MSRI
Mathematical Sciences Research Institute

17 Gauss Way Berkeley, CA 94720-5070 p: 510.642.0143 f: 510.642.8609 www.msri.org

Annual Report on the Mathematical Sciences Research Institute 2015–2016 activities supported by NSF Grant DMS-1440140 August 15th, 2015 to May 31th, 2016

July 2016

Mathematical Sciences Research Institute
Annual Report for 2015–2016

Attachment 1

Program Reports

- No. 287: New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems (PDE)
- No. 286: Differential Geometry (DG)
- No. 307: Complementary Program 2015-16

Workshop Reports (attachments 2, 3 and 4)

Attachment 2

- No. 702: Connections for Women: Differential Geometry
- No. 703: Introductory Workshop: Modern Riemannian Geometry
- No. 704: Kähler Geometry, Einstein Metrics, and Generalizations
- No. 705: Geometric Flows in Riemannian and Complex Geometry
- No. 759: Connections for Women: Dispersive and Stochastic PDE

Attachment 3

- No. 760: Introductory Workshop: Randomness and long time dynamics in nonlinear evolution differential equations
- No. 761: New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensional systems
- No. 783: Hot Topics: Cluster algebras and wall-crossing

Attachment 4

- No. 789: Modern Math Workshop 2015
- No. 796: Theory of Neural Computation
- No. 798: Math Circle - Mentorship and Partnership Program

Note: Due to size limitation, this report had to be broken into four attachments as indicated in the Table of Contents.

1. Overview of Activities

This annual report covers MSRI's projects and activities that occurred during the first 9.5 months of the NSF core grant, DMS-1440140. Following the new reporting timeline, the summer 2015 activities were reported in the previous year's annual report, 2014-15 and the summer 2016 activities will be reported in the next annual report, 2016-17.

1.1 New Developments

The year 2015–16, was an exciting year. We held two (2) one-semester programs: *New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems* during the fall semester and *Differential Geometry* during the spring semester. Both programs were very popular, and their workshops well attended. All programs had stellar researchers. Three (3) of them, Tobias Colding, Martin Hairer, and Pierre Raphaël, were funded by the Clay Mathematics Institute.

Tobias Colding is one of the leaders of geometric analysis, who has made fundamental contributions to the understanding of manifolds with bounded Ricci curvature. He is currently the Cecil and Ida Green Distinguished Professor at MIT. At the 2010 Joint Mathematics Meeting, Colding received the AMS Oswald Veblen Prize in Geometry, jointly with William Minicozzi, "for their profound work on minimal surfaces." He was appointed Senior Scholar of the Clay Mathematics Institute, 2011-2012. He has an excellent track record of mentoring younger mathematicians.

Martin Hairer was trained as both a physicist and as a mathematician at the University of Geneva and, early on established himself as a top expert on the ergodic properties of Stochastic PDEs. Currently the Regius Professor of Mathematics at University of Warwick, he is recognized as an incontestable leader in the field. He was recently awarded the prestigious Fermat prize (2013) and delivered an invited talk at the 2014 ICM.

Pierre Raphaël is an internationally respected and accomplished researcher. He has been invited to speak at the ICM 2014. Since 2011 he has been a Junior Member of the Institut Universitaire de France and his research has been continuously funded by various grants from French ANR. Raphaël is a world expert in dispersive, parabolic and kinetic nonlinear evolution equations. His work is considered to be pioneering, of brilliant originality and remarkable depth.

The lead organizers for the PDE program were Gigliola Staffilani (MIT) and Andrea Nahmod (U. of Massachussetts, Amherst), John Lott (U.C. Berkeley) and Jeff Viaclovsky (U. of Wisconsin) were the lead organizers for the differential geometry program. Other luminaries, aside from the organizers listed in the program reports, were, Amir Dembo (Stanford), Jeremy Quastel (U. of Toronto), Jalal Shatah (Courant Institute), Daniel Tataru (U.C. Berkeley), and Monica Visan (U.C. Los Angeles) whom were in residence during the fall 2015. Simon Brendle (Stanford U.), Sun-Yung Chan (Princeton), Ursula Hamenstädt (U. Bonn), Curtis McMullen (Harvard U.), and Rick Schoen (Stanford U.) were at MSRI in the spring 2016.

In all, MSRI awarded twenty-eight (28) researchers the distinguished Eisenbud and Simons Professorships.

The organizers report striking results (see the Appendix for more details). Here is a small sample of those that give a glimpse into the effervescent research activities that took place throughout the year.

During the Fall 2015 Connections for Women Workshop Dana Mandelson presented part of her thesis and in particular a certain probabilistic version of the famous Non-squeezing Theorem of Gromov. Her talk generated a lot of interest both at MSRI and in the math department of UC Berkeley. In particular, three members R. Killip, M. Visan and X. Zhang, inspired by this talk, proved a Non-squeezing Theorem for the mass critical NLS on the plane. This is an excellent example of how the Connections for Women workshop are important and why starting programs with such workshops can prove critical.

A second example came from N.Pavlovic's talk on many body quantum dynamics and nonlinear dispersive PDE, given during the Introductory Workshop; this exposé was the starting point for an ongoing collaboration between D. Mandelson, N. Pavlovic, A. Nahmod and G. Staffilani that is focused on finding a systematic way to generate conservation laws for certain Schrödinger equations as a consequence of conservation laws for the equations describing the many body quantum dynamics.

The organizers of the differential geometry program report several notable results. We have asked Prof. Curt McMullen to share some of the results he felt were particularly important. Here is his answer:

"Here are a few words about some mathematical progress made while I was at MSRI, as you requested. There are 2 advances worth describing. Both concern totally geodesic submanifolds, but in very different settings. The first is situated within my joint work with Ronen Mukamel and Alex Wright (Rice and Stanford) on totally geodesic subvarieties of moduli space. In Fall 2015 we discovered the first example of a primitive, totally geodesic algebraic surface in M_{g,n}. The corresponding 1–dimensional objects, called Teichmüller curves, are already rare gems; this is the first example of a 'Teichmüller surface'. A complete exposition of this example was completed this Spring and appears on my web page. I also spoke on this topic at Stanford, MSRI and UC Berkeley. Another big surprise took place just a couple months ago: we found two more examples of Teichmüller surfaces. At the moment all are related to elliptic curves, i.e. they reside in M_{g,n} for g = 1. The second advance is part of my joint work with Hee Oh and Amir Mohammadi on unipotent rigidity (Ratner phenomena) in the setting of open hyperbolic 3–manifolds. The original topological results of Shah and Ratner show that an immersed, totally geodesic plane in a finite volume hyperbolic 3-manifold M is either closed or dense; in the closed case, the plane covers a closed, totally geodesic surface $S \subset M$. Recently we established similar results for certain infinite volume M. The manifolds we could handle were very special, however; it was required, for example, that they already contain some closed surfaces S as above. It was not even clear what to expect in general. This Spring, we found a new approach to this result that uses only topological information about M. This new argument is very robust, and gives the first sign that an essentially complete understanding of the behavior of geodesic planes in 3-manifolds may be possible. Perhaps surprisingly, the analysis combines methods of Margulis with those of Thurston."

This year, the MSRI's annual ***Hot Topics workshop*** was on*: Cluster algebras and wall-crossing*. Cluster algebras were introduced in 2001 by Fomin and Zelevinsky to capture the combinatorics of canonical bases and total positivity in semisimple Lie groups. Since then they have revealed a rich combinatorial and group-theoretic structure, and have had significant impact beyond these initial subjects, including string theory, algebraic geometry, and mirror symmetry. Recently Gross, Hacking, Keel and Kontsevich released a preprint introducing mirror symmetry techniques into the subject which resolved several long-standing conjectures, including the construction of canonical bases for cluster algebras and positivity of the Laurent phenomenon. This preprint reformulates the basic construction of cluster algebras in terms of scattering diagrams (or wall-crossing structures). This leads to the proofs of the conjectures and to new constructions of elements of cluster algebras. But fundamentally they provide a new tool for thinking about cluster algebras. The workshop brought together many of the different users of cluster algebras to achieve a synthesis of these new techniques with many of the different aspects of the subject. There was a lecture series on the new techniques, and other lecture series on connections with Lie theory, quiver representation theory, mirror symmetry, string theory, and stability conditions.

The talks of all of our workshops were recorded and can be seen on our website at http://www.msri.org/web/msri/online-videos.

Funding. In 2015–16, the support for program members (long-term visitors including postdoctoral fellows) totaled $2.3 million of which 58% came from the NSF, 9% from NSA, and 33% from private funds. The support for workshop participants (short term visitors, excluding summer graduate schools) totaled $400,000 of which 87% came from the NSF, and 13% from private funds. These numbers demonstrate MSRI's ability to leverage the support that the NSF provides and thereby amplify its benefits; we feel that this is possible because the core NSF support provides such a strong foundation for, and endorsement of, MSRI's scientific quality.

Postdoctoral Program. Thirty-one (31) Postdoctoral Fellows participated in our two scientific programs and one (1) in the complementary program, of which twenty-seven (27) were funded by the NSF Core Grant. Yueh-Ju Lin was the Cha-Chern postdoctoral Fellow; Georg Menz was the Berlekamp Fellow, Bobby Wilson was the Gamelin Fellow, Andrea Mondino was the Huneke Fellow; Heather Macbeth was the Strauch Fellow; and Chengjian Yao and Dana Mendleson were the Viterbi Fellows. As in the past years, there was a consensus among them that the wealth of connections they were able to establish with the top researchers in their field and with fellow postdocs was extremely beneficial, as was the possibility of learning directly from the leaders of their fields. These connections are already playing an important role in their professional development. For details, please see Section 3 and the Appendix.

Collaborative Diversity Initiative. The *Diversity Initiative* consists of a series of workshops for members of groups that have been historically underrepresented in the mathematical sciences. These workshops are sponsored by a collaborative grant involving the eight NSF-funded US mathematical sciences institutes (AIM, ICERM, IMA, IPAM, MBI, MSRI, NIMBioS, and SAMSI). MSRI is the institute administering the grant. During the 2015–16 year, two events were supported by the Initiative: *Modern Math Workshop*, http://www.msri.org/workshops/789, held in Fall 2015 at the Gaylor National Resort in the Washington DC metropolitan area. It was organized by MSRI and attracted 150 participants. A complete report can be found in the Appendix. The second workshop was *Spring Opportunities*, http://tinyurl.com/samsi-so-2016**,**

held in April 2016 at the Research Triangle Park, North Carolina, and organized by the SAMSI. The report for this workshop is part of SAMSI's annual report as agreed upon with the NSF.

Critical Issues in Mathematics Education. The Critical Issues in Mathematics Education (CIME) series of workshops addresses key problems in education today. They are designed to engage professional mathematicians in discussions with education researchers, teachers, and policy makers to improve mathematics education. This year's topic was on *Observing, Evaluating and Improving Mathematics Teaching from the Early Grades through the University.* There were about 110 attendees, all very engaged in the discussions. It was funded through grants from Math for America and from the NSF Division of Education and thus reported to them directly.

Public Understanding of Mathematics.

Mathical: Books for Kids from Tots to Teens. MSRI, in conjunction with The Children's Book Council and with support from the Simons Foundation, continued the Mathical Book Prize, which cultivates a love of mathematics in the everyday world. Each year's winners and honor books join a selective and ever-growing list of new and previously published fiction and non-fiction titles for kids of all ages. These titles are as varied as the intersection between literature and mathematics — that is to say, they encompass picture books, novels, poetry collections, puzzle books, biographies, and more. The prize seeks to expand the public understanding and enjoyment of mathematics through highlighting titles that will inspire young people of all ages to see the world in new ways.

Numberphile. Since January 2014, MSRI has supported Brady Haran's "Numberphile" channel on YouTube. MSRI has contributed both support and connections to some of the world's great mathematicians — we recommend the charming piece by Barry Mazur on right triangles, and the deep interview with John Conway — and with young mathematicians such as Holly Krieger, a postdoc in arithmetic dynamics at MIT who was at MSRI for a semester last year. We were amazed by the result on primes and iterated functions that she explains in her video. These and other treats can be found at http://www.numberphile.com/.

Not on The Test, MSRI and Berkeley City College (BCC) continued their partnership with the lecture series, "Not on the Test: The Pleasures and Uses of Mathematics." Held in BCC's auditorium in downtown Berkeley, the series of four free, public talks was made possible through generous funding from the Simons Foundation. Topics included *Internet Voting: Wishful Thinking; To Infinity and Beyond: The Math and Science Behind Pixar Films; Black Girls Code;* and *Knots and DNA.*

Chicago Mercantile Exchange Prize. The 10th annual CME Group-MSRI Prize in Innovative Quantitative Applications was awarded to Douglas W. Diamond, on February 1 in Chicago. Dr. Diamond's research has focused on the study of financial intermediaries, financial crises, and liquidity. In addition to his tenure at the University of Chicago, he is the 2015-2016 Fischer Black Visiting Professor of Financial Economics at the Massachusetts Institute of Technology's (MIT) Sloan School of Management, a research associate of the National Bureau of Economic Research, and a visiting scholar at the Federal Reserve Bank of Richmond. Diamond served as president of the American Finance Association and the Western Finance Association and is a fellow of the Econometric Society, the American Academy of Arts and Sciences, and the

American Finance Association. He received the Morgan Stanley-American Finance Association Award for Excellence in Finance in 2012.The annual CME Group-MSRI Prize recognizes originality and innovation in the use of mathematical, statistical or computational methods for the study of the behavior of markets, and more broadly of economics. Read more about the prize at http://www.msri.org/general_events/21804.

1.2 Summary of Demographic Data for 2015–16 Activities

During the academic year 2015–16, MSRI hosted 242 program members, of which 32 were Postdoctoral Fellows and 1243 workshop participants.

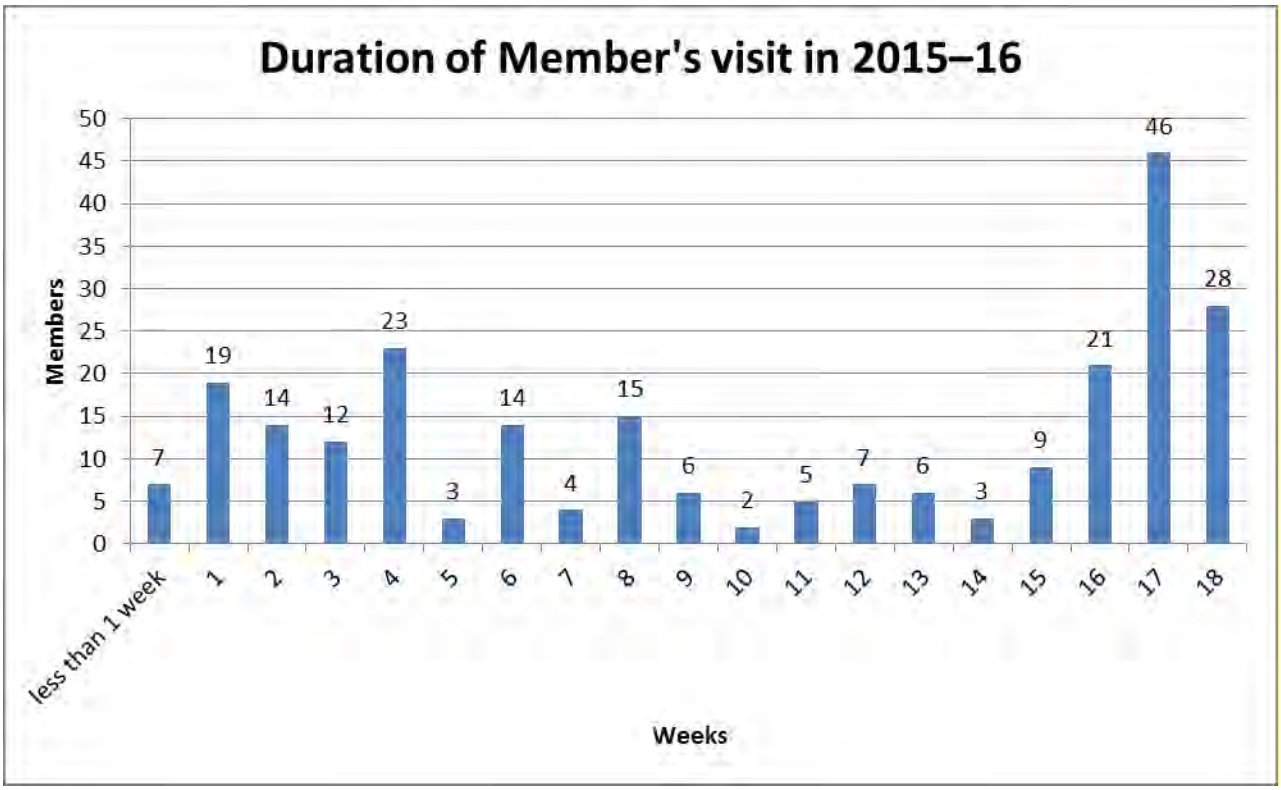
The Postdoctoral program was particularly successful and is described in detail in Section 3. Of the Fellows, 28% were female, 34% were U.S. Citizens or Permanent Residents, and 63% listed a U.S. university as home institution. Of those institutions, 30% are located in the Northeast, 20% in the West, 35% in the Midwest, and the remaining 15% in the South.

MSRI had a total of 242 long-term members. Members spent an average of 76 days at MSRI, with peak attendance in October for the fall semester and March for the spring semester. Of the members, 23% were female, 43% reported being U.S. Citizens or Permanent Residents and 58% listed a U.S. university as their home institution. Of those institutions, 16% are located in the Midwest, 30% in the West, 37% in the Northeast, and 17% in the South. Of the members, 72% had received a Ph.D degree on or after 2000, 24% received one between 1981 and 1999, and the remaining 4% had received a Ph.D. on or prior to 1980. Detailed demographic data can be found in Section 2.

In the 2015–16 workshops, MSRI hosted 1243 separate visits (some visitors attended multiple events). Of the workshop participants, 32% were female, 58% were U.S. Citizens or Permanent Residents, of which 18% reported being a member of an under-represented minority. In addition, 75% of the 1243 participants came from a U.S. institution. Demographic data on workshop participants can be found in Sections 2 and 4.

Member Visits Summary

All program members	Fall 2015	Spring 2016	2015–16	2004–16
Total Member Days	9140	9339	18479	210194
Total # of Members (non-distinct)	117	127	244	2923
Average # of Days per Member	78.12	73.54	75.73	71.91
Average # of Months per Member	2.6	2.5	2.5	2.4
All female program members	**Fall 2015**	**Spring 2016**	**2015–16**	**2009–16**
Total Member Days	2518	2220	4738	30342
Total # of Members (non-distinct)	28	28	56	418
Average # of Days per Member	89.93	79.29	84.61	72.59
Average # of Months per Member	3.0	2.6	2.8	2.4


Duration of Member's visit in 2015–16
Members
Weeks
50
45
40
35
30
25
20
15
10
5
0
7
19
14
12
23
3
14
4
15
6
2
5
7
6
3
9
21
46
28
less than 1 week
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18


Member visits by Month in 2015-16
# of Visits
Month
120
100
80
60
40
20
0
Aug '15
Sept '15
Oct '15
Nov '15
Dec '15
Jan '16
Feb '16
Mar '16
Apr '16
May '16

1.3 Scientific Programs and their Associated Workshops

There were two major and one complementary programs that took place at MSRI during the 2015–16 year, as well as 11 workshops.

Note: Full descriptions of each activity can be found the the Appendix, Section 11 of this Annual Report. In the lists of organizers of each activity below, an asterisk (*) denotes lead organizer(s).

Program 1: New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems
August 17, 2015 to December 18, 2015
*Organizers: Kay Kirkpatrick (University of Illinois at Urbana-Champaign), Yvan Martel (École Polytechnique), Jonathan Mattingly (Duke University), Andrea Nahmod (University of Massachusetts, Amherst), Pierre Raphael (Université Nice Sophia-Antipolis), Luc Rey-Bellet (University of Massachusetts, Amherst), *Gigliola Staffilani (Massachusetts Institute of Technology), Daniel Tataru (University of California, Berkeley)*

Workshop 1: Connections for Women: Dispersive and Stochastic PDE
August 19, 2015 - August 21, 2015
**Kay Kirkpatrick (University of Illinois at Urbana-Champaign), Andrea Nahmod (University of Massachusetts, Amherst)*

Workshop 2: Introductory Workshop: Randomness and long time dynamics in nonlinear evolution differential equations
August 24, 2015 - August 28, 2015
*Kay Kirkpatrick (University of Illinois at Urbana-Champaign), *Yvan Martel (École Polytechnique), *Luc Rey-Bellet (University of Massachusetts, Amherst), Gigliola Staffilani (Massachusetts Institute of Technology)*

Workshop 3: New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensional systems
October 19, 2015 - October 30, 2015
*Organizers: Jonathan Mattingly (Duke University), *Andrea Nahmod (University of Massachusetts, Amherst), Pierre Raphael (Université Nice Sophia-Antipolis), Luc Rey-Bellet (University of Massachusetts, Amherst), Daniel Tataru (University of California, Berkeley)*

Program 2: Differential Geometry
January 11, 2016 to May 20, 2016
*Organizers: Tobias Colding (Massachusetts Institute of Technology), Simon Donaldson (Imperial College, London), John Lott (University of California, Berkeley), Natasa Sesum (Rutgers University), Gang Tian (Princeton University), *Jeff Viaclovsky (University of Wisconsin-Madison)*

Workshop 1: Connections for Women: Differential Geometry
January 14, 2016 - January 15, 2016
*Christine Breiner (Fordham University), *Natasa Sesum (Rutgers University)*

Workshop 2: Introductory Workshop: Modern Riemannian Geometry
January 18, 2016 - January 22, 2016
**Tobias Colding (Massachusetts Institute of Technology), John Lott (University of California, Berkeley), Jeff Viaclovsky (University of Wisconsin-Madison)*

Workshop 3: Kähler Geometry, Einstein Metrics, and Generalizations
March 21, 2016 - March 25, 2016
*Olivier Biquard (École Normale Supérieure), Simon Donaldson (Imperial College, London), Gang Tian (Princeton University), *Jeff Viaclovsky (University of Wisconsin-Madison)*

Workshop 4: Geometric Flows in Riemannian and Complex Geometry
May 02, 2016 - May 06, 2016
*Tobias Colding (Massachusetts Institute of Technology), *John Lott (University of California, Berkeley), Natasa Sesum (Rutgers University)*

Program 3: Complementary Program (2015–16)
August 17, 2015 to May 20, 2016

MSRI had a small Complementary Program comprised of one postdoc Alexander Pavlov (University of Toronto) and ten researchers, Pierre Albin (University of Illinois at Urbana-Champaign), Dorothy Buck (Imperial College, London), Marco Fontelos (Instituto de Ciencias Matemáticas), Curtis Greene (Haverford College), Tomasz Mrowka (Massachusetts Institute of Technology), Francesca Prinari (Università di Ferrara), Marjolaine Puel (Université Nice Sophia-Antipolis), Frank-Olaf Schreyer (Universität des Saarlandes), Vasudevan Srinivas (Tata Institute of Fundamental Research) and Stephen Tennenbaum (George Washington University).

1.4 Scientific Activities Directed at Underrepresented Groups in Mathematics

Connections for Women Workshops
During the 2015–16 academic year, MSRI hosted two Connections for Women workhops, one for each scientific program. The goal of these workshops was to facilitate networks among women and members of underrepresented minorities. For more information regarding each workshop, please refer to Section 1.3 above.

Modern Math Workshop 2015
NSF supplemental grant DMS-1463511
October 28, 2015 to October 29, 2015
Organized by Hélène Barcelo (MSRI - Mathematical Sciences Research Institute), Helen Chamberlin (Ohio State University), Ricardo Cortez (Tulane University), Sujit Ghosh (NC State University), Dagan Karp (Harvey Mudd College), Anne Pfister (MSRI - Mathematical Sciences Research Institute), Christian Ratsch (University of California, Los Angeles), Ivelisse M. Rubio (University of Puerto Rico), Mariel Vazquez (University of California, Davis), and Talithia Williams (Harvey Mudd College)

Spring Opportunities
NSF supplemental grant DMS 1126721
Location: University of Minnesota, Twin Cities
March 26, 2015 to March 28, 2015
Organized by IMA and Chehrzad Shakiban (University of Minnesota, Twin Cities), Pamela Williams (LMI Government Consulting), Ulrica Wilson (Morehouse College), and Victor Zavala (Argonne National Laboratory)

Please note: The report of this activity is included in IMA's annual report, thus there is no report attached in Section 11-Appendix.

Infinite Possibilities
NSF supplemental grant DMS 1126721
Location: Oregon State University
March 2, 2015 to March 3, 2015
Organized by MBI

Please note: The report of this activity is included in MBI's annual report, thus there is no report attached in Section 11-Appendix.

1.5 Summer Graduate Schools

Following the new reporting timeline (August 15th, 2015 to May 31st, 2016), the summer 2015 activities were reported in the previous year's annual report, 2014-15 and the summer 2016 activities will be reported in the next annual report, 2016-17.

1.6 Other Scientific Workshops

Theory of Neural Computation
October 05, 2015 to October 07, 2015
*Organized by Dmitri Chklovskii (Simons Foundation), David Eisenbud (MSRI - Mathematical Sciences Research Institute), Gary Marcus (New York University), *Bruno Olshausen (University of California, Berkeley), Christos Papadimitriou (University of California, Berkeley), Terrence Sejnowski (Salk Institute for Biological Studies), Fritz Sommer (University of California, Berkeley)*

Bay Area Differential Geometry Seminar (BADGS) Winter 2015
December 05, 2015
*Organized by David Bao (San Francisco State University), Joel Hass (University of California, Davis), *David Hoffman (Stanford University), Rafe Mazzeo (Stanford University), Richard Montgomery (University of California, Santa Cruz)*

Hot Topics: Cluster algebras and wall-crossing
March 28, 2016 to April 01, 2016
*Organized by *Mark Gross (University of Cambridge), Paul Hacking (University of Massachusetts, Amherst), Sean Keel (University of Texas), and Lauren Williams (University of California, Berkeley)*

Bay Area Differential Geometry Seminar (BADGS) Spring 2016
April 30, 2016
*Organized by David Bao (San Francisco State University), Joel Hass (University of California, Davis), *David Hoffman (Stanford University), Rafe Mazzeo (Stanford University), Richard Montgomery (University of California, Santa Cruz)*

1.7 Education & Outreach Activities

Math Circle - Mentorship and Partnership Program
Location: University of Colorado, Denver
September 10, 2015 to September 12, 2015
*Organized by *Diana White (University of Colorado, Denver), Brandy Wiegers (Central Washington University)*

Critical Issues in Mathematics Education 2016: Observing, Evaluating and Improving Mathematics Teaching from the Early Grades through the University
NSF Independent Grant DMS-1461358
February 10, 2016 to February 12, 2016
*Organized by Hyman Bass (University of Michigan), Michael Driskill (Math for America), *Mark Hoover (University of Michigan), *Deborah Hughes Hallett (University of Arizona), Danny Martin (University of Illinois at Chicago), and Miriam Sherin (Northwestern University)*

Please note: This activity reported independently, thus there is no report attached in Section 11-Appendix.

1.8 Program Consultants List in 2015–16

Consultant Name(s)	Consultant Disciplinary Specialty	Consultant Employer	Activity Title
Larry Abbott	Math Biology	Columbia University	Neurscience meeting
Dave Auckly	Algebraic Geometry	Kansas State University	Navajo Math Circles
Francis Brown	Arithmetic geometry	University of Oxford	Speaker at SAC meeting
Ingrid Daubechies	Applied Math	Duke University	Neuroscience meeting and SGS
John Ewing	Math, Education	Math for America	Critical Issues in Math Education workshop
Sanford Grossman	Econ, Neuroscience	self	Neuroscience meeting
Steven Kaliszewski	Operator algebra	Arizona State University	Summer Graduate Schools
Robert Klein	Mathematics education	Ohio University	Navajo Math Circles
William Macallum	Education	University of Arizona	Educational workshops
Angus Macintyre	Logic	Queen Mary, University of London	Decidability, definability and computability in number theory
Rafe Mazzeo	Differential geometry	Stanford University	Differential geometry seminar
Robert Megginson	Fuctional analysis	University of Michigan	Critical Issues in Math Education
Andrea Montanari	High-dimensional statistics	Stanford University	Speaker at SAC meeting
Hugo Rossi	Complex analysis	University of Utah	Navajo Math Circles
Mark Saul	Education	Education Development Center	Great Circles
Myron Scholes	Economics	Stanford University	MSRI-CME Group Prize
Tatiana Shubin	Number theory	San Jose State University	Bay Area Circle for Teachers
Hugo Sonnenschein	Economics	University of Chicago	MSRI-CME Group Prize
Sam Vandervelde	Number theory	St. Lawrence University	Math Circles
Diana White	Commutative algebra	University of Colorado, Denver	National Association of Math Circles
Brandy Wiegers	Numerical analysis	Central Washington University	National Association of Math Circles
Hugh Woodin	Logic	Havard University	Decidability, definability and computability in number theory
Educational Advisory Committee (EAC)	See Section 10: Committee Membership		Using Partnerships to Strengthen Elementary Mathematics Teacher Education
Human Resources Advisory Committee (HRAC)	See Section 10: Committee Membership		MSRI - UP
Scientific Advisory Committee (SAC) & Board of Trustees (BOT)	See Section 10: Committee Membership		Geometric Group Theory Analytic Number Theory Harmonic Analysis Complementary Program Summer Graduate Schools

2. Program and Workshop Data

2.1 Program Member List

(See e-mail attachment)

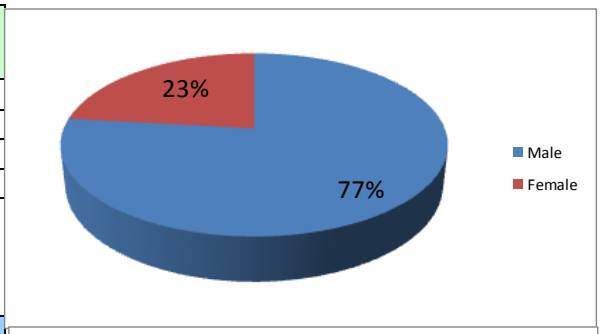
2.2 Program Member Summary

Programs	# of Members	# of Citizens & Perm. Res.	%	# of Female	%	# of Minorities[1]	%	US Home Institution	%
Differential Geometry	122	54	*44.3%*	27	*22.1%*	4	*9.1%*	66	54.1%
New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems	109	45	*41.3%*	26	*23.9%*	2	*5.9%*	70	64.2%
Complementary Program	11	5	*45.5%*	3	*27.3%*	1	*20.0%*	4	36.4%
Total # of Distinct Members	**242**	**104**	***43.0%***	**56**	***23.1%***	**7**	***8.4%***	**140**	***57.9%***

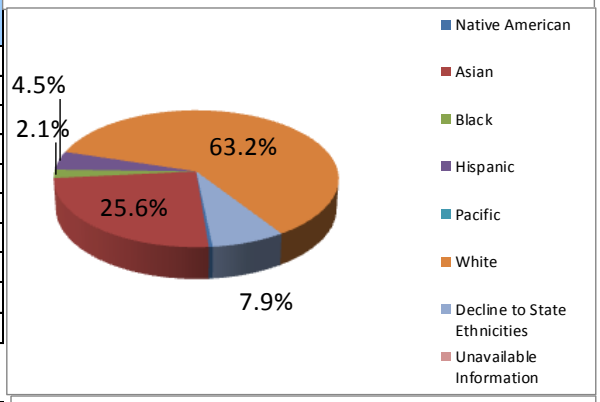
[1] *Minorities are US citizens who declare themselves American Indian, Black, Hispanic, or Pacific Islander. Minority percentage is calculated by dividing the number of Minorities by the total number of US citizens.*

2.3 Program Member Demographic Data

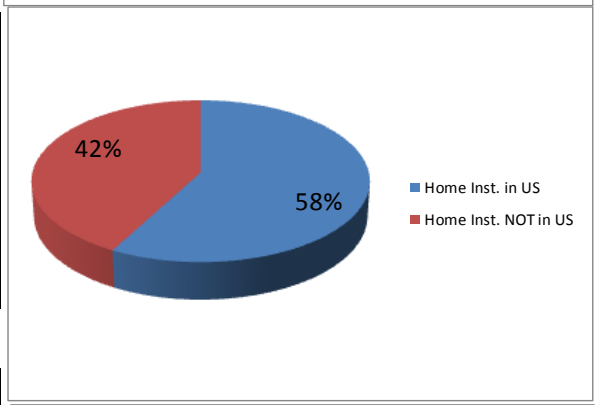
Gender	#	% (No Decl.)*	%
# of Distinct Members	242		100.0%
Male	185	76.76%	76.4%
Female	56	23.24%	23.1%
Decline to State Gender	1		0.4%



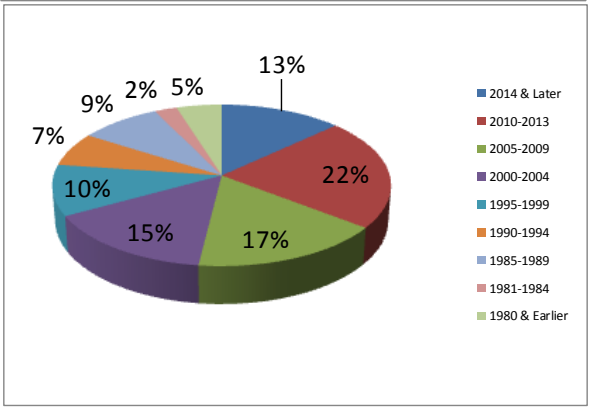
Ethnicities	#	% (No Decl.)*	%
Native American	1	0.43%	0.4%
Asian	62	26.72%	25.6%
Black	5	2.16%	2.1%
Hispanic	11	4.74%	4.5%
Pacific	0	0.00%	0.0%
White	153	65.95%	63.2%
Decline to State Ethnicities	19		7.9%
Unavailable Information	0		0.0%
Minorities	7		8.4%



Citizenships	#		%
US Citizen & Perm. Residents	104		43.0%
Foreign	138		57.0%
Unavailable information	0		0.0%
# of Distinct Members	242		100.0%
US Citizen	83		34.3%
Perm Residents	21		8.7%
Home Inst. in US	140		57.85%



Year of Ph.D	#		%
Program Associates (GS)	36		14.9%
2014 & Later	27		11.2%
2010-2013	46		19.0%
2005-2009	34		14.0%
2000-2004	31		12.8%
1995-1999	21		8.7%
1990-1994	14		5.8%
1985-1989	18		7.4%
1981-1984	5		2.1%
1980 & Earlier	10		4.1%
Unavailable Info.	0		0.0%
Total # of Distinct Members	242		100.0%



**Statistic Calculation based on all participants that did not decline.*

Programs

Differential Geometry

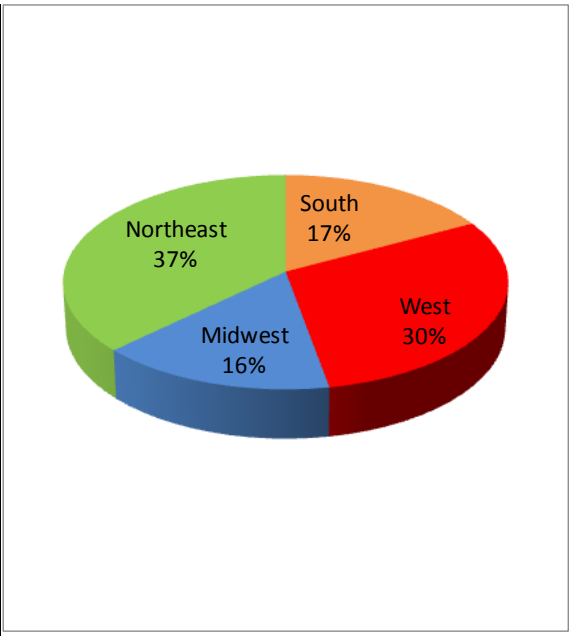
New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems

Complementary Program

2015–16 Program Members Home Institution Classified by States

**Regions based on US Census classification*

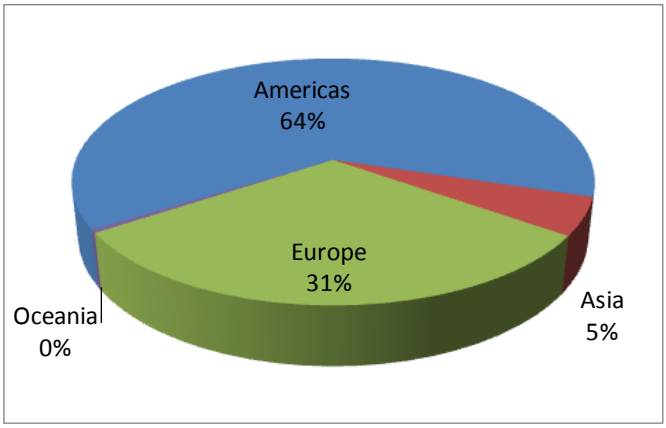
State	#	%	2007 Census Population
South	**24**	**17.1%**	**36.6%**
AL	-	0.0%	1.5%
AR	-	0.0%	0.9%
DE	-	0.0%	0.3%
DC	4	2.9%	0.2%
FL	1	0.7%	6.1%
GA	2	1.4%	3.2%
KY	-	0.0%	1.4%
LA	-	0.0%	1.4%
MD	8	5.7%	1.9%
MS	-	0.0%	1.0%
NC	2	1.4%	3.0%
OK	2	1.4%	1.2%
SC	-	0.0%	1.5%
TN	-	0.0%	2.0%
TX	3	2.1%	7.9%
VA	2	1.4%	2.6%
WV	-	0.0%	0.6%
West	**42**	**30.0%**	**23.2%**
AK	-	0.0%	0.2%
AZ	2	1.4%	2.1%
HI	-	0.0%	0.4%
ID	1	0.7%	0.5%
MT	-	0.0%	0.3%
CA	31	22.1%	12.1%
CO	-	0.0%	1.6%
NV	-	0.0%	0.9%
NM	1	0.7%	0.7%
OR	2	1.4%	1.2%
UT	3	2.1%	0.9%
WA	2	1.4%	2.1%
WY	-	0.0%	0.2%
Midwest	**22**	**15.7%**	**22.0%**
IL	8	5.7%	4.3%
IN	-	0.0%	2.1%
IA	1	0.7%	1.0%
KS	1	0.7%	0.9%
MI	4	2.9%	3.3%
MN	-	0.0%	1.7%
MO	-	0.0%	1.9%
ND	-	0.0%	0.2%
NE	-	0.0%	0.6%
OH	1	0.7%	3.8%
SD	-	0.0%	0.3%
WI	7	5.0%	1.9%
Northeast	**52**	**37.1%**	**18.1%**
CT	1	0.7%	1.2%
ME	-	0.0%	0.4%
MA	15	10.7%	2.1%
NH	4	2.9%	0.4%
NJ	11	7.9%	2.9%
NY	17	12.1%	6.4%
PA	1	0.7%	4.1%
RI	3	2.1%	0.4%
VT	-	0.0%	0.2%
Other	**-**	**0.0%**	**0%**
PR	-	0.0%	0%
Other	-	0.0%	0%
Total	**140**	**100%**	**100%**



2015–16 Program Members Home Institution Classified by Countries

**Regions based on United Nations classification*

Americas			**154**
	North America	Canada	10
		United States	140
	South America	Argentina	2
		Chile	1
	Central America	Mexico	1
Asia			**12**
	East Asia	China	4
		Japan	4
		Kopea, Republic of	1
	South-central Asia	India	1
	Western Asia	Israel	2
Europe			**75**
	Northern Europe	England	17
		Sweden	2
	Southern Europe	Spain	5
		Italy	7
		Portugal	1
	Western Europe	France	19
		Germany	18
		Switzerland	4
		Belgium	2
Oceania			**1**
	Australia and New	Australia	
Grand Total			**242**



2.4 Workshop Participant List

(See e-mail attached file)

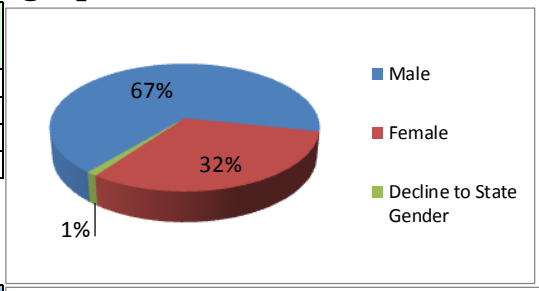
2.5 Workshop Participant Summary

Workshops	# of Participants	# of Citizens & Perm. Res.	%	# of Female	%	# of Minorities[1]	%	US Home Institution	%
9 Scientific Workshops									
Connections for Women: Differential Geometry	49	28	*57.1%*	29	*59.2%*	2	*8.3%*	35	71.4%
Connections for Women: Dispersive and Stochastic PDE	62	25	*40.3%*	27	*43.5%*	3	*14.3%*	47	75.8%
Geometric Flows in Riemannian and Complex Geometry	135	59	*43.7%*	23	*17.0%*	1	*2.0%*	80	59.3%
Introductory Workshop: Modern Riemannian Geometry	128	68	*53.1%*	34	*26.6%*	2	*3.4%*	93	72.7%
Introductory Workshop: Randomness and long time dynamics in nonlinear evolution differential	111	50	*45.0%*	30	*27.0%*	4	*9.8%*	83	74.8%
Kähler Geometry, Einstein Metrics, and Generalizations	134	55	*41.0%*	24	*17.9%*	3	*6.3%*	70	52.2%
New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensio	153	63	*41.2%*	35	*22.9%*	2	*4.2%*	98	64.1%
Theory of Neural Computation	127	92	*72.4%*	30	*23.6%*	4	*4.9%*	117	92.1%
Hot Topics: Cluster algebras and wall-crossing	73	37	*50.7%*	11	*15.1%*	1	*3.1%*	47	64.4%
All 9 Workshops Total	**972**	**477**	***49.1%***	**243**	***25.0%***	**22**	***5.4%***	**670**	***68.9%***
3 Education & Outreach Workshops									
Critical Issues in Mathematics Education 2016: Observing, Evaluating and Improving Mathematics Teaching from the Early Grades through the University	112	98	*87.5%*	65	*58.0%*	18	*18.8%*	107	95.5%
Math Circle - Mentorship and Partnership Program	39	38	*97.4%*	29	*74.4%*	3	*8.1%*	38	97.4%
Modern Math Workshop 2015	120	111	*92.5%*	57	*47.5%*	75	*72.1%*	117	97.5%
All 3 Workshops Total	**271**	**247**	***91.1%***	**151**	***55.7%***	**96**	***68.1%***	**262**	***96.7%***
All 12 Workshops Total	**1,243**	**724**	***58.2%***	**394**	***31.7%***	**118**	***21.7%***	**932**	***75.0%***

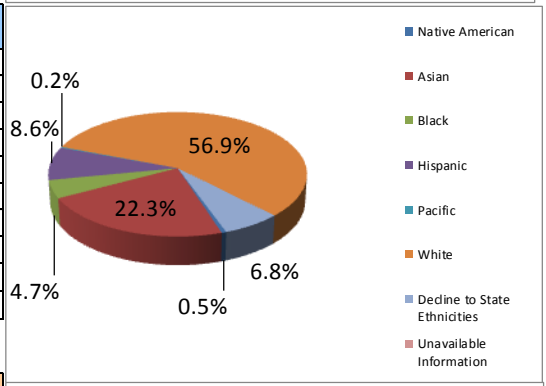
[1] *Minorities are US citizens who declare themselves American Indian, Black, Hispanic, or Pacific Islander. Minority percentage is calculated by dividing the number of Minorities by the total number of US citizens.*

2.6 Workshop Participant Demographic Data

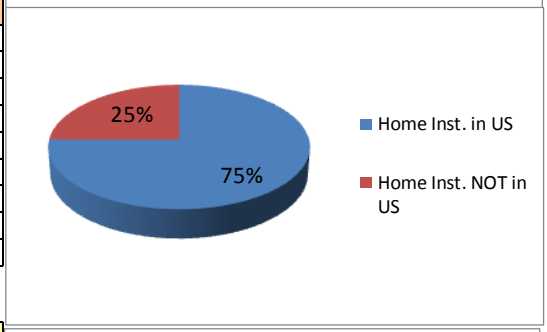
Gender	#	% (No Decl.)*	%
# of Participants	1243		100.0%
Male	835	67.94%	67.2%
Female	394	32.06%	31.7%
Decline to State Gender	14		1.1%



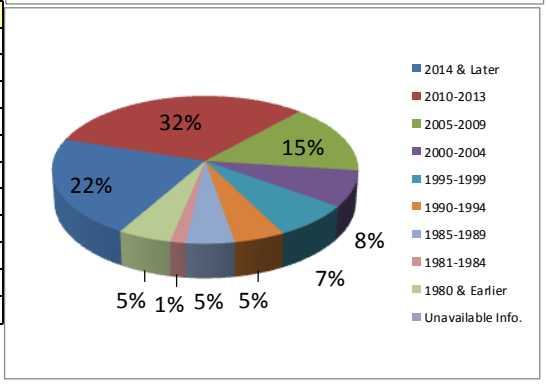
Ethnicities	#	% (No Decl.)*	%
Native American	7	0.58%	0.5%
Asian	290	23.89%	22.3%
Black	61	5.02%	4.7%
Hispanic	112	9.23%	8.6%
Pacific	3	0.25%	0.2%
White	741	61.04%	56.9%
Decline to State Ethnicities	88		6.8%
Unavailable Information	0		0.0%
Minorities	118		18.4%



Citizenships	#		%
US Citizen & Perm. Residents	724		58.2%
Foreign	513		41.3%
Unavailable information	6		0.5%
# of Particpants	1243		100.0%
US Citizen	641		51.6%
Perm Residents	83		6.7%
Home Inst. in US	932		74.98%



Year of Highest Degree	#		%
2014 & Later	268		21.6%
2010-2013	396		31.9%
2005-2009	190		15.3%
2000-2004	98		7.9%
1995-1999	93		7.5%
1990-1994	60		4.8%
1985-1989	57		4.6%
1981-1984	18		1.4%
1980 & Earlier	63		5.1%
Unavailable Info.	0		0.0%
Total # Participants	1243		100.0%



**Statistic Calculation based on all participants that did not decline.*

2015–16 Workshops

Connections for Women: Differential Geometry

Connections for Women: Dispersive and Stochastic PDE

Critical Issues in Mathematics Education 2016: Observing, Evaluating and Improving Mathematics Teaching from the Early Grades through the Uni.

Geometric Flows in Riemannian and Complex Geometry

Hot Topics: Cluster algebras and wall-crossing

Introductory Workshop: Modern Riemannian Geometry

Introductory Workshop: Randomness and long time dynamics in nonlinear evolution differential equations

Kähler Geometry, Einstein Metrics, and Generalizations

Math Circle - Mentorship and Partnership Program

Modern Math Workshop 2015

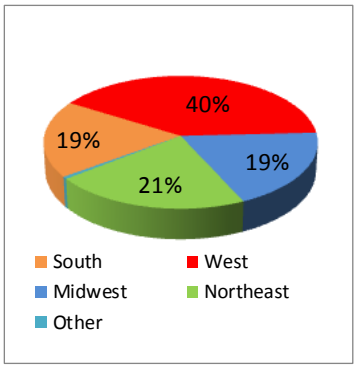
New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensional systems

Theory of Neural Computation

2015–16 Workshop Participants Home Institution Classified by States

**Regions based on US Census classification*

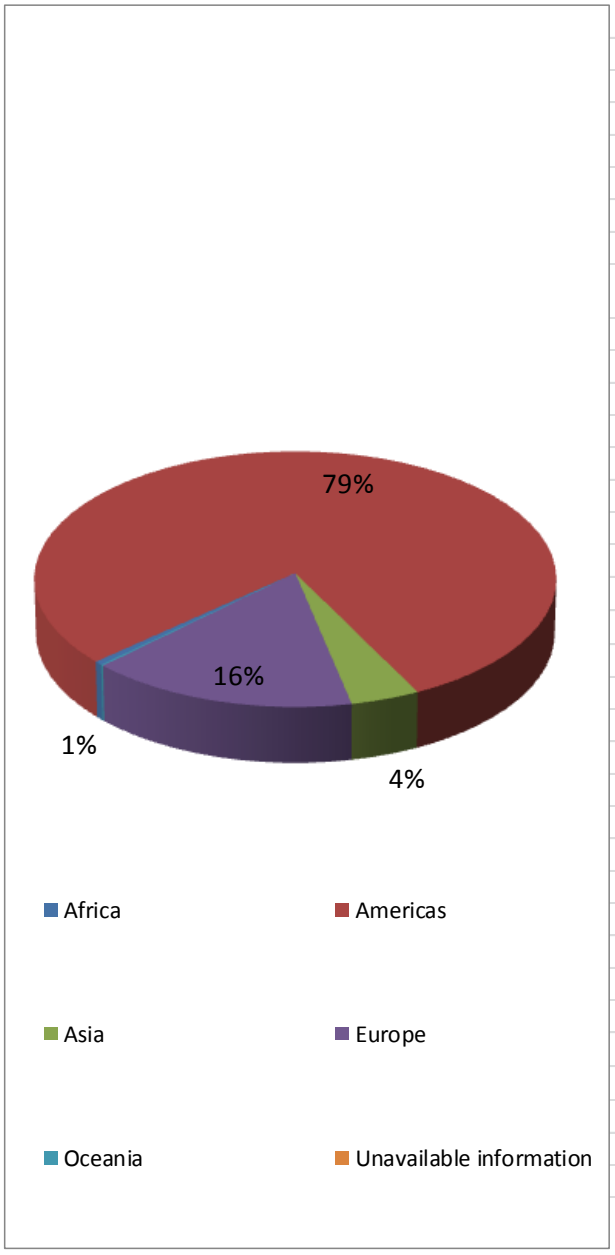
State	#	%	2007 Census Population
South	**175**	**18.8%**	**36.6%**
AL	1	0.1%	1.5%
AR	-	0.0%	0.9%
DE	3	0.3%	0.3%
DC	18	1.9%	0.2%
FL	9	1.0%	6.1%
GA	17	1.8%	3.2%
KY	2	0.2%	1.4%
LA	6	0.6%	1.4%
MD	38	4.1%	1.9%
MS	-	0.0%	1.0%
NC	15	1.6%	3.0%
OK	14	1.5%	1.2%
SC	-	0.0%	1.5%
TN	5	0.5%	2.0%
TX	31	3.3%	7.9%
VA	15	1.6%	2.6%
WV	1	0.1%	0.6%
West	**377**	**40.5%**	**23.2%**
AK	-	0.0%	0.2%
AZ	9	1.0%	2.1%
HI	2	0.2%	0.4%
ID	3	0.3%	0.5%
MT	1	0.1%	0.3%
CA	305	32.7%	12.1%
CO	9	1.0%	1.6%
NV	1	0.1%	0.9%
NM	8	0.9%	0.7%
OR	12	1.3%	1.2%
UT	9	1.0%	0.9%
WA	18	1.9%	2.1%
WY	-	0.0%	0.2%
Midwest	**176**	**18.9%**	**22.0%**
IL	46	4.9%	4.3%
IN	19	2.0%	2.1%
IA	6	0.6%	1.0%
KS	15	1.6%	0.9%
MI	37	4.0%	3.3%
MN	10	1.1%	1.7%
MO	1	0.1%	1.9%
ND	-	0.0%	0.2%
NE	3	0.3%	0.6%
OH	10	1.1%	3.8%
SD	-	0.0%	0.3%
WI	29	3.1%	1.9%
Northeast	**199**	**21.4%**	**18.1%**
CT	9	1.0%	1.2%
ME	1	0.1%	0.4%
MA	55	5.9%	2.1%
NH	8	0.9%	0.4%
NJ	29	3.1%	2.9%
NY	69	7.4%	6.4%
PA	24	2.6%	4.1%
RI	4	0.4%	0.4%
VT	-	0.0%	0.2%
Other	**5**	**0.0%**	**0%**
PR	5	0.0%	0%
Unavailable	-	0.0%	0%
Total	**932**	**99%**	**100%**



2015–16 Workshop Participants Home Institution Classified by Countries

**Regions based on United Nations classification*

Africa			**6**
	Eastern Africa	Ethiopia	1
	Northern Africa	Algeria	2
	Southern Africa	South Africa	2
	Western Africa	Nigeria	1
Americas			**986**
	Central America	Mexico	9
	North America	Canada	27
		United States	932
	South America	Argentina	5
		Brazil	6
		Chile	6
		Colombia	1
Asia			**51**
	East Asia	China	15
		Japan	11
		Korea, Republic	6
		Taiwan	5
	South-central Asia	India	2
		Iran	1
		Pakistan	1
	South-eastern Asia	Singapore	1
	Western Asia	Cyprus	1
		Israel	5
		Lebanon	1
		Turkey	2
Europe			**198**
	Eastern Europe	Czech Republic	1
		Hungary	1
		Poland	1
		Russian Federa	1
	Northern Europe	Denmark	1
		England	56
		Finland	2
		Ireland	1
		Norway	3
		Sweden	2
	Southern Europe	Italy	14
		Portugal	5
		Spain	11
	Western Europe	Belgium	5
		France	53
		Germany	30
		Luxembourg	1
		Switzerland	10
Oceania			**2**
	Australia & NZ	Australia	1
		New Zealand	1
Unavailable information			
Grand Total			**1243**



2.7 Program Publication List

(Attachment in Research.gov)

2.8 Program Publication Work-In-Progress List

(Attachment in Research.gov)

3. Postdoctoral Program

3.1 Description of Activities

The postdoctoral program at MSRI is central to MSRI's mission of continued excellence in mathematics research. The programs MSRI organizes produce the leading research in that field of study. MSRI's postdocs engage with fellow mathematicians from all over the world to develop their interests and contribute to the Science community. During the 2015–16 academic year, MSRI selected 32 postdoctoral scholars with research interests in the programs that MSRI offered. Of those postdocs, 21 were funded by the NSF Core Grant, 4 by the NSA, 2 by Viterbi Endowment, 1 by Gamelin Endowment, 1 by Berlekamp Endowment, 1 by Huneke Endowment, 1 by the Strauch Postdoctoral Fellowship and 1 by the MacaulayII NSF grant. Each postdoctotal fellow completed the Responsible Conduct of Research (RCR) training through UC Berkeley.

Of the 32 Postdoctoral Fellows at MSRI, nine (29%) were female, 11 (35.5%) were a U.S. Citizen or Permanent Resident, and 20 (64.5%) came from a US institution. The program organizers were extremely satisfied with the Postdoctoral Program and believed that it was by all accounts an enormous success.

Here are additional details on the Postdoctoral Fellows for each program.

New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems

Bulut, Aynur

Name: Aynur Bulut
Year of Ph.D: 2011
Institution of Ph.D.: The University of Texas at Austin
Dissertation title: Global well-posedness and scattering for the defocusing energy-supercritical cubic Nonlinear Wave Equation
Ph.D. advisor: William Beckner and Natasa Pavlovic

Mentor while at MSRI: Rowan Killip

Institution prior to obtaining the MSRI PD fellowship: University of Michigan
Position at that institution: Postdoctoral Assistant Professor

Institution (or company) where you are going after the MSRI PD fellowship: University of Michigan
Position: Postdoctoral Assistant Professor
Anticipated length: Until August 2016

Postdoctoral fellow comments:

During my time in residence as a postdoctoral fellow at MSRI, I continued work on an ongoing project joint with B. Dodson on global well-posedness results for slightly energy-supercritical nonlinear wave equations under partial symmetry assumptions. I also began several collaborative projects which are currently ongoing; these include work with P. Raphael on nonradial cases of blowup results for energy-subcritical NLS closely related to earlier work of Merle-Raphael, a work with P. Gerard on weak-turbulence results in a non-periodic setting, and investigation into equipartition of energy results (joint with N. Visciglia) for energy-supercritical wave equations. I also began collaboration with Z. Hani on large-domain limits without symmetry or periodicity assumptions for weakly nonlinear NLS.

The support and research environment at MSRI was very beneficial to the development of my research program, and the activities throughout the term provided exposure to a wide variety of research activity in dispersive PDE, probability, and allied topics. I especially benefited from the opportunity to interact with senior and junior researchers, both to discuss aspects of my recent and current work, and to explore new collaborations and possible problems for future investigation.

Butkovsky, Oleg

Name: Oleg Butkovsky
Year of Ph.D: 2013
Institution of Ph.D.: Lomonosov Moscow State University
Dissertation title: Limit theorems for Markov processes
Ph.D. advisor: Alexander Veretennikov & Alexander Bulinski

Mentor while at MSRI: Fraydoun Rezakhanlou

Institution prior to obtaining the MSRI PD fellowship: Technion - Israel Institute of Technology
Position at that institution: postdoc
Mentor (if applicable): Leonid Mytnik

Institution (or company) where you are going after the MSRI PD fellowship: Technion - Israel Institute of Technology
Position: postdoc
Anticipated length: till October 2016
Mentor (if applicable): Leonid Mytnik

Postdoctoral fellow's comments:

During my stay at MSRI I worked on three different projects.
In a joint work with Michael Scheutzow, we have studied invariant measures for stochastic differential delay equations (SDDEs). We have established new sufficient conditions (optimal in a certain sense) for the existence and uniqueness of invariant measure of SDDE and obtained bounds on convergence rate. The publication "New conditions for ergodicity of stochastic delay equations" is now in preparation.

Together with Leonid Mytnik, we have finished our work on path-by-path uniquness for stochastic heat equation. We have proved that a stochastic heat equation with "bad" drift has a unique solution for almost all trajectories of a random white noise. We have also established existence of the stochastic flow for stochastic heat equation. The publication "Regularization by noise for stochastic heat equations" is now in preparation.

Finally, in a joint project with Jonathan Mattingly and Andrew Stuart, we have started analyzing and developing Random Hamiltonian Monte Carlo Algorithm (RHMC). We have proved ergodicity of infinite-dimensional RHMC for some model cases. We hope to extend our results to a more general case in future.

Thus, as a result of my stay at MSRI, two papers have been (almost) written and work on one additional project has been started.
Therefore, I think that my experience at MSRI was very beneficial and I am very grateful to the organizers for their hospitality.

Haberman, Boaz

Name: Boaz Haberman
Year of Ph.D: 2015
Institution of Ph.D.: UC Berkeley
Dissertation title: Inverse problems with rough data
Ph.D. advisor: Daniel Tataru

Mentor while at MSRI: Herbert Koch

Institution prior to obtaining the MSRI PD fellowship: UC Berkeley
Position at that institution: Graduate student
Mentor (if applicable): Daniel Tataru

Institution (or company) where you are going after the MSRI PD fellowship: University of Chicago
Position: L.E. Dickson Instructor
Anticipated length: 3 years
Mentor (if applicable): Carlos Kenig

Postdoctoral fellow's comments:

While I was at MSRI I worked on finishing a result that I had partially proven in my thesis. I showed that a Schrodinger operator D^2 + A.D + D.A + q on a bounded domain in R^3 is determined by its Dirichlet-to-Neumann map, assuming that A is small in W^{0+epsilon,3} and q is only in W^{-1,3}. I recently posted a preprint at arXiv:1512.01580. I am working on improving this to treat the critical case where A is large in L^3. While at MSRI I had the opportunity to discuss my work with Daniel Tataru and Herbert Koch, which was very useful in order to make progress. I have now finally figured out a key estimate, and have a program to treat the critical case, which requires a much more precise analysis than the subcritical case.

My experience at MSRI was very beneficial. So far my work has been mainly in one direction, and being at MSRI exposed me to many interesting problems. I feel that I benefited from the consistent theme of the semester as well as from the diversity of subjects presented. I also benefited from talking to participants about their research and gaining new perspectives.

Huang, Jingyu

Name: Jingyu Huang
Year of Ph.D: 2015
Institution of Ph.D.: University of Kansas
Dissertation title: Stochastic partial differential equations driven by colored noise
Ph.D. advisor: Yaozhong Hu and David Nualart.

Mentor while at MSRI: Jonathan Mattingly.

Institution prior to obtaining the MSRI PD fellowship: University of Kansas
Position at that institution: Graduate Student
Mentor (if applicable): Yaozhong Hu and David Nualart.

Institution (or company) where you are going after the MSRI PD fellowship: University of Utah
Position: Postdoc
Anticipated length: 2.5 years.
Mentor (if applicable): Davar Khoshnevisan.

Postdoctoral fellow's comments:

I did some work with Khoa Le and David Nualart in stochastic heat equation. My experience at MSRI is really beneficial.

Kim, Kunwoo

Name: Kunwoo Kim
Year of Ph.D: 2012
Institution of Ph.D.: University of Illinois at Urbana-Champaign
Dissertation title: New results in stochastic moving boundary problems
Ph.D. advisor: Richard Sowers
Mentor while at MSRI: Carl Mueller

Institution prior to obtaining the MSRI PD fellowship: University of Utah
Position at that institution: Postdoc
Mentor (if applicable): Davar Khoshnevisan

Institution (or company) where you are going after the MSRI PD fellowship: Teachnion-Israel Institute of Technology
Position: Postdoc
Anticipated length: 1 year
Mentor (if applicable): Leonid Mytnik

Postdoctoral fellow's comments:

I have been working in the area of stochastic partial differential equations at MSRI. While I was at MSRI, I submitted 3 papers:
1. On the large-scale structure of the tall peaks for stochastic heat equations with fractional Laplacian.
2. A boundedness trichotomy for the stochastic heat equation (with Le Chen and Davar Khoshnevisan).
3. Nonlinear stochastic heat equation driven by spatially colored noise (with Le Chen).

Was your experience at MSRI beneficial? Why or why not?

Yes, it was very beneficial to me since I had the opportunity to learn from and talk with many experts in SPDEs and also in PDEs. I learned new things and also enjoyed living in Berkeley.

Le, Khoa

Name: Khoa Le
Year of Ph.D: 2015
Institution of Ph.D.: University of Kansas
Dissertation title: Nonlinear integrals, diffusion in random environments and stochastic partial differential equations

Mentor while at MSRI: Arnaud Debussche

Institution prior to obtaining the MSRI PD fellowship: University of Kansas
Position at that institution: Graduate student

Institution (or company) where you are going after the MSRI PD fellowship: University of Calgary
Position: Postdoc
Anticipated length: 1 year
Mentor (if applicable): Deniz Sezer

Postdoctoral fellow's comments:

Work at MSRI: I study the spatial asymptotic of the solution of the parabolic Anderson model with initial condition being a Dirac mass. This is a joint work with Jingu Huang who was also a postdoc at MSRI at the time. We obtained some results and will publish the manuscript some time in the future.

Publications made:

- Large time asymptotics for the parabolic Anderson model driven by spatially correlated noise, with Jingu Huang and David Nualart (submitted)
- A remark on a result of Xia Chen, manuscript
- Multi-stage portfolio optimization: a duality result in conic market models, with Robert Bassett, manuscipt

My experience at MSRI is overall beneficial for the environment and condition it provides.

Mendelson, Dana

Name: Dana Mendelson
Year of Ph.D: 2015
Institution of Ph.D.: MIT
Dissertation title: Nonlinear dispersive equations with random initial data
Ph.D. advisor: Gigliola Staffilani
Mentor while at MSRI: Yvan Martel

Institution prior to obtaining the MSRI PD fellowship: MIT
Position at that institution: Graduate Student
Mentor (if applicable): see above

Institution (or company) where you are going after the MSRI PD fellowship: Institute for Advanced Study & University of Chicago
Position: Member (IAS), L.E. Dickson Instructor (UChicago)
Anticipated length: (if it is a tenure track position just write tenure-track): 6 months (IAS), 3 years (UChicago)
Mentor (if applicable): Carlos Kenig (UChicago)

Postdoctoral fellow's comments:

I think it's a fantastic place. Generally, was very happy throughout the semester. There was a pleasant atmosphere and a conducive work environment.

Menz, Georg

Name: Georg Menz
Year of Ph.D: 2011
Institution of Ph.D.: University of Bonn
Dissertation title: Equilibrium dynamics of unbounded spin systems
Ph.D. advisor: Felix Otto
Mentor while at MSRI: Andrea Nahmod

Institution prior to obtaining the MSRI PD fellowship: Stanford University
Mentor (if applicable): George Papanicolaou

Institution (or company) where you are going after the MSRI PD fellowship: UCLA
Position: Assistant professor
Anticipated length: (if it is a tenure track position just write tenure-track): tenure-track
Mentor (if applicable): Marek Biskup, Thom Ligget

Postdoctoral fellow's comments:

While at MSRI: Used the time for discussions with various people at the MSRI or at Berkeley (Jonathan Mattingly, Andrea Nahmod, Max Fathi, Oleg Bukovsky, Aynur Bulut, Hendrik Weber ect.).
Preparing the Square meeting in November at the AIM San Jose,
Writing up an article with Chris Henderson, and another one with Matthias Erbar, Chris Henderson and Prasad Tetali.
Working on several problems of high-dimensional convex geometry. didn't result in an article.
Meeting with Elwyn Berblekamp and visiting the combinatorial game theory workshop.

Was your experience at MSRI beneficial? Why or why not?
Very beneficial, because of the unique atmosphere and the availability of so many world class scientist.
And the big amount of time one can spent on research without distractions.

Shahshahani, Sohrab

Name: Sohrab Shahshahani
Year of Ph.D: 2012
Institution of Ph.D.: EPFL, Lausanne, Switzerland
Dissertation title: Stability and singularity formation for wave maps in curved backgrounds.
Ph.D. advisor: Joachim Krieger

Mentor while at MSRI: P. Raphael

Institution prior to obtaining the MSRI PD fellowship: University of Michigan
Position at that institution: Postdoc
Mentor (if applicable): Lydia Bieri

Institution (or company) where you are going after the MSRI PD fellowship: University of Michigan
Position: Postdoc
Anticipated length: (if it is a tenure track position just write tenure-track): One semester
Mentor (if applicable): Lydia Bieri

Postdoctoral fellow's comments:

My experience at MSRI was beneficial in that I could benefit from speaking to the experts in the fields and attending the seminars and conferences as well as work with my collaborators. During my stay at MSRI I was able to complete two papers which I had started working on prior to my arrival. One paper was joint with A. Lawrie and S._J. Oh both at MSRI, and was on the Cauchy problem for wave maps on Hd, and the other was joint with L. Bieri, S. Miao, and S. Wu and was on the motion of an incompressible self-gravitating fluid body in two dimensions. I was also able to initiate further projects with my collaborator during my MSRI visit.

Tarfulea, Andrei

Name: Andrei Tarfulea
Year of Ph.D: 2015
Institution of Ph.D: Princeton University
Dissertation title: A Study in the Asymptotic Behavior of Nonlinear Evolution Equations with Nonlocal Operators
Ph.D. advisor: Peter Constantin

Mentor while at MSRI: Monica Visan

Institution prior to obtaining the MSRI PD fellowship: Princeton University
Position at that institution: Graduate (doctoral) Student
Mentor: Peter Constantin

Institution where I am going after the MSRI PD fellowship: University of Chicago
Position: Dickson RTG Instructorship
Anticipated length: 2.5 years
Mentor: Panagiotis E. Souganidis

Postdoctoral fellow's comments:

I attended three workshops at the MSRI ("Connections for Women: Dispersive and Stochastic PDE", "Introductory Workshop: Randomness and long time dynamics in nonlinear evolution differential equations", and "New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensional systems") and presented at three more workshops abroad (MFO at Oberwolfach, Rice University, and the SIAM Conference at Phoenix). I continued work with my collaborator Jean-Michel Roquejoffre on fractional reaction-diffusion equations; our paper is in the final stages of review at JMPA (titled "Gradient estimates and symmetrization for Fisher-KPP front propagation with fractional diffusion"). I presented the subject of this work at the MSRI's Postdoc Symposium, after which I explored potential collaborations continuing this line of work into areas more focused on probability. I worked on an independent project in fluid dynamics, occasionally requesting guidance from my MSRI Mentor concerning certain commutator estimates. While at the MSRI, I also participated in the Berkeley Math Circle (teaching a practice AMC8/10 course) and applied for the NSF Postdoctoral Research Fellowship with my future mentor at the University of Chicago.

Overall, I would say that my experience at the MSRI was beneficial. I had the opportunity to speak with many outstanding researchers attending the varied conferences. The institute was also quite conducive to my independent research.

Totz, Nathan

Name: Nathan Totz
Year of Ph.D: 2011
Institution of Ph.D.: University of Michigan
Dissertation title: A Rigorous Justification of the Modulation Approximation to the 2D Full Water Wave Problem
Ph.D. advisor: Sijue Wu

Mentor while at MSRI: Natasa Pavlovic

Institution prior to obtaining the MSRI PD fellowship: University of Massachusetts Amherst
Position at that institution: Visiting Assistant Professor
Mentor (if applicable): Andrea Nahmod

Institution (or company) where you are going after the MSRI PD fellowship: University of Massachusetts Amherst
Anticipated length: 2 years
Mentor (if applicable): Andrea Nahmod

Postdoctoral fellow's comments:

I finished and submitted the paper "Global Well-Posedness of 2D Non-Focusing Schrodinger Equations via Rigorous Modulation Justification

Was your experience at MSRI beneficial? Why or why not?

Definitely! My research was rapidly sped up thanks to the intense environment, the other very knowledgeable participants, and the time to focus.

Wang, Chuntian

Name: Chuntian Wang
Year of Ph.D: 6 years of Ph. D, just finished in May 2015.
Institution of Ph.D.: Indiana University Bloomington
Dissertation title: Deterministic and Stochastic Zakharov-Kuznetsov equation in a bounded domain.
Ph.D. advisor: Roger Temam

Mentor while at MSRI: Andrea Montanari

Institution prior to obtaining the MSRI PD fellowship: UCLA
Position at that institution: Hedrick Assistant Professor
Mentor (if applicable): Andrea Bertozzi

Institution (or company) where you are going after the MSRI PD fellowship: UCLA
Position: Hedrick Assistant Professor
Anticipated length: (if it is a tenure track position just write tenure-track): two and half years
Mentor (if applicable): Andrea Bertozzi

Postdoctoral fellow's comments:

I have worked on mainly two projects: The 3D global-well poshness of the Zakharov equation, and then an interacting particle system with the application in criminology. I have not made publications yet.

Was your experience at MSRI beneficial? Why or why not?

It was highly beneficial. I have learned math and how to be a better person. This is a life-time chance for me, as a young research, who can set up a goal in research after seeing so many different areas of research, and form a personality, after interacting with so many people with different personalities.

Wilson, Bobby

Name: Bobby Wilson
Ph.D. Year: 2015
Ph.D. Institution: The University of Chicago
Dissertation Title: Three Results in Analysis
Ph.D. Advisor: Wilhelm Schlag

MSRI Mentor: Daniel Tataru

Pre-MSRI Institution: The University of Chicago
Position: Graduate Student
Mentor: Wilhelm Schlag

Post-MSRI Institution: Massachusetts Institute of Technology
Position: Post-Doc
Length: 2.5 years

Postdoctoral fellow's comments:

At MSRI this Fall, I was able to work on extending some of the work I did for my thesis. I am collaborating with Jeremy Marzuola and Chongchun Zeng to establish stability results for the quasilinear Schrodinger equation. I also was able to write a preprint furthering some work on the convergence of Fourier series. Being at MSRI during this time was substantially beneficial to my career. It is unique to be able to spend so much time around a high concentration of great researchers doing research directly related to the work that I do, and I appreciated the experience.

Xu, Samantha

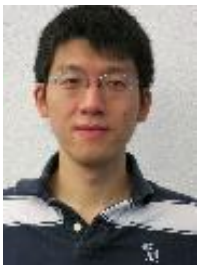
Name: Samantha Xu
Ph.D. Year: 2014
Ph.D. Institution: UCLA
Dissertation Title: Hamiltonian Systems and Gibbs Measures
Ph.D. Advisor: Rowan Killip

Pre-MSRI Institution: University of Illinois at Urbana-Champaign
Position: Visiting Assistant Professor

Post-MSRI Institution: University of Illinois at Urbana-Champaign
Position: Visiting Assistant Professor
Length: 2014 to present

Comments:

For the last month, Samantha was ill and could not work on site at MSRI. We were unable to obtain a summary of her experience at MSRI.



Zeng, Qiang

Name: Qiang Zeng
Year of Ph.D: 2014
Institution of Ph.D.: University of Illinois at Urbana-Champaign
Dissertation title: Poincare inequalities in noncommutative Lp spaces
Ph.D. advisor: Marius Junge and Renming Song

Mentor while at MSRI: Sandra Cerrai

Institution prior to obtaining the MSRI PD fellowship: Harvard University
Position at that institution: Postdoc Fellow
Mentor (if applicable): H.-T. Yau

Institution (or company) where you are going after the MSRI PD fellowship: Northwestern University
Position: Boas Assistant Professor
Anticipated length: 2.5 years.
Mentor (if applicable): Elton Hsu

Postdoctoral fellow's comments:

As I planned, I am here to learn SPDEs. My previous research area is in (noncommutative) stochastic analysis, which is related to SPDE. I learned various techniques in SPDEs here, especially got to know some problems. I also discussed some problems with people here. I wrote a paper with a collaborator in math department at Berkeley.

Was your experience at MSRI beneficial? Why or why not?

Yes for sure. The stimulating environment and the beautiful bay view make me productive. As a junior professional person, it is very important to learn some new things and see what others are doing. I am looking forward to coming back to MSRI for other workshops again!

Zhong, Jie

Name: Jie Zhong
Year of Ph.D: 2013
Institution of Ph.D.: University of Southern California
Dissertation title: Stochastic second order evolution equations by Wiener chaos approach
Ph.D. advisor: Sergey Lototsky

Mentor while at MSRI: Luis Vega

Institution prior to obtaining the MSRI PD fellowship: University of Central Florida
Position at that institution: Visiting assistant professor

Institution (or company) where you are going after the MSRI PD fellowship: University of Central Florida
Position: Visiting assistant professor

Postdoctoral fellow's comment:

I started several new projects with members at MSRI, and I had very productive and wonderful time at MSRI.

Differential Geometry

Ache, Antonio

Name: Antonio G. Ache
Year of Ph.D: 2012
Institution of Ph.D.: University of Wisconsin-Madison
Dissertation title: Obstruction-flat Asymptotically Locally Euclidean Metrics and Infin-itesimal obstructions of the self-dual deformation complex
Ph.D. advisor: Jeff Viaclovsky
Mentor while at MSRI: Felix Schulze

Institution prior to obtaining the MSRI PD fellowship: Princeton University
Position at that institution: Instructor
Mentor (if applicable): Gang Tian

Institution (or company) where you are going after the MSRI PD fellowship: University of Notre-Dame
Anticipated length: 2 years
Mentor (if applicable): Matthew Gursky

Postdoctoral fellow's comments:

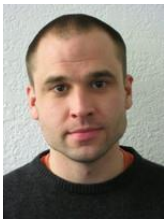
During my fellowship at MSRI I started a project with Jason Lotay intended to understand the long time behavior of the symplectic curvature flow on model spaces. Symplectic Curvature Flow is an evolution equation introduced by Tian and Streets with the goal of deforming given symplectic structures into canonical or optimal symplectic structures in a way similar to the K¨ahler-Ricci flow evolution. A fundamental difference with the non-K¨ahler case is that symplectic curvature flow cannot preserve the initial almost complex structure which forces one to consider a coupled system that deforms symplectic structures and almost complex structures simultaneously. To this date, the only examples for which long time existence is well understood have a very special structure, for example, homogeneous spaces. In the project that I initiated with Jason Lotay, we consider j-holomorphic maps defined on symplectic 4-manifolds and we study the evolution of the submanifolds defined by these j-holomorphic maps if one assumes that the ambient space evolves by symplectic curvature flow. For example, there are symplectic structures on model spaces like the Kodaira-Thurston manifold that can be thought of as j-holomorphic maps fibered by j-holomorphic maps, and it is not clear if either the base space or the fibers collapse along the flow. We also consider possible ways to couple symplectic curvature flow with evolutions that preserve the j-holomorphic condition.

It was proved by Jason Lotay and Tommaso Paccini if a symplectic manifold (M, ω) admits a totally real Lagrangian submanifold $\Sigma \subset M$, then Lagrangian condition is preserved by symplectic curvature flow if one also deforms the submanifold by the Maslov flow, which in the totally real Lagrangian setting is closely related to the mean curvature flow. We are working on finding a natural evolution of symplectic submanifolds that will preserve the j-holomorphic condition.

I also started collaborations with Casey Kelleher and Ronan Conlon. With Casey Kelleher I am considering the problem of determining whether the space of symplectic structures on the 4-torus is path-connected or not using symplectic curvature flow. We are also considering long time existence questions for higher order generalizations of the Yang-Mills flow. With Ronan Conlon, I am considering convergence questions for the K¨aher-Ricci flow on asymptotically Calabi-Yau manifolds.

Was your experience at MSRI beneficial? Why or why not?

Overall my experience at MSRI was beneficial because I was able to meet junior and well established mathematicians who gave me very valuable career advice and who will be from now on part of my professional network. For example, it gave me the opportunity of being in the same place as Jason Lotay, Casey Kelleher and Ronan Conlon and start discussing projects with them. Also, I was able to significantly improve my presentation skills by for example rehearsing talks in front of mentors and peers and by receiving honest feedback from them after the talk that I gave in the post-doc seminar. I also received significant moral support from my colleagues at a time during my MSRI fellowship when I had problems with my job applications. This support came from my MSRI mentor (Felix Schulze) but also from people like Jason Lotay, Michael Singer, Tobias Colding, Rosa Sena Dias and Ronan Conlon among many others. Finally, the flexibility in the use of my time provided by the fellowship allowed me to spontaneously discuss ideas with MSRI members without the need of scheduling meetings as it happens during a regular semester at a university.



Conlon, Ronan

Name: Ronan Conlon
Year of Ph.D: 2011
Institution of Ph.D.: Imperial College London
Dissertation title: On the Construction of Asymptotically Conical Calabi-Yau manifolds
Ph.D. advisor: Mark Haskins
Mentor while at MSRI: Michael Singer

Institution prior to obtaining the MSRI PD fellowship: Universite du Quebec a Montreal
Position at that institution: Postdoctoral Fellow

Institution (or company) where you are going after the MSRI PD fellowship: Florida International University
Position: Assistant Professor
Anticipated length: Tenure-track

Postdoctoral fellow's comments:

During my time at MSRI I began a collaboration with Alix Deurelle, another postdoctoral fellow. We worked on constructing new examples of expanding Kahler-Ricci solitons. At the minute we are writing up a paper and it should be ready to be posted on the arXiv within the next month or so.

I also had time at MSRI to write up a short article that is joint with Hans-Joachim Hein on a relationship between deformations of complex cones and complex manifolds appearing as ample divisors with prescribed normal bundle. We hope to get this article posted on the arXiv soon.

I also gave a talk in the "Kahler geometry, Einstein metrics, and Generalizations" workshop and in the postdoctoral seminar. The postdoctoral seminar was very beneficial and I feel that the constructive criticism I received will greatly benefit my talks in the future.

Overall, I found that my experience at MSRI was very beneficial. It brought together mathematicians working in the same field which allowed new collaborations to develop, one of which I am an example. Everything was taken care of by MSRI (housing, healthcare, etc.) which meant I was able to focus 100% on my research without any distractions.

I also found being assigned a mentor very useful as during my time at MSRI I was interviewing for professor jobs and my mentor (Michael Singer) gave me great advice. He also provided me with advice on how to write grant proposals and how to write references for students. This advice is difficult to get from other sources and will benefit me greatly as I begin my career as an Assistant Professor.

Having a seminar every day was also great as it kept me up-to-date with what other people were working on and the latest developments in the field. I learnt a lot from them.

Finally, I enjoyed tea at 3pm everyday as it created an environment in which I was able to chat with other mathematicians informally about the problems that I was thinking about that day. I learnt a lot from these conversations.

Deruelle, Alix

Name: Alix Deruelle
Year of Ph.D: 2012
Institution of Ph.D.: Institut Fourier
Dissertation title: Sur la géométrie à l'infini de certaine variétés riemanniennes non compactes
Ph.D. advisor: Laurent Bessieres
Mentor while at MSRI: Tom Ilmanen

Institution prior to obtaining the MSRI PD fellowship: Université Paris Sud 11 Orsay
Position at that institution: Post-doc
Mentor (if applicable): Jean-Michel Bismut

Institution (or company) where you are going after the MSRI PD fellowship: Université Paris Sud 11 Orsay
Position: Post-doc
Anticipated length: 1 year
Mentor (if applicable): Jean-Michel Bismut

Postdoctoral fellow's comments:

I started four projects with four different persons, it was very intense in a good sense, and together with one of my collaborators, I am about to publish a preprint by the end of May. So yes, this stay at MSRI as a post-doc was very beneficial!

Di Nezza, Eleonora

Name: Eleonora Di Nezza
Year of Ph.D: 2014
Institution of Ph.D.: University di Roma Tor Vergara/Université Paul Sabatier
Dissertation title: Geometry of Complex Monge-Ampère equations
Ph.D. advisor: Vincent Guedj and Stefano Trapani
Mentor while at MSRI: Ursula Hamenstädt

Institution prior to obtaining the MSRI PD fellowship: Imperial College London
Position at that institution: Marie Curie fellow
Mentor (if applicable): Mark Haskins

Institution (or company) where you are going after the MSRI PD fellowship: Imperial College London
Position: Marie Curie fellow
Anticipated length: until December 2017
Mentor (if applicable): Mark Haskins

Postdoctoral fellow's comments:

During my staying at MSRI I started three projects and two of these will be soon on the arxiv.
Two of these projects are in collaboration with mathematicians that I met at MSRI, Tamas Darvas and Christina Sormani.
I actively participated at the seminars and the postdoc seminars. As a postdoc I also gave a talk during the postdoc seminar: I talked about one of my new projects and it was very useful to have feedbacks from the people at MSRI. In this concern my mentor, Ursula Hamenstädt, that always gave to me good advices and made constructive critics.
I gave two talks during two of the conferences of the program: Connection for Women and Geometric flows. It was a great occasion to talk about my research talk and to create contacts in U.S.
Helene Barcelo and David Eisenbud gave me the possibility to give an expository talk during the Academic Sponsor day. It was a honor for me and I was glad to receive positive comments after my talk: giving a seminar from an audience of mathematicians that are not necessarily geometers was a challenge for me. In this concern I should thanks David Eisenbud that dedicated me his time giving me a lot of advices.
I had the chance to go and give a talk at Columbia University (one of the academic sponsored MSRI). He was a great occasion to meet and discuss experts in Kaehler geometry (my field of research) and to create new contacts.
I also gave a lecture at the MATH CIRCLE. It was an extremely intense experience for me. Mathematics can be fun and I am glad that I could give my contribution in spreading this concepts. Moreover, kids at the math circle are incredibly smart. I was very impressed by them.
My experience at MSRI was absolutely valuable. I am extremely happy and satisfied of my staying here, not only from a mathematical point of view but also from a human point of view: I met extraordinary people!

Foscolo, Lorenzo

Name: Lorenzo Foscolo
Year of Ph.D: Dec 2013
Institution of Ph.D.: Imperial College London
Dissertation title: On moduli spaces of monopoles and gravitational instantons
Ph.D. advisor: Mark Haskins
Mentor while at MSRI: Michael Singer

Institution prior to obtaining the MSRI PD fellowship: Stony Brook University
Position at that institution: James H. Simons Instructor

Institution (or company) where you are going after the MSRI PD fellowship: Stony Brook University
Position: James H. Simons Instructor
Anticipated length: until August 2017

Postdoctoral fellow's comments:

On my arrival at MSRI I finalized work on the paper "Deformation theory of nearly Kähler manifolds". Work on the paper had already been done previously to my arrival, but the paper was posted on the pre-print repository arXiv.org under the reference no. arXiv:1601.04400 and submitted for publication in a peer-reviewed journal while I was in residence at MSRI.

In February and March I devoted most of my time working on the paper "ALF gravitational instantons and collapsing Ricci-flat metrics on the K3 surface". The main inspiration for the paper originated from a discussion with Bobby Acharya, Mark Haskins and Johannes Nordström in February 2015, but the entire work was done while in residence at MSRI. The paper is now posted on arXiv.org under the reference no. arXiv:1603.06315 and was submitted for publication in a peer-reviewed journal. Discussions with Olivier Biquard, Mark Haskins, Michael Singer and Jeff Viaclovsky, all present at MSRI, were extremely beneficial to fine-tune the exposition in the final stages of the writing process. I also had the chance to present my results during the workshop Kähler Geometry, Einstein Metrics, and Generalizations held at MSRI in March. As a follow-up to the paper, a research project with Hans-Joachim Hein (University of Maryland) was initiated during my short research visit to UMD at the beginning of May.

Throughout the semester I greatly benefited from daily contact with my collaborators Mark Haskins and Johannes Nordström, both in residence at MSRI for (most of) the semester. We worked on a series of related research projects and made very exciting progress in various directions. A paper "Deformation theory of ALC G2 manifolds" is in an advance draft stage. Contact with Rafe Mazzeo and Michael Singer, both in residence at the Institute, was very important to understand what was already known in the literature and what instead had to be worked out. We also made detailed working notes for other two or three related papers and proved a number of intermediate results.

My collaborator Gonçalo Oliveira visited the Institute during two of the programmatic workshops. Discussions with him in those occasions were helpful to advance our joint research project on gauge theory on nearly Kähler manifolds.

The Postdoc Lunch Seminar was the opportunity for me to present some earlier work (the main result of "Deformation theory of nearly Kähler manifolds" and an earlier joint project with Mark Haskins) to a broader audience then I was able in the past.

Daily seminars and discussions with the other MSRI members provided an extremely pleasant and exciting research environment. During my stay at the Institute I made many exciting discoveries of surprising and deep results, techniques and open problems in different areas of differential geometry. My development as a broader researcher has certainly benefited from these interactions.

Kennard, Lee

Name: Lee Kennard
Year of Ph.D: 2012
Institution of Ph.D.: University of Pennsylvania
Dissertation title: On the Hopf conjectures with symmetry
Ph.D. advisor: Wolfgang Ziller
Mentor while at MSRI: Vitali Kapovitch

Institution prior to obtaining the MSRI PD fellowship: University of Oklahoma
Position at that institution: Assistant Professor

Institution (or company) where you are going after the MSRI PD fellowship: University of Oklahoma
Position at that institution: Assistant Professor
Anticipated length: tenure-track

Postdoctoral fellow's comments:

I started a collaboration with Burkhard Wilking, who was a member here for about 4 months, and we have an early draft of a paper. I continued my collaboration with William Wylie, who was a member here for a month, and we have an early draft of a paper. I continued my collaboration with Manuel Amann, who was a member here for about a month, and we discussed a number of projects but ultimately spent most of our productive time streamlining a finished paper of ours in order to submit it for publication. I continued my collaboration with Jason DeVito on a project that is in early stages. I used my NSF grant to pay for his visit. He was not given an opportunity to give a talk, and he received no money from MSRI.

Was your experience at MSRI beneficial? Why or why not?

Yes, absolutely. I benefitted from communicating with a number of experts in my field and adjacent fields. I can't wait to visit again!

Leach, Jeremy

Name: Jeremy Leach
Year of Ph.D: 2015
Institution of Ph.D.: Stanford University
Dissertation title: The vacuum Einstein constraint equations on manifolds with ends of cylindrical type
Ph.D. advisor: Rafe Mazzeo
Mentor while at MSRI: Robert Kusner

Institution prior to obtaining the MSRI PD fellowship: University of Washington
Position at that institution: Acting Assistant Professor
Mentor (if applicable): Daniel Pollack

Institution (or company) where you are going after the MSRI PD fellowship: Trexquant Investment LP
Position: Portfolio Manager
Anticipated length: Permanent

Postdoctoral fellow's comments:

I spent the first three weeks of the program finishing up a paper (pertaining to the Einstein constraint equations on manifolds with both asymptotically Euclidean and asymptotically conformally cylindrical ends) which I had started working on while I was a postdoc at the University of Washington.
After submitting that paper to Classical and Quantum Gravity, I split the remainder of my time at MSRI between two projects. The first was an independent effort to analyze the sign of the energy density associated to the Alcubierre metric in the conformal gravity model. I have made progress, thanks in large part to the access to Mathematica which MSRI granted me. Though this project is still ongoing, I expect this work to result in a published paper in the near future.
The other project is a joint work with both my MSRI mentor, Robert Kusner, and my Ph.D. advisor, Rafe Mazzeo. Early in the semester, my advisor proposed the following question to me: Is the cylinder the only conformally flat Riemannian manifold with constant positive scalar curvature and a finite number of asymptotically cylindrical ends? There is an analogue to this question in the mean curvature setting as well. We currently believe that we can construct a counterexample which suggests that the answer to this question is "no", though there are still gaps in the proof which we believe we can fix. If we are successful, this project will also certainly result in a published paper.

Was your experience at MSRI beneficial? Why or why not?
My time at MSRI was extremely beneficial. Though it is true that my academic research has no bearing on my future in industry, my semester at MSRI has given me the opportunity to do precisely what drew me to mathematics in the first place: research and collaboration. The ability to dedicate all of my time to these pursuits has made my semester here the most enjoyable and rewarding mathematical experience of my life, and much of the impact I will have on my field of research will be owed to the collaborations which took place here.

Lin, Yueh-Ju

Name: Yueh-Ju Lin
Year of Ph.D: 2014
Institution of Ph.D.: University of Notre Dame
Dissertation title: Connected sum construction of constant Q-curvature manifolds in higher dimensions
Ph.D. advisor: Matthew Gursky
Mentor while at MSRI: Sun-Yung Alice Chang

Institution prior to obtaining the MSRI PD fellowship: University of Michigan
Position at that institution: Postdoctoral Assistant Professor
Mentor (if applicable): Daniel Burns

Institution (or company) where you are going after the MSRI PD fellowship: University of Michigan
Position: Postdoctoral Assistant Professor
Anticipated length: until June 30, 2017
Mentor (if applicable): Daniel Burns

Postdoctoral fellow's comments:

I worked on higher order variational problems in conformal geometry. More precisely, I studied Q-curvature problems in four or higher imensions which is equivalent to solving fourth order nonlinear PDEs. I also studied the deformations of Q-curvature or more general conformal scalar invariants which lead us to the rigidity and stability questions. Moreover, I was also interested in uniqueness and non-uniqueness of constant Q-curvature metrics.

Was your experience at MSRI beneficial? Why or why not?

It was a great opportunity for me to visit MSRI for the Differential Geometry program. One of the great benefits of the postdoctoral positions in MSRI is that I had quality time to concentrate on my research programs. I had regular meetings and discussions with my mentor here at MSRI. We initiated potential projects to work on. Through various seminars, I had chances to present my works to my colleagues and at the same time learned more about the research of others. In addition, the four workshops held by the program allowed me to meet and discuss with mathematicians in different areas in differential geometry.

Lock, Michael

Name: Michael Lock
Year of Ph.D: 2013
Institution of Ph.D.: University of Wisconsin - Madison
Dissertation title: Index theorems for anti-self-dual and self-dual orbifolds
Ph.D. advisor: advisor: Jeff Viaclovsky
Mentor while at MSRI: Robert Kusner

Institution prior to obtaining the MSRI PD fellowship: University of Texas at Austin
Position at that institution: RTG Postdoctoral Fellow Mentor
Mentor (if applicable): Dan Freed

Institution (or company) where you are going after the MSRI PD fellowship: Leaving academia

Postdoctoral fellow's comments:

While at MSRI I worked on problems concerning special Hermitian metrics in the non-Kahler setting. I completed the work for one publication that is forthcoming, as well as answered questions regarding a generalization of previous work that will be in a forthcoming publication as well. My experience at MSRI was very beneficial because it broadened my research interests.

I'm actually leaving academia after this semester. I made the decision to at the end of last summer though, so it has nothing to do with my experience at MSRI which was wonderful. I still enjoy my work in math very much, and benefited from the experience at MSRI, I just have had a growing desire to try something completely new which is why I'm leaving math.

Macbeth, Heather

Name: Heather Macbeth
Year of Ph.D: 2015
Institution of Ph.D.: Princeton
Dissertation title: Kahler-Einstein metrics, Bergman metrics, and higher alpha-invariants
Ph.D. advisor: advisor: Gang Tian
Mentor while at MSRI: Olivier Biquard

Institution prior to obtaining the MSRI PD fellowship: MIT
Position at that institution: CLE Moore Instructor
Mentor (if applicable): Toby Colding

Institution (or company) where you are going after the MSRI PD fellowship: MIT
Position: CLE Moore Instructor
Anticipated length: Until June 2018
Mentor (if applicable): Toby Colding

Postdoctoral fellow's comments:

My major project at MSRI was joint with Alix Deruelle, another MSRI postdoc. We had met in 2015 and started working together by email, partly because we knew that we would have an upcoming opportunity to work more closely together during the MSRI program. We had previously (in so far unpublished work) proved a first-order Weyl law for Ornstein-Uhlenbeck type operators on asymptotically conical Riemannian manifolds, and during the MSRI program we have been trying to extend this to a second-order Weyl law (which is much harder). The project should have applications to the theory of stability of Ricci solitons.

We are still not sure whether this project will succeed. We spent some of our time at MSRI becoming acquainted with the theory of Fourier integral operators, which was worthwhile in itself but does not seem to be as applicable to our problem as we had hoped. In the last few weeks of the program we developed an alternative approach which seems rather hopeful, but we have yet to explore it in detail. At MSRI we benefited from being able to talk every day rather than slowly over email, and from contact with Berkeley's Maciej Zworski, with whom we met several times. In summary, the project was rather risky and time-intensive, but the freedom to have attempted a project like this (rather than a "safer" project) is something we probably owe to the MSRI program, and I am grateful for the opportunity.

I also began a project with my MSRI mentor Olivier Biquard, and a joint project with Christine Breiner and Rosa Sena-Dias. Neither of these possible collaborations, with more senior mathematicians whom I did not previously know or know well, could have occurred without the slow building of mathematical relationships which happens naturally at MSRI.

Finally, I worked on an extension of my thesis, on higher alpha-invariants, which I hope will substantially improve it before it is submitted for publication.

The time at MSRI has been tremendously stimulating, and I expect that the projects begun here will occupy much of my attention for the next year of my post-doc at MIT.

Mondello, Ilaria

Name: Ilaria Mondello
Year of Ph.D: 2015
Institution of Ph.D.: Université de Nantes
Dissertation title: The Yamabe problem on stratified spaces
Ph.D. advisor: Gilles Carron
Mentor while at MSRI: Olivier Biquard

Institution prior to obtaining the MSRI PD fellowship: Institut de Mathématiques de Jussieu
Position at that institution: Postdoc
Mentor (if applicable): Vincent Minerbe

Institution (or company) where you are going after the MSRI PD fellowship: Université de Paris Est Créteil
Position: Maître de conférence
Anticipated length: Permanent position
Mentor (if applicable):

Postdoctoral fellow's comments:

During this semester I kept on working on some of the projects I started after my PhD defense, in particular proving a positive mass theorem on stratified spaces. Rafe Mazzeo, Dan Lee and Donovan McFeron gave me some advice and suggestions about this work, which is still in preparation. I had the occasion to discuss often with Rafe Mazzeo, with whom we tried working on the spectrum of the Laplacian on stratified spaces which have singularity of codimension two and angle bigger than 2\pi: we found examples in which the first non-zero eigenvalue of the Laplacian is smaller than the dimension of the space, and intended to extend this to a more general setting. The question appeared to be more difficult than we thought, but it lead us to interesting discussions with Curtis McMullen, mostly about the relation between stratified spaces and cone manifolds.

I also had the occasion to talk to other people about other problems, like Andrea Mondino, Christian Ketterer, Carolyn Gordon, Chengjian Yao, Olivier Biquard. I think this has been useful to enlarge my perspective and to suggest problems to work on, most of all in the long term rather than in the short term. It also has been very interesting to attend to the weekly seminars. For the first part of the semester following the many activities and having discussions with many people has been a bit dispersive for me, but I am sure that the ideas I have been talking about with other geometers will be useful in the future.

Mondino, Andrea

Name: Andrea Mondino
Year of Ph.D: 2011
Institution of Ph.D.: SISSA (Trieste-Italy)
Dissertation title: The Willmore functional and other L^p curvature functionals in Riemannian manifolds
Ph.D. advisor: Andrea Malchiodi
Mentor while at MSRI: John Lott

Institution prior to obtaining the MSRI PD fellowship: University of Zurich
Position at that institution: Lecturer Mentor

Institution (or company) where you are going after the MSRI PD fellowship: University of Warwick
Position: Assistant Professor
Anticipated length: tenure-track

Postdoctoral fellow's comments:

During my staying at MSRI I benefitted a lot of the daily seminars and of the occasion to meet experts. Indeed thanks to the MSRI period I started new collaborations both with more senior professors (in particular with Prof. Wei and with Prof. Kapovich) and with junior researchers like me (in particular with Dr. Ketterer and Dr. Di Nezza).

With each of the named four people above we have an ongoing project which with very high chances will converge into a paper. With Prof. Wei one project is already concluded and gave the paper "On the universal cover and the fundamental group of an $RCD^*(K,N)$-space" preprint arXiv:1605.02854.

At the same time the freedom of being an MSRI post doc gave me the time to conclude already started projects, so that during the months of fellowship the following papers were submitted:

- "On a isoperimetric-isodiametric inequality", joint with E. Spadaro, preprint arXiv:1603.05263.
- "Gaussian-type Isoperimetric Inequalities in $RCD(K,\infty)$ probability spaces for positive K" joint with L. Ambrosio, preprint arXiv:1605.02852.

Finally, the chance of speaking with the top world experts of differential geometry was a unique opportunity for a young researcher like me. Concluding, from all the points of view I consider a great time the months spent here at MSRI and I am so grateful of having such an opportunity.

Perales, Raquel

Name: Raquel Perales
Year of Ph.D: 2015
Institution of Ph.D.: Stony Brook University
Dissertation title: Convergence of Manifolds and Metric Spaces with Boundary
Ph.D. advisor: Christina Sormani
Mentor while at MSRI: Guofang Wei

Institution prior to obtaining the MSRI PD fellowship: Mathematics Institute at Universidad Autonoma de Mexico (UNAM)
Position at that institution: Postdoc
Mentor (if applicable): Pablo Suarez

Institution (or company) where you are going after the MSRI PD fellowship: Mathematics Institute at Universidad Autonoma de Mexico (UNAM)
Position: Postdoc
Anticipated length: 1 year
Mentor (if applicable): Pablo Suarez

Postdoctoral fellow's comments:

I worked on the following projects:
1. Tetrahedral property defined by Sormani.
It was proven that sequences of spaces that satisfy this condition in a uniform way then have Gromov-Hausdorff convergent subsequences. With my collaborator, Jesus Nunez, we have been doing calculations to show that Alexandrov Spaces satisfy this condition.

2. I did some reading with Ilaria Mondello and Eleonora Di Nezza. We went through Sturm's papers where CD(K,N) spaces are defined.

3. I was reading Cavalletti-Mondino's paper about the Isoperimetric Inequality. Together with Guofang we wanted to see if their method could be generalized to N=infinity. But stopped the project.

4. I am starting a project which will be applications of a paper written by Mondino-Wei at the MSRI this semester.

5. I have been working on a paper with Catherine Searle, Maree Jaramillo, Priyanka Rajan and Anna Siffert about intrinsic flat currents defined on Alexandrov spaces.

6. I did some corrections done by a referee of a paper that I wrote while I was a PhD student.

7. I figured out that one of the papers I wrote when I was a PhD student works with just bounded above as an hypotheses rather than with a nonnegative one.

Was your experience at MSRI beneficial? Why or why not?

My experience at the MSRI was very beneficial. I had the time to learn about other aspects of differential geometry. Also, the working conditions here are great. It was nice to have a semester to focus only on research.

Shen, Liangming

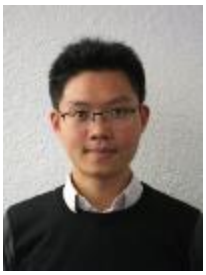
Name: Liangming Shen
Year of Ph.D: 2015
Institution of Ph.D.: Princeton University
Dissertation title: Smoothing conic Kähler metrics and conical Kähler-Ricci flow
Ph.D. advisor: Gang Tian
Mentor while at MSRI: Zhiqin Lu

Institution prior to obtaining the MSRI PD fellowship: University of British Columbia
Position at that institution: Postdoc fellow
Mentor (if applicable): Jingyi Chen

Institution (or company) where you are going after the MSRI PD fellowship: University of British Columbia
Position: Postdoc fellow
Anticipated length: 2 years
Mentor (if applicable): Jingyi Chen

Postdoctoral fellow's comments:

Study some works on Kähler geometry and Kähler-Ricci flow. Conic Kähler-Einstein metrics along simple normal crossing divisors on Fano manifolds, arXiv:1603.06329 The experience at MSRI is very beneficial, as it not only supplies me a platform to communicate with many mathematicians who are working on the same field with me, but also lets me know about many other geometric fields.



Yao, Chengjian

Name: Chengjian Yao
Year of Ph.D: 2015
Institution of Ph.D.: Stony Brook University
Dissertation title: Conical Kahler-Einstein metrics and Its applications
Ph.D. advisor: Xiuxiong Chen
Mentor while at MSRI: Zhiqin Lu

Institution prior to obtaining the MSRI PD fellowship: Universite Libre de Bruxelles
Position at that institution: Postdoc
Mentor (if applicable): Joel Fine

Institution (or company) where you are going after the MSRI PD fellowship: Universite Libre de Bruxelles
Position: Postdoc
Anticipated length: 2 years
Mentor (if applicable): Joel Fine

Postdoctoral fellow's comments:

Together with Hongnian Huang and Joel Fine, we studied a concrete example of the definite triple flow, i.e. on 4-tori, starting from a triple which is T^3 invariant, the flow is shown to be existing for long time and converge to the standard flat triple. This is the first example that the behavior of the flow of definite triples is known.

Another work initiated at MSRI is a joint work with Bing Wang. We try to study the Kahler-Ricci flow on general Q-Fano varieties. Even though the weak Kahler-Ricci flow is defined on it, the Riemannian geometric property of the flow is far from clear. We showed that the initial weak Kahler metric is nice in the sense that the metric completion of the regular part concides with the Gromov-Hausdorff limit of a family of smooth Kahler metrics with Ricci bounded below in the case of crepant resolution.

My experience at MSRI is overall wonderful and beneficial. The successive workshops spreading over the semester are in good chain from introductory to advanced topics. Those broadened my view a lot. The mentor at MSRI is also very friendly and helpful in suggesting problems to me.

Complementary Program 2015-16

Pavlov, Alexander
MacaulayII postdoc

Name: Alexander Pavlov
Year of Ph.D: 2015
Institution of Ph.D.: University of Toronto
Dissertation title: Betti Tables of Maximal Cohen-Macaulay Modules over the Cones of Elliptic Normal Curves
Ph.D. advisor: Ragnar-Olaf Buchweitz

Mentor while at MSRI: David Eisenbud

Institution prior to obtaining the MSRI PD fellowship: University of Toronto
Position at that institution: Phd Student

Institution (or company) where you are going after the MSRI PD fellowship: University of Wisconsin, Madison
Position: Van Vleck Visiting Assistant Professor
Anticipated length: 2 years
Mentor (if applicable): Daniel Erman

Postdoctoral fellow comments:

During my stay at MSRI I continued to work on the topic of my thesis in the following directions: 1. Obtaining explicit description of matrix factorizations of smooth plane cubics 2. Interpreting CI operators for transversal intersection of two quadrics in projective space in terms of the derived category of the intersection. 3. Generalizing my results to higher dimension, in particular to cubic surfaces.

Results at the moment exist as two preprints: one is on arxive.org: http://arxiv.org/abs/1511.05502 and the second (relation between theta functions and matrix factorizations of Hesse cubics) is still in preparation, but will be ready soon.

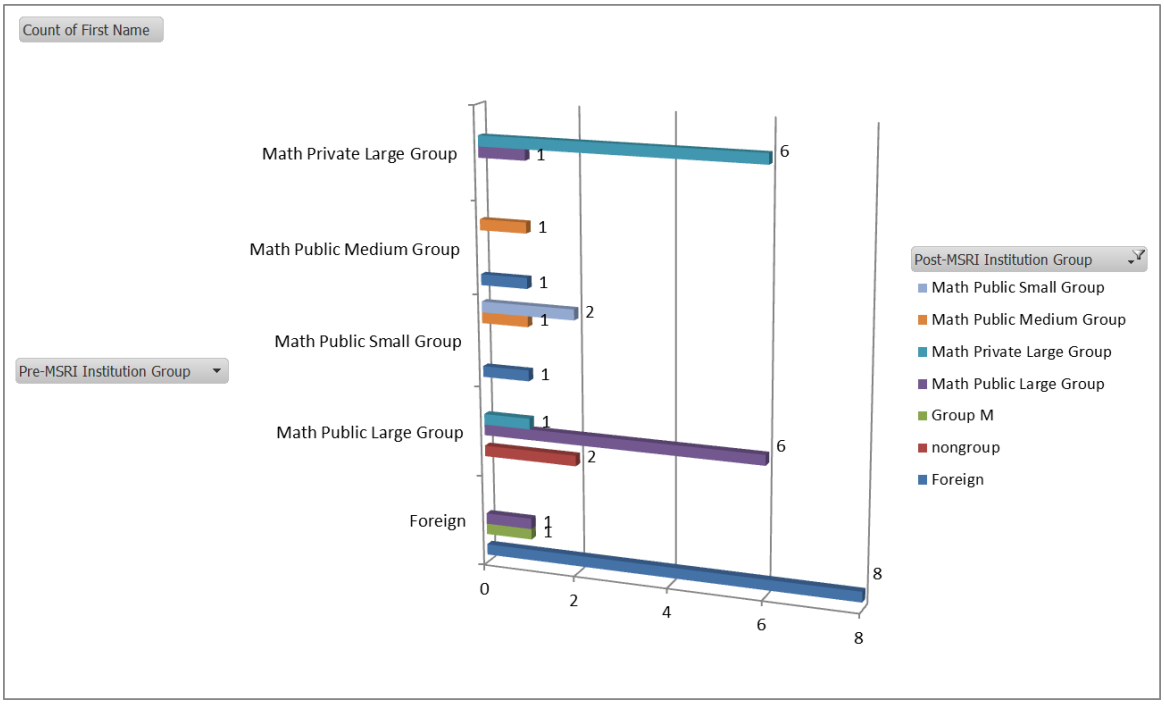
MSRI provided excellent working conditions and allowed me to focus on my research, not being distracted by anything else. In particular, I'm appreciative of financial support for travel to MSRI and to workshops. I'm also very grateful to my mentor David Eisenbud for support, interest in my work and many stimulating discussions.

3.2 Postdoctoral Fellow Placement List

Family Name	First Name	Pre-MSRI Institution Group	Post-MSRI Institution Group	Pre-MSRI Institution Name	Placement Institution Name
Bulut	Aynur	Math Public Large Group	Math Public Large Group	University of Michigan	University of Michigan
Butkovsky	Oleg	Foreign	Foreign	Technion - Israel Institute of Technology	Technion - Israel Institute of Technology
Haberman	Boaz	Math Public Large Group	Math Private Large Group	UC Berkeley	University of Chicago
Huang	Jingyu	Math Public Small Group	Math Public Medium Group	University of Kansas	University of Utah
Kim	Kunwoo	Math Public Medium Group	Foreign	University of Utah	Teachnion-Israel Institute of Technology
Le	Khoa	Math Public Small Group	Foreign	University of Kansas	University of Calgary
Mendelson	Dana	Math Private Large Group	Math Private Large Group	MIT	Institute for Advanced Study & University of Chicago
Menz	Georg	Math Private Large Group	Math Public Large Group	Stanford University	UCLA
Shahshahani	Sohrab	Math Public Large Group	Math Public Large Group	University of Michigan	University of Michigan
Tarfulea	Andrei	Math Private Large Group	Math Private Large Group	Princeton University	University of Chicago
Totz	Nathan	Math Public Medium Group	Math Public Medium Group	University of Massachusetts Amherst	University of Massachusetts Amherst
Wang	Chuntian	Math Public Large Group	Math Public Large Group	UCLA	UCLA
Wilson	Bobby	Math Private Large Group	Math Private Large Group	University of Chicago	Massachusetts Institute of Technology
Xu	Samantha	Math Public Large Group	Math Public Large Group	University of Illinois at Urbana-Champaign	University of Illinois at Urbana-Champaign
Zeng	Qiang	Math Private Large Group	Math Private Large Group	Harvard University	Northwestern University
Zhong	Jie	Math Public Small Group	Math Public Small Group	University of Central Florida	University of Central Florida
Ache	Antonio	Math Private Large Group	Math Private Large Group	Princeton University	University of Notre-Dame
Conlon	Ronan	Foreign	Group M	Universite du Quebec a Montreal	Florida International University
Deruelle	Alix	Foreign	Foreign	Université Paris Sud 11 Orsay	Université Paris Sud 11 Orsay
Di Nezza	Eleonora	Foreign	Foreign	Imperial College London	Imperial College London
Foscolo	Lorenzo	Math Public Large Group	Math Public Large Group	Stony Brook University	Stony Brook University
Kennard	Lee	Math Public Small Group	Math Public Small Group	University of Oklahoma	University of Oklahoma
Leach	Jeremy	Math Public Large Group	nongroup	University of Washington	Trexquant Investment LP
Lin	Yueh-Ju	Math Public Large Group	Math Public Large Group	University of Michigan	University of Michigan
Lock	Michael	Math Public Large Group	nongroup	University of Texas at Austin	Leaving academia
Macbeth	Heather	Math Private Large Group	Math Private Large Group	MIT	MIT
Mondello	Ilaria	Foreign	Foreign	Institut de Mathématiques de Jussieu	Université de Paris Est Créteil
Mondino	Andrea	Foreign	Foreign	University of Zurich	University of Warwick
Perales	Raquel	Foreign	Foreign	Universidad Autonoma de Mexico (UNAM)	Universidad Autonoma de Mexico (UNAM)
Shen	Liangming	Foreign	Foreign	University of British Columbia	University of British Columbia
Yao	Chengjian	Foreign	Foreign	Universite Libre de Bruxelles	Universite Libre de Bruxelles
Pavlov	Alexander	Foreign	Math Public Large Group	University of Toronto	University of Wisconsin, Madison

Postdoctoral Fellow Placement Institution

(based on AMS Groupings)



Highlights: Of the 16 postdocs who came from Private and Public Large Groups, 7 went to Private and 7 went to Public Large Groups after their fellowships at MSRI.

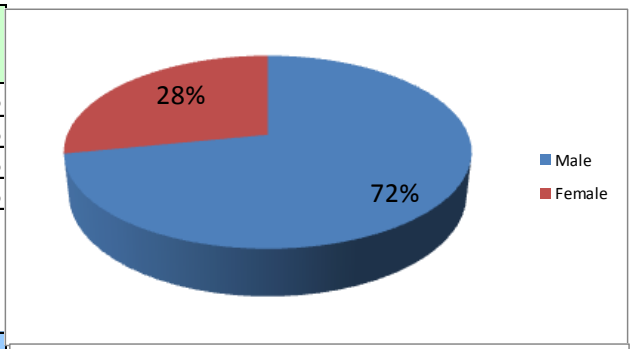
3.3 Postdoctoral Fellow Participant Summary

Programs	# of Postdocs	# of Citizens & Perm. Res.	%	# of Female	%	# of Minorities[1]	%	US Home Institution	%
Differential Geometry	15	4	*26.7%*	5	*33.3%*	1	*25.0%*	7	46.7%
New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems	16	7	*43.8%*	4	*25.0%*	1	*20.0%*	13	81.3%
Complementary Program	1	0	*0.0%*	0	*0.0%*	0	*0.0%*	0	0.0%
Total # of Distinct Postdocs	**32**	**11**	***34.4%***	**9**	***28.1%***	**2**	***22.2%***	**20**	***62.5%***

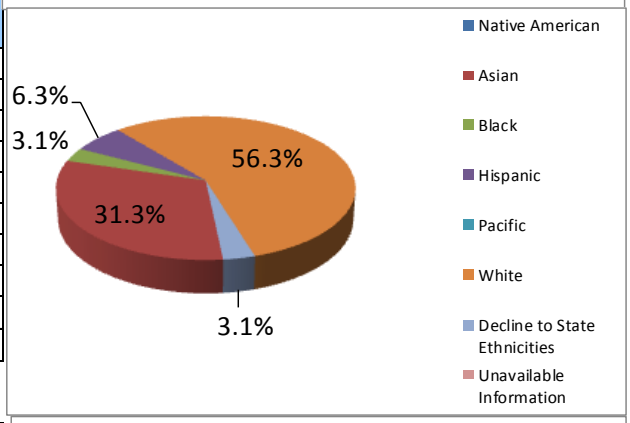
[1] *Minorities are US citizens who declare themselves American Indian, Black, Hispanic, or Pacific Islander. Minority percentage is calculated by dividing the number of Minorities by the total number of US citizens.*

3.4 Postdoctoral Fellow Demographic Data

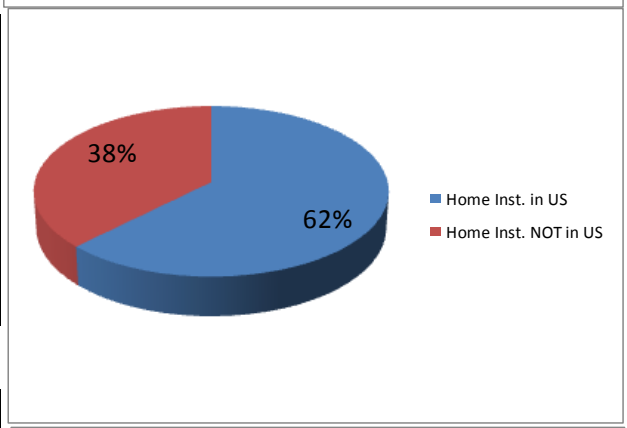
Gender	#	% (No Decl.)*	%
# of Distinct Postdocs	32		100.0%
Male	23	71.88%	71.9%
Female	9	28.13%	28.1%
Decline to State Gender	0		0.0%



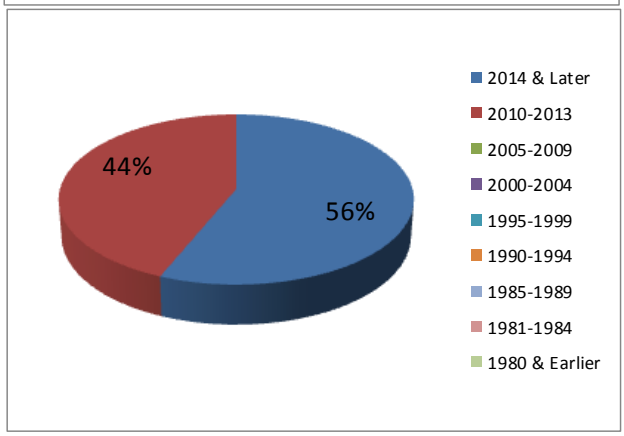
Ethnicities	#	% (No Decl.)*	%
Native American	0	0.00%	0.0%
Asian	10	32.26%	31.3%
Black	1	3.23%	3.1%
Hispanic	2	6.45%	6.3%
Pacific	0	0.00%	0.0%
White	18	58.06%	56.3%
Decline to State Ethnicities	1		3.1%
Unavailable Information	0		0.0%
Minorities	2		22.2%



Citizenships	#		%
US Citizen & Perm. Residents	11		34.4%
Foreign	21		65.6%
Unavailable information	0		0.0%
# of Distinct Members	32		100.0%
US Citizen	9		28.1%
Perm Residents	2		6.3%
Home Inst. in US	20		62.50%



Year of Ph.D	#		%
Program Associates (GS)	0		0.0%
2014 & Later	18		56.3%
2010-2013	14		43.8%
2005-2009	0		0.0%
2000-2004	0		0.0%
1995-1999	0		0.0%
1990-1994	0		0.0%
1985-1989	0		0.0%
1981-1984	0		0.0%
1980 & Earlier	0		0.0%
Unavailable Info.	0		0.0%
Total # of Distinct Postdocs	32		100.0%



**Statistic Calculation based on all participants that did not decline.*

Programs

Differential Geometry

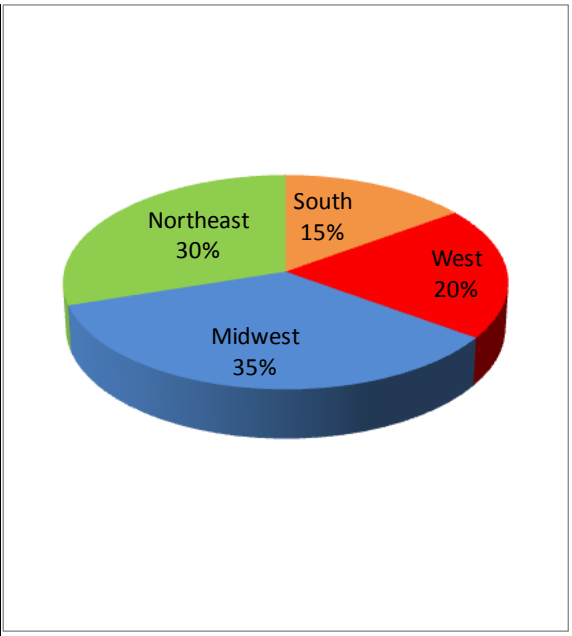
New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems

Complementary Program

2015–16 Postdoctoral Fellows Home Institution Classified by States

**Regions based on US Census classification*

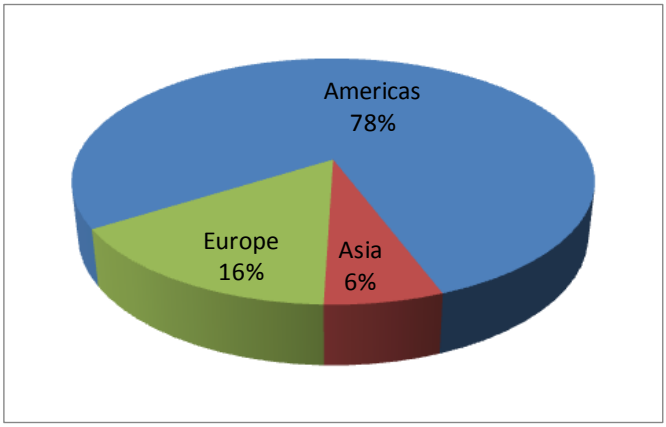
State	#	%	2007 Census Population
South	**3**	**15.0%**	**36.6%**
AL	-	0.0%	1.5%
AR	-	0.0%	0.9%
DE	-	0.0%	0.3%
DC	-	0.0%	0.2%
FL	1	5.0%	6.1%
GA	-	0.0%	3.2%
KY	-	0.0%	1.4%
LA	-	0.0%	1.4%
MD	-	0.0%	1.9%
MS	-	0.0%	1.0%
NC	-	0.0%	3.0%
OK	1	5.0%	1.2%
SC	-	0.0%	1.5%
TN	-	0.0%	2.0%
TX	1	5.0%	7.9%
VA	-	0.0%	2.6%
WV	-	0.0%	0.6%
West	**4**	**20.0%**	**23.2%**
AK	-	0.0%	0.2%
AZ	-	0.0%	2.1%
HI	-	0.0%	0.4%
ID	-	0.0%	0.5%
MT	-	0.0%	0.3%
CA	2	10.0%	12.1%
CO	-	0.0%	1.6%
NV	-	0.0%	0.9%
NM	-	0.0%	0.7%
OR	-	0.0%	1.2%
UT	1	5.0%	0.9%
WA	1	5.0%	2.1%
WY	-	0.0%	0.2%
Midwest	**7**	**35.0%**	**22.0%**
IL	4	20.0%	4.3%
IN	-	0.0%	2.1%
IA	-	0.0%	1.0%
KS	-	0.0%	0.9%
MI	3	15.0%	3.3%
MN	-	0.0%	1.7%
MO	-	0.0%	1.9%
ND	-	0.0%	0.2%
NE	-	0.0%	0.6%
OH	-	0.0%	3.8%
SD	-	0.0%	0.3%
WI	-	0.0%	1.9%
Northeast	**6**	**30.0%**	**18.1%**
CT	-	0.0%	1.2%
ME	-	0.0%	0.4%
MA	4	20.0%	2.1%
NH	-	0.0%	0.4%
NJ	1	5.0%	2.9%
NY	1	5.0%	6.4%
PA	-	0.0%	4.1%
RI	-	0.0%	0.4%
VT	-	0.0%	0.2%
Other	**-**	**0.0%**	**0%**
PR	-	0.0%	0%
Other	-	0.0%	0%
Total	**20**	**100%**	**100%**



2015–16 Postdoctoral Fellows Home Institution Classified by Countries

**Regions based on United Nations classification*

Americas			**25**
	North America	Canada	4
		United States	20
	Central America	Mexico	1
Asia			**2**
	Western Asia	Israel	2
Europe			**5**
	Northern Europe	England	1
	Western Europe	France	2
		Switzerland	1
		Belgium	1
Grand Total			**32**



3.5 Postdoctoral Research Member Placement List

Family Name	First Name	Pre-MSRI Institution Group	Post-MSRI Institution Group	Pre-MSRI Institution Name	Placement Institution Name
Chodosh	Otis	Foreign	Math Private Large Group	Center for Mathematical Sciences	Princeton University
Harrop-Griffiths	Benjamin	Math Private Large Group	Math Private Large Group	New York University, Courant Institute	New York University, Courant Institute
Li	Yao	Math Public Medium Group	Math Public Medium Group	University of Massachusetts, Amherst	University of Massachusetts, Amherst

3.6 Postdoctoral Research Member Summary

Programs	# of PDRMs	# of Citizens & Perm. Res.	%	# of Female	%	# of Minorities[1]	%	US Home Institution	%
Differential Geometry	1	1	*100.0%*	0	*0.0%*	0	*0.0%*	0	0.0%
New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems	2	0	*0.0%*	0	*0.0%*	0	*0.0%*	2	100.0%
Total # of Distinct PDRMs	**3**	**1**	***33.3%***	**-**	***0.0%***	**-**	***0.0%***	**2**	***66.7%***

[1] *Minorities are US citizens who declare themselves American Indian, Black, Hispanic, or Pacific Islander. Minority percentage is calculated by dividing the number of Minorities by the total number of US citizens.*

4. Graduate Program

In 2015–16, 392 graduate students visited MSRI to participate in our workshops (355 graduate students), and programs (36 graduate students/program associates). While the majority of the graduate students who visit MSRI had been invited to take part in one of our workshops or summer graduate schools, a smaller number of graduate students were invited as 'Program Associates' in our semester-long scientific programs.

4.1 Summer Graduate Schools (SGS)

Following the new reporting timeline (August 15th, 2015 to May 31st, 2016), the summer 2015 activities were reported in the previous year's annual report, 2014-15 and the summer 2016 activities will be reported in the next annual report, 2016-17.

4.2 Summer Graduate School Data

There is no Summer Graduate School data for this reporting period.

4.3 Program Associate

Program Associates benefit greatly from the opportunity to interact with leaders of a field and postdoctoral fellows, gaining intense exposure to current ideas and trends in their area of specialization. While MSRI does not have the financial resources to fund the Program Associates, they are closely supervised and essentially benefit from all members' privileges, including shared office space. They are provided with an access card to the building which allows them to use the premises at any time. They receive a bus pass, and a library and sports facilities access pass. There were 37 graduate students who resided at MSRI for an extended period of time during the academic year 2015–16. See the table in section 4.4 for a detailed description of the demographic data.

4.4 Program Associate Data

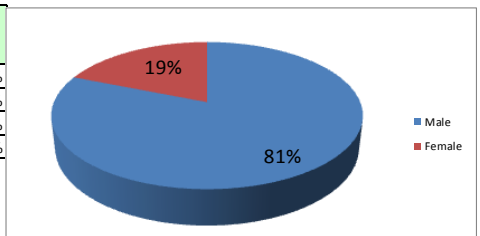
Programs	# of PAs	# of Citizens & Perm. Res.	%	# of Female	%	# of Minorities[1]	%	US Home Institution	%
Differential Geometry	15	6	*40.0%*	4	*26.7%*	0	*0.0%*	11	73.3%
New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems	22	2	*9.1%*	3	*13.6%*	0	*0.0%*	13	59.1%
Total # of Distinct Program Associates (PAs)	**37**	**8**	***21.6%***	**7**	***18.9%***	**-**	***0.0%***	**24**	***64.9%***

[1] *Minorities are US citizens who declare themselves American Indian, Black, Hispanic, or Pacific Islander. Minority percentage is calculated by dividing the number of Minorities by the total number of US citizens.*

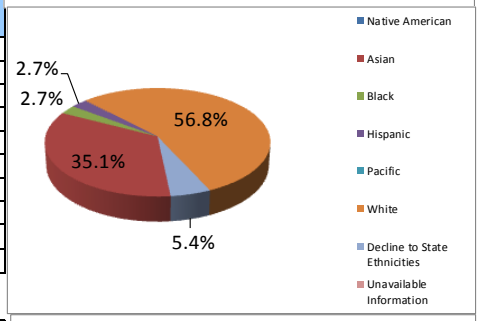
Program Associate Demographic Data

2015–16 Program Associates Demographic Summary

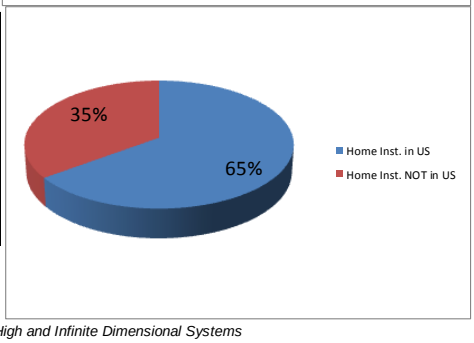
Gender	#	% (No Decl.)*	%
# of Distinct PAs	37		100.0%
Male	30	81.08%	81.1%
Female	7	18.92%	18.9%
Decline to State Gender	0		0.0%



Ethnicities	#	% (No Decl.)*	%
Native American	0	0.00%	0.0%
Asian	13	36.11%	35.1%
Black	1	2.78%	2.7%
Hispanic	1	2.78%	2.7%
Pacific	0	0.00%	0.0%
White	21	58.33%	56.8%
Decline to State Ethnicities	2		5.4%
Unavailable Information	0		0.0%
Minorities	0		0.0%



Citizenships	#		%
US Citizen & Perm. Residents	8		21.6%
Foreign	29		78.4%
Unavailable information	0		0.0%
# of Distinct PAs	37		100.0%
US Citizen	8		21.6%
Perm Residents	0		0.0%
Home Inst. in US	24		64.86%



Programs

Differential Geometry

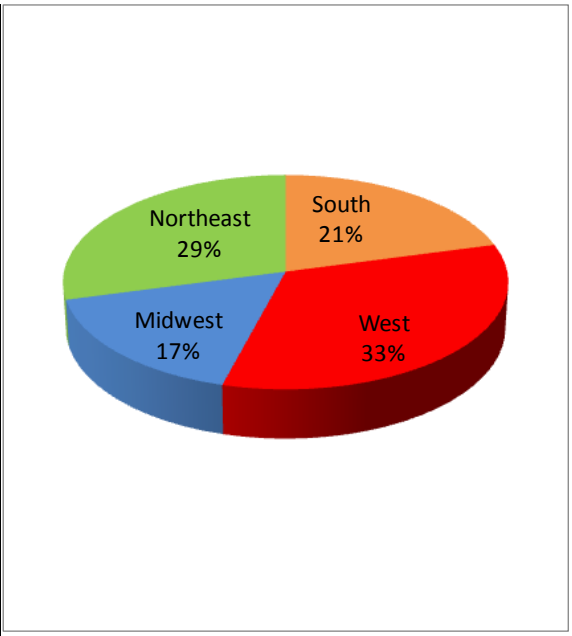
New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems

Complementary Program

2015–16 Program Associates Home Institution Classified by States

**Regions based on US Census classification*

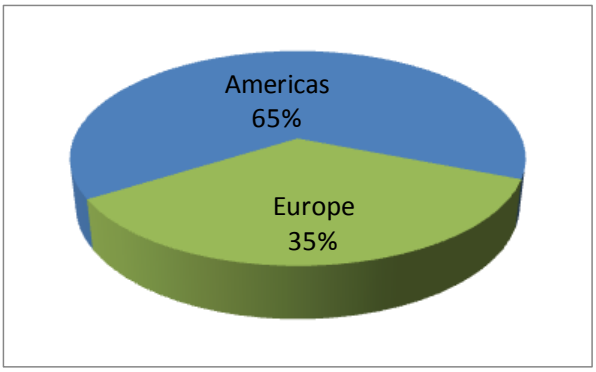
State	#	%	2007 Census Population
South	**5**	**20.8%**	**36.6%**
AL	-	0.0%	1.5%
AR	-	0.0%	0.9%
DE	-	0.0%	0.3%
DC	2	8.3%	0.2%
FL	-	0.0%	6.1%
GA	-	0.0%	3.2%
KY	-	0.0%	1.4%
LA	-	0.0%	1.4%
MD	2	8.3%	1.9%
MS	-	0.0%	1.0%
NC	-	0.0%	3.0%
OK	-	0.0%	1.2%
SC	-	0.0%	1.5%
TN	-	0.0%	2.0%
TX	1	4.2%	7.9%
VA	-	0.0%	2.6%
WV	-	0.0%	0.6%
West	**8**	**33.3%**	**23.2%**
AK	-	0.0%	0.2%
AZ	1	4.2%	2.1%
HI	-	0.0%	0.4%
ID	-	0.0%	0.5%
MT	-	0.0%	0.3%
CA	6	25.0%	12.1%
CO	-	0.0%	1.6%
NV	-	0.0%	0.9%
NM	-	0.0%	0.7%
OR	-	0.0%	1.2%
UT	1	4.2%	0.9%
WA	-	0.0%	2.1%
WY	-	0.0%	0.2%
Midwest	**4**	**16.7%**	**22.0%**
IL	1	4.2%	4.3%
IN	-	0.0%	2.1%
IA	-	0.0%	1.0%
KS	-	0.0%	0.9%
MI	-	0.0%	3.3%
MN	-	0.0%	1.7%
MO	-	0.0%	1.9%
ND	-	0.0%	0.2%
NE	-	0.0%	0.6%
OH	-	0.0%	3.8%
SD	-	0.0%	0.3%
WI	3	12.5%	1.9%
Northeast	**7**	**29.2%**	**18.1%**
CT	-	0.0%	1.2%
ME	-	0.0%	0.4%
MA	3	12.5%	2.1%
NH	2	8.3%	0.4%
NJ	1	4.2%	2.9%
NY	-	0.0%	6.4%
PA	-	0.0%	4.1%
RI	1	4.2%	0.4%
VT	-	0.0%	0.2%
Other	**-**	**0.0%**	**0%**
PR	-	0.0%	0%
Other	-	0.0%	0%
Total	**24**	**100%**	**100%**



2015–16 Associates Home Institution Classified by Countries

**Regions based on United Nations classification*

Americas			**24**
	North America	United States	24
Europe			**13**
	Northern Europe	England	3
	Southern Europe	Spain	2
		Italy	1
	Western Europe	France	4
		Germany	3
Grand Total			**37**



4.5 Graduate Student List

(Participants who attended 2015–16 workshops)

(See e-mail attachment)

4.6 Graduate Student Data

(Participants who attended 2015–16 workshops)

Workshops	# of GSs	# of Citizens & Perm. Res.	%	# of Female	%	# of Minorities[1]	%	US Home Institution	%
9 Scientific Workshops									
Connections for Women: Differential Geometry	13	8	*61.5%*	7	*53.8%*	2	*25.0%*	11	84.6%
Connections for Women: Dispersive and Stochastic PDE	24	6	*25.0%*	7	*29.2%*	0	*0.0%*	20	83.3%
Geometric Flows in Riemannian and Complex Geometry	39	17	*43.6%*	5	*12.8%*	1	*7.1%*	29	74.4%
Introductory Workshop: Modern Riemannian Geometry	52	29	*55.8%*	11	*21.2%*	2	*7.4%*	46	88.5%
Introductory Workshop: Randomness and long time dynamics in nonlinear evolution differential	39	16	*41.0%*	9	*23.1%*	0	*0.0%*	33	84.6%
Kähler Geometry, Einstein Metrics, and Generalizations	37	13	*35.1%*	7	*18.9%*	1	*8.3%*	25	67.6%
New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensio	41	9	*22.0%*	7	*17.1%*	0	*0.0%*	26	63.4%
Theory of Neural Computation	45	30	*66.7%*	8	*17.8%*	3	*10.7%*	43	95.6%
Hot Topics: Cluster algebras and wall-crossing	29	14	*48.3%*	5	*17.2%*	1	*7.7%*	24	82.8%
All 9 Workshops Total	**319**	**142**	***44.5%***	**66**	***20.7%***	**10**	***7.6%***	**257**	***80.6%***
3 Education & Outreach Workshops									
Critical Issues in Mathematics Education 2016: Observing, Evaluating and Improving Mathematics Teaching from the Early Grades through the University	14	12	*85.7%*	10	*71.4%*	7	*58.3%*	14	100.0%
Math Circle - Mentorship and Partnership Program	2	2	*100.0%*	2	*100.0%*	0	*0.0%*	2	100.0%
Modern Math Workshop 2015	20	18	*90.0%*	9	*45.0%*	16	*88.9%*	20	100.0%
All 3 Workshops Total	**36**	**32**	***88.9%***	**21**	***58.3%***	**23**	***115.0%***	**36**	***100.0%***
All 12 Workshops Total	**355**	**174**	***49.0%***	**87**	***24.5%***	**33**	***21.7%***	**293**	***82.5%***

[1] *Minorities are US citizens who declare themselves American Indian, Black, Hispanic, or Pacific Islander. Minority percentage is calculated by dividing the number of Minorities by the total number of US citizens.*

5. Undergraduate Program (MSRI-UP)

Following the new reporting timeline (August 15th, 2015 to May 31st, 2016), the summer 2015 activities were reported in the previous year's annual report, 2014-15 and the summer 2016 activities will be reported in the next annual report, 2016-17.

11. Appendix – Final Reports of Activities in 2015–16

MSRI
Mathematical Sciences Research Institute

17 Gauss Way Berkeley, CA 94720-5070 p: 510.642.0143 f: 510.642.8609 www.msri.org

New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems

August 17, 2015 - December 18, 2015
MSRI, Berkeley, CA
USA

Organizers:

Kay Kirkpatrick (University of Illinois at Urbana-Champaign)
Yvan Martel (École Polytechnique)
Jonathan Mattingly (Duke University)
Andrea Nahmod (University of Massachusetts, Amherst)
Pierre Raphael (Université Nice Sophia-Antipolis)
Luc Rey-Bellet (University of Massachusetts, Amherst)
LEAD Gigliola Staffilani (Massachusetts Institute of Technology)
Daniel Tataru (University of California, Berkeley)

REPORT ON THE NEW CHALLENGES IN PDE: DETERMINISTIC DYNAMICS AND RANDOMNESS IN HIGH AND INFINITE DIMENSIONAL SYSTEMS.

MSRI SPECIAL JUMBO PROGRAM, FALL 2015

KAY KIRKPATRICK, YVAN MARTEL, JONATHAN MATTINGLY, ANDREA R. NAHMOD, PIERRE RAPHAËL, LUC REY-BELLET, GIGLIOLA STAFFILANI AND DANIEL TATARU

1. INTRODUCTION

This semester-long jumbo research program in Dispersive PDE and Stochastic PDE was held at MSRI during the fall of 2015 (August 17-December 18). The semester was proposed and organized by Kay Kirkpatrick, Yvan Martel, Jonathan Mattingly, Andrea R. Nahmod, Pierre Raphaël, Luc Rey-Bellet, Gigliola Staffilani and Daniel Tataru.

We envisioned this special semester to be a venue where experts on dispersive and wave equations, on stochastic equations and on the intersections of these two major fields of research would converge on a single institution to discuss and tackle some of the most challenging questions that remain unanswered in these fields and develop new integrative methods.

Over the past twenty years the theory of nonlinear *dispersive* partial differential equations and systems (PDE) on the one hand, and the theory of *stochastic* partial differential equations (SPDE) on the other have developed into a matured mathematical theory. On the PDE side, the development of analytical tools in nonlinear Fourier and harmonic analysis to address nonlinear estimates, related deep functional analytic methods and profile decompositions have fundamentally contributed to the study of the local and global-in-time well-posedness[1] as well as singularity formation for dispersive equations and systems. The thrust of this body of work had focused primarily on deterministic aspects of wave phenomena. More recently, several publications had though appeared aimed at understanding the non-deterministic point of view as well. On the SPDE side, similar questions about existence, uniqueness and qualitative long-time behavior[2] had also been addressed for a large number of models by bringing together tools from statistical mechanics, dynamical systems and probability theory. In recent years, the focus in both PDE and SPDE had thus shifted to trying to gain a more quantitative understanding of the nondeterministic long-time dynamical behavior in various regimes. While there had been spectacular progress in both of these fields, the advances had taken place in a parallel fashion without substantial exchange of ideas between the two mathematical communities. However, many fundamental questions remained still open in both fields that we believed could be tackled by exploring the numerous ties among them. We already had a small example of a fruitful interaction between the two communities that occurred at a conference in Oxford, UK where G. Staffilani (PDE) interacted for the first time with M. Hairer (SPDE). During their brief conversation, it became clear that the two mathematicians were interested on similar questions, but Staffilani was not familiar with the probabilistic approach combined with the concept of *rough paths* that Hairer had used in his recent breakthrough to prove existence of solutions to the Kardar-Parisi-Zhang (KPZ) equation; and Hairer was not familiar with the Fourier analytic tools and data randomization she had used in a work on Navier-Stokes equations joint with A. Nahmod

[1]Existence, uniqueness and some form of stability for the Cauchy initial value problem.

[2]Existence and uniqueness of underlying stationary measure, mixing rates, etc.

and N. Pavlovic. At the end, both mathematicians realized the deep connections between both approaches and the potential power of a synergistic combination. It should be said here that a mini-lab of what happened at MSRI this fall was the Exploratory Seminar that was organized by A. Nahmod and G. Staffilani with the support of the Radcliffe Institute for Advanced Study at Harvard. This Exploratory Seminar, titled *Randomness and Long-Time Dynamics in Nonlinear Evolution Differential Equations*, took place over a weekend in October 2014. A small group of researchers in PDE and SPDE gathered for presentations and in particular for discussions and interactions. The event was in fact fundamental in oder to find a strategy that would encourage maximum interactions at MSRI.

After the semester at MSRI ended and after reading the comments the members and visitors made in their exit survey, some of which are reported in the last section, it is clear that the cross-pollination between the two areas that we had envisioned indeed happened and most likely will provide new and exciting results, some of them already obtained and reported in the last section of this report.

2. Postdoctoral Fellows

More details on each postdoctoral fellow can be found five pages down.

3. Workshops

We had three workshops in our program: the *Connections for Women Workshop: Dispersive and Stochastic PDE*, run by Kay Kirkpatrick and Andrea Nahmod, the one week *Introductory Workshop: Randomness and long time dynamics in nonlinear evolution differential equations*, run by Kay Kirkpatrick, Yvan Martel, Luc Rey-Bellet and Gigliola Staffilani, and the two weeks *Research Workshop: New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensional systems*, run by Jonathan Mattingly, Andrea Nahmod, Pierre Raphael, Luc Rey-Bellet and Daniel Tataru. These workshop were very well attended, in particular the research workshop. In fact this last one had a format that was quite unique in the sense that the speakers and the topics introduced spanned a very wide spectrum. We believe that the reason why it worked so well and the audience really appreciated it was certainly due to the caliber of the speakers but also to the effort that the speakers made in reaching out to a very diverse audience, after they received from the organizers general guidelines on the type of talk that was expected.

3.1. **: Connections for Women Workshop: Dispersive and Stochastic PDE**. This workshop consisted of various talks given by prominent female mathematicians whose research lies in and interfaces with the fields of nonlinear evolution dispersive PDE, wave phenomena and stochastic processes. These talks were appropriate for graduate students, post-docs, and researchers in the areas above mentioned. The list of speakers with titles was as follows:

- *Multiple timescales in the evolution of fluids models* by **Margaret Beck**
- *Diffusion Processes and Invariant Gibbs Measures* by **Samantha Xu**
- *Negative energy blowup results for the focusing Hartree hierarchy* by **Aynur Bulut**
- *The Feynman–Kac Formula and Harnack Inequality for Degenerate Diffusions* by **Camelia Pop**
- *Breaking in water wave models* by **Vera Mikyoung Hur**
- *Symplectic non-squeezing for the cubic nonlinear Klein-Gordon equation on* $\mathbb{T}^3$ by **Dana Mendelson**
- *Liouville Theorems for the Navier Stokes Equation on a Hyperbolic Space* by **Magdalena Czubak**
- *Blow-up and scattering in the focusing dispersive equations* by **Svetlana Roudenko**

- *Stochastic Homogenisation on geometric spaces* by **Xue-Mei Li.**

There were also two panel session. The first was on *Professional development: Collaboration, Communication, and Job searches*, the second on *Work/Life balance: Two-body problems, Three-body, and N-body*.

3.2. **Introductory Workshop: Randomness and long time dynamics in nonlinear evolution differential equations.** . The purpose of the program was to bring together a core group of mathematicians from the dispersive PDE and the SPDE communities whose research contains an underlying and unifying problem: analyzing high or infinite dimensional dynamics, where dynamics is understood in a broad sense and arising from the flows generated by either deterministic or stochastic partial differential equations, or from dynamical evolution of large physical systems. The introductory workshop served as an overview to the program. It aimed at familiarizing graduate students, postdocs, and other researchers to the major topics of the program through short courses and discussions.

The list of lecturers with titles was as follows:

- *Geometric nonlinear dispersive PDE's* by **Daniel Tataru**
- *Introduction to Stochastic Partial Differential Equations* by **Arnaud Debussche**
- *Introduction to invariant measure and Unique ergodicity for SPDEs* by **Jonathan Mattingly**
- *Many body quantum dynamics and nonlinear dispersive PDE* by **Natasa Pavlovic**
- *MCMC, SMC and IS in High and Infinite Dimensional Spaces* by **Andrew Stuart**
- *Global dynamics of nonlinear dispersive equations* by **Kenji Nakanishi**
- *Invariant Measures for nonlinear PDE* by **Andrea Nahmod**

The two or three hours lectures were greatly appreciated not just by the junior mathematicians but by the senior ones as well and they represented the starting point of several collaborations among the members.

3.3. **Research Workshop: New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensional systems.** . This workshop served to bring into focus the fundamental aim of the jumbo program by both a) showcasing the spectacular progress in recent years in the study of both nonlinear dispersive as well as stochastic partial differential equations and b) bringing to the fore the key challenges for the future in quantitatively analyzing the dynamics of solutions arising from the flows generated by deterministic and non-deterministic evolution differential equations, or dynamical evolution of large physical systems.

During the two weeks long workshop, we intertwined talks on a wide array of topics by some of the key researchers in both communities and we aimed at highlighting the most salient ideas, proofs and questions which are important and fertile for 'cross-pollination? between PDE and SPDE. Topics included: Global dynamics and singularity formation for geometric and physical nonlinear wave and dispersive models (critical and supercritical regimes); dynamics of infinite dimensional systems (critical phenomena, multi scale dynamics and metastability); symplectic structures of infinite dimensional dynamical systems; randomization and long time dynamics, invariant Gibbs and weighted Wiener measures; derivation of effective dynamics in quantum systems; weak turbulence phenomena; optimization and learning algorithms: distributed, stochastic and parallel.

The list of speakers with titles was as follows:

- *Wave turbulence for the cubic Szegö equation and beyond* by **Patrick Gerard**
- *Diffusive limits for stochastic kinetic equations* by **Arnaud Debussche**
- *Symplectic non-squeezing for the cubic NLS on* R^2 by **Monica Visan**
- *Optimal Regularity for some Parabolic SPDEs* by **Davar Khoshnevisan**

- An Applied Math Perspective on Climate Science, Turbulence, and Other Complex Systems by **Andrew Majda**
- *Generalized Smoluchowski Equations and Scalar Conservation Laws* by **Fraydoun Rezakhanlou**
- *The Talbot effect and the evolution of Vortex Filaments* by **Luis Vega**
- *KP-II in 2 and 3d* by **Herbert Koch**
- *The Kardar-Parisi-Zhang equation and universality class* by **Jeremy Quastel**
- *Exotic blow up rates for some critical nonlinear dispersive equations* by **Yvan Martel**
- *Toward a smooth ergodic theory for infinite dimensional systems* by **Lai-Sang Young**
- *Invariant measures and the soliton resolution conjecture* by **Sourav Chatterjee**
- *The large box limit of nonlinear Schrodinger equations in weakly nonlinear regime* by **Jalal Shatah**
- *On random strings* by **Martin Hairer**
- *Random Versus Deterministic Approach in the Study of Wave and Dispersive Equations* by **Gigliola Staffilani**
- *Energy distribution and wave turbulence closures for the nonlinear Schrödinger equation* by **Zaher Hani**
- *Classical Hamiltonian Systems, Driven out of Equilibrium, a Review*, by **Jean-Pierre Eckmann**
- *From particles to linear hydrodynamic equations* by **Thierry Bodineau**
- *From particles to linear hydrodynamic equations* by **Isabelle Gallagher**
- *Global stability of a flat interface for the gravity-capillary water-wave model* by **Benoit Pausader**
- *On global solutions of water wave models* by **Alexandru Ionescu**
- *Control of water waves* by **Thomas Alazard**
- *Universality in polytope phase transitions and message passing algorithms* by **Andrea Montanari**
- *The stochastic Landau-Lifshitz equation* by **Anne de Bouard**
- *On long term dynamics of nonlinear evolution equations* by **Wilhelm Schlag**
- *Dispersion for the wave and the Schrdinger equations outside strictly convex domains* by **Oana Ivanovici**
- *SPDEs on graphs as limit of SPDEs on narrow channels* by **Sandra Cerrai**
- *Renormalisation in regularity structures* by **Lorenzo Zambotti**
- *Blow-up of the critical norm for supercritical wave equations* by **Thomas Duyckaerts**
- *Second microlocalization and stabilization of damped wave equations on tori* by **Nicolas Burq**
- *Data assimilation for high dimensional nonlinear forecasting* by **David Kelly**
- *Some generic features of dynamics in a high-dimensional rugged landscape* by **Jorge Kurchan**
- *Long wave limit for Schrödinger maps* by **Pierre Germain**
- *Hitting questions and multiple points for stochastic PDE (SPDE) in the critical case* by **Carl Mueller**
- *The cubic Dirac equation in* $H^{\frac{1}{2}}(\mathbb{R}^2)$ by **Ioan Bejenaru**.

An impromptu concert featuring Kay Kirkpatrick, Isabelle Gallagher and Wilhelm Schlag concluded a wonderful conference!

4. Organizational Structure

In addition to the three workshops, the organizers created a number of events that helped people better know each other and structure the time of the members in residence. Many of these events were designated with the Postdoctoral Fellows and other junior mathematicians in mind. These events started with a series of "Five Minutes Talks" given at the beginning of the semester by most of the members in residence. According to the exit survey this event was fundamental in oder to start interactions among the members. As for the recurrent meetings we had a series of x mini-courses, a weekly research seminar, a weekly post-doc seminar and a weekly grad student seminar and the bi-weekly lectures of Pierre Raphael (Chancellor Professor) in Evans Hall.

4.1. **Mini-courses.** The mini curses that took place once a week were particularly welcomed. Each speaker prepared a 90 minutes lecture and the audience greatly interacted with the speaker throughout the duration of the lecture. The speakers and the topics introduced are listed here:

- *Connections between Partial systems and SPDE (or Duality in SPDEs)* by **Carl Mueller**
- *Scaling limits for iterative algorithms* by **Andrea Montanari**
- *Hypoellipticity for SPDEs* by **Jonathan Mattingly**
- *Paradifferential parametrices in geometric nonlinear wave equations* by **Daniel Tataru**
- *The cubic Szegö equation* by **Patrick Gerard**
- *Syngular integrals, forest formulae, etc.* by **Martin Hairer**
- *Diffusions with Rough Drifts and Stochastic Symplectic Maps* by *Fraydoun Rezakhanlou*
- *On the small mass limit for a class of stochastic damped wave equations* by **Sandra Cerrai**
- *Concentration compactness for nonlinear dispersive equations* by **Thomas Duyckaerts**
- *Asymptotic stability for nonlinear waves* by **Yvan Martel**

Since the program put together researchers from two different fields, the mini-courses became a great way to learn some of the most exciting new techniques developed in recent years in these fields in a friendly and very collegial manner.

4.2. **Weekly Meeting on Wave Turbulence.** The weekly meeting on wave turbulence was another instance of interaction between the probability and PDE groups of the workshop. The first few meetings had a ?round table discussion? format, in which participants were asking and proposing questions aimed at improving their understanding of concepts related to wave turbulence, particularly because many such concepts are not precisely defined in the literature. A few weeks into the semester the meetings started to become more focused on a couple of particular, and realistically achievable questions, that the group tried to address.

4.3. **Weekly Research Seminars.** A weekly research seminar was scheduled throughout the semester. The speakers for this series of seminar were senior accomplished mathematicians who had not had the chance to present their current research at either one of the scheduled workshops. The organizers, in putting together the schedule, maintained great sensitivity in promoting diversity in terms of both gender of the speakers and topics presented.

4.4. **Post-doc seminars.** Every Friday a seminar was held featuring two lectures by post-docs. The two lectures were separated by a pizza lunch. The seminar was run and organized by two post-docs under the supervision of a senior mathematician.

4.5. **Graduate student seminar.** The graduate students seminar was supervised by two research professors and gave the opportunity to the graduate students in residence to present classical or very fundamental papers in both dispersive PDE and SPDE. The graduate students learned a lot of mathematics and they also practiced in giving clear and well presented lectures.

5. Nuggets and Breackthroughs

Finally we would like to conclude with a few "nuggets" about our time at MSRI.

During the Connection for Women Workshop Dana Mandelson presented part of her thesis and in particular a certain *probabilistic* version of the famous Non-squeezing Theorem of Gromov. This talk generated quite a lot of interest both at MSRI and at the math department of UC Berkeley. In particular though, the three members R. Killip, M. Visan and X. Zhang, inspired by this talk, proved a Non-squeezing Theorem for the mass critical NLS on the plane.

The talk of N.Pavlovic on many body quantum dynamics and nonlinear dispersive PDE, given during the Introductory Workshop, was instead the starting point for an ongoing collaboration between D. Mandelson, N. Pavlovic, A. Nahmod and G. Staffilani that is focused on finding a systematic way to generate conservation laws for certain Schrödinger equations as a consequence of conservation laws for the equations describing the many body quantum dynamics.

As other example of the cross-pollination between the fields represented at MSRI this past semester we would like to report the ongoing collaboration between P. Gerard and J. Mattingly who are working on the stochastic Cubic Szegö equation and the collaboration between H. Weber with D. Mandelson, A. Nahmod and G. Staffilani on analyzing in a more physical manner certain invariant measures originally introduced in Dispersive PDE by Bourgain.

During the duration of the whole semester there were countless "conversations" and collaborations that could only take place by being together under the umbrella of this program at MSRI for an extended period.

Finally we would like to conclude with few comments gathered from the exit surveys and that really summarize the spirit that accompanied us throughout the semester.

- Of the program I liked...*The opportunity to interact with colleagues on a daily basis, the opportunity to ask questions and to learn about new research, the opportunity to start a new collaboration - all of these were very important for me. I enjoyed a lot initial workshop, I think it was brilliantly organized with lots of very interesting mini courses. The pizza postdoc seminar was also a great opportunity to learn about new things. I would say that the atmosphere that was created at MSRI was truly unique. No doubt, that this was my best experience by far of doing math. Thanks a lot!*
- *I truly enjoyed my stay at MSRI. I had an amazing time and it is a little bit sad that everything is almost finished by now. The organization was on a very high level, the conditions for work were almost perfect. Of course there are some places for improvements (especially food for lunch!) but my overall impression is very high. It was a fantastic time and thanks a lot for all that you are doing.*
- *I really enjoyed my stay here. Berkeley is beautiful, MSRI is a stunning place to work at and the scientific program has even exceeded my expectations (which were definitely high). I really regret I can't stay any longer (unfortunately I am quickly running out of funds), but I will be surely looking forward to be back as soon as I will have the chance (if within this program, even better). Thanks all, and my very best compliments.*
- *I found it extremely beneficial to be surrounded by experts in my field, the field of dispersive PDE. At the same time, it was a great learning experience to be around people in probability. MSRI and organizers have done a superb job in setting up the interactions between the two groups. Given how successful this has been, having more future programs combining two different fields is one suggestion.*
- *Having visited other institutes, this one is my favorite. MSRI is an excellent place for a mathematical growth and advancement of research. I would love to return.*

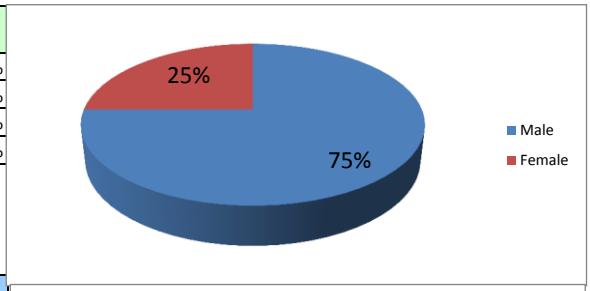
- *The quiet and peaceful atmosphere is excellent to work! One of the main point of the interest of the semester is that the best specialists on two of my main subjects (SPDEs, dispersive PDEs) were here and I learned many things.*
- *I took part in the Graduate Student Lunch Seminar. I found in it a great opportunity to get in touch with the graduate students at MSRI and to learn about problems that are not directly related to my research. I also had the opportunity to present my own work and let everybody know a little bit about my research.*
- Of the program I liked... *The possibility to discuss with colleagues from another domain with a lot of potential interactions (namely, probability theory) and to have much time to think of my personal of collaborative research projects. I particularly appreciated the mixed thematic feature of the program (stochastic + dispersive PDEs).*
- Of the program I liked... *1) Pleasant and calm environment, 2) Proximity to UC Berkeley, 2) availability of many experts in the field participating at the same time allowed to speed up many collaborations, start new ones, and benefit from many fruitful discussions.*
- *After I presented at the workshop, I received many useful comments and some of them developed into new collaborations. I also learned many interesting research topics at the 5 minutes relay presentations. I got to talk to some presenters personally after the sessions and learned new problems to work on.*
- *As a beginning researcher looking to broaden my interests, I appreciated the breadth of topics discussed in the various seminars and workshops.*

Postdoc Pre/Post-MSRI Institution Group

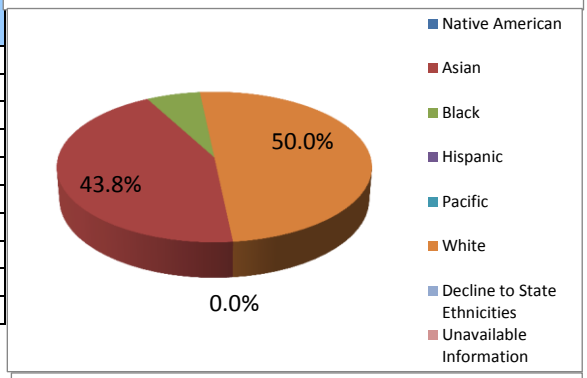
Family Name	First Name	Pre-MSRI Institution Group	Post-MSRI Institution Group	Pre-MSRI Institution Name	Placement Institution Name
Bulut	Aynur	Math Public Large Group	Math Public Large Group	University of Michigan	University of Michigan
Butkovsky	Oleg	Foreign	Foreign	Technion - Israel Institute of Technology	Technion - Israel Institute of Technology
Haberman	Boaz	Math Public Large Group	Math Private Large Group	UC Berkeley	University of Chicago
Huang	Jingyu	Math Public Small Group	Math Public Medium Group	University of Kansas	University of Utah
Kim	Kunwoo	Math Public Medium Group	Foreign	University of Utah	Teachnion-Israel Institute of Technology
Le	Khoa	Math Public Small Group	Foreign	University of Kansas	University of Calgary
Mendelson	Dana	Math Private Large Group	Math Private Large Group	MIT	Institute for Advanced Study & University of Chicago
Menz	Georg	Math Private Large Group	Math Public Large Group	Stanford University	UCLA
Shahshahani	Sohrab	Math Public Large Group	Math Public Large Group	University of Michigan	University of Michigan
Tarfulea	Andrei	Math Private Large Group	Math Private Large Group	Princeton University	University of Chicago
Totz	Nathan	Math Public Medium Group	Math Public Medium Group	University of Massachusetts Amherst	University of Massachusetts Amherst
Wang	Chuntian	Math Public Large Group	Math Public Large Group	UCLA	UCLA
Wilson	Bobby	Math Private Large Group	Math Private Large Group	University of Chicago	Massachusetts Institute of Technology
Xu	Samantha	Math Public Large Group	Math Public Large Group	University of Illinois at Urbana-Champaign	University of Illinois at Urbana-Champaign
Zeng	Qiang	Math Private Large Group	Math Private Large Group	Harvard University	Northwestern University
Zhong	Jie	Math Public Small Group	Math Public Small Group	University of Central Florida	University of Central Florida

2015–16 Postdoctoral Fellows Demographic Summary

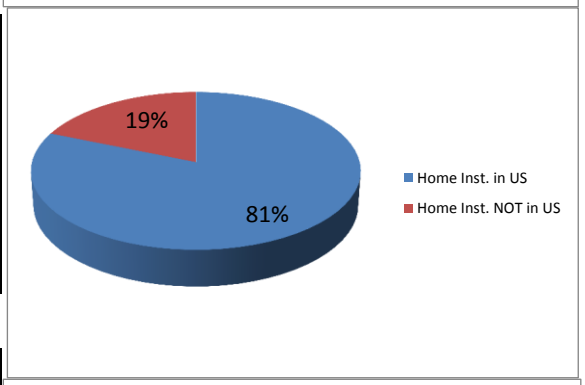
Gender	#	% (No Decl.)*	%
# of Distinct Members	16		100.0%
Male	12	75.00%	75.0%
Female	4	25.00%	25.0%
Decline to State Gender	0		0.0%



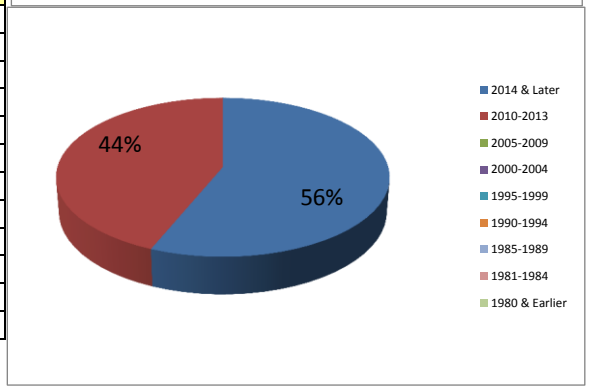
Ethnicities	#	% (No Decl.)*	%
Native American	0	0.00%	0.0%
Asian	7	43.75%	43.8%
Black	1	6.25%	6.3%
Hispanic	0	0.00%	0.0%
Pacific	0	0.00%	0.0%
White	8	50.00%	50.0%
Decline to State Ethnicities	0		0.0%
Unavailable Information	0		0.0%
Minorities	1		20.0%



Citizenships	#		%
US Citizen & Perm. Residents	7		43.8%
Foreign	9		56.3%
Unavailable information	0		0.0%
# of Distinct Members	16		100.0%
US Citizen	5		31.3%
Perm Residents	2		12.5%
Home Inst. in US	13		81.25%



Year of Ph.D	#		%
Program Associates (GS)	0		0.0%
2014 & Later	9		56.3%
2010-2013	7		43.8%
2005-2009	0		0.0%
2000-2004	0		0.0%
1995-1999	0		0.0%
1990-1994	0		0.0%
1985-1989	0		0.0%
1981-1984	0		0.0%
1980 & Earlier	0		0.0%
Unavailable Info.	0		0.0%
Total # of Distinct Members	16		100.0%



**Statistic Calculation based on all participants that did not decline.*

New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems

Program Summary

Role	# of Distinct Members	%	# of Citizens & Perm. Res.	%	US Home Inst.	%	# of Female	%	# of Minorities[1]	%
Organizers	7	6.4%	5	71.4%	5	71%	3	42.9%	1	20.0%
Research Professors	16	14.7%	9	56.3%	9	56%	3	18.8%	0	0.0%
Postdoctoral Fellows MSRI	16	14.7%	7	43.8%	13	81%	4	25.0%	1	20.0%
Postdoctoral Fellows RM	2	1.8%	0	0.0%	2	100%	0	0.0%	0	0.0%
Research Members	46	42.2%	22	47.8%	28	61%	13	28.3%	0	0.0%
Program Associates	22	20.2%	2	9.1%	13	59%	3	13.6%	0	0.0%
Total # of Distinct Members	**109**		**45**	***41.3%***	**70**	**64%**	**26**	***23.9%***	**2**	***5.9%***

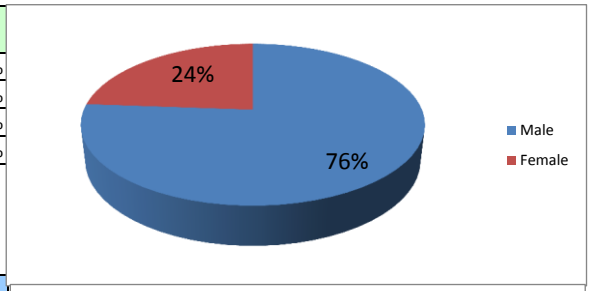
[1] *Minorities are US citizen who declare themselves American Indian, Black, Hispanic, or Pacific Islander. Minority percentage is calculated by dividing the number of Minorities by the total number of US citi*

Home Institute Grouping

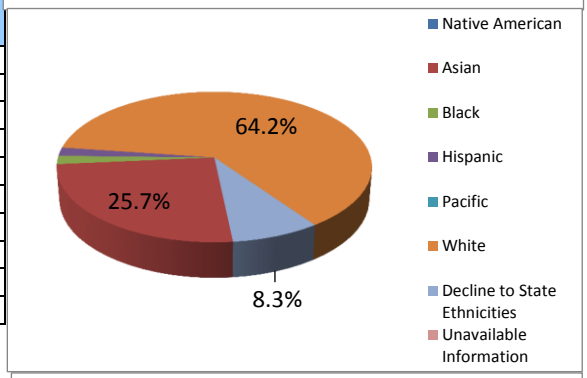
	US									
Role	Math Private Large Group	Math Private Small Group	Math Public Large Group	Math Public Medium Group	Math Public Small Group	Group M	Group B	Total US Institution	Foreign	Total
Organizers	2	0	2	1	0	0	0	5	2	7
Research Professors	2	1	6	0	0	0	0	9	7	16
Postdoctoral Fellows MSRI	5	0	5	2	1	0	0	13	3	16
Postdoctoral Fellows RM	1	0	0	1	0	0	0	2	0	2
Research Members	10	2	7	9	0	0	0	28	18	46
Program Associates	3	2	4	4	0	0	0	13	9	22
Total	**23**	**5**	**24**	**17**	**1**	**-**	**-**	**70**	**39**	**109**
%	***21.1%***	***4.6%***	***22.0%***	***15.6%***	***0.9%***	***0.0%***	***0.0%***	***64.2%***	***35.8%***	***100.0%***

2015–16 Program Members Demographic Summary

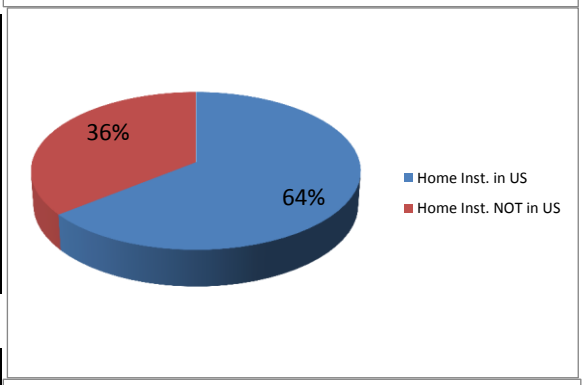
Gender	#	% (No Decl.)*	%
# of Distinct Members	109		100.0%
Male	83	76.15%	76.1%
Female	26	23.85%	23.9%
Decline to State Gender	0		0.0%



Ethnicities	#	% (No Decl.)*	%
Native American	0	0.00%	0.0%
Asian	28	27.45%	25.7%
Black	2	1.96%	1.8%
Hispanic	2	1.96%	1.8%
Pacific	0	0.00%	0.0%
White	70	68.63%	64.2%
Decline to State Ethnicities	9		8.3%
Unavailable Information	0		0.0%
Minorities	2		5.9%

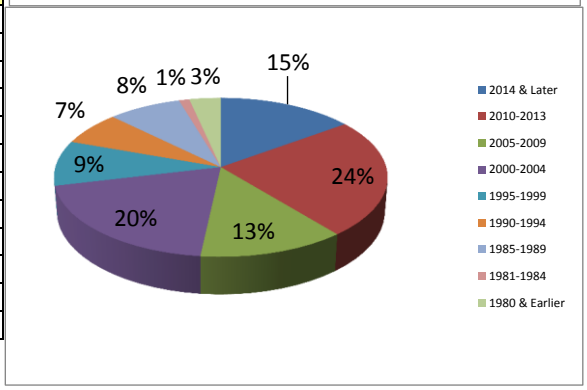


Citizenships	#		%
US Citizen & Perm. Residents	45		41.3%
Foreign	64		58.7%
Unavailable information	0		0.0%
# of Distinct Members	109		100.0%
US Citizen	34		31.2%
Perm Residents	11		10.1%
Home Inst. in US	70		64.22%



Year of Ph.D	#		%
Program Associates (GS)	22		20.2%
2014 & Later	13		11.9%
2010-2013	21		19.3%
2005-2009	11		10.1%
2000-2004	17		15.6%
1995-1999	8		7.3%
1990-1994	6		5.5%
1985-1989	7		6.4%
1981-1984	1		0.9%
1980 & Earlier	3		2.8%
Unavailable Info.	0		0.0%
Total # of Distinct Members	109		100.0%

**Statistic Calculation based on all participants that did not decline.*



MSRI
Mathematical Sciences Research Institute

17 Gauss Way Berkeley, CA 94720-5070 p: 510.642.0143 f: 510.642.8609 www.msri.org

Differential Geometry

January 11, 2016 - May 20, 2016
MSRI, Berkeley, CA
USA

Organizers:

Tobias Colding (Massachusetts Institute of Technology)
Simon Donaldson (Imperial College, London)
John Lott (University of California, Berkeley)
Natasa Sesum (Rutgers University)
Gang Tian (Princeton University)
LEAD Jeff Viaclovsky (University of Wisconsin-Madison)

REPORT ON THE MSRI SEMESTER ON DIFFERENTIAL GEOMETRY

SPRING 2016

1. Introduction

The "jumbo" semester on Differential Geometry at MSRI was held in the Spring 2016, from January 11 – May 20. The organizers of the semester were:

- Toby Colding (MIT)
- Simon Donaldson (Imperial College and Stony Brook University)
- John Lott (Berkeley)
- Natasa Sesum (Rutgers)
- Gang Tian (Beijing/Princeton)
- Jeff Viaclovsky (Wisconsin) [Lead organizer]

There were a two-day "Connections for Women" workshop and a week-long "Introductory Workshop" at the beginning of the semester, along with two week-long research conferences during the semester. There were daily research seminars, and several working seminars. A key aspect of this semester was the postdoctoral program; there were 15 postdocs in attendance, and all were supervised by a senior member.

2. Scientific Overview

Differential geometry is a subject with both deep roots and recent advances. Many old problems in the field have recently been solved, such as the Poincaré and geometrization conjectures by Perelman, the quarter pinching conjecture by Brendle-Schoen, the Lawson Conjecture by Brendle, and the Willmore Conjecture by Marques-Neves. The solutions of these problems have introduced a wealth of new techniques into the field. The semester focused on the following main themes:

- **Einstein metrics and generalizations**: Einstein metrics, special holonomy, other critical metrics, Ricci solitons.
- **Complex differential geometry**: Kähler-Einstein metrics and extremal Kähler metrics, relations to notions of stability in algebraic geometry, Calabi-Yau manifolds.
- **Spaces with curvature bounded from below**: Ricci limit spaces, synthetic Ricci curvature, collapsing under lower curvature bounds.
- **Geometric flows**: Ricci flow, Kähler-Ricci Flow, mean curvature flow, other geometric flows.

Many of these topics have links to other fields, and connections to other areas such as algebraic geometry and theoretical physics were also explored.

3. Workshops

There were a two-day "Connections for Women" workshop and a week-long "Introductory Workshop" at the beginning of the semester, along with two week-long research conferences during the semester.

3.1. **Connections for Women Workshop.** The organizers were

- Christine Breiner (Fordham)
- Natasa Sesum (Rutgers)

This workshop was held on January 14-15, 2016. The purpose of this meeting was to help junior female researchers to become familiar with the focus topics of the main MSRI program, and also for the junior researchers to have an opportunity to get acquainted with more senior women researchers in differential geometry. This workshop was open to *all* mathematicians.

3.2. **Introductory Workshop: Modern Riemannian Geometry.** The organizers were

- Tobias Colding (Massachusetts Institute of Technology)
- John Lott (University of California - Berkeley)
- Jeff Viaclovsky (University of Wisconsin - Madison)

This workshop was held the week of January 18-22, 2016. The week was devoted to an introduction to modern techniques in geometry. This was intended to help graduate students and younger researchers get a headstart, in order to increase their participation during the main semester programs and research lectures. To increase outreach, the week focused on Riemannian geometry and was largely accessible. The workshop had several expository lectures dealing with aspects of spaces with curvature bounded from below, since such spaces occurred throughout the semester.

The majority of the participants in the workshop were graduate students or postdocs. Each speaker gave two 1-hour talks, with the first talk intended to provide background for the second talk.

3.3. **Kähler Geometry, Einstein Metrics, and Generalizations.** The organizers were

- Olivier Biquard (Ecole Normale Superieure)
- Simon Donaldson (Imperial College and Stony Brook University)
- Gang Tian (Princeton University and Beijing University)
- Jeff Viaclovsky (University of Wisconsin-Madison)

This workshop was held the week of March 21-25, 2016. Kähler geometry and other special geometries such as Einstein metrics and metrics with special holonomy have played a central role in modern differential geometry. This workshop was intended to integrate elements from complex differential geometry with Einstein metrics and their generalizations. The topics included:

- Existence of Kähler-Einstein metrics and extremal Kähler metrics. Notions of stability in algebraic geometry such as Chow stability and K-stability. Relations with singular Kähler-Einstein metrics.
- Calabi-Yau metrics and collapsed limit spaces. Connections with physics and mirror symmetry.
- Einstein metrics and their moduli spaces, ϵ-regularity, noncompact examples such as ALE, ALF, and Poincaré-Einstein metrics. Generalizations of the Einstein condition, such as Ricci solitons.
- Sasaki-Einstein metrics and metrics with special holonomy. New examples and classification problems.

Each speaker gave a fifty minute talk, with ten minutes being allotted for questions. Many participants in the workshop were graduate students or postdocs.

3.4. **Geometric Flows in Riemannian and Complex Geometry.** The organizers were

- Tobias Colding (Massachusetts Institute of Technology)
- John Lott (University of California - Berkeley)
- Natasa Sesum (Rutgers)

This workshop was held the week of May 2-6, 2016. The workshop dealt with parabolic methods in both Riemannian geometry and complex geometry. The topics included:

- Ricci flow. Analytic questions about Ricci flow with surgeries. Ricci flow on spaces with singularities. Ricci-flow in higher dimensions under curvature assumptions.
- Mean curvature flow. Singularity analysis. Fully nonlinear curvature flows.
- Geometric flows in the holomorphic setting, such as Kähler-Ricci flow and Calabi flow. Study of solitons and limiting behaviour.

Each speaker gave a fifty minute talk, with ten minutes being allotted for questions. Many participants in the workshop were graduate students or postdocs.

4. Postdoctoral Fellows

There were 15 postdoctoral members in attendance for the entire program. Each had a mentor assigned from among the senior participants. The duties of the mentors were to hold regular meetings with their assigned postdocs to discuss research and to offer professional and career advice, and give advice on how to apply for grants. There was a weekly seminar for the postdoctoral members which was held on Fridays. There were usually two talks, with a pizza lunch in between. This seminar was geared more towards the junior participants such as postdoctoral members and visiting graduate students, but it was open for anyone to attend.

The complete list of all of the postdoctoral fellows is as follows.

4.1. **Antonio Ache, mentor: Felix Schulze.** Antonio received his Ph.D. in 2012 from University of Wisconsin-Madison. Before MSRI, he was an Instructor at Princeton University. Next year, he will go to Notre Dame for a 2 year visiting professorship.

Antonio's research is in geometric analysis, and he started many collaborations while at MSRI. He is working with Jason Lotay on long-time behavior of symplectic curvature flow. He is also working with Casey Kelleher on using symplectic curvature flow to understand connectedness of the space of symplectic stucture on the 4-torus. With Ronan Conlon, he is considering convergence questions for the Kähler-Ricci flow on asymptotically Calabi-Yau manifolds.

4.2. **Ronan Conlon, mentor: Michael Singer.** Ronan received his Ph.D. in 2011 from Imperial College. Before MSRI, he was a postdoctoral fellow at University of Quebec in Montreal. Next year, he will become a tenure-track assistant professor at Florida International University.

Ronan's research deals with asymptotically conical geometries. At MSRI, he completed an article with Hans-Joachim Hein on a relationship between deformations of complex cones and complex manifolds appearing as ample divisors with prescribed normal bundle. He also began a collaboration with Alix Deurelle, another postdoctoral fellow. They worked on constructing new examples of expanding Kähler-Ricci solitons.

4.3. **Alix Deruelle, mentor: Tom Ilmanen.** Alix received his Ph.D. in 2012 from Institut Fourier in Grenoble. Before MSRI, he was a postdoctoral fellow at University Paris Sud 11 Orsay. After MSRI, he will move to a permanent position at Jussieu.

Alix's research deals with on the geomtry at infinity of noncompact spaces. At MSRI he started 4 collaborations. One of them was mentioned above, and is joint work with Ronan Conlon. Another one is joint work with Heather Macbeth, and is mentioned below.

4.4. **Eleonora Di Nezza, mentor: Ursula Hamenstädt.** Eleonora received her Ph.D. in 2014 from University di Roma Tor Vergara. Before MSRI, she was a Marie Curie Fellow at Imperial College. After MSRI she will return to the same position at Imperial until December of 2017.

Eleonora's research deals with the geometry of complex Monge-Ampere equations. At MSRI, she started 3 projects. Two of these projects are joint works with mathematicians she met at MSRI, Tamas Darvas, and Christina Sormani.

4.5. **Lorenzo Foscolo, mentor: Michael Singer.** Lorenzo received his Ph.D. in 2013 from Imperial College. Before MSRI, he was a James H. Simons Instructor at Stony Brooks. After MSRI he will return to the same position at Stony Brook until 2017.

Lorenzo's research deals with gluing constructions and deformation theories in specialized geometries. While at MSRI, he finalized a paper "Deformation theory of nearly Kähler manifolds". He devoted a lot of time to finishing the paper "ALF gravitational instantons and collapsing Ricci-flat metrics on the K3 surface," and was invited to lecture on this at the March workshop. He also worked on a series of projects with Mark Haskins and Johannes Nordstrom on "Deformation theory of ALC G2 manifolds."

4.6. **Lee Kennard, mentor: Vitali Kapovitch.** Lee received his Ph.D. in 2012 from the University of Pennsylvania. Before coming to MSRI, he was an assistant professor at the Univeristy of Oklahoma. After MSRI, he will return to that position.

Lee's research is about the study of metrics with positive curvature under symmetry assumptions. At MSRI, he started a collaboration with Burkhard Wilking. He also continued collaborations with William Wylie, Manual Amann, and Jason DeVito.

4.7. **Jeremy Leach, mentor: Robert Kusner.** Jeremy received his Ph.D. in 2015 from Stanford University. Before coming to MSRI, he was at University of Washington as an acting assistant professor. After MSRI, he will be leaving academia and working at Trexquant Investment LP.

Jeremy's research deals with the Einstein constraint equations in general relativity. At MSRI, he finished a paper pertaining to the Einstein constraint equations on manifolds with both asymptotically Euclidean and asymptotically conformally cylindrical ends. He also started a project with Robert Kusner and Rafe Mazzeo regarding ends of asymptotically cylindrical locally conformally flat manifolds.

4.8. **Yueh-Ju Lin, mentor: Alice Chang.** Yueh-Ju received her Ph.D. in 2014 from University of Notre Dame. Before coming to MSRI, she was a postdoctoral assistant professor at the University of Michigan. After MSRI, she will return to that position until 2017.

Yueh-Ju's research is about higher order variational problems in conformal geometry At MSRI, she studied the deformations of Q-curvature or more general conformal scalar invariants. This lead her to start a joint project with Alice Chang about rigidity and stability questions, and uniqueness and non-uniqueness of constant Q-curvature metrics.

4.9. **Michael Lock, mentor: Robert Kusner.** Michael received his Ph.D. in 2013 from the University of Wisconsin-Madison. Before MSRI, he was an RTG postdoctoral fellow at the University of Texas-Austin. After MSRI, he is leaving academia.

Michael's research is on the existence of scalar-flat Kähler ALE metrics, and on problems concerning special Hermitian metrics in the non-Kahler setting. While at MSRI, he completed the work for one publication that is forthcoming, as well as answered questions regarding a generalization of previous work that will be in a forthcoming publication as well.

4.10. **Heather Macbeth, mentor: Olivier Biquard.** Heather received her Ph.D. in 2015 from Princeton University. Before coming to MSRI, she was a CLE Moore instructor at MIT. After MSRI, she will return to that position until 2018.

Heather's research is in geometric analysis; she has worked on problems in conformal geometry and Kähler geometry. At MSRI, she started a major project with Alix Deruelle to proved a second-order Weyl law for Ornstein-Uhlenbeck type operators on asymptotically conical Riemannian manifolds. She also began a project with Olivier Biquard, and a joint project with Christine Breiner and Rosa Sena-Dias.

4.11. **Illaria Mondello, mentor: Olivier Biquard.** Illaria received her Ph.D. in 2015 from University of Nantes. Before coming to MSRI, she was a postdoctoral fellow at Institut de Mathématiques de Jussieu. After MSRI, she will be going to a permanent position at that Université de Paris Est Créteil.

Illaria's research deals with the Yamabe problem on stratified spaces. At MSRI, she worked on a project to prove a positive mass theorem on stratified spaces. She held crucial discussions at MSRI with Rafe Mazzeo, Dan Lee, and Donovan McFeron. She also started a joint project with Rafe Mazzeo about the spectrum of the Laplacian on stratified spaces which have singularity of codimension two and angle bigger than 2π. She also had interesting discussions at MSRI with Curt McMullen, mostly about the relation between stratified spaces and cone manifolds.

4.12. **Andrea Mondino, mentor: John Lott.** Andrea received his Ph.D. in 2011 from SISSA in Trieste, Italy. Before coming to MSRI, he was a Lecturer at University of Zurich. After MSRI, he will become an assistant professor at University of Warwick.

Andrea's research is in geometric analysis. At MSRI, he collaborated with Guofang Wei on a project involving $RCD^*(K,N)$-spaces. He also started collaborations with Vitali Kapovich, Cristian Ketterer and Eleonora Di Nezzo. He was also able to finish 2 papers which he had started before coming to MSRI. One paper was on an isoperimetric-isodiametric inequality, and the other was on Gaussian-type isoperimetric inequalities in $RCD(K,\infty)$ probability spaces for positive K.

4.13. **Raquel Perales, mentor: Guofang Wei.** Raquel received her Ph.D. in 2015 from Stony Brook University. Before coming to MSRI, she held a postdoctoral fellowship at Institute at Universidad Autonoma de Mexico. After MSRI, she will return there for another year as a postdoc.

Raquel's research is in the general area of convergence of manifolds and metric spaces. At MSRI, she worked on several projects. One of these is regarding the tetrahedral property defined by Sormani. She did a reading project with Ilaria Mondello and Eleonora Di Nezza, where they went through Sturm's papers where $CD(K,N)$ spaces are defined. She also worked on a paper with Catherine Searle, Maree Jaramillo, Priyanka Rajan and Anna Siffert about intrinsic flat currents defined on Alexandrov spaces.

4.14. **Liangming Shen, mentor: Zhiqin Lu.** Liangming received his Ph.D. in 2015 from Princeton University. Before coming to MSRI, he was a postdoctoral fellow at University of British Columbia. After MSRI, he will return to that position for another 2 years.

Linagming's research is in the area of Kähler geometry and Kähler-Ricci flow. At MSRI, he completed a paper about conic Kähler-Einstein metrics along simple normal crossing divisors on Fano manifolds.

4.15. **Chengjian Yao, mentor: Zhiqin Lu.** Chengjian received his Ph.D. in 2015 from Stony Brook University. Before coming to MSRI, he held a postdoctoral fellowship at Universite Libre de Bruxelles. After MSRI, he will return to that position for another 2 years.

Chengjian's research is in Kähler geometry, and other special geoemtries. At MSRI, together with Hongnian Huang and Joel Fine, he studied an example of the definite triple flow. Another work that he initiated at MSRI is a joint work with Bing Wang in order to study the Kähler-Ricci flow on general Q-Fano varieties.

5. Organizational structue

In addition to the workshops, there were a number of lectures and seminars held throughout the semester.

5.1. **Main research seminars.** There were regular seminars held Mondays, Tuesdays, Wednesday, and Thursdays throughout the semester in the weeks without a workshop.

- Mondays: Complex Geometry, organizer: Ronan Conlon, 13 speakers.
- Tuesdays: Riemannian Geometry, organizer: Lee Kennard, 13 speakers.
- Wednesdays: Geometry, organizer: Heather Macbeth, 13 speakers.
- Thursdays: Geometric Analysis, organizer: Andrea Mondino, 13 speakers.

There was a seminar "Symmetry in Geometry" held on Thursday afternoons, which started in March, and had 6 seminars. This seminar was organized by Martin Kerin.

There was also a seminar "Informal Homogeneous Space Seminar", which was initiated by Carolyn Gordon. This was held on Wednesday afternoons. It was organized by Carolyn when she was in residence, and then by Catherine Searle.

5.2. **Postdoc lunch seminar.** In general, Fridays were reserved for the postdoc lunch seminar. There were usually two talks. After the first talk, there was a pizza lunch, followed by the second talk. These talks were very well-attended, and focused mostly on the current research of the postdocs. Every postdoc was required to give a talk in this seminar, so there were a total of 15 talks.

5.3. **Graduate student seminar.** Throughout the semester, there were around 15-20 graduate students in attendance. MSRI has a policy that graduate students are only allowed if their supervisor is in residence. So they were closely mentored by their advisors. Several of the graduate students organized a reading seminar which met once or twice a week. They studied details of Cheeger-Naber's proof of the codimension four conjecture, using lecture notes written by Richard Bamler.

5.4. **Berkeley colloquia.** Three of the senior members of the program gave the colloquium lectures at Berkeley:

- April 14, 2016: Michael Singer, "Monopoles, configurations and the Sen conjectures."
- April 21, 2016: Alice Chang, "Q-curvature, some survey and recent development."
- April 28, 2016: Toby Colding, "Level set flow."

5.5. **Math Circle.** One of the postdocs, Eleonora Di Nezza, gave a talk at the Berkeley Math Circle entitled "The Euler characteristic and the Gauss Bonnet theorem." She said about the experience:

> I also gave a lecture at the MATH CIRCLE. It was an extremely intense experience for me. Mathematics can be fun and I am glad that I could give my contribution in spreading this concepts. Moreover, kids at the math circle are incredibly smart. I was very impressed by them.

6. Nuggets and breakthroughs

The following list contains several notable results which were completed during the program.

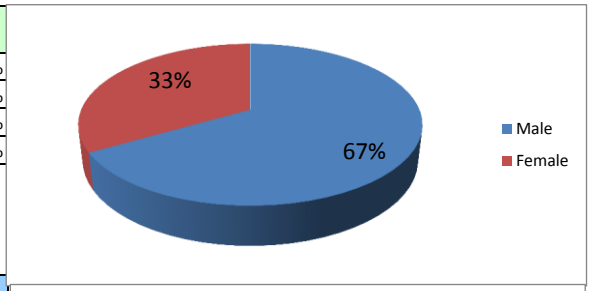
- Toby Colding (with Bill Minicozzi) made advances in understanding the regularity properties of the level set flow.
- Ronan Conlon and Alix Deruelle constructed new examples of expanding Kähler-Ricci solitons on line bundles.
- Joel Fine, Jason Lotay, and Michael Singer made progress on understanding the moduli space of hyperkähler metrics on manifolds with boundary.
- Lorenzo Foscolo constructed examples of collapsing sequences of Calabi-Yau metrics on K3 surfaces by carrying out a modified Kummer construction involving gluing in ALF metrics in addition to ALE metrics.
- Lorenzo Foscolo, Mark Haskins, and Johannes Nordstrom made substantial progress on the deformation theory of ALC G2 manifolds.
- Jiyuan Han and Jeff Viaclovsky completed the deformation theory of scalar-flat Kähler ALE metrics on complex surfaces.
- Vitali Kapovich and John Lott proved a result which shows that in certain cases, manifolds with almost Ricci-flat metrics also admit Ricci-flat metrics.
- Martin Kerin (with Ravi Shankar and Sebastian Goette) showed that all exotic 7-spheres admit metrics with nonnegative sectional curvature, a fact which was previously known only for the Milnor 7-spheres.
- Ramiro Lafuente showed that any immortal homogeneous Ricci flow approaches an expanding Ricci soliton.

Postdoc Pre/Post-MSRI Institution Group

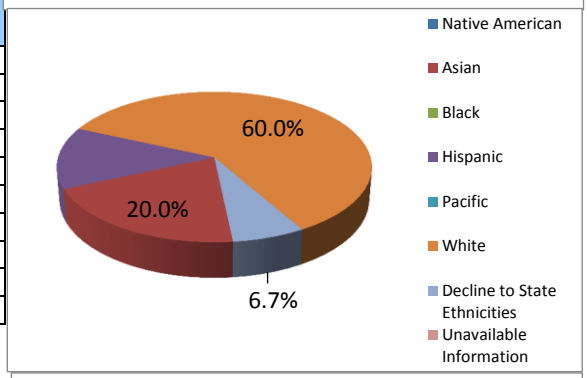
Family Name	First Name	Pre-MSRI Institution Group	Post-MSRI Institution Group	Pre-MSRI Institution Name	Placement Institution Name
Ache	Antonio	Math Private Large Group	Math Private Large Group	Princeton University	University of Notre-Dame
Conlon	Ronan	Foreign	Group M	Universite du Quebec a Montreal	Florida International University
Deruelle	Alix	Foreign	Foreign	Université Paris Sud 11 Orsay	Université Paris Sud 11 Orsay
Di Nezza	Eleonora	Foreign	Foreign	Imperial College London	Imperial College London
Foscolo	Lorenzo	Math Public Large Group	Math Public Large Group	Stony Brook University	Stony Brook University
Kennard	Lee	Math Public Small Group	Math Public Small Group	University of Oklahoma	University of Oklahoma
Leach	Jeremy	Math Public Large Group	nongroup	University of Washington	Trexquant Investment LP
Lin	Yueh-Ju	Math Public Large Group	Math Public Large Group	University of Michigan	University of Michigan
Lock	Michael	Math Public Large Group	nongroup	University of Texas at Austin	Leaving academia
Macbeth	Heather	Math Private Large Group	Math Private Large Group	MIT	MIT
Mondello	Ilaria	Foreign	Foreign	Institut de Mathématiques de Jussieu	Université de Paris Est Créteil
Mondino	Andrea	Foreign	Foreign	University of Zurich	University of Warwick
Perales	Raquel	Foreign	Foreign	Mathematics Institute at Universidad Autonoma de Mexico (UNAI	Mathematics Institute at Universidad Autonoma de Mexico (UNA
Shen	Liangming	Foreign	Foreign	University of British Columbia	University of British Columbia
Yao	Chengjian	Foreign	Foreign	Universite Libre de Bruxelles	Universite Libre de Bruxelles

2015–16 Postdoctoral Fellows Demographic Summary

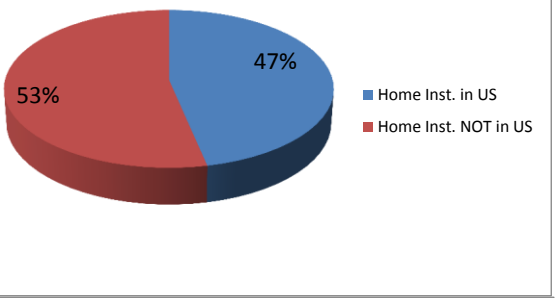
Gender	#	% (No Decl.)*	%
# of Distinct Members	15		100.0%
Male	10	66.67%	66.7%
Female	5	33.33%	33.3%
Decline to State Gender	0		0.0%



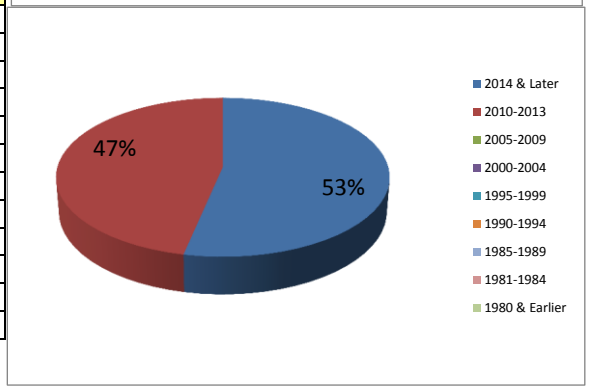
Ethnicities	#	% (No Decl.)*	%
Native American	0	0.00%	0.0%
Asian	3	21.43%	20.0%
Black	0	0.00%	0.0%
Hispanic	2	14.29%	13.3%
Pacific	0	0.00%	0.0%
White	9	64.29%	60.0%
Decline to State Ethnicities	1		6.7%
Unavailable Information	0		0.0%
Minorities	1		25.0%



Citizenships	#		%
US Citizen & Perm. Residents	4		26.7%
Foreign	11		73.3%
Unavailable information	0		0.0%
# of Distinct Members	15		100.0%
US Citizen	4		26.7%
Perm Residents	0		0.0%
Home Inst. in US	7		46.67%



Year of Ph.D	#		%
Program Associates (GS)	0		0.0%
2014 & Later	8		53.3%
2010-2013	7		46.7%
2005-2009	0		0.0%
2000-2004	0		0.0%
1995-1999	0		0.0%
1990-1994	0		0.0%
1985-1989	0		0.0%
1981-1984	0		0.0%
1980 & Earlier	0		0.0%
Unavailable Info.	0		0.0%
Total # of Distinct Members	15		100.0%



**Statistic Calculation based on all participants that did not decline.*

Differential Geometry

Program Summary

Role	# of Distinct Members	%	# of Citizens & Perm. Res.	%	US Home Inst.	%	# of Female	%	# of Minorities[1]	%
Organizers	5	4.1%	4	80.0%	5	100%	1	20.0%	0	0.0%
Research Professors	18	14.8%	10	55.6%	9	50%	3	16.7%	0	0.0%
Postdoctoral Fellows MSRI	15	12.3%	4	26.7%	7	47%	5	33.3%	1	25.0%
Postdoctoral Fellows RM	1	0.8%	1	100.0%	0	0%	0	0.0%	0	0.0%
Research Members	68	55.7%	29	42.6%	34	50%	14	20.6%	3	13.6%
Program Associates	15	12.3%	6	40.0%	11	73%	4	26.7%	0	0.0%
Total # of Distinct Members	**122**		**54**	***44.3%***	**66**	**54%**	**27**	***22.1%***	**4**	***9.1%***

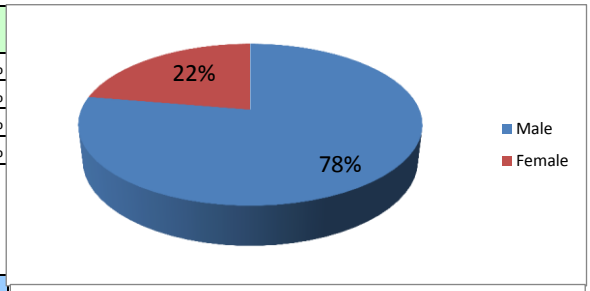
[1] *Minorities are US citizen who declare themselves American Indian, Black, Hispanic, or Pacific Islander. Minority percentage is calculated by dividing the number of Minorities by the total number of US citi.*

Home Institute Grouping

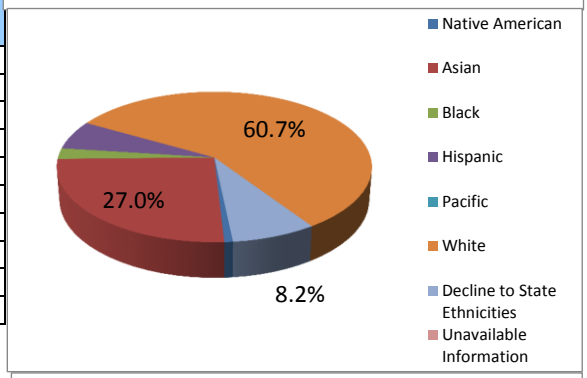
	US									
Role	Math Private Large Group	Math Private Small Group	Math Public Large Group	Math Public Medium Group	Math Public Small Group	Group M	Group B	Total US Institution	Foreign	Total
Organizers	2	0	2	0	1	0	0	5	0	5
Research Professors	3	0	2	4	0	0	0	9	9	18
Postdoctoral Fellows MSRI	2	0	4	0	1	0	0	7	8	15
Postdoctoral Fellows RM	0	0	0	0	0	0	0	0	1	1
Research Members	6	6	10	2	7	1	2	34	34	68
Program Associates	0	2	6	2	1	0	0	11	4	15
Total	**13**	**8**	**24**	**8**	**10**	**1**	**2**	**66**	**56**	**122**
%	***10.7%***	***6.6%***	***19.7%***	***6.6%***	***8.2%***	***0.8%***	***1.6%***	***54.1%***	***45.9%***	***100.0%***

2015–16 Program Members Demographic Summary

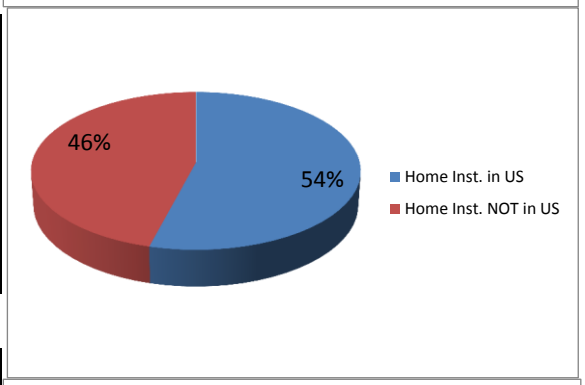
Gender	#	% (No Decl.)*	%
# of Distinct Members	122		100.0%
Male	94	77.69%	77.0%
Female	27	22.31%	22.1%
Decline to State Gender	1		0.8%



Ethnicities	#	% (No Decl.)*	%
Native American	1	0.84%	0.8%
Asian	33	27.73%	27.0%
Black	3	2.52%	2.5%
Hispanic	8	6.72%	6.6%
Pacific	0	0.00%	0.0%
White	74	62.18%	60.7%
Decline to State Ethnicities	10		8.2%
Unavailable Information	0		0.0%
Minorities	4		9.1%

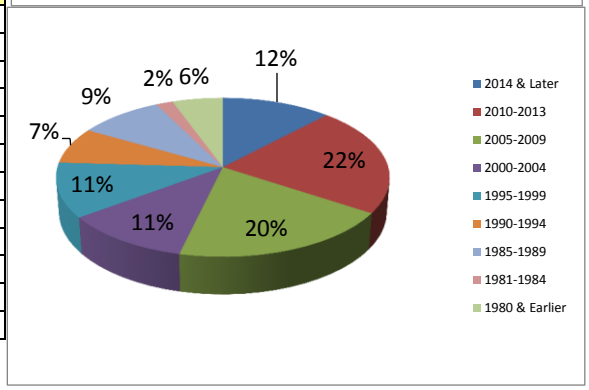


Citizenships	#		%
US Citizen & Perm. Residents	54		44.3%
Foreign	68		55.7%
Unavailable information	0		0.0%
# of Distinct Members	122		100.0%
US Citizen	44		36.1%
Perm Residents	10		8.2%
Home Inst. in US	66		54.10%



Year of Ph.D	#		%
Program Associates (GS)	14		11.5%
2014 & Later	13		10.7%
2010-2013	24		19.7%
2005-2009	21		17.2%
2000-2004	12		9.8%
1995-1999	12		9.8%
1990-1994	8		6.6%
1985-1989	10		8.2%
1981-1984	2		1.6%
1980 & Earlier	6		4.9%
Unavailable Info.	0		0.0%
Total # of Distinct Members	122		100.0%

**Statistic Calculation based on all participants that did not decline.*



Complementary Program 2015–16

August 17, 2015 to May 20, 2016

MSRI

Berkeley, CA

USA

Complementary Program (2015–16)
August 17, 2015 to May 20, 2016

The Complementary Program has a limited number of memberships that are open to mathematicians whose interests are not closely related to the core programs; special consideration is given to mathematicians who are partners of an invited member of a core program.

During the 2015–16 year, MSRI had a small Complementary Program comprised of one postdoctoral fellow, Alexander Pavlov (Massachusetts Institute of Technology) and ten researchers, Pierre Albin (University of Illinois at Urbana-Champaign), Dorothy Buck (Imperial College, London), Marco Fontelos (Instituto de Ciencias Matemáticas), Curtis Greene (Haverford College), Tomasz Mrowka (Massachusetts Institute of Technology), Francesca Prinari (Università di Ferrara), Marjolaine Puel (Université Nice Sophia-Antipolis), Frank-Olaf Schreyer (Universität des Saarlandes), Vasudevan Srinivas (Tata Institute of Fundamental Research) and Stephen Tennenbaum (George Washington University).

Pierre Albin
Research Member, August17, 2015 to December 4, 2015
Spouse of Kay Kirkpatrick, Organizer in *New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensional systems* program.
University of Illinois at Urbana-Champaign
Urbana, IL
United States

At MSRI, Dr. Albin mainly collaborated with Jeremy Marzuola. He produced a paper titled, *On the Hodge theory of stratified spaces*.

Dorothy Buck
Research Member, January 11, 2016 to May 20, 2016
Spouse of Mark Haskins, Research Professor in *Differential Geometry* program.
Imperial College, London
London
United Kingdom

Marco Fontelos
Research Member, January 11, 2016 to April 4, 2016
Spouse of Maria del Mar González, Research Member in *Differential Geometry* program.
Instituto de Ciencias Matemáticas
Madrid
Spain

At MSRI, Dr. Fontelos mainly collaborated with Maria del Mar González. He comments "The environment and facilities are excellent. Was a unique and productive experience."

Curtis Greene
Research Member, August 17, 2015 to July 31, 2016
Haverford College
Haverford, PA
United States

Dr. Greene worked primarily with Deputy Director, Helene Barcelo.

Tomasz Mrowka
Research Member, August 20, 2015 to November 27, 2015
Spouse of Gigliola Staffilani, Organizer in *New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensional systems* program.
Massachusetts Institute of Technology
Cambridge, MA
United States

Francesca Prinari
Research Member, August 17, 2015 to December 18, 2015
Spouse of Nicola Visciglia, Research Member in *New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensional systems* program.
Università di Ferrara
Ferrara
Italy

At MSRI, Dr. Prinari mainly collaborated with Sandra Cerrai.

Marjolaine Puel
Research Member, August 17, 2015 to December 15, 2015
Spouse of Pierre Raphael, Organizer in *New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensional systems* program.
Université Nice Sophia-Antipolis
Nice
France

Frank-Olaf Schreyer
Research Member, September 4, 2015 to September 29, 2015
Universitat des Saarlandes
Saarbrücken
Germany

At MSRI, Dr. Schreyer mainly collaborated with David Eisenbud, MSRI's Director and Justin Chen. He worked on three papers while at MSRI.

Vasudevan Srinivas
Research Professor, January15, 2016 to February 15, 2016
Tata Institute of Fundamental Research
Mumbai
India

At MSRI, Dr. Srinivas mainly collaborated with David Eisenbud, MSRI's Director.

Stephen Tennenbaum
Research Member, August 28, 2015 to December 18, 2015
George Washington University
Washington, DC
United States

At MSRI, Dr. Tennenbaum mainly collaborated with David Schwartzman and Ben Mills. He worked on two papers: *An Emergy/Co-emergy analysis of the US economy (2000, 2004, 2008)* and *Potential multiple steady-states in the long-term carbon cycle*.

Complementary Program 2015-16

Program Summary

Role	# of Distinct Members	%	# of Citizens & Perm. Res.	%	US Home Inst.	%	# of Female	%	# of Minorities[1]	%
Organizers	0	0.0%	0	0.0%	0	0%	0	0.0%	0	0.0%
Research Professors	1	9.1%	0	0.0%	0	0%	0	0.0%	0	0.0%
Postdoctoral Fellows MSRI	1	9.1%	0	0.0%	0	0%	0	0.0%	0	0.0%
Postdoctoral Fellows RM	0	0.0%	0	0.0%	0	0%	0	0.0%	0	0.0%
Research Members	9	81.8%	5	55.6%	4	44%	3	33.3%	1	20.0%
Program Associates	0	0.0%	0	0.0%	0	0%	0	0.0%	0	0.0%
Total # of Distinct Members	**11**		**5**	***45.5%***	**4**	**36%**	**3**	***27.3%***	**1**	***20.0%***

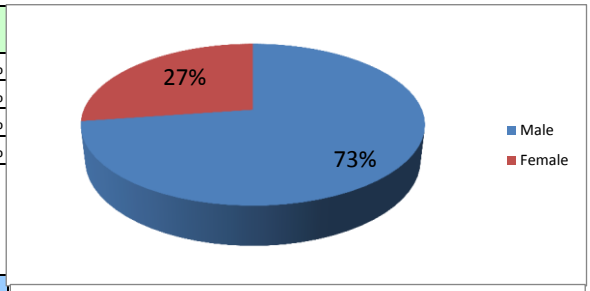
[1] *Minorities are US citizen who declare themselves American Indian, Black, Hispanic, or Pacific Islander. Minority percentage is calculated by dividing the number of Minorities by the total number of US citi.*

Home Institute Grouping

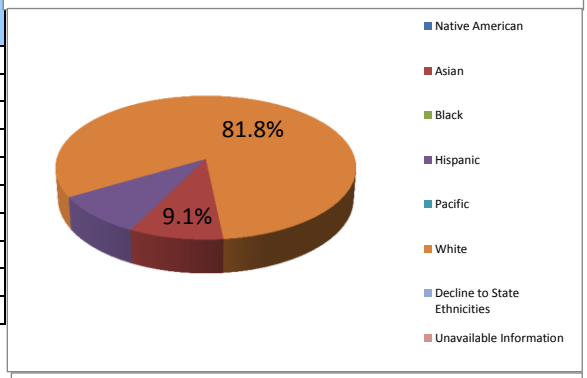
	US									
Role	Math Private Large Group	Math Private Small Group	Math Public Large Group	Math Public Medium Group	Math Public Small Group	Group M	Group B	Total US Institution	Foreign	Total
Organizers	0	0	0	0	0	0	0	0	0	0
Research Professors	0	0	0	0	0	0	0	0	1	1
Postdoctoral Fellows MSRI	0	0	0	0	0	0	0	0	1	1
Postdoctoral Fellows RM	0	0	0	0	0	0	0	0	0	0
Research Members	1	1	1	0	0	0	1	4	5	9
Program Associates	0	0	0	0	0	0	0	0	0	0
Total	**1**	**1**	**1**	**-**	**-**	**-**	**1**	**4**	**7**	**11**
%	***9.1%***	***9.1%***	***9.1%***	***0.0%***	***0.0%***	***0.0%***	***9.1%***	***36.4%***	***63.6%***	***100.0%***

2015–16 Program Members Demographic Summary

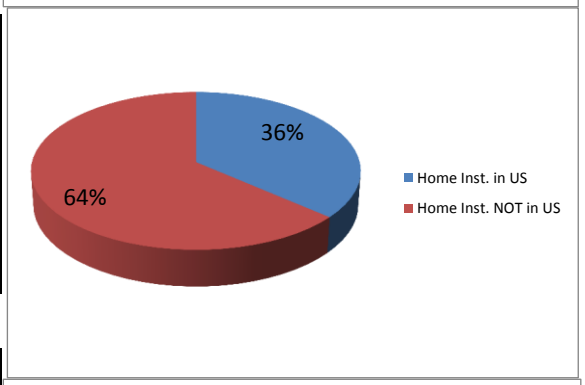
Gender	#	% (No Decl.)*	%
# of Distinct Members	11		100.0%
Male	8	72.73%	72.7%
Female	3	27.27%	27.3%
Decline to State Gender	0		0.0%



Ethnicities	#	% (No Decl.)*	%
Native American	0	0.00%	0.0%
Asian	1	9.09%	9.1%
Black	0	0.00%	0.0%
Hispanic	1	9.09%	9.1%
Pacific	0	0.00%	0.0%
White	9	81.82%	81.8%
Decline to State Ethnicities	0		0.0%
Unavailable Information	0		0.0%
Minorities	1		20.0%

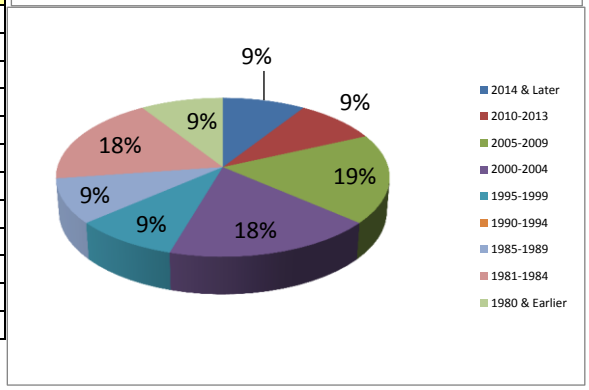


Citizenships	#		%
US Citizen & Perm. Residents	5		45.5%
Foreign	6		54.5%
Unavailable information	0		0.0%
# of Distinct Members	11		100.0%
US Citizen	5		45.5%
Perm Residents	0		0.0%
Home Inst. in US	4		36.36%



Year of Ph.D	#		%
Program Associates (GS)	0		0.0%
2014 & Later	1		9.1%
2010-2013	1		9.1%
2005-2009	2		18.2%
2000-2004	2		18.2%
1995-1999	1		9.1%
1990-1994	0		0.0%
1985-1989	1		9.1%
1981-1984	2		18.2%
1980 & Earlier	1		9.1%
Unavailable Info.	0		0.0%
Total # of Distinct Members	11		100.0%

**Statistic Calculation based on all participants that did not decline.*



Connections for Women: Differential Geometry

January 14, 2016 - 16, 2016

MSRI, Berkeley, CA, USA

Organizers:

Christine Breiner (Fordham University)

Natasa Sesum (Rutgers University)

REPORT ON THE MSRI WORKSHOP "CONNECTIONS FOR WOMEN: DIFFERENTIAL GEOMETRY", JANUARY 14-15, 2016.

1. Organizers

- Christine Breiner (Fordham University)
- Natasa Sesum (Rutgers Univeristy)

2. Scientific description

Differential geometry is a subject with both deep roots and recent advances. Many old problems in the field have recently been solved, including the Poincaré and geometrization conjectures by Perelman, the quarter pinching conjecture by Brendle-Schoen, the Lawson Conjecture by Brendle, and the Willmore Conjecture by Marques-Neves. The solutions of these problems have introduced a wealth of new techniques into the field.

The purpose of the "Connections for Women" workshop is to help junior female researchers to become familiar with the focus topics of the main MSRI program, and also for the junior researchers to have an opportunity to get acquainted with more senior women researchers in differential geometry. The workshop highlighted the research accomplishments of both young women and well-established researchers in Geometric Analysis and Differential Geometry.

One of the remarkable features of the workshop was the interaction with the "Introductory Workshop: Modern Riemannian Geometry", hosted by MSRI the week immediately following the "Connections for Women" workshop. Some of the women who attended the "Connections for Women" workshop participated also in the introductory workshop the following week. In the distribution of funding, those who were registered for both workshops received funding through the weekend in between. During the introductory announcements, the deputy director of MSRI, Hélène Barcelo, encouraged individuals who had not registered for the introductory workshop to consider attending and apply for additional funding. Two of the graduate students were so excited by the "Connections for Women" workshop, they decided to pursue this option. Their requests for funding were quickly met and their engagement in the workshop in the following week demonstrated the success

of this endeavor. The overall distribution of funding for the workshop itself was successful, as every female mathematician who applied was awarded funding to attend the "Connections for Women" workshop.

Overall, the workshop was very well attended. Many of the speakers discusses important open problems in their respective areas of interest. We received wonderful input at the end of the workshop saying that all the lectures and overall impression was very enthusiastic.

3. Highlights of the workshop

Many young women found the workshop very inspiring and encouraging, especially by seeing more senior and successful women around them. For example, one of the participants said: "I walked with one of speakers at the workshop. I was really impressed by her talk, but we talked a bit about how different her plans were at the beginning of graduate school. It was really reassuring that someone in a position like hers could be really uncertain at the beginning, where I currently am. Furthermore, I find it difficult to imagine a conversation like the one we had happening at any other conference."

The workshop included eight talks by female mathematicians with diverse interests, representing the breadth of differential geometry and its applications. A number of talks were related to parabolic problems in differential geometry. The workshop began with a talk by Lu Wang (Wisconsin) on a topological characterization of closed 3-surfaces with small entropy. Her talk included an extensive introduction to mean-curvature flow, important techniques, and known results about self-shrinkers. Panagiota Daskalopoulos (Columbia) spoke about ancient and entire solutions to mean curvature flow, Ricci flow, and the Yamabe flow. She directed her talk toward the graduate students and non-experts, giving an overview of the known classification and existence results. She paid special attention to the important techniques introduced and exploited for each of these parabolic problems. Casey Kelleher (Irvine) spoke on singularity formation in the Yang-Mills flow. She introduced a theory of tangent measures for the flow at singular points and used this theory to analyze the singular strata.

There were two talks related to notions of manifold and metric space convergence. Christina Sormani (CUNY) introduced the many notions of convergence

and provided motivating examples for the necessity of such notions. She then presented recent work that demonstrates when the intrinsic flat limit and the Gromov-Hausdorff limit agree. One of the graduate students commented that she had heard of these notions of convergence before, but she did not understand the definitions or their motivation until she saw the talk by Sormani. Raquel Perales (UNAM) extended the convergence notions to include manifolds with boundary. She provided certain hypotheses under which the two limiting notions agree in this setting, and used easy examples to demonstrate the necessity of these hypotheses.

The remaining three talks were in three different and very active areas of mathematics. Guofang Wei (UCSB) spoke on integral Ricci curvature. She showed that a local isoperimetric constant estimate for integral Ricci curvature can be used to extend results on manifolds with pointwise lower Ricci bounds to those with integral lower Ricci curvature bounds. Eleonora Di Nezza (Imperial) spoke on the regularity of solutions of degenerate complex Monge-Ampére equations where the right hand-side is smooth just outside the divisor D. She establishes uniform a priori estimates, generalizing both Yau's and Kolodziej's celebrated estimates. Finally, Yi Wang (JHU) discussed locally conformally flat manifolds with finite total curvature. She proves a sort of Gauss-Bonnet type theorem for such manifolds, where the integral of Gauss curvature is replaced by the integral of the Q-curvature.

Organizers		
First Name	**Last Name**	**Institution**
Christine	Breiner	Fordham University
Natasa	Sesum	Rutgers University
Speakers		
First Name	**Last Name**	**Institution**
Panagiota	Daskalopoulos	Columbia University
Eleonora	Di Nezza	Imperial College, London
Casey	Kelleher	University of California, Irvine
Raquel	Perales	UNAM - Universidad Nacional Autonoma de Mexico
Christina	Sormani	CUNY, Graduate Center
Lu	Wang	University of Wisconsin-Madison
Yi	Wang	Johns Hopkins University
Guofang	Wei	University of California, Santa Barbara

Connections for Women: Differential Geometry

January 14- 15, 2016

Schedule

Thursday, January 14, 2015			
9:15AM - 9:30AM	Simons Auditorium		Welcome
9:30AM - 10:30AM	Simons Auditorium	Lu Wang	Topology of Closed Hypersurfaces of Small Entropy
10:30AM - 11:00AM	Atrium		Tea
11:00AM - 12:00PM	Simons Auditorium	Panagiota Daskalopoulos	Ancient solutions to geometric flows
12:00PM - 2:00PM	Atrium		Lunch
2:00PM - 3:00PM	Simons Auditorium	Eleonora Di Nezza	Monge-Ampère equations on quasi-projective varieties
3:00PM - 3:30PM	Atrium		Tea
3:30PM - 4:30PM	Simons Auditorium	Christina Sormani	Sliced Filling Volumes and Intrinsic Flat Convergence
4:30PM - 5:30PM	Commons		Panel Discussion
6:30PM - 8:30PM	MSRI		Dinner at The Taste of Himalayas

Friday, January 15, 2015			
9:30AM - 10:30AM	Simons Auditorium	Yi Wang	Finite total Q-curvature on a locally conformally flat manifold
10:30AM - 11:00AM	Atrium		Tea
11:00AM - 12:00PM	Simons Auditorium	Raquel Perales Aguilar	Convergence of Manifolds and Metric Spaces with Boundary
12:00PM - 2:00PM	Atrium		Lunch
2:00PM - 3:00PM	Simons Auditorium	Casey Kelleher	Singularity Formation of the Yang-Mills Flow
3:00PM - 3:30PM	Atrium		Tea
3:30PM - 4:30PM	Simons Auditorium	Guofang Wei	Local Isoperimetric Constant Estimate for Integral Ricci Curvature

Participants		
First Name	**Last Name**	**Institution**
Ian	Adelstein	Trinity College
Bernadett	Aradi	University of Debrecen
Romina	Arroyo	Universidad Nacional de Cordoba
Christine	Breiner	Fordham University
Kate	Brubaker	Purdue University
Orsola	Capovilla-Searle	Duke University
Donato	Cianci	Dartmouth College
Gabriella	Clemente	University of Notre Dame
Xianzhe	Dai	University of California, Santa Barbara
Panagiota	Daskalopoulos	Columbia University
Azahara	de la Torre Pedraza	Universitat Politèctica de Catalunya
Cément	Debin	Université de Grenoble I (Joseph Fourier)
Eleonora	Di Nezza	Imperial College, London
Jonathan	Epstein	Dartmouth College
Maria del Mar	Gonzalez	Universitat Politecnica de Catalunya
Carolyn	Gordon	Dartmouth College
Jiyuan	Han	University of Wisconsin-Madison
Hongnian	Huang	University of New Mexico
Casey	Kelleher	University of California, Irvine
Lee	Kennard	University of Oklahoma
Fariba	Khoshnasib	University of Texas at Dallas
Rob	Kusner	University of Massachusetts, Amherst
Jeremy	Leach	University of Washington
Dan	Lee	Queens College, CUNY
Yueh-Ju	Lin	University of Michigan
Michael	Lock	University of Texas
Jason	Lotay	University College
Shabnam	Malik	Forman Christian College (a Chartered University)
Jesus	Martinez Garcia	Johns Hopkins University
Donovan	McFeron	Ramapo College of New Jersey
Ilaria	Mondello	Institut de Mathématiques de Jussieu
Peyman	Morteza	University of Wisconsin-Madison
T. Tam	Nguyen Phan	Binghamton University (SUNY)
Tracy	Payne	Idaho State University
Raquel	Perales	UNAM - Universidad Nacional Autonoma de Mexico
Mariel	Saez Trumper	Pontificia Universidad Católica de Chile
Felix	Schulze	University College
Catherine	Searle	Wichita State University
Rosa	Sena-Dias	Instituto Superior Técnico
Christina	Sormani	CUNY, Graduate Center
Ioana	Suvaina	Vanderbilt University
Thunwa	Theerakarn	University of California, Berkeley
Jeff	Viaclovsky	University of Wisconsin-Madison
Lu	Wang	University of Wisconsin-Madison

Participants		
First Name	**Last Name**	**Institution**
Yi	Wang	Johns Hopkins University
Guofang	Wei	University of California, Santa Barbara
Lina	Wu	Borough of Manhattan Community College- The City University of New York
Chengjian	Yao	Université Libre de Bruxelles
Evangelie	Zachos	Stanford University

Officially Registered Participant Information

Participants		**49**

Gender		**49**
Male	40.82%	20
Female	59.18%	29
Declined to state	0.00%	0
	0.00%	

Ethnicity*		**62**
White	63.27%	31
Asian	30.61%	15
Hispanic	12.24%	6
Pacific Islander	0.00%	0
Black	2.04%	1
Native American	0.00%	0
Mixed	12.24%	6
Declined to state	6.12%	3

* ethnicity specifications are not exclusive

34 responses

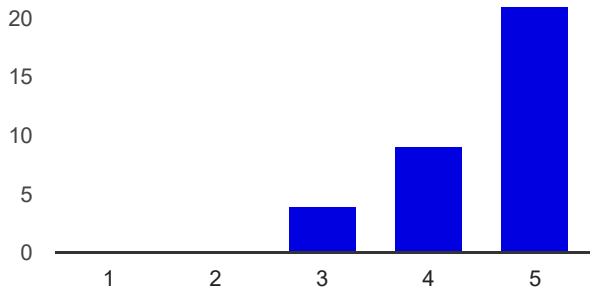
34 responses out of 49 participants = 65% response rate

View all responses Publish analytics

Summary

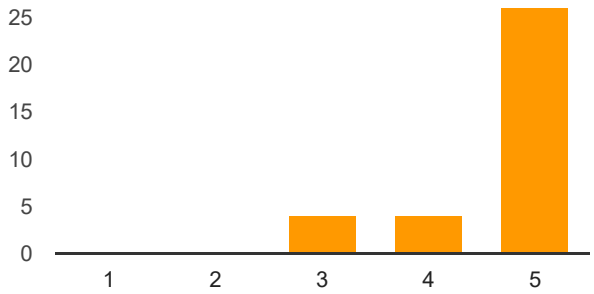
Workshop assessment

The workshop was intellectually stimulating



Not at all:	1	0	0%
	2	0	0%
	3	4	11.8%
	4	9	26.5%
Very:	5	21	61.8%

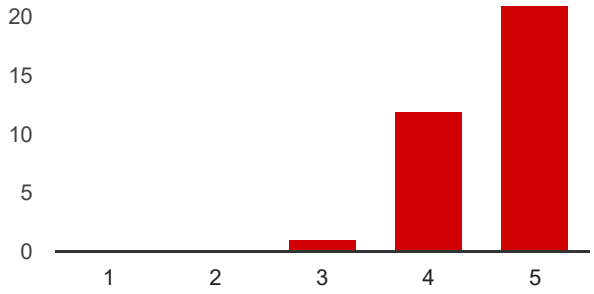
The overall experience of the workshop was worthwhile



Not at all:	1	0	0%

2	0	0%
3	4	11.8%
4	4	11.8%
Very: 5	26	76.5%

The time between lectures was adequate for discussion



Not al all: 1	0	0%
2	0	0%
3	1	2.9%
4	12	35.3%
Very: 5	21	61.8%

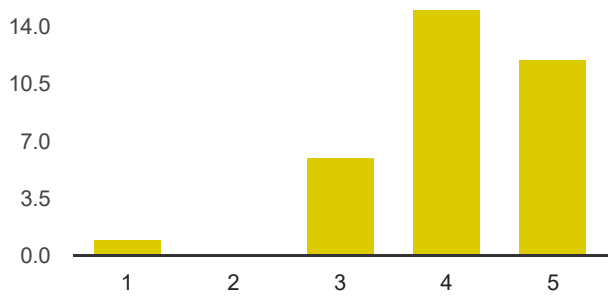
Additional comments on the workshop organization

very enthusiastic

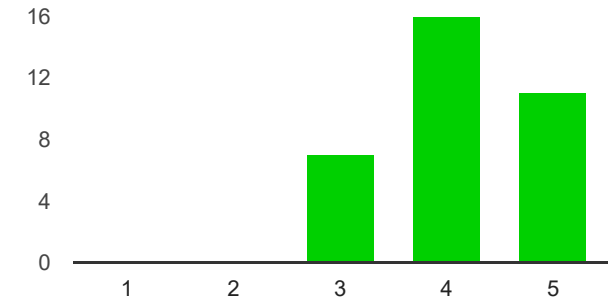
This workshop was a unique experience for me. I met several other women geometers from several different countries. It was great to learn about their work and diverse experiences as math graduate students, postdocs, and researchers.

Personal assessment

I was well prepared to benefit from the lectures

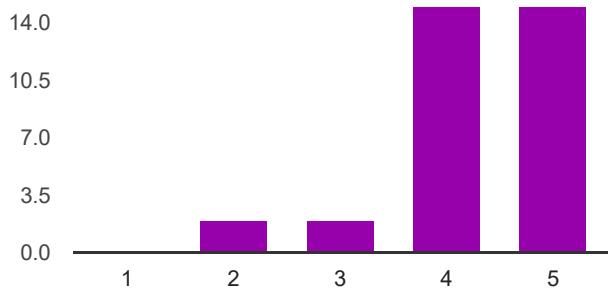


My interest in the subject matter was increased by the workshop



Niot at all:	1	0	0%
	2	0	0%
	3	7	20.6%
	4	16	47.1%
Very:	5	11	32.4%

The workshop helped me meet people with similar scientific interests



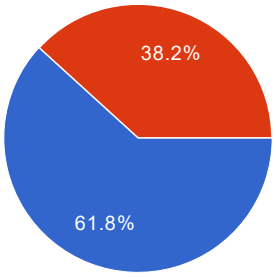
Not at all:	1	0	0%
	2	2	5.9%
	3	2	5.9%
	4	15	44.1%

Very Much: 5	15	44.1%

Additional comments on your personal assessment

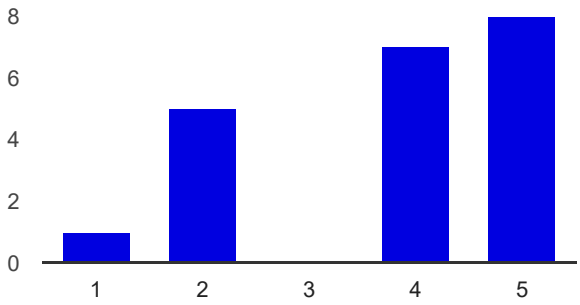
Additional Activities

Did you attend the panel discussion?



Yes	21	61.8%
No	13	38.2%

If you did attend the panel discussion, did you find it worthwhile?



Not at all: 1	1	4.8%
2	5	23.8%
3	0	0%
4	7	33.3%
Very much: 5	8	38.1%

What other subjects should be addressed in future panel discussions?

Two body problems, balance life and career

The most opinionated people dominated the discussion. There should be a panel so all panelists speak equal amounts.

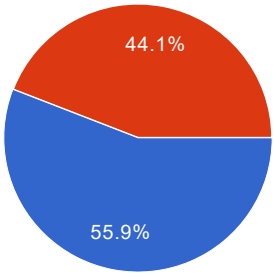
Have a panel and allow all panelists to speak equally to get more points of view

How to be a good mathematician. (This is different from how to become a successful

mathematician.)

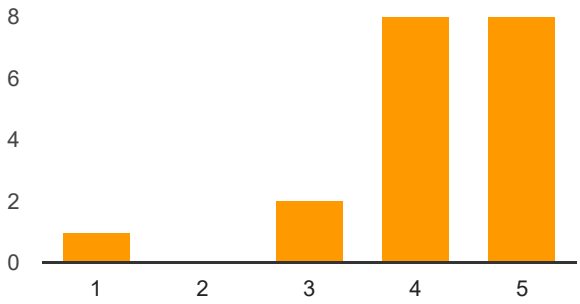
format was issue: smaller groups

Did you attend the dinner?



Yes	19	55.9%
No	15	44.1%

If you did attend the dinner, did it help to solidify the contacts you made in the workshop?



Not at all:	1	1	5.3%
	2	0	0%
	3	2	10.5%
	4	8	42.1%
Very much:	5	8	42.1%

Please provide any comments on the dinner

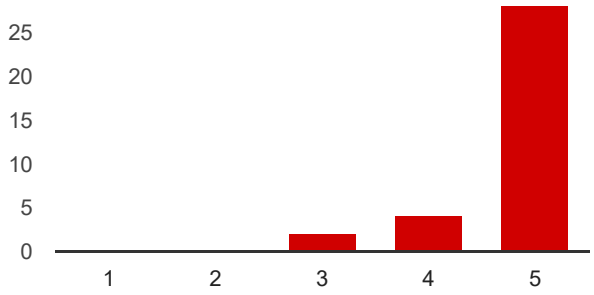
There was some confusion about resevations and bill + service was not great - my food was cold by the time I got it

Restaurant was not organized, food was cold

The food was a bit odd, but the experience of attending the dinner was still great

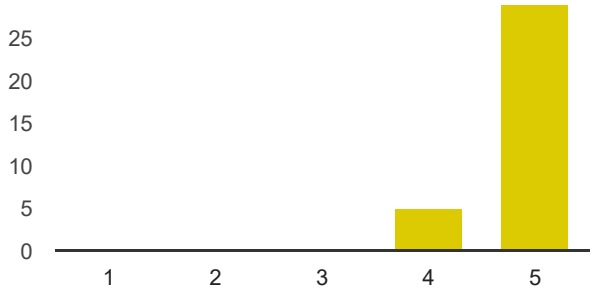
Venue

I found the MSRI staff helpful



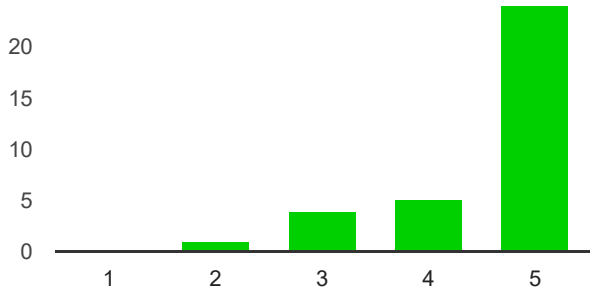
Not at all:	1	0	0%
	2	0	0%
	3	2	5.9%
	4	4	11.8%
Very:	5	28	82.4%

The MSRI physical facilities were conducive for such a workshop

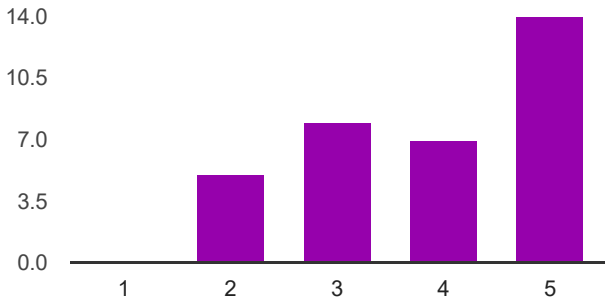


Not at all:	1	0	0%
	2	0	0%
	3	0	0%
	4	5	14.7%
Very:	5	29	85.3%

The MSRI computer facilities were adequate for such a workshop

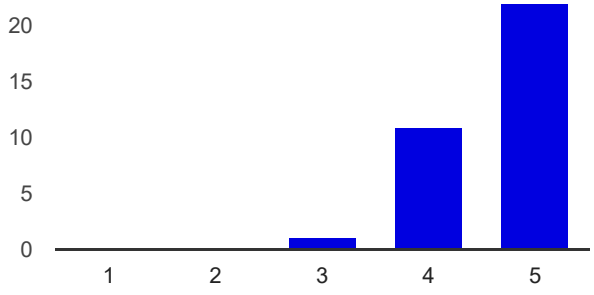


The MSRI lunch arrangements were satisfactory



Not at all:	1	0	0%
	2	5	14.7%
	3	8	23.5%
	4	7	20.6%
Very:	5	14	41.2%

The MSRI tea arrangements were satisfactory



Not at all:	1	0	0%
	2	0	0%
	3	1	2.9%

4	11	32.4%
Very: 5	22	64.7%

Additional comments on the venue

could not print in computer lab

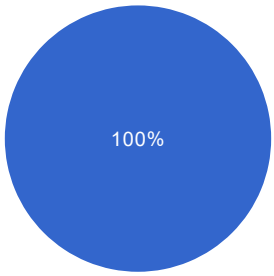
The building, staff, and atmosphere are wonderful

better vegetarian lunch options! More substantial ones

I want to thank the organizers of this workshop, especially Christine Breiner, Jacari Scott, and the Deputy Director, Helene Barcelo, for making it possible for me to extend my stay to attend the Riemannian Geometry workshop that followed.

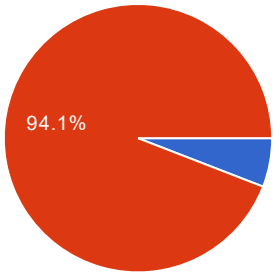
MSRI Wireless Network

Did you use MSRI's wireless network?



Yes	34	100%
No	0	0%

Did you experience any difficulties with the network?



Yes	2	5.9%
No	32	94.1%

If you did experience difficulties with the network, please explain:

it doesn´t get connected in some rooms

Bad connectivity in the second floor.

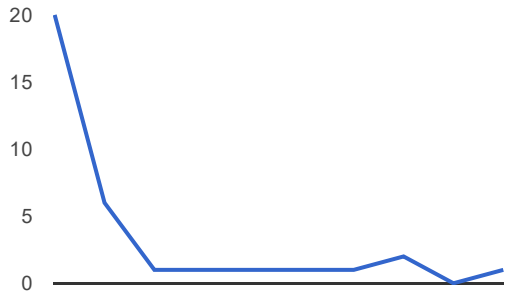
Thank you for completing this survey

We welcome any additional comments or suggestions you may have to improve the overall experience for future participants.

Thank you for all you do!

Maybe there could be a few short talks by grad students, aimed at explaining their research to other grad students

Number of daily responses



Introductory Workshop: Modern Riemannian Geometry

January 18, 2016 - January 22, 2016

MSRI, Berkeley, CA, USA

Organizers:

Tobias Colding (Massachusetts Institute of Technology)

John Lott (University of California, Berkeley)

Jeff Viaclovsky (University of Wisconsin-Madison)

REPORT ON THE MSRI "INTRODUCTORY WORKSHOP : MODERN RIEMANNIAN GEOMETRY", JANUARY 18-22, 2016

Organizers

- Tobias Colding (Massachusetts Institute of Technology)
- John Lott (University of California - Berkeley)
- Jeff Viaclovsky (University of Wisconsin - Madison)

1. Scientific description

The week was devoted to an introduction to modern techniques in geometry. This was intended to help graduate students and younger researchers get a headstart, in order to increase their participation during the main semester programs and research lectures. To increase outreach, the week focused on Riemannian geometry and was largely accessible. The workshop had several expository lectures dealing with aspects of spaces with curvature bounded from below, since such spaces occurred throughout the semester.

The great majority of the participants in the workshop were graduate students or postdocs.

Each speaker gave two 1-hour talks, with the first talk intended to provide background for the second talk.

2. Presentations

The workshop began with expositions by Karsten Grove and Guofang Wei about Riemannian manifolds with lower sectional curvature bounds and Riemannian manifolds with lower Ricci curvature bounds, respectively. Grove also described the basic properties of Alexandrov spaces, i.e. metric spaces with a generalized notion of a lower sectional curvature bound. The material presented in the initial talks by Grove and Wei returned repeatedly in the rest of the workshop talks.

In his second talk, Grove returned to questions about Riemannian manifolds with positive or nonnegative sectional curvatures. He described the history of the subject, along with more recent classification results.

In her second talk, Guofang Wei showed to what degree the standard comparison geometry results for Ricci curvature can be extended to the setting of smooth metric-measure spaces, when the Ricci curvature is replaced by the Bakry-Emery-Ricci curvature. She also described comparison results based on integral Ricci curvature bounds.

Mark Haskins gave two talks on Ricci flat spaces and metrics with special or exceptional holonomy. His first talk explained the notion of holonomy and the search for Riemannian manifolds with exceptional holonomy. In his second talk he described gluing constructions to make hundreds of seven-dimensional manifolds that support a Riemannian metric with G_2-holonomy.

In his first talk, Michael Anderson introduced the existence and uniqueness problems for Einstein metrics. He explained basic results and questions about their moduli spaces. Anderson's second talk included a discussion of obstructions to resolving singular Einstein metrics, and a discussion of the boundary value problem for Einstein metrics.

Tobias Colding gave two talks about mean curvature flow. The first talk explained how to derive the mean curvature flow formula and its level set formulation. In his second talk, Colding presented results about singularities in mean curvature flow, and in particular new regularity results for the arrival time function.

Catherine Searle's talks focused on Riemannian manifolds with positive or nonnegative curvature, in the presence of symmetry. The first talk explained how one can use torus symmetries to partially reduce the problem to questions about the Alexandrov geometry of the quotient space. The second talk gave more detailed results about how varying amounts of symmetry can affect the existence problem.

The talks of Andrea Mondino centered on Ricci curvature for nonsmooth spaces. The first talk presented the notion of a lower Ricci curvature bound for a metric-measure space, using optimal transport. Mondino's second talk was devoted to isoperimetric questions. He explained how optimal transport methods can be used to derive isoperimetric inequalities for metric-measure spaces. Some of the corollaries are new even for smooth Riemannian manifolds.

Vitali Kapovitch's first talk explained the notion of a semiconcave function on an Alexandrov space, and how the gradient flow of such functions can be used to prove structure results. His second talk gave some open problems in Alexandrov geometry, along with the construction of a geodesic flow for Alexandrov spaces.

Organizers

First Name	Last Name	Institution
Tobias	Colding	Massachusetts Institute of Technology
John	Lott	University of California, Berkeley
Jeff	Viaclovsky	University of Wisconsin-Madison

Speakers

First Name	Last Name	Institution
Michael	Anderson	State University of New York, Stony Brook
Tobias	Colding	Massachusetts Institute of Technology
Karsten	Grove	University of Notre Dame
Mark	Haskins	Imperial College, London
Vitali	Kapovitch	University of Toronto
Andrea	Mondino	Universität Zürich
Richard	Schoen	University of California, Irvine
Catherine	Searle	Wichita State University
Guofang	Wei	University of California, Santa Barbara

Introductory Workshop: Modern Riemannian Geometry

January 18-22, 2016

Schedule

Monday, January 18, 2016			
9:15 AM - 9:30 AM	Simons Auditorium		Welcome
9:30 AM - 10:30 AM	Simons Auditorium	Karsten Grove	Manifolds with lower sectional curvature bounds and Alexandrov geometry
10:30 AM - 11:00 AM	Atrium		Break
11:00 AM - 12:00 PM	Simons Auditorium	Guofang Wei	Comparison geometry for Ricci curvature I
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Mark Haskins	Ricci flat spaces and metrics with special or exceptional holonomy I
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Michael Anderson	Aspects of Einstein metrics on 4-manifolds I

Tuesday, January 19, 2016			
9:30 AM - 10:30 AM	Simons Auditorium	Tobias Colding	Mean curvature flow
10:30 AM - 11:00 AM	Atrium		Break
11:00 AM - 12:00 PM	Simons Auditorium	Catherine Searle	Positively and non-negatively curved manifolds and (torus) symmetries
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Andrea Mondino	Metric measure spaces satisfying Ricci curvature lower bounds I
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Vitali Kapovitch	Semiconcave functions in Alexandrov geometry
4:30 PM - 6:20 PM	Atrium		Reception

Wednesday, January 20, 2016			
9:30 AM - 10:30 AM	Simons Auditorium	Karsten Grove	A panoramic glimpse of nonnegative curvature
10:30 AM - 11:00 AM	Atrium		Tea
11:00 AM - 12:00 PM	Simons Auditorium	Guofang Wei	Comparison geometry for Ricci curvature II

Thursday, January 21, 2016			
9:30 AM - 10:30 AM	Simons Auditorium	Mark Haskins	Ricci flat spaces and metrics with special or exceptional holonomy II
10:30 AM - 11:00 AM	Atrium		Break
11:00 AM - 12:00 PM	Simons Auditorium	Michael Anderson	Aspects of Einstein metrics on 4-manifolds II
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Catherine Searle	The maximal symmetry rank conjecture for nonnegative curvature
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Richard Schoen	Minimal submanifolds and lower curvature bounds I

Friday, January 22, 2016			
9:30 AM - 10:30 AM	Simons Auditorium	Richard Schoen	Minimal submanifolds and lower curvature bounds II
10:30 AM - 11:00 AM	Atrium		Break
11:00 AM - 12:00 PM	Simons Auditorium	Tobias Colding	Mean curvature flow
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Andrea Mondino	Metric measure spaces satisfying Ricci curvature lower bounds II
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Vitali Kapovitch	Measure-metric boundary and Liouville theorem in Alexandrov geometry

Participants		
First Name	**Last Name**	**Institution**
Abrahamsen	Nilin	Massachusetts Institute of Technology
Adelstein	Ian	Trinity College
Anderson	Michael	State University of New York, Stony Brook
Arbour	Jean-Francois	State University of New York, Stony Brook
Arroyo	Romina	Universidad Nacional de Cordoba
Avramidi	Grigori	Ohio State University
Belegradek	Igor	Georgia Institute of Technology
Blacker	Casey	University of California, Santa Barbara
Breiner	Christine	Fordham University
Brubaker	Kate	Purdue University
Cabrera Pacheco	Armando	University of Miami
Capovilla-Searle	Orsola	Duke University
Charalambous	Nelia	University of Cyprus
Cianci	Donato	Dartmouth College
Clemente	Gabriella	University of Notre Dame
Colding	Tobias	Massachusetts Institute of Technology
Conlon	Ronan	Université du Québec à Montréal
Cote	Laurent	Stanford University
Czubak	Magdalena	Binghamton University (SUNY)
Dai	Xianzhe	University of California, Santa Barbara
Datar	Ved	University of California, Berkeley
de la Torre Pedraza	Azahara	Universitat Politèctica de Catalunya
Debin	Cément	Université de Grenoble I (Joseph Fourier)
Dellatorre	Matthew	University of Maryland
Deng	Qin	University of Toronto
Deruelle	Alix	Université de Marie Curie et Université de Paris XI (Paris-Sud)
Di Nezza	Eleonora	Imperial College, London
Dong	Zhe Ting	Oregon State University
Epstein	Jonathan	Dartmouth College
Eriksson-Bique	Sylvester	New York University, Courant Institute
Escher	Christine	Oregon State University
Flores	Daniel	Instituto de Ciencias Nucleares, UNAM
Fluegemann	Joseph	San Jose State University
Foscolo	Lorenzo	State University of New York, Stony Brook
Futaki	Akito	University of Tokyo
Gage	Michael	University of Rochester
Geis	Michael	Northwestern University
Gonzalez	Maria del Mar	Universitat Politecnica de Catalunya
Gordon	Carolyn	Dartmouth College
Greenberg	Marvin	University of California, Santa Cruz
Greverath	Desiree	Stanford University
Grove	Karsten	University of Notre Dame
Han	Jiyuan	University of Wisconsin-Madison
Han	Sang Yong	Chung-Ang University

Participants		
First Name	**Last Name**	**Institution**
Haskins	Mark	Imperial College, London
He	Chenxu	University of California, Riverside
Hoisington	Joseph	University of Pennsylvania
Huang	Hongnian	University of New Mexico
Jin	Zhongmin	University of California, Santa Barbara
Ju	Tao	University of Wisconsin-Madison
Kapovitch	Vitali	University of Toronto
Karr	William	University of Illinois at Urbana-Champaign
Kazaras	Demetre	University of Oregon
Kelleher	Casey	University of California, Irvine
Kennard	Lee	University of Oklahoma
Kerr	Megan	Wellesley College
Ketterer	Christian	Albert-Ludwigs-Universität Freiburg
Kim	Jin Hong	Chosun University
Kobayashi	Kei	The Institute of Statistical Mathematics
Krishnan	Anusha	University of Pennsylvania
Kroencke	Klaus	Universität Hamburg
Kusner	Rob	University of Massachusetts, Amherst
Lane	Thomas	University of Oklahoma
Leach	Jeremy	University of Washington
Lee	King-Leung	Rutgers University
Lee	Dan	Queens College, CUNY
Li	Nan	New York City Technical College, CUNY
Li	Yihan	University of California, Santa Barbara
Li	Didong	Duke University
Lin	Yueh-Ju	University of Michigan
Lock	Michael	University of Texas
Lotay	Jason	University College
Lott	John	University of California, Berkeley
Macbeth	Heather	Massachusetts Institute of Technology
Magid	Martin	Wellesley College
Marsh	Jason	University of Notre Dame
Martinez Garcia	Jesus	Johns Hopkins University
McCleerey	Nicholas	Northwestern University
McFeron	Donovan	Ramapo College of New Jersey
McKeown	Stephen	University of Washington
Merlini	Jonathan	University of Oklahoma
Mondello	Ilaria	Institut de Mathématiques de Jussieu
Mondino	Andrea	Universität Zürich
Morteza	Peyman	University of Wisconsin-Madison
Nguyen	Dat	Stanford University
Nguyen Phan	T. Tam	Binghamton University (SUNY)
Ofner	Theodore	Binghamton University (SUNY)
Otoba	Nobuhiko	Keio University, Yagami Campus

Participants		
First Name	**Last Name**	**Institution**
Park	Jiewon	Massachusetts Institute of Technology
Payne	Tracy	Idaho State University
Perales	Raquel	UNAM - Universidad Nacional Autonoma de Mexico
Pfeffer	Joshua	Massachusetts Institute of Technology
Rajan	Priyanka	University of California, Riverside
Rubinstein	Yanir	University of Maryland
Saez Trumper	Mariel	Pontificia Universidad Católica de Chile
Sawon	Justin	University of North Carolina
Schoen	Richard	University of California, Irvine
Schulze	Felix	University College
Searle	Catherine	Wichita State University
Sena-Dias	Rosa	Instituto Superior Técnico
Seto	Shoo	University of California, Santa Barbara
Shen	Liangming	University of British Columbia
Sinaei	Zahra	Northwestern University
Smillie	Peter	Harvard University
Song	Chong	University of Washington
Sormani	Christina	CUNY, Graduate Center
Srinivas	Vasudevan	Tata Institute of Fundamental Research
Sritharan	Sivaguru	Air Force Institute of Technology
Stolarski	Maxwell	University of Texas
Strehlke	Nicholas	Massachusetts Institute of Technology
Tekile	Hailemariam	University of Gondar
Theerakarn	Thunwa	University of California, Berkeley
Tilles	Michael	University of Oklahoma
Tsonev	Dragomir	UFAM
Viaclovsky	Jeff	University of Wisconsin-Madison
Walsh	Mark	Wichita State University
Warchall	Henry	National Science Foundation
Wei	Guofang	University of California, Santa Barbara
Wilson	Patrick	University of California, Berkeley
Wu	Lina	Borough of Manhattan Community College- The City University of New York
Yamaguchi	Takao	Kyoto University
Yang	Xiaomei	Nankai University
Yao	Chengjian	Université Libre de Bruxelles
Zachos	Evangelie	Stanford University
Zhang	Yuguang	Mathematical Sciences Center, Tsinghua University
Zhu	Xuwen	Stanford University
Zhu	Xiaohua	Peking Univiversity
Zhu	Jonathan	Harvard University

Officially Registered Participant Information

Participants		**128**

Gender		**128**
Male	72.66%	93
Female	26.56%	34
Declined to state	0.78%	1

Ethnicity*		**139**
White	59.38%	76
Asian	30.47%	39
Hispanic	6.25%	8
Pacific Islander	0.00%	0
Black	1.56%	2
Native American	0.00%	0
Mixed	3.91%	5
Declined to state	7.03%	9

* ethnicity specifications are not exclusive

87 responses

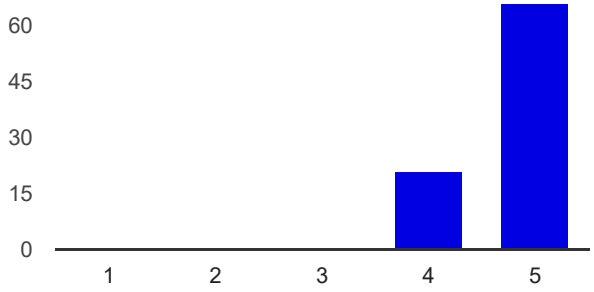
87 responses out of 128 participants = 68% response rate

View all responses Publish analytics

Summary

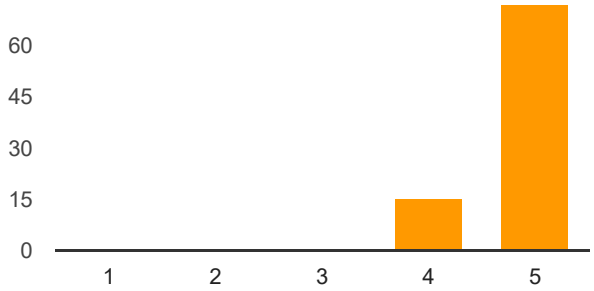
Workshop assessment

The workshop was intellectually stimulating



Not at all:	1	0	0%
	2	0	0%
	3	0	0%
	4	21	24.1%
Very:	5	66	75.9%

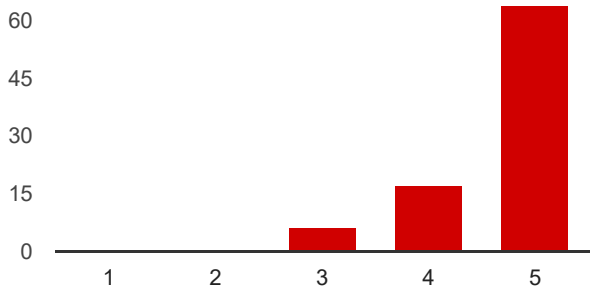
The overall experience of the workshop was worthwhile



Not at all:	1	0	0%

2	0	0%
3	0	0%
4	15	17.2%
Very: 5	72	82.8%

The time between lectures was adequate for discussion



Not al all: 1	0	0%
2	0	0%
3	6	6.9%
4	17	19.5%
Very: 5	64	73.6%

Additional comments on the workshop organization

very good

I would have liked to see more actal introductory talks. With a few exceptions most talks were either very technical or very fast survey talks, more suitable for experts rather than graduate students and postdocs.

Some of the talks were well-beyond "introductory". The survey talks that crammed in a lot were the least useful. The talks that gave an introduction to the general ideas were much better.

loved the triangle and the time format of the conference.

Wonderful, Friendly, Inspiring

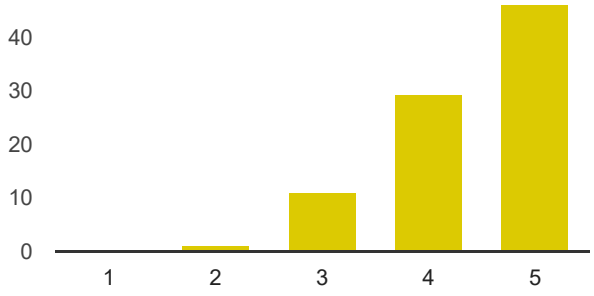
Excellent

I learned about numerous ideas and the work of other mathematicians that I expect will be useful in my future work. I think that had I not attended the workshop, I would have become aware of these new ideas much later. The environment was very conducive of doing and discussing mathematics. My experience at MSRI was very positive and inspiring.

i believe if the lectures were a little more in the style of courses that would be helpful. They seemed to be like surveys of a topic rather than an introduction at times.

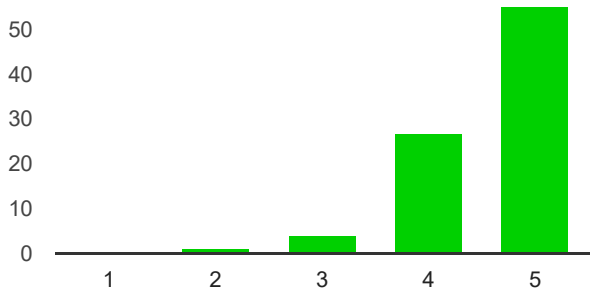
Personal assessment

I was well prepared to benefit from the lectures



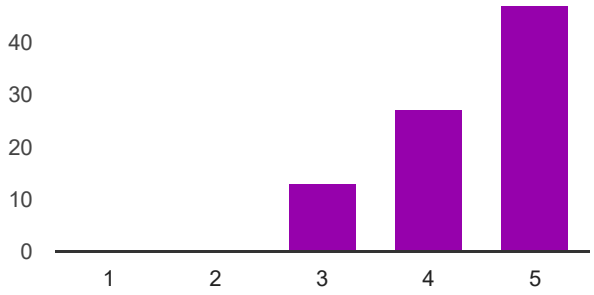
Not at all:	1	0	0%
	2	1	1.1%
	3	11	12.6%
	4	29	33.3%
Very:	5	46	52.9%

My interest in the subject matter was increased by the workshop



Niot at all:	1	0	0%
	2	1	1.1%
	3	4	4.6%
	4	27	31%
Very:	5	55	63.2%

The workshop helped me meet people with similar scientific interests



2	0	0%
3	13	14.9%
4	27	31%
Very Much: 5	47	54%

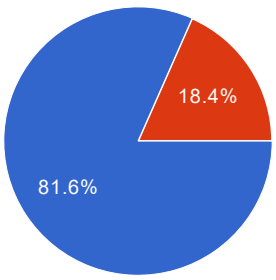
Additional comments on your personal assessment

get a lot of benefit

I think the abstract should be posted at the same time as the workshop is announced (or at least posted before the workshop)

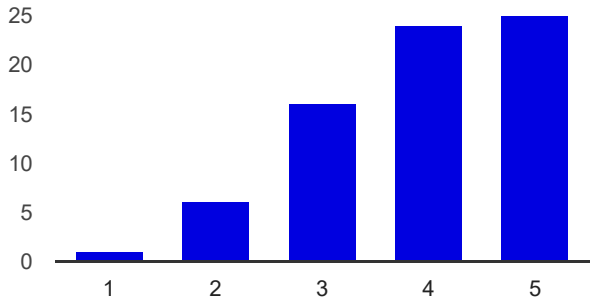
Additional Activities

Did you attend the reception?



Yes	71	81.6%
No	16	18.4%

If you did attend the reception, did it help to solidify the contacts you made in the workshop?



Please provide any comments on the reception

free discussion

Good

I did not see how the reception was significantly different from lunch or tea time.

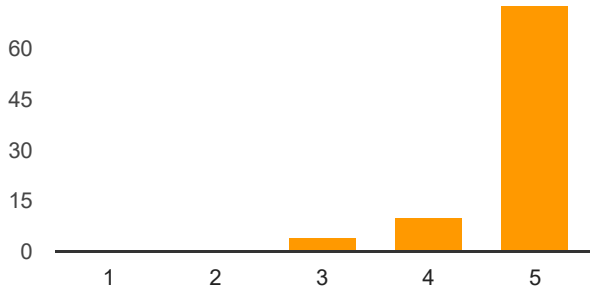
Friendly

Very good food

Because the workshop was so large, the reception was a little hampered by the limited seating in the reception area

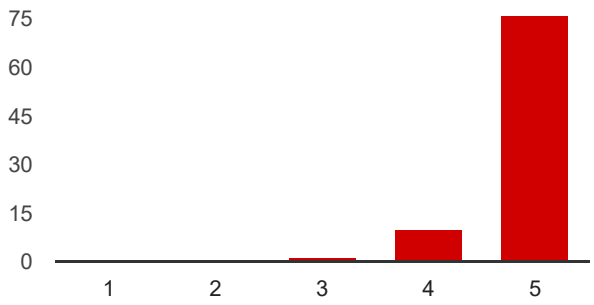
Venue

I found the MSRI staff helpful



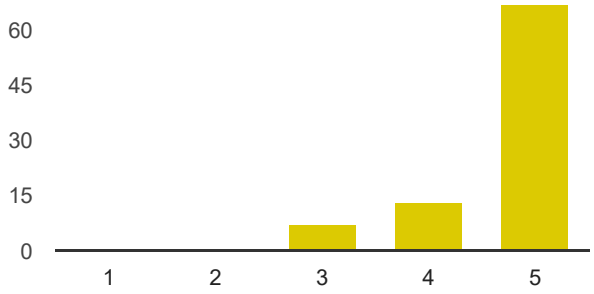
Not at all:	1	0	0%
	2	0	0%
	3	4	4.6%
	4	10	11.5%
Very:	5	73	83.9%

The MSRI physical facilities were conducive for such a workshop



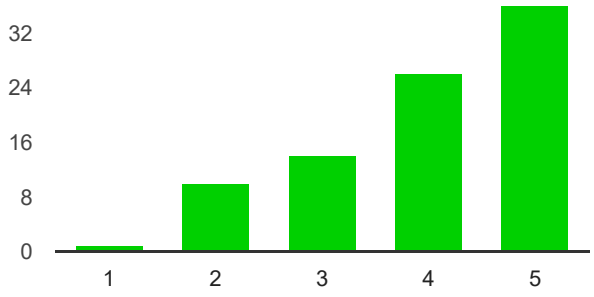
Not at all:	1	0	0%
	2	0	0%
	3	1	1.1%
	4	10	11.5%
Very:	5	76	87.4%

The MSRI computer facilities were adequate for such a workshop

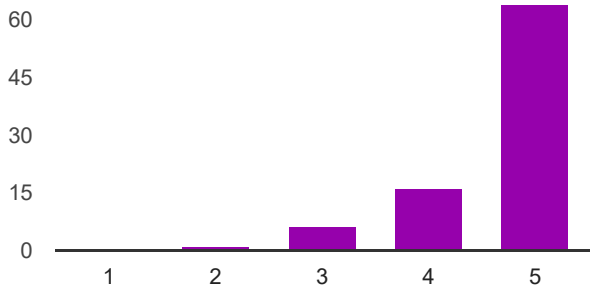


Not at all:	1	0	0%
	2	0	0%
	3	7	8%
	4	13	14.9%
Very:	5	67	77%

The MSRI lunch arrangements were satisfactory



The MSRI tea arrangements were satisfactory



Not at all:	1	0	0%
	2	1	1.1%
	3	6	6.9%
	4	16	18.4%
Very:	5	64	73.6%

Additional comments on the venue

staffs are all very hospital

Found it difficult to not bring coffee into the lectures

My only suggestion concerning the teas would be to have more items that are not sweet . Otherwise the teas were very nice.

The computers were surprisingly slow, but I only used them to print.

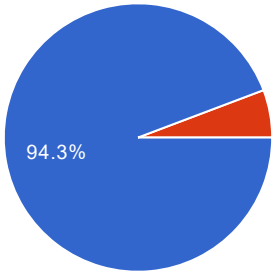
Would prefer more consistantly healthy options at Tea's (ex vegetables)

minor comment: I would prefer more fruit-like flavored teas.

very long lunch lines...

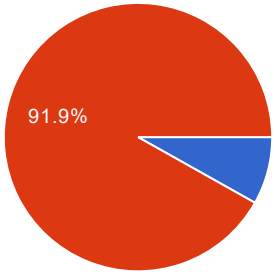
MSRI Wireless Network

Did you use MSRI's wireless network? 16



Yes	82	94.3%
No	5	5.7%

Did you experience any difficulties with the network?



Yes	7	8.1%
No	79	91.9%

If you did experience difficulties with the network, please explain:

Some slowness/patchy connection

I had difficulties printing but this could also be related to an older operating system on my Mac.

On one day I had trouble connecting, but it was fine the rest of the week.

low connectivity in my office (218, I think)

Thank you for completing this survey

We welcome any additional comments or suggestions you may have to improve the overall experience for future participants.

I think MSRI can make a better directions on the directions. like I still didn't know where is the beautiful walking place. Also, it will be so cool to have some small MSRI theme gift we could buy.

Variety of lunch options

I understand the no drinks policy inside the library, but I think it would be very nice to have a quiet place to work where water and coffee are allowed, in the common areas sometimes is very distracting.

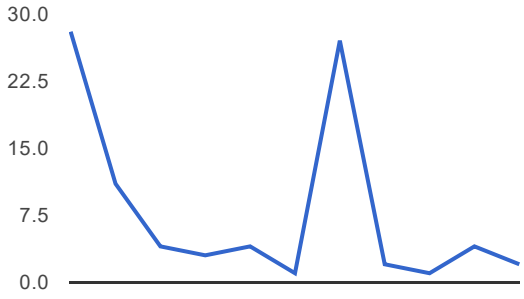
If at all possible it would be nice to have more introductory talks at such a workshop. There will be plenty of technical talks later on but this is a chance to provide an introduction to younger people in the field.

Having the videos available immediately after the lectures was great! I could go back and watch the parts I needed to again straight away, like instant reply.

Please, put the reception at a later time. It was too early to eat.

The only way it could have been improved for me was if there was a way to choose a more complex geometry focused version of the Introductory Workshop

Number of daily responses



Kähler Geometry, Einstein Metrics, and Generalizations

March 21, 2016 - March 25, 2016

MSRI, Berkeley, CA, USA

Organizers:

Olivier Biquard (École Normale Supérieure)

Simon Donaldson (Imperial College, London)

Gang Tian (Princeton University)

Jeff Viaclovsky (University of Wisconsin-Madison)

REPORT ON THE MSRI WORKSHOP "KÄHLER GEOMETRY, EINSTEIN METRICS, AND GENERALIZATIONS", MARCH 21-25, 2016

Organizers

- Olivier Biquard (Ecole Normale Superieure)
- Simon Donaldson (Imperial College and Stony Brook University)
- Gang Tian (Princeton University and Beijing University)
- Jeff Viaclovsky (University of Wisconsin-Madison)

1. Scientific description

Kähler geometry and other special geometries such as Einstein metrics and metrics with special holonomy have played a central role in modern differential geometry. This workshop was intended to integrate elements from complex differential geometry with Einstein metrics and their generalizations. The topics included

- Existence of Kähler-Einstein metrics and extremal Kähler metrics. Notions of stability in algebraic geometry such as Chow stability and K-stability. Relations with singular Kähler-Einstein metrics.
- Calabi-Yau metrics and collapsed limit spaces. Connections with physics and mirror symmetry.
- Einstein metrics and their moduli spaces, ϵ-regularity, noncompact examples such as ALE, ALF, and Poincaré-Einstein metrics. Generalizations of the Einstein condition, such as Ricci solitons.
- Sasaki-Einstein metrics and metrics with special holonomy. New examples and classification problems.

Each speaker gave a fifty minute talk, with ten minutes being allotted for questions. Many participants in the workshop were graduate students or postdocs.

2. Presentations

The workshop began with a talk by Valentino Tosatti on holomorphic fibrations on Calabi-Yau manifolds and collapsing. There were several other talks dealing with the geometry of Calabi-Yau metrics. Ronan Conlon discussed asymptotically conical Calabi-Yau manifolds. Dominic Joyce described some new Donaldson-Thomas type invariants counting coherent sheaves on Calabi-Yau 4-folds. Mark Gross presented results on Gromov-Hausdorff collapse of Calabi-Yau manifolds. Lorenzo Foscolo discussed ALF gravitational instantons and collapsing Ricci-flat metrics on the K3 surface.

Another topic was that of connections between notions of stability and existence of special metrics. Mihai Paun lectured about foliations with positive slopes and stability of cotangent bundle. Yanir Rubinstein gave a talk about Tian's properness conjectures, which was closely related to the talk given by Tamas Darvas about infinite dimensional

geometries on the space of Kähler metrics and applications to canonical metrics. Heather Macbeth discussed some new conditions for existence of Kähler-Einstein metrics involving higher alpha-invariants.

A major recent result in differential geometry was the proof by Cheeger-Naber of the codimension four conjecture, which says the singular sets of limits of Einstein metrics are at least of codimension four. Jeff Cheeger outlined the main steps of the proof of the codimension four conjecture for manifolds with bounded Ricci curvature. Naber discussed some new progress on L^2 curvature bounds on manifolds with bounded Ricci curvature.

There were several talks in other closely related areas. Johannes Nordstrom discussed a new invariant of G_2 structures which he used to show that the G_2 moduli space can be disconnected. Bing Wang discussed Kähler-Ricci flow on Fano manifolds, with applications to a proof of the Hamilton-Tian conjecture and the partial C^0-conjecture of Tian. Alice Chang presented research on compactness of conformally compact Einstein manifolds in dimension four. David Witt Nystrom discussed the proof of a conjecture of Boucksom-Demailly-Paun-Peternell, which says that the pseudoeffective cone is dual to the cone of movable classes, in the projective case. Slawomir Kolodziej lectured about stability of weak solutions of the complex Monge-Ampere equation on compact Hermitian manifolds. Eveline Legendre described a connection between the Hilbert–Einstein functional and the Sasaki-Futaki invariant. The workshop ended with a lecture by Akito Futaki discussing Fano-Ricci limit spaces and spectral convergence.

Organizers

First Name	Last Name	Institution
Olivier	Biquard	École Normale Supérieure
Simon	Donaldson	Imperial College, London
Gang	Tian	Princeton University
Jeff	Viaclovsky	University of Wisconsin-Madison

Speakers

First Name	Last Name	Institution
Robert	Berman	Chalmers University of Technology
Sun-Yung	Chang	Princeton University
Jeff	Cheeger	New York University, Courant Institute
Ronan	Conlon	Université du Québec à Montréal
Tamas	Darvas	University of Maryland
Lorenzo	Foscolo	State University of New York, Stony Brook
Akito	Futaki	University of Tokyo
Mark	Gross	University of Cambridge
Dominic	Joyce	University of Oxford
Slawomir	Kolodziej	Jagiellonian University
Eveline	Legendre	Université de Toulouse III (Paul Sabatier)
Heather	Macbeth	Massachusetts Institute of Technology
Aaron	Naber	Northwestern University
Johannes	Nordstrom	University of Bath
Yanir	Rubinstein	University of Maryland
Valentino	Tosatti	Northwestern University
Bing	Wang	University of Wisconsin-Madison
David	Witt Nystrom	Chalmers University of Technology

Kähler Geometry, Einstein Metrics, and Generalizations

March 21-25, 2015

Schedule

Monday, March 21, 2015			
9:15 AM - 9:30 AM	Simons Auditorium		Welcome
9:30 AM - 10:30 AM	Simons Auditorium	Valentino Tosatti	Collapsing Calabi-Yau manifolds
10:30 AM - 11:00 AM	Atrium		Break
11:00 AM - 12:00 PM	Simons Auditorium	Mihai Paun	Foliations with positive slopes and stability of cotangent bundle
12:00 PM - 2:00 PM	Atrium		Lunch
1:00 PM - 1:50 PM	Simons Auditorium	Edward Dunne	Special Talk: MathSciNet in 2016
2:00 PM - 3:00 PM	Simons Auditorium	Yanir Rubinstein	Tian's properness conjectures
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Heather Macbeth	Kähler-Einstein metrics and higher alpha-invariants

Tuesday, March 22, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Jeff Cheeger	Manifolds of bounded Ricci curvature and the codimension 4 conjecture
10:30 AM - 11:00 AM	Atrium		Break
11:00 AM - 12:00 PM	Simons Auditorium	Johannes Nordstrom	Disconnecting the G_2 moduli space
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Tamas Darvas	Infinite dimensional geometries on the space of Kahler metrics and applications to canonical metrics
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Bing Wang	Kähler Ricci flow on Fano manifold
4:30 PM - 6:20 PM	Atrium		Reception

Wednesday, March 23, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Alice Chang	Compactness of conformally compact Einstein manifolds in dimension 4
10:30 AM - 11:00 AM	Atrium		Beak
11:00 AM - 12:00 PM	Simons Auditorium	Ronan Conlon	Asymptotically Conical Calabi-Yau manifolds

Thursday, March 24, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Aaron Naber	L^2 Curvature Bounds on Manifolds with Bounded Ricci Curvature
10:30 AM - 11:00 AM	Atrium		Break
11:00 AM - 12:00 PM	Simons Auditorium	Dominic Joyce	New Donaldson-Thomas type invariants counting coherent sheaves on Calabi-Yau 4-folds
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	David Witt-Nystrom	Okounkov bodies and Kähler embeddings of ellipsoids
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Mark Gross	Gromov-Hausdorff collapse of Calabi-Yau manifolds

Friday, March 25, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Lorenzo Foscolo	ALF gravitational instantons and collapsing Ricci-flat metrics on the K3 surface
10:30 AM - 11:00 AM	Atrium		Break
11:00 AM - 12:00 PM	Simons Auditorium	Slawomir Kolodziej	Stability of weak solutions of the complex Monge-Amp ere equation on compact Hermitian manifolds
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Eveline Legendre	The Hilbert--Einstein functional and the Sasaki-Futaki invariant
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Akito Futaki	Fano-Ricci limit spaces and spectral convergence

Participants		
First Name	**Last Name**	**Institution**
Antonio	Ache	Princeton University
Hugues	Auvray	Université de Paris XI
Halyson	Baltazar	Universidade Federal do Piauí
Thomas	Begley	Center for Mathematical Sciences
Robert	Berman	Chalmers University of Technology
Olivier	Biquard	École Normale Supérieure
Jess	Boling	University of California, Irvine
Charles	Boyer	University of New Mexico
Christine	Breiner	Fordham University
Kate	Brubaker	Purdue University
Gilles	Carron	Université de Nantes
Sun-Yung	Chang	Princeton University
Jeff	Cheeger	New York University, Courant Institute
Luke	Cherveny	Boston College
Bennett	Chow	University of California, San Diego
Gabriella	Clemente	University of Notre Dame
Ronan	Conlon	Université du Québec à Montréal
Jaime	Cuadros	Pontificia Universidad Católica de Chile
Sean	Curry	University of Auckland
Adam	da Silva	Universidade Federal do Para
Xianzhe	Dai	University of California, Santa Barbara
Tamas	Darvas	University of Maryland
Ved	Datar	University of California, Berkeley
Matthew	Dellatorre	University of Maryland
Eleonora	Di Nezza	Imperial College, London
Simon	Donaldson	Imperial College, London
Greg	Edwards	Northwestern University
Jonathan	Epstein	Dartmouth College
Sylvester	Eriksson-Bique	New York University, Courant Institute
Joseph	Fluegemann	San Jose State University
Lorenzo	Foscolo	State University of New York, Stony Brook
Akito	Futaki	University of Tokyo
Fernando	Galaz Garcia	Karlsruhe Institute of Technology
Steven	Gindi	University of Waterloo
Elena	Giorgi	Columbia University
Mark	Gross	University of Cambridge
Bo	Guan	Ohio State University
Vincent	Guedj	Institut de Mathématiques de Toulouse
Ursula	Hamenstädt	Universität Bonn
Jiyuan	Han	University of Wisconsin-Madison
Mark	Haskins	Imperial College, London
Nobuhiro	Honda	Tokyo Institute of Technology
Hongnian	Huang	University of New Mexico
Ryan	Hunter	University of Maryland

Participants		
First Name	**Last Name**	**Institution**
Tom	Ilmanen	ETH Zürich
Michael	Jablonski	University of Oklahoma
Adam	Jacob	University of California, Davis
Dominic	Joyce	University of Oxford
Tao	Ju	University of Wisconsin-Madison
Casey	Kelleher	University of California, Irvine
Lee	Kennard	University of Oklahoma
Martin	Kerin	Westfälische Wilhelms-Universität Münster
Seongtag	Kim	Inha University
Slawomir	Kolodziej	Jagiellonian University
Klaus	Kroencke	Universität Hamburg
Rob	Kusner	University of Massachusetts, Amherst
Ramiro	Lafuente	Westfälische Wilhelms-Universität Münster
Jorge	Lauret	Universidad Nacional de Cordoba
Jeremy	Leach	University of Washington
King-Leung	Lee	Rutgers University
John	Lee	University of Washington
Eveline	Legendre	Université de Toulouse III (Paul Sabatier)
Long	Li	McMaster University
Xiaoxiao	Li	University of Notre Dame
Yueh-Ju	Lin	University of Michigan
Michael	Lock	University of Texas
Jason	Lotay	University College
John	Lott	University of California, Berkeley
Peng	Lu	University of Oregon
Christian	Lund	Center for Mathematical Sciences
Heather	Macbeth	Massachusetts Institute of Technology
Farid	Madani	Johann Wolfgang Goethe-Universität Frankfurt
Florestan	Martin-Baillon	École Normale Supérieure
Nicholas	McCleerey	Northwestern University
Donovan	McFeron	Ramapo College of New Jersey
Niels	Moeller	Abdus Salam International Centre for Theoretical Physics
Ilaria	Mondello	Institut de Mathématiques de Jussieu
Andrea	Mondino	Universität Zürich
Kim	Moore	University of Cambridge
Peyman	Morteza	University of Wisconsin-Madison
Tommy	Murphy	California State University
Xuesen	Na	University of Maryland
Aaron	Naber	Northwestern University
Roger	Nakad	Notre Dame University
Johannes	Nordstrom	University of Bath
Goncalo	Oliveira	Duke University
Tristan	Ozuch	École Normale Supérieure
Tracy	Payne	Idaho State University

Participants		
First Name	**Last Name**	**Institution**
Raquel	Perales	UNAM - Universidad Nacional Autonoma de Mexico
Mihaela	Pilca	Universität Regensburg
Yanir	Rubinstein	University of Maryland
Henrique	Sá Earp	State University of Campinas (UNICAMP)
Raul	Sanchez-Galan	University College
Felix	Schulze	University College
Catherine	Searle	Wichita State University
Jan	Segert	University of Missouri
Lars Martin	Sektnan	Imperial College, London
Rosa	Sena-Dias	Instituto Superior Técnico
Kyriakos	Sergiou	University of Wisconsin-Madison
Shoo	Seto	University of California, Santa Barbara
Liangming	Shen	University of British Columbia
Michael	Singer	University College
Jeffrey	Streets	University of California, Irvine
Yuchin	Sun	Imperial College, London
Craig	Sutton	Dartmouth College
Ioana	Suvaina	Vanderbilt University
Thunwa	Theerakarn	University of California, Berkeley
Gang	Tian	Princeton University
Christina	Tonnesen-Friedman	Union College
Jonatán	Torres Orozco Román	Cimat
Valentino	Tosatti	Northwestern University
Yury	Ustinovskiy	Princeton University
Craig	van Coevering	University of Science and Technology of China
Caroline	Vernier	Université de Nantes
Boris	Vertman	University Muenster
Jeff	Viaclovsky	University of Wisconsin-Madison
Dominic	Wallis	University of Bath
Bing	Wang	University of Wisconsin-Madison
Changliang	Wang	University of California, Santa Barbara
Lu	Wang	University of Wisconsin-Madison
Guofang	Wei	University of California, Santa Barbara
Quinton	Westrich	University of Wisconsin-Madison
David	Witt Nystrom	Chalmers University of Technology
Chengjian	Yao	Université Libre de Bruxelles
Naoto	Yotsutani	Fudan University
Yuan	Yuan	Syracuse University
Ahmed	Zeriahi	Université de Toulouse III (Paul Sabatier)
Ruobing	Zhang	Princeton University
Shangyou	Zhang	University of Delaware
SHIJIN	ZHANG	Beijing University of Aeronautics and Astronautics
Yuguang	Zhang	Mathematical Sciences Center, Tsinghua University
Siyi	Zhang	Princeton University

Participants		
First Name	**Last Name**	**Institution**
Kai	Zheng	University of Warwick
Xiaohua	Zhu	Peking University

Officially Registered Participant Information

Participants		**134**

Gender		**133**
Male	80.45%	107
Female	18.05%	24
Declined to state	1.50%	2

Ethnicity*		**142**
White	58.65%	78
Asian	27.07%	36
Hispanic	7.52%	10
Pacific Islander	0.00%	0
Black	1.50%	2
Native American	0.00%	0
Mixed	3.01%	4
Declined to state	9.02%	12

* ethnicity specifications are not exclusive

msri.coord@gmail.com

Edit this form

69 responses

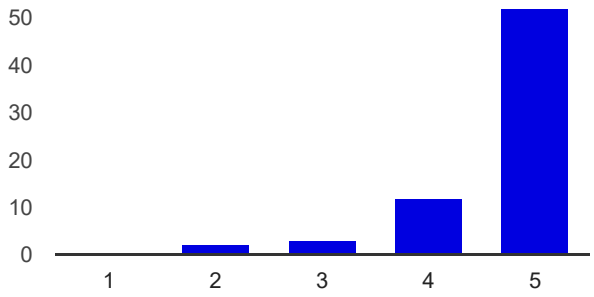
69 responses out of 134 participants = 51% response rate

View all responses Publish analytics

Summary

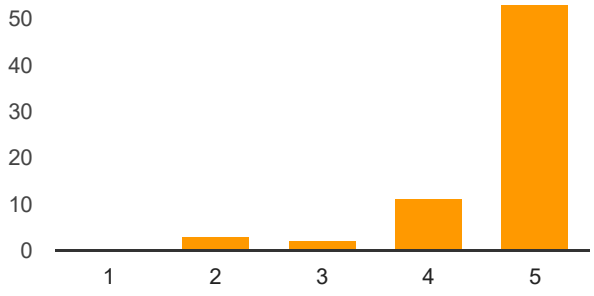
Workshop assessment

The workshop was intellectually stimulating



Not at all:	1	0	0%
	2	2	2.9%
	3	3	4.3%
	4	12	17.4%
Very:	5	52	75.4%

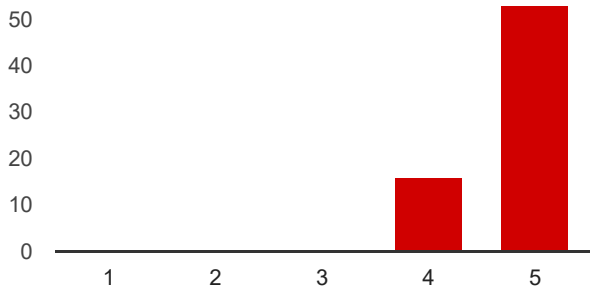
The overall experience of the workshop was worthwhile



Not at all:	1	0	0%

	2	3	4.3%
	3	2	2.9%
	4	11	15.9%
Very:	5	53	76.8%

The time between lectures was adequate for discussion



Not al all:	1	0	0%
	2	0	0%
	3	0	0%
	4	16	23.2%
Very:	5	53	76.8%

Additional comments on the workshop organization

It is great.

Nice overall balance of talks.

The number of lectures per day was very good. It meant there were plenty of good talks, but also gave opportunity for discussions outside of the talks.

It would have been nicer if the hotshot famous guys had given less technical, more welcoming talks. Many talks did this well, but there were others that really should have been more accessible.

Will it be possible to cover the travel cost?

None in particular

Fantastic workshop. Amazing to be able to talk to so many experts in the field. It was an invaluable experience.

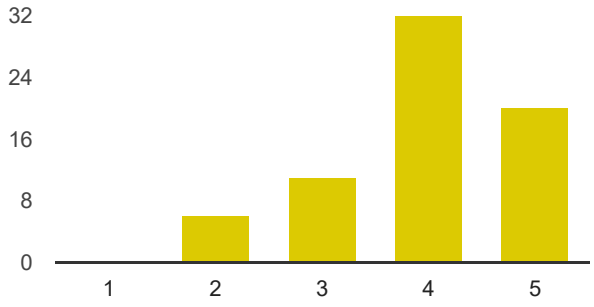
The Wednesday afternoon

The workshop drew together an excellent group of researchers. As a finishing Grad student I'm glad I attended.

The balance between lectures and time to talk with other mathematicians was well balanced.

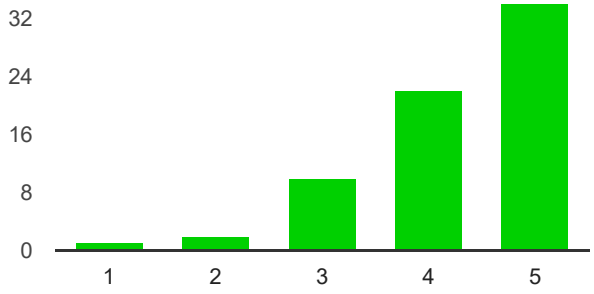
Personal assessment

I was well prepared to benefit from the lectures



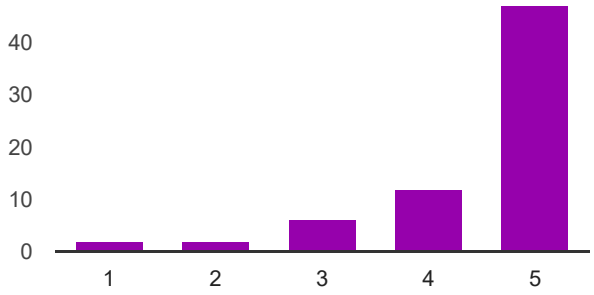
Not at all:	1	0	0%
	2	6	8.7%
	3	11	15.9%
	4	32	46.4%
Very:	5	20	29%

My interest in the subject matter was increased by the workshop



Niot at all:	1	1	1.4%
	2	2	2.9%
	3	10	14.5%
	4	22	31.9%
Very:	5	34	49.3%

The workshop helped me meet people with similar scientific interests



2	2	2.9%
3	6	8.7%
4	12	17.4%
Very Much: 5	47	68.1%

Additional comments on your personal assessment

None

very helpful and interesting

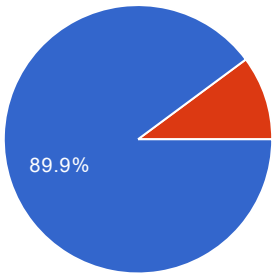
My work is a little outside this area. I went to broaden my horizons rather than to dig deeper into some of these topics.

None in particular

I only attended because I am at MSRI for the semester.

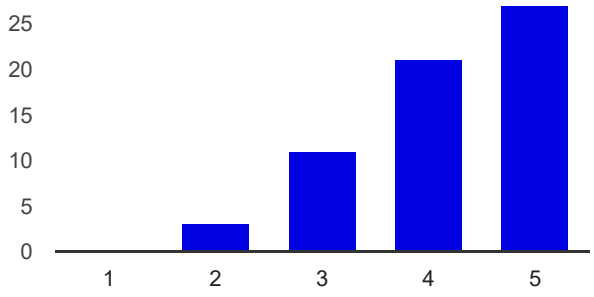
Additional Activities

Did you attend the reception?



Yes	62	89.9%
No	7	10.1%

If you did attend the reception, did it help to solidify the contacts you made in the workshop?



	4	21	33.9%
Very much:	5	27	43.5%

Please provide any comments on the reception

Waiting in lines is boring.

None

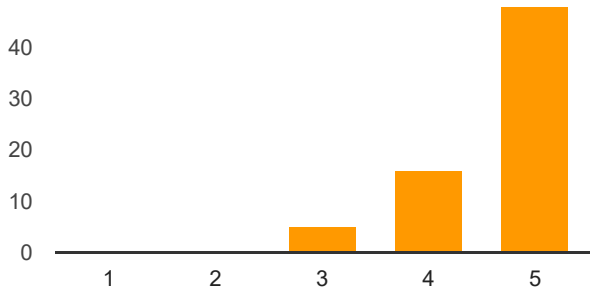
None in particular

Food is too limited.

The reception was also helpful, but not more than the rest of the coffee breaks.

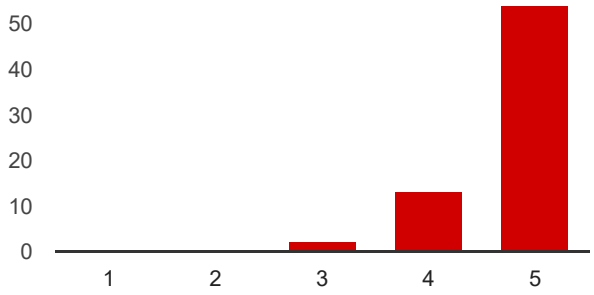
Venue

I found the MSRI staff helpful



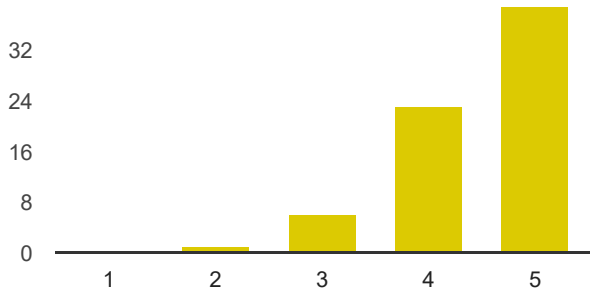
Not at all:	1	0	0%
	2	0	0%
	3	5	7.2%
	4	16	23.2%
Very:	5	48	69.6%

The MSRI physical facilities were conducive for such a workshop



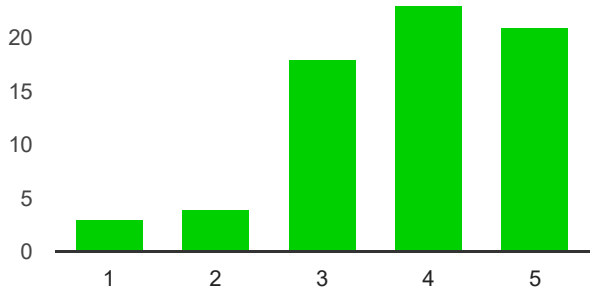
Not at all:	1	0	0%
	2	0	0%
	3	2	2.9%
	4	13	18.8%
Very:	5	54	78.3%

The MSRI computer facilities were adequate for such a workshop

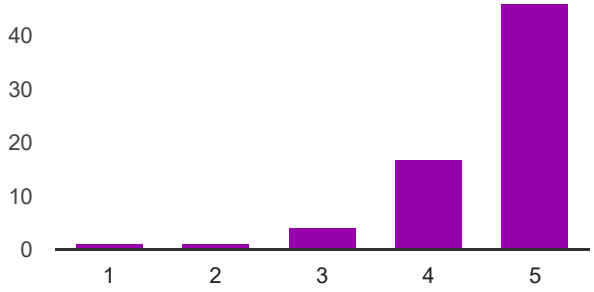


Not at all:	1	0	0%
	2	1	1.4%
	3	6	8.7%
	4	23	33.3%
Very:	5	39	56.5%

The MSRI lunch arrangements were satisfactory



The MSRI tea arrangements were satisfactory



Not at all:	1	1	1.4%
	2	1	1.4%
	3	4	5.8%
	4	17	24.6%
Very:	5	46	66.7%

Additional comments on the venue

None

I ordered a veggie burrito for Wednesday and it accidentally had chicken. Since I am vegetarian this was a bit unfortunate. I don't like to complain about such things, but I thought you should know.

perfect

I have some allergies and the first three days it was a bit hard to find out what I could or could not have, so I just had to go for a plain salad that was definitely ok. The last two days the staff was able to help me, so that was good.

I wish I could pay with credit card or debit card for lunch.

None in particular

Everything was very nice, but I thought maybe slightly more lunch options would be good. The endless supply of tea and coffee was wonderful. Maybe some lower-sugar food options for the

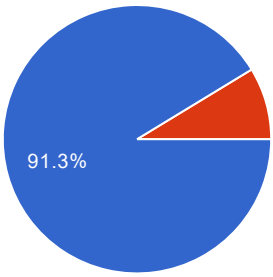
3:30 "tea" would also be good.

The food provided on Friday is very bad...

The quality of the lunch and tea has significantly gone downhill versus the last time I visiting MSRI. This may seem like a small thing, but it does affect every participant and in particular will have a negative impact on getting speakers for future workshops.

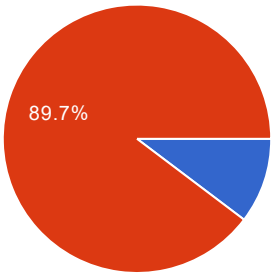
MSRI Wireless Network

Did you use MSRI's wireless network?



Yes	63	91.3%
No	6	8.7%

Did you experience any difficulties with the network?



Yes	7	10.3%
No	61	89.7%

If you did experience difficulties with the network, please explain:

Bad connection at some points

it is very weak, even inside the building, even in the library.

Unstable connection to the internet. My RSSI and noise levels were fine, but the quality of internet connection made it almost impossible to Skype. There were times the connection was so bad that I couldn't even load text-based webpages on the NSF's website. This is bad...

getting WiFi passowrd

A little slow sometimes, and would cut out.

Wireless network unstable

Sometimes seemed hard to connect inside the auditorium

I was often hard to connect to the network towards 6pm-7pm.

Thank you for completing this survey

We welcome any additional comments or suggestions you may have to improve the overall experience for future participants.

None

If a graduate student applies for funding, I think they should get a response at some point.

Better synchronizing timing of talks with shuttle bus service would be nice.

It is a great pace, please keep going in organizing such meetings.

Maybe we can have one outdoors activity during one workshop, e.g. a short hiking.

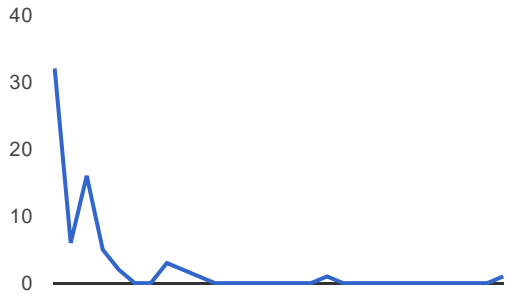
None in particular

A wonderful experience!

I saw many talks that jumped into narrow specialization after only a few minutes. Speakers were not always good at giving an intro that described the field, gave background and examples. Other talks went way too fast. Speakers should be better at giving talks. This is not the fault of MSRI but of our discipline.

It was a fantastic conference. I learned a lot and I got to talk to people which very very relevant for my research.

Number of daily responses



Geometric Flows in Riemannian and Complex Geometry

May 02, 2016 - May 06, 2016

MSRI, Berkeley, CA, USA

Organizers:

Tobias Colding (Massachusetts Institute of Technology)

John Lott (University of California, Berkeley)

Natasa Sesum (Rutgers University)

REPORT ON THE MSRI "GEOMETRIC FLOWS IN RIEMANNIAN AND COMPLEX GEOMETRY", May 2-6, 2016

Organizers

- Tobias Colding (Massachusetts Institute of Technology)
- John Lott (University of California - Berkeley)
- Natasa Sesum (Rutgers)

1. Scientific description

Differential geometry is a subject with both deep roots and recent advances. There were year-long MSRI programs in differential geometry in 1993-1994 and 2003-2004. Since that time, many old problems in the field have been solved, such as Perelman's solution of the Poincaré conjecture and the geometrization conjecture.

One of the biggest changes from the last MSRI differential geometry program is the impact of geometric flows. In addition to Perelman's transformative work on Ricci flow, another important success was the Brendle-Schoen use of Ricci flow to prove the longstanding quarter-pinching problem. Namely, any Riemannian manifold whose sectional curvatures all lie in (¼, 1] is diffeomorphic to a spherical space form.

Since then, new directions have emerged. There are many outstanding problems, both for Ricci flow and for other geometric flows. The workshop was devoted to a global understanding of the present status of the field.

Each speaker gave a fifty minute talk, with ten minutes being allotted for questions. Many participants in the workshop were graduate students or postdocs.

2. Presentations

The workshop began with a talk by Simon Brendle about a new geometric flow that preserves 2-convexity of hypersurfaces in general Riemannian manifolds, as opposed to just Euclidean space. Further talks on hypersurface flows were given by Tom Ilmanen, Lei Ni, Lu Wang and Natasa Sesum. Tom Ilmanen discussed singularities of the mean curvature flow for curves in Euclidean space. Lei Ni described convergence results for the Gauss curvature flow, in which the speed of the flow is given by the Gauss curvature function. Lu Wang gave results on the geometry and topology of low-entropy stationary configurations for the mean curvature flow. Natasa Sesum gave a survey about ancient solutions in various geometric flows and presented new results about ancient solutions for the mean curvature ow and the Yamabe flow.

Another main topic was Ricci flow, with talks by Felix Schulze, Burkhard Wilking, Brett Kotschwar, Bruce Kleiner, Richard Bamler and Miles Simon. Felix Schulze explained how to construct Ricci flows coming out of certain spaces with conical singularities. Burkhard Wilking used Ricci flow to characterize noncollapsed Riemannian manifolds with almost nonnnegative curvature operator. Brett Kotschwar gave strong uniqueness results for asymptotically conical shrinking Ricci solitons. Bruce Kleiner described how to extend three-dimensional Ricci flow through singularities. Richard

REPORT ON THE MSRI “GEOMETRIC FLOWS IN RIEMANNIAN AND COMPLEX GEOMETRY", May 2-6, 2016

Bamler proved a Riemannian version of the Hamilton-Tian conjecture. Miles Simon gave a gap theorem for the Ricci flow on homogeneous spaces.

The talks by Gang Tian, Jian Song, Vincent Guedj, Ben Weinkove and Peter Topping concerned geometric flows in the holomorphic setting. Gang Tian described a pluriclosed flow for nonKähler Hermitian manifolds. Jian Song gave the precise behavior of the Ricci flow on a two-sphere equipped with a finite collection of points with prescribed conical singularities. Vincent Guedj showed convergence of the weak Kähler-Ricci flow for minimal models with positive Kodaira dimension. Ben Weinkove gave convergence results for the Chern-Ricci flow, an alternative flow for nonKähler Hermitian manifolds. Finally, Peter, Topping presented a flow that evolves a map from a surface to a Riemannian manifold, into a collection of branched minimal immersions.

Organizers

First Name	Last Name	Institution
Tobias	Colding	Massachusetts Institute of Technology
John	Lott	University of California, Berkeley
Natasa	Sesum	Rutgers University

Speakers

First Name	Last Name	Institution
Richard	Bamler	University of California, Berkeley
Simon	Brendle	Stanford University
Eleonora	Di Nezza	Imperial College, London
Vincent	Guedj	Institut de Mathématiques de Toulouse
Tom	Ilmanen	ETH Zürich
Bruce	Kleiner	New York University, Courant Institute
Brett	Kotschwar	Arizona State University
Lei	Ni	University of California, San Diego
Felix	Schulze	University College
Natasa	Sesum	Rutgers University
Miles	Simon	Otto-von-Guericke-Universität Magdeburg
Jian	Song	Rutgers University
Peter	Topping	University of Warwick
Lu	Wang	University of Wisconsin-Madison
Ben	Weinkove	Northwestern University
Burkhard	Wilking	Westfälische Wilhelms-Universität Münster

Geometric Flows in Riemannian and Complex Geometry

May 2-6, 2015

Schedule

Monday, May 2, 2015			
9:15 AM - 9:30 AM	Simons Auditorium		Welcome
9:30 AM - 10:30 AM	Simons Auditorium	Simon Brendle	Fully nonlinear flows with surgery
10:30 AM - 11:00 AM	Atrium		Tea
11:00 AM - 12:00 PM	Simons Auditorium	Felix Schulze	Ricci flow from metrics with isolated conical singularities
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Tom Ilmanen	Singularities of mean curvature flow
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Burkhard Wilking	Manifolds with almost nonnegative curvature operator

Tuesday, May 3, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Gang Tian	Hermitian curvature flows
10:30 AM - 11:00 AM	Atrium		Tea
11:00 AM - 12:00 PM	Simons Auditorium	Brett Kotschwar	Asymptotic rigidity of noncompact shrinking gradient Ricci solitons
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Lei Ni	Flow by the Gauss curvature and its power
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Lu Wang	Hypersurfaces of Low Entropy
4:30 PM - 6:20 PM	Atrium		Reception

Wednesday, May 4, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Bruce Kleiner	Ricci flow through singularities
10:30 AM - 11:00 AM	Atrium		Tea
11:00 AM - 12:00 PM	Simons Auditorium	Jian Song	The Ricci flow on the sphere with marked points

Thursday, May 5, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Vincent Guedj	Convergence of weak Kaehler-Ricci flows on minimal models of positive Kodaira dimension
10:30 AM - 11:00 AM	Atrium		Tea
11:00 AM - 12:00 PM	Simons Auditorium	Richard Bamler	Convergence of Ricci flows with bounded scalar curvature
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Natasa Sesum	Ancient solutions, their asymptotics and uniqueness
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Ben Weinkove	The Chern-Ricci flow

Friday, May 6, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Peter Topping	Global solutions of the Teichmueller harmonic map flow
10:30 AM - 11:00 AM	Atrium		Tea
11:00 AM - 12:00 PM	Simons Auditorium	Miles Simon	A gap theorem and some uniform estimates for Ricci flows on homogeneous spaces
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Eleonora Di Nezza	Smoothing properties and uniqueness of the weak Kaehler-Ricci flow
3:00 PM - 3:30 PM	Atrium		Tea

Participants		
First Name	**Last Name**	**Institution**
Bernd	Ammann	Universität Regensburg
Jean-Francois	Arbour	State University of New York, Stony Brook
Eric	Bahuaud	Seattle University
Richard	Bamler	University of California, Berkeley
Thomas	Begley	Center for Mathematical Sciences
Franziska	Beitz	Westfälische Wilhelms-Universität Münster
Igor	Belegradek	Georgia Institute of Technology
Christopher	Brand	Universität Regensburg
Christine	Breiner	Fordham University
Simon	Brendle	Stanford University
Po - Chieh	Chen	National Taiwan University
Chih-Wei	Chen	National Taiwan University
Otis	Chodosh	Center for Mathematical Sciences
Bennett	Chow	University of California, San Diego
Tobias	Colding	Massachusetts Institute of Technology
Ronan	Conlon	Université du Québec à Montréal
Ved	Datar	University of California, Berkeley
Paul	David	Claremont Graduate University
Eleonora	Di Nezza	Imperial College, London
Xin	Dong	University of Maryland
Nick	Edelen	Stanford University
Greg	Edwards	Northwestern University
Paul	Feehan	Rutgers University
Joel	Fine	Université Libre de Bruxelles
Arthur	Fischer	University of California, Santa Cruz
Lorenzo	Foscolo	State University of New York, Stony Brook
Ailana	Fraser	University of British Columbia
Kazufumi	Fukuda	Waseda University
Michael	Geis	Northwestern University
Panagiotis	Gianniotis	University College
Vincent	Guedj	Institut de Mathématiques de Toulouse
Ursula	Hamenstädt	Universität Bonn
Jiyuan	Han	University of Wisconsin-Madison
Mark	Haskins	Imperial College, London
Robert	Haslhofer	University of Toronto
Dylan	Helliwell	Seattle University
Or	Hershkovits	New York University, Courant Institute
Tsung-Wei	Hu	National Taiwan University
Hongnian	Huang	University of New Mexico
Pei-Ken	Hung	Columbia University
Ryan	Hunter	University of Maryland
Tom	Ilmanen	ETH Zürich
James	Isenberg	University of Oregon
Adam	Jacob	University of California, Davis

Participants		
First Name	**Last Name**	**Institution**
Tao	Ju	University of Wisconsin-Madison
Vitali	Kapovitch	University of Toronto
Demetre	Kazaras	University of Oregon
Casey	Kelleher	University of California, Irvine
Lee	Kennard	University of Oklahoma
Inkang	Kim	Korea Institute for Advanced Study (KIAS)
Bruce	Kleiner	New York University, Courant Institute
Dan	Knopf	University of Texas
Brett	Kotschwar	Arizona State University
Klaus	Kroencke	Universität Hamburg
Rob	Kusner	University of Massachusetts, Amherst
Ramiro	Lafuente	Westfälische Wilhelms-Universität Münster
Jorge	Lauret	Universidad Nacional de Cordoba
Emanuel	Lazar	University of Pennsylvania
Jeremy	Leach	University of Washington
King-Leung	Lee	Rutgers University
Eveline	Legendre	Université de Toulouse III (Paul Sabatier)
Qun	Li	Wright State University
Xiaolong	Li	University of California, San Diego
Nan	Li	New York City Technical College, CUNY
Yueh-Ju	Lin	University of Michigan
Chien	Lin	National Tsing Hua University
Jorge	Lira	Federal University of Ceará
Michael	Lock	University of Texas
Christopher	Lopez	University of California, Irvine
Jason	Lotay	University College
John	Lott	University of California, Berkeley
Peng	Lu	University of Oregon
Zhiqin	Lu	University of California, Irvine
Nikita	Lvov	Princeton University
Heather	Macbeth	Massachusetts Institute of Technology
Nicholas	McCleerey	Northwestern University
Donovan	McFeron	Ramapo College of New Jersey
Andrew	McLeod	University of Warwick
Curtis	McMullen	Harvard University
Niels	Moeller	Abdus Salam International Centre for Theoretical Physics
Melody	Molander	University of Oklahoma
Ilaria	Mondello	Institut de Mathématiques de Jussieu
Andrea	Mondino	Universität Zürich
Kim	Moore	University of Cambridge
Peyman	Morteza	University of Wisconsin-Madison
Xuesen	Na	University of Maryland
Hoi	Nguyen	Ohio State University
Lei	Ni	University of California, San Diego

Participants		
First Name	**Last Name**	**Institution**
Goncalo	Oliveira	Duke University
Tommaso	Pacini	Scuola Normale Superiore
Jiewon	Park	Massachusetts Institute of Technology
Raquel	Perales	UNAM - Universidad Nacional Autonoma de Mexico
Yanir	Rubinstein	University of Maryland
Mariel	Saez Trumper	Pontificia Universidad Católica de Chile
Felix	Schulze	University College
Catherine	Searle	Wichita State University
Rosa	Sena-Dias	Instituto Superior Técnico
Natasa	Sesum	Rutgers University
Liangming	Shen	University of British Columbia
Miles	Simon	Otto-von-Guericke-Universität Magdeburg
Yilmaz	Simsek	Akdeniz University
Michael	Singer	University College
Jian	Song	Rutgers University
Maxwell	Stolarski	University of Texas
Jeffrey	Streets	University of California, Irvine
Nicholas	Strehlke	Massachusetts Institute of Technology
Michael	Tilles	University of Oklahoma
Peter	Topping	University of Warwick
Hung	Tran	University of California, Irvine
Yury	Ustinovskiy	Princeton University
Craig	van Coevering	University of Science and Technology of China
Dimiter	Vassilev	University of New Mexico
Jeff	Viaclovsky	University of Wisconsin-Madison
Changliang	Wang	University of California, Santa Barbara
Lu	Wang	University of Wisconsin-Madison
Guofang	Wei	University of California, Santa Barbara
Yong	Wei	University College
Shihshu Walter	Wei	University of Oklahoma
Ben	Weinkove	Northwestern University
Burkhard	Wilking	Westfälische Wilhelms-Universität Münster
Cynthia	Will	Universidad Nacional de Cordoba
Peng	Wu	Fudan University
Haotian	Wu	University of Oregon
William	Wylie	Syracuse University
Bo	Yang	Rutgers University
Chengjian	Yao	Université Libre de Bruxelles
Show-Fang	Yeh	National Taiwan university
Yu	Yuan	University of Washington
Evangelie	Zachos	Stanford University
Kewei	Zhang	Peking University
Zhenlei	Zhang	Capital Normal University
Zhou	Zhang	University of Sydney

Participants		
First Name	**Last Name**	**Institution**
Yu	Zheng	East China Normal University
Xiaohua	Zhu	Peking University
Jonathan	Zhu	Harvard University

Officially Registered Participant Information

Participants		**135**

Gender		**135**
Male	82.22%	111
Female	17.04%	23
Declined to state	0.74%	1
Ethnicity*		**140**
White	59.26%	80
Asian	33.33%	45
Hispanic	3.70%	5
Pacific Islander	0.00%	0
Black	0.00%	0
Native American	0.00%	0
Mixed	2.22%	3
Declined to state	5.19%	7

* ethnicity specifications are not exclusive

59 responses

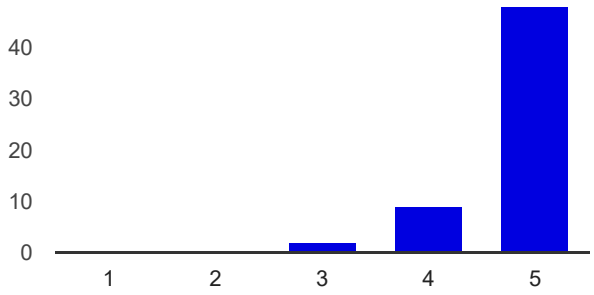
59 responses out of 135 participants = 44% response rate

Publish analytics

Summary

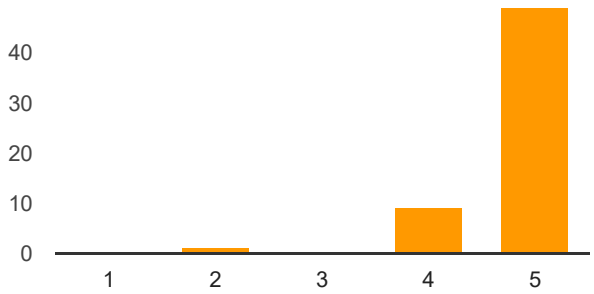
Workshop assessment

The workshop was intellectually stimulating



Not at all:	1	0	0%
	2	0	0%
	3	2	3.4%
	4	9	15.3%
Very:	5	48	81.4%

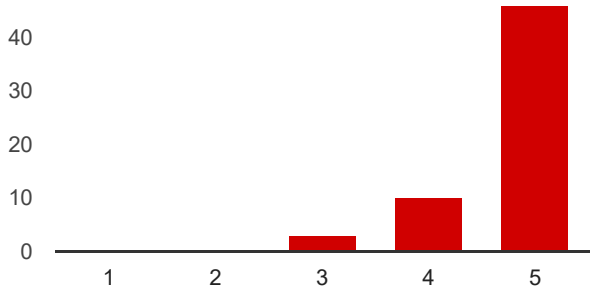
The overall experience of the workshop was worthwhile



Not at all:	1	0	0%

2	1	1.7%
3	0	0%
4	9	15.3%
Very: 5	49	83.1%

The time between lectures was adequate for discussion



Not al all: 1	0	0%
2	0	0%
3	3	5.1%
4	10	16.9%
Very: 5	46	78%

Additional comments on the workshop organization

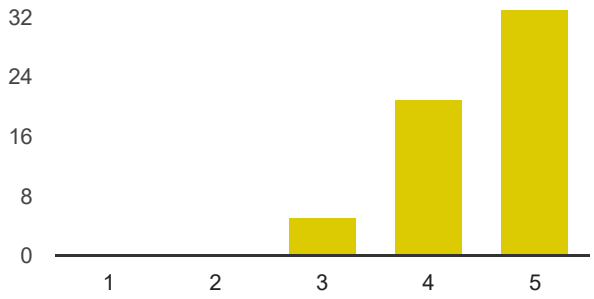
Talk quality -- speakers' organization and skill at presenting -- was very high; I learned a lot despite not being a specialist in the field

Great. Fantastic environment to work and discuss mathematics with others.

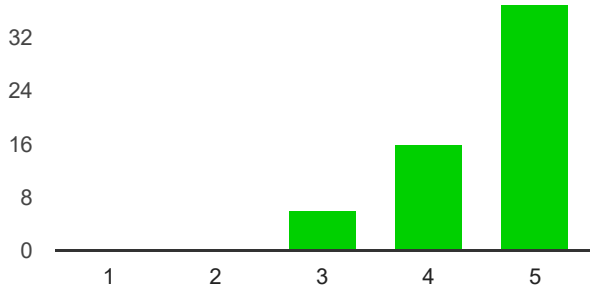
My enthusiasm for this subject is high. Also, I think the subject is really hopping and there are lots of very talented people entering this field.

Personal assessment

I was well prepared to benefit from the lectures

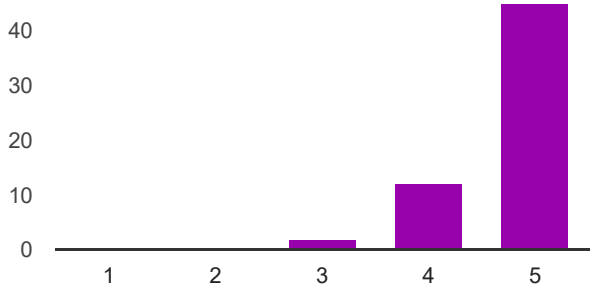


My interest in the subject matter was increased by the workshop



Niot at all:	1	0	0%
	2	0	0%
	3	6	10.2%
	4	16	27.1%
Very:	5	37	62.7%

The workshop helped me meet people with similar scientific interests



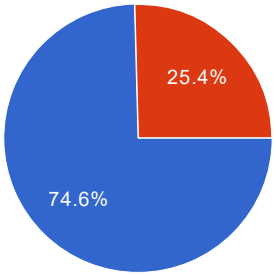
Not at all:	1	0	0%
	2	0	0%
	3	2	3.4%

	4	12	20.3%
Very Much:	5	45	76.3%

Additional comments on your personal assessment

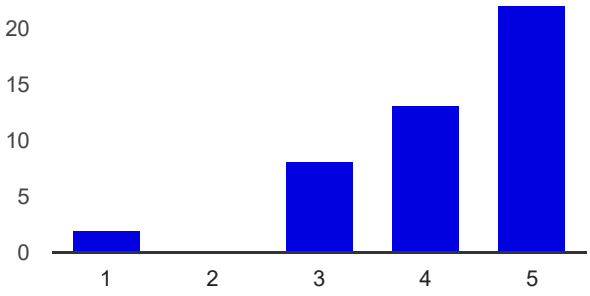
Additional Activities

Did you attend the reception?



Yes		44	74.6%
No		15	25.4%

If you did attend the reception, did it help to solidify the contacts you made in the workshop?



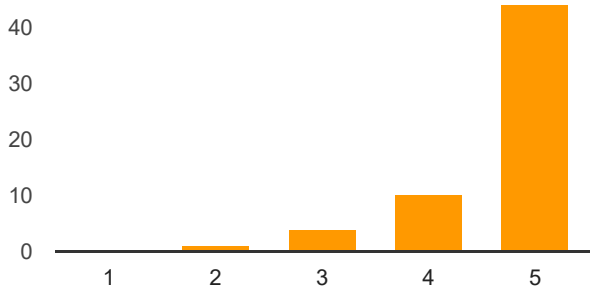
Not at all:	1	2	4.4%
	2	0	0%
	3	8	17.8%
	4	13	28.9%
Very much:	5	22	48.9%

Please provide any comments on the reception

Not so much different from tea breaks.

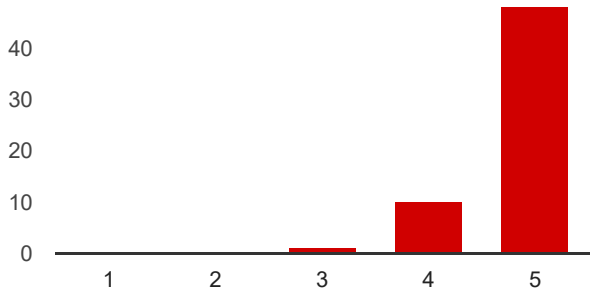
Venue

I found the MSRI staff helpful



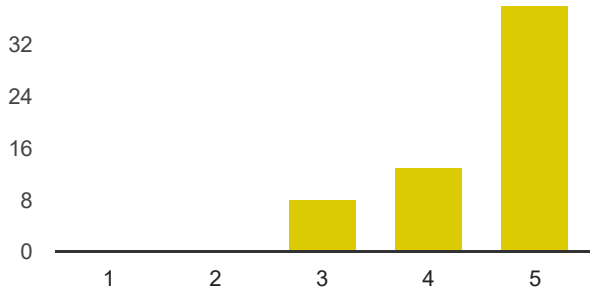
Not at all:	1	0	0%
	2	1	1.7%
	3	4	6.8%
	4	10	16.9%
Very:	5	44	74.6%

The MSRI physical facilities were conducive for such a workshop



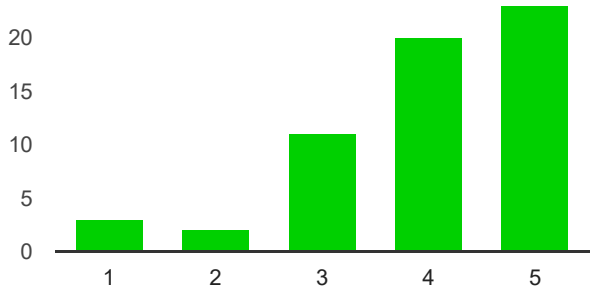
Not at all:	1	0	0%
	2	0	0%
	3	1	1.7%
	4	10	16.9%
Very:	5	48	81.4%

The MSRI computer facilities were adequate for such a workshop



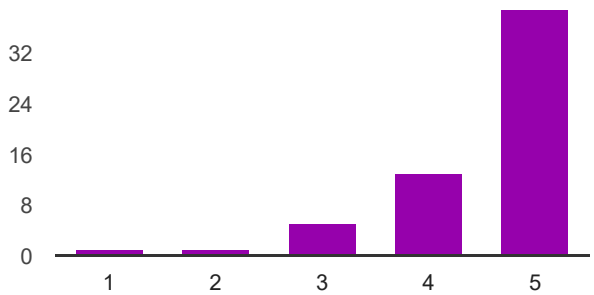
2	0	0%
3	8	13.6%
4	13	22%
Very: 5	38	64.4%

The MSRI lunch arrangements were satisfactory



Not at all: 1	3	5.1%
2	2	3.4%
3	11	18.6%
4	20	33.9%
Very: 5	23	39%

The MSRI tea arrangements were satisfactory



Not at all:	1	1	1.7%
	2	1	1.7%
	3	5	8.5%
	4	13	22%
Very:	5	39	66.1%

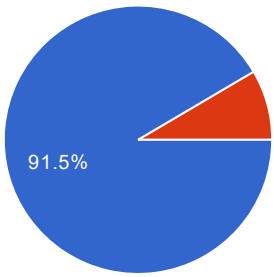
Additional comments on the venue

People should be told about when the photo is going to be taken cause sometimes the speakers are answering questions after their talks without knowing about a photo being taken at that precise moment. Also, when chalk is used I propose to clean the blackboard after the talks in the mornings so they look good for the afternoon talks.

INFINITE COFFEE

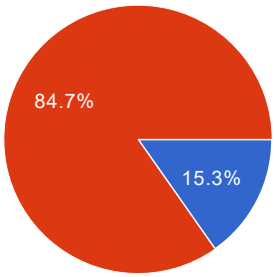
MSRI Wireless Network

Did you use MSRI's wireless network?



Yes	54	91.5%
No	5	8.5%

Did you experience any difficulties with the network?



Yes	9	15.3%
No	50	84.7%

If you did experience difficulties with the network, please explain:

It turned off occasionally.

the network was slow

Occasionally drops and have to re-connect

It was difficult to skype with collaborators. The speed wasn't enough for pictures, so we had to use sound only.

The speed wasn't sufficient to skype with collaborators - we had to use sound only.

connection lost sometimes

network was often slow

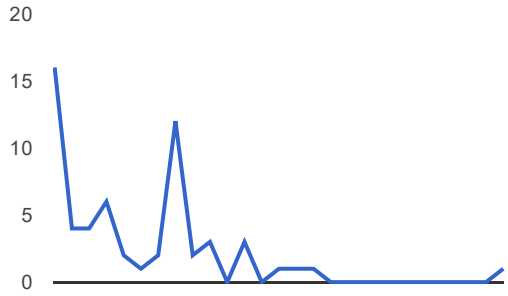
Thank you for completing this survey

We welcome any additional comments or suggestions you may have to improve the overall experience for future participants.

Thank you for organizing this workshop and for allowing a diverse range of people to attend. It was terrific not having too many lectures per day, and having a half-day on Wednesday. Overall awesome.

I had some trouble finding affordable accomodation. It wopuld have beend useful if hotels which are decent but affordable, say less than 130 Dollars, would be listed seperately. Also in this questionare, I think questions along the lines of : 'Were funding issues with MSRI taken care to your satisfaction' would be appropriate.

Number of daily responses



Connections for Women: Dispersive and Stochastic PDE

August 19, 2015 - August 21, 2015

MSRI, Berkeley, CA, USA

Organizers:

Kay Kirkpatrick (University of Illinois at Urbana-Champaign)

Andrea Nahmod (University of Massachusetts, Amherst)

MSRI – Report on

Connections for Women: Dispersive and Stochastic PDE (August 19, 2015 - August 21, 2015).

Organizers : Kay Kirkpatrick (University of Illinois at Urbana-Champaign), Andrea Nahmod (University of Massachusetts, Amherst).

The main purpose of the Fall program at MSRI *New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems* at MSRI was to bring together mathematicians from the dispersive PDE and the stochastic PDE communities who research high or infinite dimensional dynamics, understanding the word *dynamics* in its broadest sense, from the study of the flows generated by these PDE, to the time evolution of large physical systems. The Connections for Women workshop was meant to highlight important topics and the research accomplishments of women in these fields. In addition, many of the participants in this workshop stayed on to participate in the Introductory Workshop too.

Some of the highlights of the Connections for Women workshop were the following:

- Some of the participants had interests on one side of the program or the other, but not both sides, especially the younger participants. This workshop thus gathered groups of people that often do not meet. As a result, there was a synergy between the two sides of the program.
- An excellent example of this synergy was the non-squeezing result of Killip-Visan-Zhang that was inspired by the talk of Dana Mendelson.

Below, we summarize the contents of the ten talks and two panels (1h each):

- The workshop started with the talk of **Margaret Beck** (Boston University) on modeling evolution of fluids, which provided an excellent physical motivation for some important fluid equations, and how multiple timescales can arise in these models.
- **Samantha Xu** (University of Illinois at Urbana-Champaign) presented the construction and invariance of Gibbs measures associated to certain nonlinear PDE and their corresponding diffusion processes.
- **Aynur Bulut** (MSRI) spoke about some negative energy blowup results for the focusing Hartree hierarchy.
- **Camelia Pop** (University of Pennsylvania) spoke about degenerate diffusions and corresponding Feynman-Kac formulas and Harnack inequalities.
- **Vera Hur** (University of Illinois at Urbana-Champaign) introduced another class of equations motivated by the physics of wave-breaking in water waves.
- **Dana Mendelson** (MSRI) spoke about symplectic non-squeezing results for the cubic nonlinear Klein-Gordon equation on the 3-torus.
- **Magdalena Czubak** (SUNY Binghamton) spoke about Liouville theorems for the Navier Stokes Equation on hyperbolic space.
- **Svetlana Roudenko** (George Washington University) spoke about blowup and scattering for focusing dispersive equations.
- **Chuntian Wang** (UCLA) spoke about stochastic numerical analysis with applications in fluid dynamics.

- **Xue-Mei Li** (University of Warwick) finished the talk portion of the workshop with a discussion of stochastic homogenisation on geometric spaces.

In addition, there were two panel discussions open to everyone at MSRI.
Both panels generated a lot of good discussion and feedback among all participants.

- **Panel 1 on Professional Development** consisted of Camelia Pop, Sandra Cerrai, Xue-Mei Li, and Gigliola Staffilani, moderated by Andrea Nahmod, answered questions from the audience about job searches, tenure, and gender.

- **Panel 2 on Work/Life balance** consisted of Kay Kirkpatrick, Monica Visan, Vera Hur, and Margaret Beck, moderated by Svetlana Roudenko, answered questions about accommodations for new parents and two-body problems.

We think that this workshop provided a broad overview of interesting topics being studied by program participants. It helped participants to understand the points of view from the two sides of the program and provided preparation for the introductory workshop, the research seminars, and the October two-week workshop.

Special thanks to the fantastic staff of MSRI for all of their help and support.

Organizers		
First Name	**Last Name**	**Institution**
Kay	Kirkpatrick	University of Illinois at Urbana-Champaign
Andrea	Nahmod	University of Massachusetts, Amherst
Speakers		
First Name	**Last Name**	**Institution**
Margaret	Beck	Boston University
Aynur	Bulut	University of Michigan
Magdalena	Czubak	Binghamton University (SUNY)
Vera Mikyoung	Hur	University of Illinois at Urbana-Champaign
Xue-Mei	Li	University of Warwick
Dana	Mendelson	MSRI - Mathematical Sciences Research Institute
Camelia	Pop	University of Pennsylvania
Svetlana	Roudenko	George Washington University
Chuntian	Wang	University of California
Samantha	Xu	University of Illinois at Urbana-Champaign

Connections for Women: Dispersive and Stochastic PDE

August 19 - 21, 2015

Schedule

Wednesday, August 19, 2015			
9:15AM - 9:30AM	Simons Auditorium		Welcome
9:30AM - 10:30AM	Simons Auditorium	Margaret Beck	Multiple timescales in the evolution of fluids models
10:30AM - 11:00AM	Atrium		Break
11:00AM - 12:00PM	Simons Auditorium	Samantha Xu	Diffusion Processes and Invariant Gibbs Measures
12:00PM - 2:00PM	Atrium		Lunch
2:00PM - 3:00PM	Simons Auditorium	Aynur Bulut	Negative energy blowup results for the focusing Hartree hierarchy
3:00PM - 3:30PM	Atrium		Tea
3:30PM - 4:30PM	Simons Auditorium	Camelia Pop	The Feynman--Kac Formula and Harnack Inequality for Degenerate Diffusions
6:00PM - 8:00PM			Dinner at Taste of Himalayas

Thursday,August 20, 2015			
9:30AM - 10:30AM	Simons Auditorium	Vera Mikyoung Hur	Breaking in water wave models
10:30AM - 11:00AM	Atrium		Break
11:00AM - 12:00PM	Simons Auditorium	Dana Mendelson	Symplectic non-squeezing for the cubic nonlinear Klein-Gordon equation on $\mathbb{T}^3$
12:00PM - 2:00PM	Atrium		Lunch
2:00PM - 3:00PM	Simons Auditorium		Panel Session 1: Professional development: Collaboration, Communication, and Job searches
3:00PM - 3:30PM	Atrium		Tea
3:30PM - 4:30PM	Simons Auditorium	Magdalena Czubak	Liouville Theorems for the Navier Stokes Equation on a Hyperbolic Space

Friday, August 21, 2015			
9:30AM - 10:30AM	Simons Auditorium	Svetlana Roudenko	Blow-up and scattering in the focusing dispersive equations
10:30AM - 11:00AM	Atrium		Break
11:00AM - 12:00PM	Simons Auditorium	Chuntian Wang	Stochastic numerical analysis with applications in fluid dynamics
12:00PM - 2:00PM	Atrium		Lunch
2:00PM - 3:00PM	Simons Auditorium	Xue-Mei Li	Stochastic Homogenisation on geometric spaces
3:00PM - 3:30PM	Atrium		Tea
3:30PM - 4:30PM	Simons Auditorium		Panel Session 2: Work/Life balance: Two-body problems, Three-body, and N-body

Participants		
First Name	**Last Name**	**Institution**
Mohammadreza	Aghajani	Brown University
FNU	Anudeep Kumar	George Washington University
Peter	Bates	Michigan State University
Margaret	Beck	Boston University
Aynur	Bulut	University of Michigan
Jorge	Cardona	University of Miami
Sandra	Cerrai	University of Maryland
Magdalena	Czubak	Binghamton University (SUNY)
Latifa	Debbi	University M'hamed Bougara,
Arnaud	Debussche	Ecole Normale Supérieure de Rennes
Chenjie	Fan	Massachusetts Institute of Technology
Aingeru	Fernández	Universidad del País Vasco/Euskal Herriko Unibertsitatea
Anna Rita	Giammetta	Università di Pisa
Cristi	Guevara	Louisiana State University
Nilhan	Gurkan	Gediz University
Boaz	Haberman	University of Chicago
Sebastian	Herr	Universität Bielefeld
Jingyu	Huang	University of Kansas
Vera Mikyoung	Hur	University of Illinois at Urbana-Champaign
Casey	Jao	University of California, Los Angeles
Su Chen	Kang	University of Kansas
Kunwoo	Kim	University of Utah
Kay	Kirkpatrick	University of Illinois at Urbana-Champaign
Andrew	Lawrie	University of California, Berkeley
Khoa	Le	University of Kansas
Marta	Lewicka	University of Pittsburgh
Xue-Mei	Li	University of Warwick
Michael	Lindsey	University of California, Berkeley
Grace	Liu	University of California, Berkeley
Fei	Lu	University of California, Berkeley
Yvan	Martel	École Polytechnique
Jeremy	Marzuola	University of North Carolina
Dana	Mendelson	MSRI - Mathematical Sciences Research Institute
Andrea	Nahmod	University of Massachusetts, Amherst
Giuseppe	Negro	Consejo Superior de Investigaciones Científicas (CSIC)
Mac Jugal	Nguepedja	Ecole Normale Supérieure de Rennes
Sung-Jin	Oh	University of California, Berkeley
Camelia	Pop	University of Pennsylvania
Marco	Romito	Università di Pisa
Leslie	Ross	University of Illinois at Urbana-Champaign
Svetlana	Roudenko	George Washington University
Michael	Scheutzow	TU Berlin
Zachary	Selk	University of California, Davis
Sohrab	Shahshahani	University of Michigan

Participants		
First Name	**Last Name**	**Institution**
Gigliola	Staffilani	Massachusetts Institute of Technology
Andrei	Tarfulea	Princeton University
Maja	Taskovic	University of Texas
Jeremy	Trageser	University of Nebraska
Nicola	Visciglia	Università di Pisa
Polina	Vytnova	School of Mathematical Sciences, Queen Mary, University of London
Chuntian	Wang	University of California
Andre	Wibisono	University of California
Klaus	Widmayer	New York University, Courant Institute
Diane	Wilcox	University of the Witwatersrand
Bobby	Wilson	MSRI - Mathematical Sciences Research Institute
Samantha	Xu	University of Illinois at Urbana-Champaign
Kai	Yang	George Washington University
Hui	Yu	The University of Texas at Austin
Xueying	Yu	University of Massachusetts, Amherst
Qiang	Zeng	Harvard University
Zihui	Zhao	University of Washington
Jie	Zhong	University of Central Florida

Officially Registered Participant Information

Participants		**62**

Gender		**62**
Male	54.84%	34
Female	43.55%	27
Declined to state	1.61%	1

Ethnicity*		**69**
White	56.45%	35
Asian	33.87%	21
Hispanic	6.45%	4
Pacific Islander	0.00%	0
Black	4.84%	3
Native American	0.00%	0
Mixed	4.84%	3
Declined to state	4.84%	3

* ethnicity specifications are not exclusive

26 responses

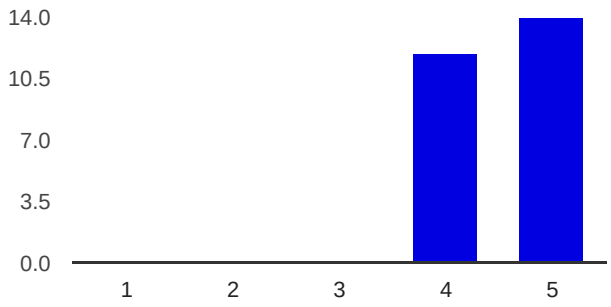
Response Rate 26/62 = 42%

View all responses Publish analytics

Summary

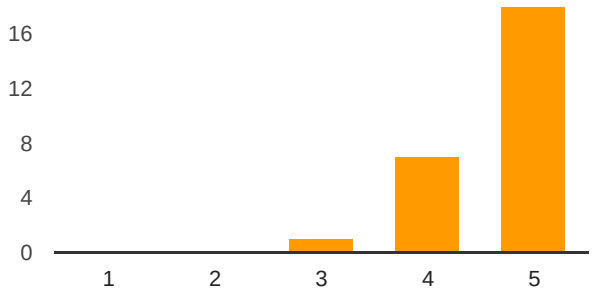
Workshop assessment

The workshop was intellectually stimulating



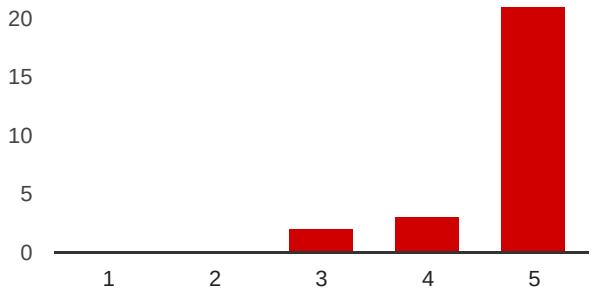
Not at all: 1	**0**	0%
2	**0**	0%
3	**0**	0%
4	**12**	46.2%
Very: 5	**14**	53.8%

The overall experience of the workshop was worthwhile



Not at all: 1	**0**	0%
2	**0**	0%
3	**1**	3.8%
4	**7**	26.9%
Very: 5	**18**	69.2%

The time between lectures was adequate for discussion



Not al all: 1	**0**	0%
2	**0**	0%
3	**2**	7.7%
4	**3**	11.5%
Very: 5	**21**	80.8%

Additional comments on the workshop organization

Talks were to specialized, "only for experts", rather than an providing an overview and connections to possible future research.

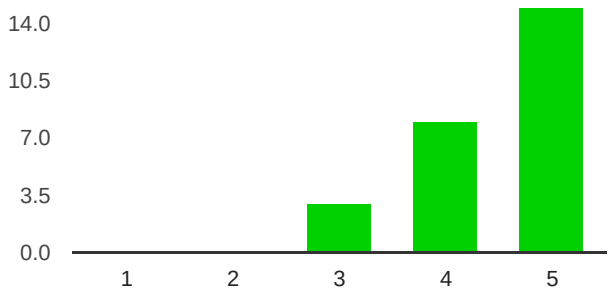
Maybe it could be a good idea to change the schedule of the talks, reducing the coffee break time and leaving more free time in the afternoon, for work and discussion.

Personal assessment

I was well prepared to benefit from the lectures

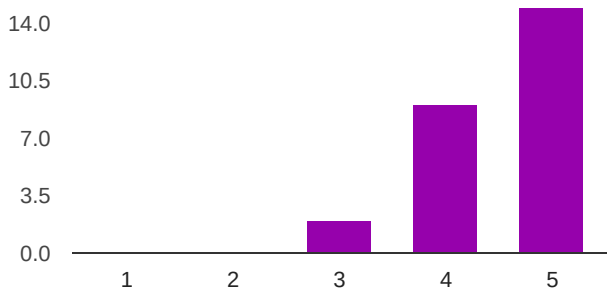
Not at all: 1	**0**	0%
2	**0**	0%
3	**5**	19.2%
4	**12**	46.2%
Very: 5	**9**	34.6%

My interest in the subject matter was increased by the workshop



Niot at all: 1	**0**	0%
2	**0**	0%
3	**3**	11.5%
4	**8**	30.8%
Very: 5	**15**	57.7%

The workshop helped me meet people with similar scientific interests

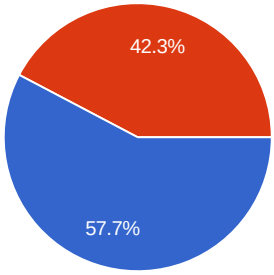


Not at all:	1	**0**	0%
	2	**0**	0%
	3	**2**	7.7%
	4	**9**	34.6%
Very Much:	5	**15**	57.7%

Additional comments on your personal assessment

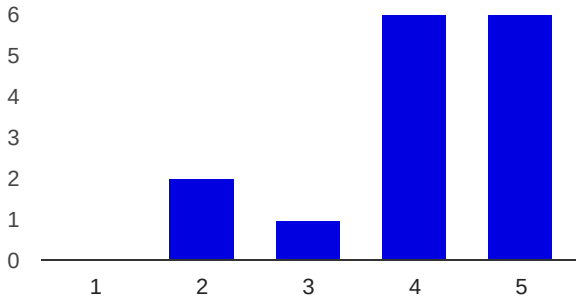
Additional Activities

Did you attend the panel discussions?



Yes	**15**	57.7%
No	**11**	42.3%

If you did attend the panel discussion, did you find it worthwhile?



Not at all:	1	**0**	0%
	2	**2**	13.3%
	3	**1**	6.7%
	4	**6**	40%
Very much:	5	**6**	40%

What other subjects should be addressed in future panel discussions?

I have been very interested to attend the discussion sessions. But because of the extension of a discussion with a professor, I could not. However, I believe that discussion is really needed. I propose to discuss the policies in academia and how much they can help research and the situation of the woman researcher from developing countries.

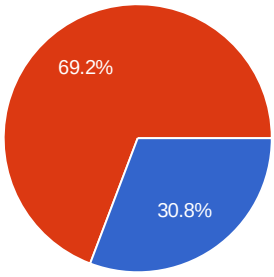
To my best knowledge, there is neither dinner conference nor panel sessions, unless I have not been informed or invited to such activities.

Same topics, but panelists should be better prepared, with more thought out answers.

I just want to add that panel discussions were excellent, mainly thanks to a great choice of panelists and moderators.

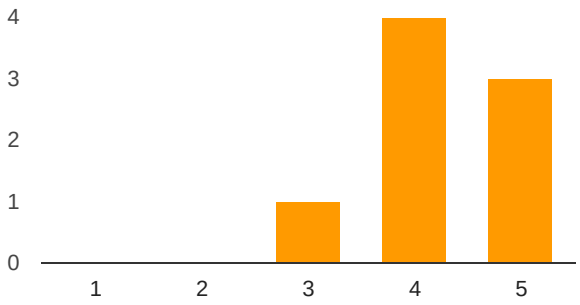
How to build collaborations and work with other mathematicians, how to find interesting topics to work with

Did you attend the dinner?



Yes	**8**	30.8%
No	**18**	69.2%

If you did attend the dinner, did it help to solidify the contacts you made in the workshop?



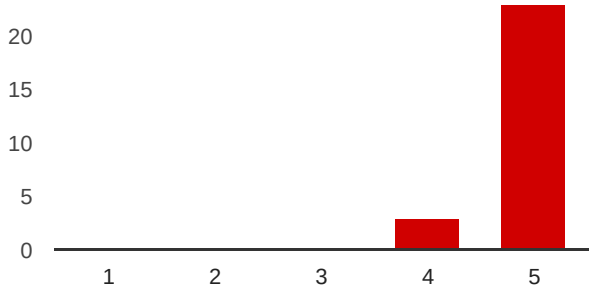
Not at all: 1	**0**	0%
2	**0**	0%
3	**1**	12.5%
4	**4**	50%
Very much: 5	**3**	37.5%

Please provide any comments on the dinner

It might be good to have a private room for such dinners, as restaurants are quite loud and it is difficult to hear others. A brown bag dinner at MSRI would do if it is possible to have a room for the participants of the dinner only.

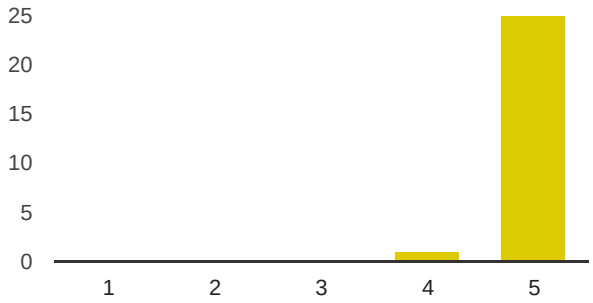
Venue

I found the MSRI staff helpful



Not at all: 1	**0**	0%
2	**0**	0%
3	**0**	0%
4	**3**	11.5%
Very: 5	**23**	88.5%

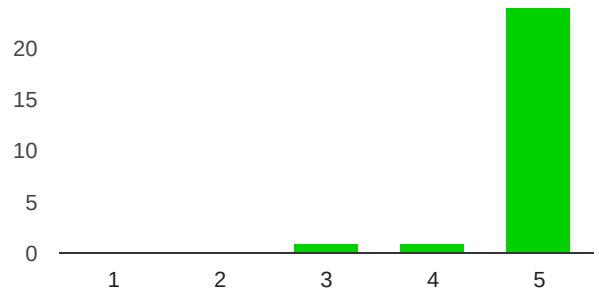
The MSRI physical facilities were conducive for such a workshop



Not at all: 1	**0**	0%
2	**0**	0%

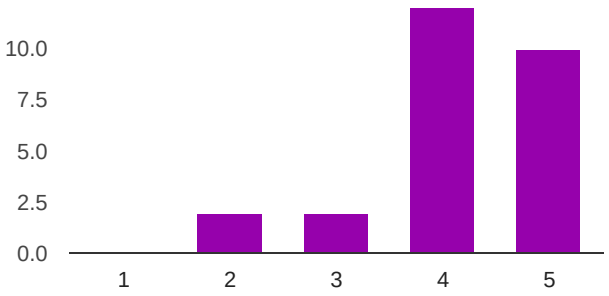
3	**0**	0%
4	**1**	3.8%
Very: 5	**25**	96.2%

The MSRI computer facilities were adequate for such a workshop



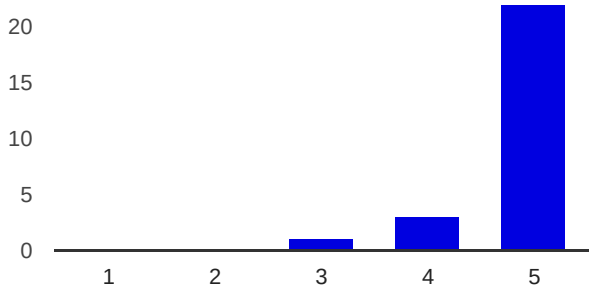
Not at all: 1	**0**	0%
2	**0**	0%
3	**1**	3.8%
4	**1**	3.8%
Very: 5	**24**	92.3%

The MSRI lunch arrangements were satisfactory



Not at all: 1	**0**	0%
2	**2**	7.7%
3	**2**	7.7%
4	**12**	46.2%
Very: 5	**10**	38.5%

The MSRI tea arrangements were satisfactory



Not at all: 1	**0**	0%
2	**0**	0%
3	**1**	3.8%
4	**3**	11.5%
Very: 5	**22**	84.6%

Additional comments on the venue

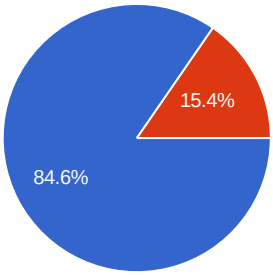
MSRI is a fantastic place for work and collaboration.

It would be great to have more fruit at coffee breaks.

Lunch was expensive and not great

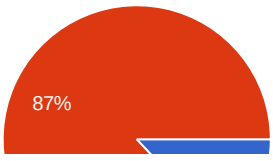
MSRI Wireless Network

Did you use MSRI's wireless network?



Yes	**22**	84.6%
No	**4**	15.4%

Did you experience any difficulties with the network?



Yes	**3**	13%
No	**20**	87%

If you did experience difficulties with the network, please explain:

The signal was very weak, especially on the terrace. But, that is a minor issue.

Coverage problems

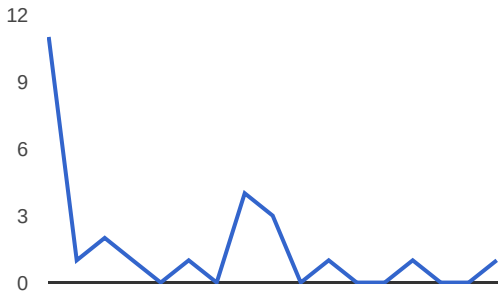
In the office 306, at least in the desk near the window, the signal is not very good

Thank you for completing this survey

We welcome any additional comments or suggestions you may have to improve the overall experience for future participants.

This has been an amazing experience. I would highly recommend MSRI to anyone.

Number of daily responses



Introductory Workshop: Randomness and long time dynamics in nonlinear evolution differential equations

August 24-28, 2015

MSRI, Berkeley, CA, USA

Organizers:

Kay Kirkpatrick (University of Illinois at Urbana-Champaign)

Yvan Martel (École Polytechnique)

Luc Rey-Bellet (University of Massachusetts, Amherst)

Gigliola Staffilani (Massachusetts Institute of Technology)

MSRI – Report on

Introductory Workshop: Randomness and long time dynamics in nonlinear evolution differential equations (August 24, 2015 - August 28, 2015).

Organizers : Kay Kirkpatrick (University of Illinois at Urbana-Champaign), Yvan Martel (École Polytechnique), Luc Rey-Bellet (University of Massachusetts, Amherst), Gigliola Staffilani (Massachusetts Institute of Technology).

The main purpose of the Fall program at MSRI *New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems* at MSRI was to bring together a core group of mathematicians from the dispersive PDE and the stochastic PDE communities whose research contains the unifying question of analyzing high or infinite dimensional dynamics. Here the word *dynamics* is understood in its broadest sense, from the study of the flows generated by deterministic or stochastic PDE, to the time evolution of large physical systems. The introductory workshop was meant as an overview and showcase to the whole program. Its goal was to familiarize graduate students, postdocs, and other researchers to the major topics of the program through several broad audience short courses and discussions.

In our opinion, major indicators of the success of this workshop are the following.

(1) Some of the senior participants to the program had already wide interests in most aspects of the program, but it was not necessarily the case for all of us, and especially for students and post-docs. One of the objectives of the program was thus to gather groups of people that usually do not meet. A major issue would have been a splitting, each community attending only the mini-courses in its thematic. As far as we can judge, this was not at all the case. On the contrary, most participants (especially researchers at an early stage of their carriers) went to all the courses and enjoyed them.

(2) The main reason for this success was of course the primary interest of the participants to open themselves to other thematic but also decisively the quality and high interest of the courses. Also, as a rule, no prerequisite on stochastic calculus was expected from the audience for the stochastic courses. Finally, the schedule was designed so that courses of different flavor would be gathered.

(3) The important number of participants evaluated at 111.

Below, we summarize the contents of the seven courses (3h or 2h each).

- *Introduction to Stochastic Partial Differential Equations* by Arnaud Debussche (Ecole Normale Supérieure de Rennes). After presenting what is white noise and stochastic calculus in infinite dimension, Debussche showed how to solve some classical SPDEs with white noise (mainly stochastic Burgers and reaction-diffusion equations with different kinds of white noises). He explained how much the space dimension matters for reaction-diffusion equation: dimension 2 is already challenging and the much more difficult case of dimension 3 has been solved only recently by Martin Hairer.

- *Introduction to invariant measure and unique ergodicity for SPDEs* by Jonathan Mattingly (Duke University). The main topic was to present some classical conditions for existence and uniqueness of invariant measures for finite dimensional Markov Processes. Then, J.

Mattingly presented in a very pedagogical way how the situation can become more complicated in the infinite dimensional setting of SPDE (mainly dissipative SDPEs).
- *Invariant Measures for nonlinear PDE* by Andrea Nahmod (University of Massachusetts, Amherst) Andrea Nahmod presented the construction and invariance of Gibbs and other weighted Wiener measures associated to certain nonlinear PDE (like the focusing or defocusing NLS and the derivative NLS on the torus of various dimensions). She also discussed applications, further properties and open questions in this direction.
- *Global dynamics of nonlinear dispersive equations* by Kenji Nakanishi (Osaka University). Solutions of nonlinear dispersive equations exhibit various space-time behaviors, such as blow-up, soliton, and scattering. It is an important and challenging problem to predict the behavior of the solutions in the future and the past from the initial data. Combining variational, dispersive, and spectral analysis, Kenji Nakanishi explained how to describe the structure of solutions and of initial data in some cases. He mainly focused on the nonlinear Schrödinger equation with potential.
- *Many body quantum dynamics and nonlinear dispersive PDE* by Natasa Pavlovic (University of Texas). The derivation of nonlinear dispersive PDE, such as the nonlinear Schrödinger from many body quantum dynamics is a central topic in mathematical physics. One way is to derive NLS via the Gross-Pitaevskii (GP) hierarchy, which is an infinite system of coupled linear non-homogeneous PDE. These lectures presented the process of going from a quantum many body system of bosons to the NLS via the GP. Conversely, what nonlinear PDE such as NLS can tell us about the GP hierarchy and quantum many body systems was also discussed.
- *MCMC, SMC and IS in High and Infinite Dimensional Spaces* by Andrew stuart (University of Warwick). This is a quite enigmatic title for lectures aiming at showing the unifying role played by the property of absolute continuity in understanding the behaviour of, and construction of effective algorithms to explore, probability measures in high and infinite dimensional spaces. Links to continuous time processes, and SPDEs in particular, were made.
-Geometric nonlinear dispersive PDEs by Daniel Tataru (University of California, Berkeley). The aim of these lectures was to provide an overview of results, ideas and sharp techniques which have been developed in recent years in the study of energy critical geometric nonlinear dispersive PDEs. Problems discussed included wave maps, Maxwell-Klein Gordon, Yang Mills evolutions, and Schrödinger maps.

We think that this program was quite demanding yet very interesting and of broad interest. We are convinced that it helped many participants to understand the issues discussed in the next lectures, research seminars and in the October two-week workshop. Finally, it was the occasion to enjoy courses from excellent lecturers.

Special thanks to the fantastic staff of MSRI. They made it easy for everyone and especially for the organizers, who were thus able themselves to fully enjoy the lectures and the discussions.

Organizers		
First Name	**Last Name**	**Institution**
Kay	Kirkpatrick	University of Illinois at Urbana-Champaign
Yvan	Martel	École Polytechnique
Luc	Rey-Bellet	University of Massachusetts, Amherst
Gigliola	Staffilani	Massachusetts Institute of Technology
Speakers		
First Name	**Last Name**	**Institution**
Arnaud	Debussche	Ecole Normale Supérieure de Rennes
Jonathan	Mattingly	Duke University
Andrea	Nahmod	University of Massachusetts, Amherst
Kenji	Nakanishi	Osaka University
Natasa	Pavlovic	University of Texas
Andrew	Stuart	University of Warwick
Daniel	Tataru	University of California, Berkeley

Introductory Workshop: Randomness and long time dynamics in nonlinear evolution differential equations

August 24 -28, 2015

Schedule

Monday, August 24, 2015			
9:15 AM - 9:30 AM	Simons Auditorium		Welcome
9:30 AM - 10:30 AM	Simons Auditorium	Daniel Tataru	Geometric nonlinear dispersive pde's
10:30 AM - 11:00 AM	Atrium		Break
11:00 AM - 12:00 PM	Simons Auditorium	Arnaud Debussche	Introduction to Stochastic Partial Differential Equations
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Jonathan Mattingly	Introduction to invariant measure and unique ergodicity for SPDEs
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Arnaud Debussche	Introduction to Stochastic Partial Differential Equations

Tuesday, August 25, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Daniel Tataru	Geometric nonlinear dispersive pde's
10:30 AM - 11:00 AM	Atrium		Break
11:00 AM - 12:00 PM	Simons Auditorium	Arnaud Debussche	Introduction to Stochastic Partial Differential Equations
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Jonathan Mattingly	Introduction to invariant measure and unique ergodicity for SPDEs
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Natasa Pavlovic	Many body quantum dynamics and nonlinear dispersive PDE
4:30 PM - 6:20 PM	Atrium		Reception

Wednesday, August 26, 2015			
9:00 AM - 10:00 AM	Simons Auditorium	Daniel Tataru	Geometric nonlinear dispersive pde's
10:00 AM - 11:00 AM	Simons Auditorium	Jonathan Mattingly	Introduction to invariant measure and unique ergodicity for SPDEs
11:00 AM - 11:30 AM	Atrium		Tea
11:30 AM - 12:30 PM	Simons Auditorium	Natasa Pavlovic	Many body quantum dynamics and nonlinear dispersive PDE

Thursday, August 27, 2015			
9:00 AM - 10:00 AM	Simons Auditorium	Andrew Stuart	MCMC, SMC and IS in High and Infinite Dimensional Spaces
10:00 AM - 11:00 AM	Simons Auditorium	Kenji Nakanishi	Global dynamics of nonlinear dispersive equations
11:00 AM - 11:30 AM	Atrium		Break
11:30 AM - 12:30 PM	Simons Auditorium	Andrea Nahmod	Invariant Measures for nonlinear PDE
12:30 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Andrew Stuart	MCMC, SMC and IS in High and Infinite Dimensional Spaces
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Andrea Nahmod	Invariant Measures for nonlinear PDE

Friday, August 28, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Kenji Nakanishi	Global dynamics of nonlinear dispersive equations
10:30 AM - 11:00 AM	Atrium		Tea
11:00 AM - 12:00 PM	Simons Auditorium	Andrea Nahmod	Invariant Measures for nonlinear PDE
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Andrew Stuart	MCMC, SMC and IS in High and Infinite Dimensional Spaces
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Kenji Nakanishi	Global dynamics of nonlinear dispersive equations

Participants

First Name	Last Name	Institution
Mohammadreza (Reza)	Aghajani	Brown University
Albert	Ai	University of California, Berkeley
FNU	Anudeep Kumar	George Washington University
Alexander	Azzam	University of California, Los Angeles
Peter	Bates	Michigan State University
Margaret	Beck	Boston University
Eric	Brattain	University of California, Davis
Justin	Brereton	University of California, Berkeley
Stefano Francesco	Burzio	École Polytechnique Fédérale de Lausanne (EPFL)
Oleg	Butkovsky	Technion---Israel Institute of Technology
Federico	Cacciafesta	UniversitÍ di Roma ``La Sapienza''
Jorge	Cardona	University of Miami
Sandra	Cerrai	University of Maryland
Jacky	Chong	University of Maryland
Erin	Compaan	University of Illinois at Urbana-Champaign
Magdalena	Czubak	Binghamton University (SUNY)
Latifa	Debbi	University M'hamed Bougara,
Arnaud	Debussche	Ecole Normale Supérieure de Rennes
Ryan	Denlinger	New York University, Courant Institute
Toka	Diagana	Howard University
Joscha	Diehl	University of California, San Diego
Benjamin	Dodson	Johns Hopkins University
Tarini	Dutta	Gauhati University
melissa	fabros	UC Berkeley
Chenjie	Fan	Massachusetts Institute of Technology
Max	Fathi	University of California, Berkeley
Aingeru	Fernández	Universidad del País Vasco/Euskal Herriko Unibertsitatea
John	Gemmer	Brown University
Anna Rita	Giammetta	UniversitÍ di Pisa
Nathan	Glatt-Holtz	Virginia Polytechnic Institute and State University
Boaz	Haberman	University of Chicago
Zaher	Hani	Georgia Institute of Technology
Benjamin	Harrop-Griffiths	New York University, Courant Institute
Sebastian	Herr	Universität Bielefeld
Jingyu	Huang	University of Kansas
Slim	Ibrahim	University of Victoria
Casey	Jao	University of California, Los Angeles
Jiayin	Jin	Georgia Institute of Technology
Kunwoo	Kim	University of Utah
Kay	Kirkpatrick	University of Illinois at Urbana-Champaign
Robert	Korsan	Carnegie Mellon University
Andrew	Lawrie	University of California, Berkeley
Khoa	Le	University of Kansas
Kijung	Lee	Ajou University
Marta	Lewicka	University of Pittsburgh

Participants		
First Name	**Last Name**	**Institution**
Xue-Mei	Li	University of Warwick
Yao	Li	New York University, Courant Institute
Joseph	Lindgren	University of Kentucky
Michael	Lindsey	University of California, Berkeley
Grace	Liu	University of California, Berkeley
Fei	Lu	University of California, Berkeley
Milivoje	Lukic	University of Toronto
Yvan	Martel	École Polytechnique
Jeremy	Marzuola	University of North Carolina
Dana	Mendelson	MSRI - Mathematical Sciences Research Institute
Georg	Menz	University of California
Oleksandr	Minakov	Faculty of Nuclear Sciences and Physical Engineering
Carl	Mueller	University of Rochester
Jason	Murphy	University of California, Berkeley
Andrea	Nahmod	University of Massachusetts, Amherst
Kenji	Nakanishi	Osaka University
Kihun	Nam	Rutgers University
Tayyab	Nawaz	University of Illinois at Urbana-Champaign
Giuseppe	Negro	Consejo Superior de Investigaciones CientÍ-ficas (CSIC)
Mac Jugal	Nguepedja	Ecole Normale Supérieure de Rennes
Sung-Jin	Oh	University of California, Berkeley
Benoit	Pausader	Princeton University
Natasa	Pavlovic	University of Texas
Lea	Popovic	Concordia University
Fabio	Pusateri	Princeton University
Kavita	Ramanan	Brown University
Luc	Rey-Bellet	University of Massachusetts, Amherst
Marco	Romito	UniversitÍ di Pisa
Leslie	Ross	University of Illinois at Urbana-Champaign
Svetlana	Roudenko	George Washington University
Axel	Saenz	University of California, Davis
Michael	Scheutzow	TU Berlin
Zachary	Selk	University of California, Davis
Sohrab	Shahshahani	University of Michigan
Gigliola	Staffilani	Massachusetts Institute of Technology
Marta	Strani	Institut de Mathematiques de Jussieu
Andrew	Stuart	University of Warwick
Erwin	Suazo	University of Texas
Juntao	Sun	University of Texas-Pan American
Andrei	Tarfulea	Princeton University
Maja	Taskovic	University of Texas
Daniel	Tataru	University of California, Berkeley
Nathan	Totz	University of Massachusetts
Jeremy	Trageser	University of Nebraska

Participants		
First Name	**Last Name**	**Institution**
Nicola	Visciglia	Universitĺ di Pisa
Polina	Vytnova	School of Mathematical Sciences, Queen Mary, University of London
Chuntian	Wang	University of California
Hendrik	Weber	University of Warwick
Klaus	Widmayer	New York University, Courant Institute
Diane	Wilcox	University of the Witwatersrand
Bobby	Wilson	MSRI - Mathematical Sciences Research Institute
Samantha	Xu	University of Illinois at Urbana-Champaign
Kazuo	Yamazaki	Washington State University
Bianxia	Yang	University of Texas-Pan American
Yunan	Yang	University of Texas
Kai	Yang	George Washington University
Hui	Yu	The University of Texas at Austin
Xueying	Yu	University of Massachusetts, Amherst
Haitian	Yue	University of Massachusetts
Qiang	Zeng	Harvard University
Qingtian	Zhang	Pennsylvania State University
Xiaoyi	Zhang	University of Iowa
Zihui	Zhao	University of Washington
Jie	Zhong	University of Central Florida
Christian	Zillinger	Universität Bonn
Jeffery	Zylinski	Purdue University

Officially Registered Participant Information

Participants		**111**

Gender		**111**
Male	72.07%	80
Female	27.03%	30
Declined to state	0.90%	1

Ethnicity*		**118**
White	50.85%	60
Asian	29.66%	35
Hispanic	4.24%	5
Pacific Islander	0.85%	1
Black	3.39%	4
Native American	0.00%	0
Mixed	2.54%	3
Declined to state	8.47%	10

* ethnicity specifications are not exclusive

msri.coord@gmail.com

Edit this form

76 responses

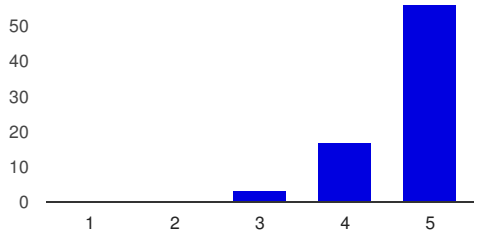
76 responses/111 participants = 68% Response Rate

View all responses Publish analytics

Summary

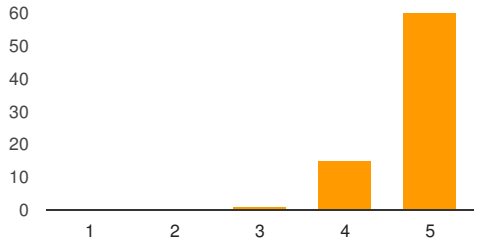
Workshop assessment

The workshop was intellectually stimulating



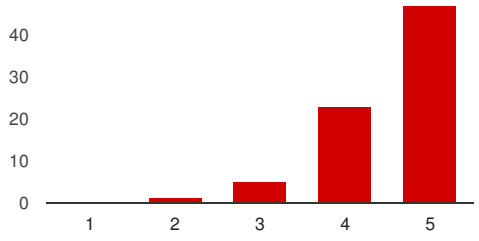
Not at all: 1	**0**	0%
2	**0**	0%
3	**3**	3.9%
4	**17**	22.4%
Very: 5	**56**	73.7%

The overall experience of the workshop was worthwhile



Not at all: 1	**0**	0%
2	**0**	0%
3	**1**	1.3%
4	**15**	19.7%
Very: 5	**60**	78.9%

The time between lectures was adequate for discussion



Not al all: 1	**0**	0%
2	**1**	1.3%
3	**5**	6.6%
4	**23**	30.3%
Very: 5	**47**	61.8%

Additional comments on the workshop organization

Excellent speakers!

Excellent

D. Tataru's lectures were not adequate for an "introductory" workshop. They were targeted at experts.

Lunch catering on Monday was awful !! And overpriced - please never use those caterers again

More financial support to students

Slightly too many talks, not enough time to kibitz

All the lectures were delivered by eminent mathematicians effectively showing recent trend of reseach

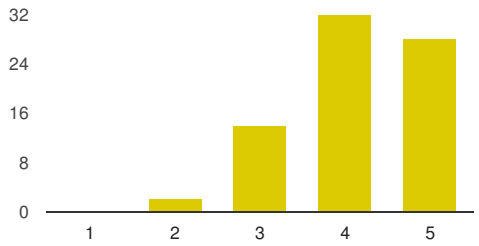
perfect!

Good job! organizers!

Topics were too scattered

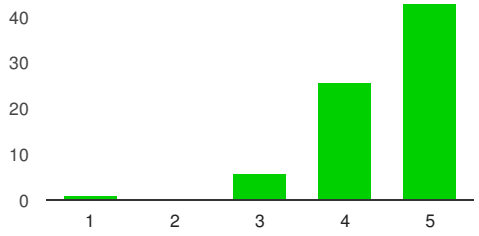
Personal assessment

I was well prepared to benefit from the lectures



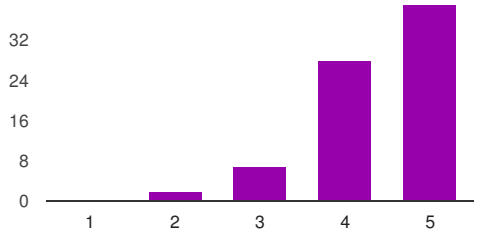
Not at all: 1	**0**	0%
2	**2**	2.6%
3	**14**	18.4%
4	**32**	42.1%
Very: 5	**28**	36.8%

My interest in the subject matter was increased by the workshop



Niot at all: 1	**1**	1.3%
2	**0**	0%
3	**6**	7.9%
4	**26**	34.2%
Very: 5	**43**	56.6%

The workshop helped me meet people with similar scientific interests



Not at all: 1	**0**	0%
2	**2**	2.6%
3	**7**	9.2%
4	**28**	36.8%
Very Much: 5	**39**	51.3%

Additional comments on your personal assessment

I was also interested

it would be better if everyone would use the board for their lectures instead of slides

more sufficiently prepare

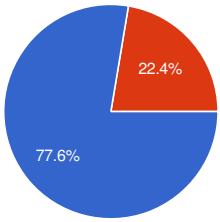
All the Lecturers were delivered by the eminent mathematicians by hughlighting new direction of research.Hospitality was extremely appreciable. Arrangement was highly satisfactory.

I am new on Stochastic stuff

The stochastic side was accessible but not the pde

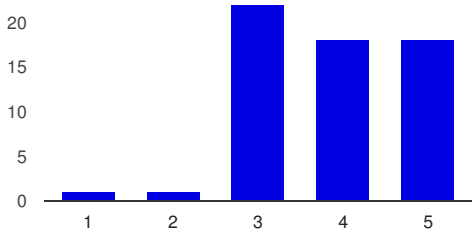
Additional Activities

Did you attend the reception?



Yes	**59**	77.6%
No	**17**	22.4%

If you did attend the reception, did it help to solidify the contacts you made in the workshop?



Not at all: 1	**1**	1.7%
2	**1**	1.7%
3	**22**	36.7%
4	**18**	30%
Very much: 5	**18**	30%

Please provide any comments on the reception

Really appreciated

it really helps to meet and talk to people

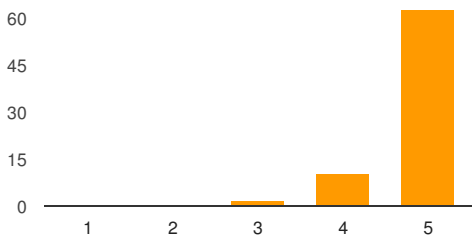
No

Reception was excellent

nice add-on

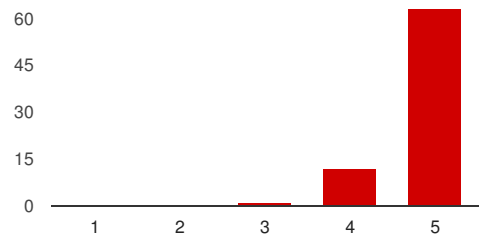
Venue

I found the MSRI staff helpful



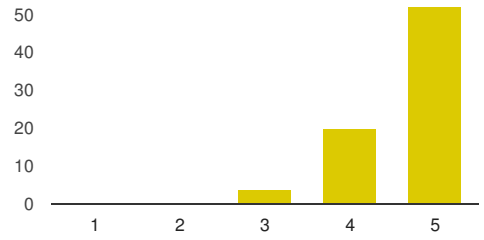
Not at all: 1	**0**	0%
2	**0**	0%
3	**2**	2.6%
4	**11**	14.5%
Very: 5	**63**	82.9%

The MSRI physical facilities were conducive for such a workshop



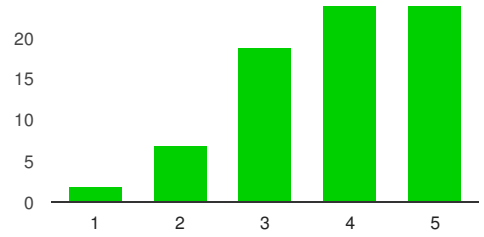
Not at all: 1	**0**	0%
2	**0**	0%
3	**1**	1.3%
4	**12**	15.8%
Very: 5	**63**	82.9%

The MSRI computer facilities were adequate for such a workshop



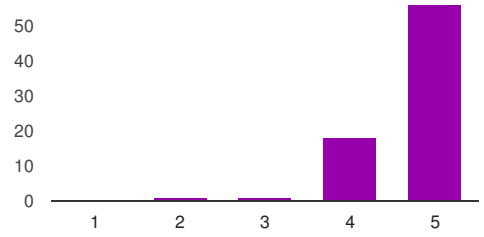
Not at all: 1	**0**	0%
2	**0**	0%
3	**4**	5.3%
4	**20**	26.3%
Very: 5	**52**	68.4%

The MSRI lunch arrangements were satisfactory



Not at all: 1	**2**	2.6%
2	**7**	9.2%
3	**19**	25%
4	**24**	31.6%
Very: 5	**24**	31.6%

The MSRI tea arrangements were satisfactory



Not at all: 1	**0**	0%
2	**1**	1.3%
3	**1**	1.3%
4	**18**	23.7%
Very: 5	**56**	73.7%

Additional comments on the venue

There was some printing trouble on Thursday

It is really very inconvenient that we were not allowed to take tea/coffee into the lecture hall.

Food ran out @ lunch on Monday. The other days were fine.

lunch arrangements are were ok for Thursday and Friday, but Mon and Tue were quite bad

bigger classroom

Let us bring coffee in to the Simons auditorium! It;s more important than water for mathematicians.

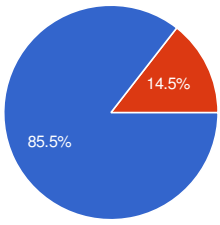
More computer access could be useful

It is very frustrating that only water is allowed in the lecture hall. (And frankly many people ignore this rule anyway.)

The caters ran out of everything except salads before I got my turn to purchase anything.

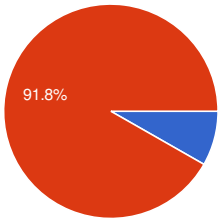
MSRI Wireless Network

Did you use MSRI's wireless network?



Yes	**65**	85.5%
No	**11**	14.5%

Did you experience any difficulties with the network?



Yes	**6**	8.2%
No	**67**	91.8%

If you did experience difficulties with the network, please explain:

too slow

Connects extremely slowly, sometimes very slow connection

It was sometimes slow, and I had to turn my wireless off and then back on again to bring it back to normal speed.

Coverage problems

no

The wireless network signals were very weak at many places which sometimes make it difficult to use search engines. But this problem was only in specific areas so i believe that have to do with some other factors as well.

Sometimes it got very slow, so I had to turn my connection off and then back on again to reset it, which usually brought the speed back up to normal.

Thank you for completing this survey

We welcome any additional comments or suggestions you may have to improve the overall experience for future participants.

If the speakers could print out at least an outline of lectures beforehand, and also make the schedule of the workshop available much in advance when people book the flights, it would help to arrange the better attendance

more financial support to students

Foreign participants should be fully funded.

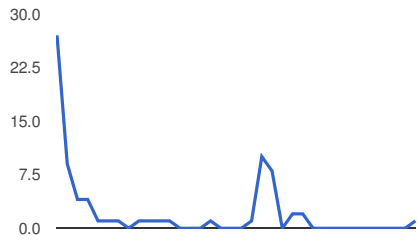
I believe if we can have multidisciplinary research areas participant then we may be able to have more collaborations . This will

help to use Mathematics in fields such as Biology, Physics, Finacnce etc. This may also increase the chances of funding opportunities

more finicial support for Ph.D students

I thank the IT staff for the loan of a USA compatible cable for my laptop power supply

Number of daily responses



New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensional systems

October 19, 2015 - October 30, 2015

MSRI, Berkeley, CA, USA

Organizers:

Andrea Nahmod (University of Massachusetts, Amherst)

Jonathan Mattingly (Duke University)

Daniel Tataru (University of California, Berkeley)

Pierre Raphael (Université Nice Sophia-Antipolis)

Luc Rey-Bellet (University of Massachusetts, Amherst)

MSRI – Report on

Research Workshop: New Challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensional systems

(October 19, 2015 –October 30, 2015).

Organizers : Jonathan Mattingly (Duke University), Andrea R. Nahmod (University of Massachussetts Amherst), Pierre Raphael (Université Nice Sophia-Antipolis), Luc Rey-Bellet (University of Massachusetts, Amherst), Daniel Tataru (University of California Berkeley).

The main purpose of the Fall program at MSRI *New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems* has been to bring together a core group of mathematicians from the general communities of nonlinear dispersive and stochastic partial differential equations and probability whose research contains an underlying and unifying problem: quantitatively analyzing the *dynamics* of solutions arising from the flows generated by both deterministic and non-deterministic evolution equations. The word *dynamics* is understood in its broadest sense, from the study of the flows generated by deterministic or stochastic PDE to the time evolution of large physical systems. In recent years there has been spectacular progress within both communities in the understanding of this common problem. The main efforts, mostly in parallel so far, have generated an incredible number of deep results, that are important to understand the complex natural phenomena around us. Yet, many open questions and challenges remain ahead of us. The aim of our program was to produce new and fundamental results in both areas, and possibly to be the start of a new generation of researchers comfortable on both languages.

The two-weeks long research workshop was the highlight of the program and showcased the main research directions and advances in both PDE and SPDE for the broader audience in both fields. It consisted of 36 speakers (18 each week). It served to enhance the goals of the program and explore specific problems at the core of the unifying theme and to have a focused and open exchange of ideas, connections and mathematical tools leading to potential new paradigms.

A fundamental idea of the workshop was to intertwine -rather than cluster -the talks on a wide array of topics in PDE and SPDE by some of the key researchers in both communities. We aimed to highlight the most exciting advances, salient ideas, proofs and open questions at the forefront of the research in these fields, and at the same time to create opportunities for `cross-pollination' between the two communities. A key aspect to the success of this combined two weeks workshop relied on making the speakers aware before-hand of the mixed audience and emphasize that they would be talking to the `other' community as well, and not just their own. To this effect we sent to them the following guidelines to consider while preparing their talks:

This Research Workshop is part of a Jumbo Program at MSRI that brings together researchers mainly from two different communities: SPDE/Probability (including Algorithms) and Dispersive PDE.

One of the main objectives of the workshop and program is to facilitate the exchange of ideas, communication and interaction among and across all participants in these communities. To this end, we ask that your talk be prepared not just for your community and/or the experts in the audience, but for all the attendees. Bear in mind also that there is a large number of junior people in residence as well. Below we list a few suggestions that we hope you will consider while preparing your talk.

1) A very general overview of the theme of your talk that includes central/relevant definitions for non-experts.
2) An outline of a theory/a strategy/group of ideas, that you think are relevant.
3) A sketch of a proof that you think is most insightful to present.
4) A description of some of the most salient open questions related to your talk.
5) When possible, please indicate connections/ideas that are fertile for cross-pollination among SPDE/Prob/PDE.

The roster of speakers and titles were:

Patrick Gerard, *Wave turbulence for the cubic Szeg\"o equation and beyond*
Arnaud Debussche *Diffusive limits for stochastic kinetic equations*
Monica Visan *Symplectic non-squeezing for the cubic NLS on $R^2*
Davar Khoshnevisan *Optimal Regularity for some Parabolic SPDEs*
Andrew Majda *An Applied Math Perspective on Climate Science, Turbulence, and Other Complex Systems.*
Fraydoun Rezakhanlou *Generalized Smoluchowski Equations and Scalar Conservation Laws*.
Luis Vega *The Talbot effect and the evolution of Vortex Filaments.*
Herbert Koch *KP-II in 2 and 3d*
Jeremy Quastel *The Kardar-Parisi-Zhang equation and universality class*
Yvan Martel *Exotic blow up rates for some critical nonlinear dispersive equations*
Lai-Sang Young *Toward a smooth ergodic theory for infinite dimensional systems*
Sourav Chatterjee *Invariant measures and the soliton resolution conjecture*
Jalal Shatah *The large box limit of nonlinear Schrodinger equations in weakly nonlinear regime*
Martin Hairer *On random strings*
Gigliola Staffilani *Random Versus Deterministic Approach in the Study of Wave and Dispersive Equations*
Zaher Hani *Energy distribution and wave turbulence closures for the nonlinear Schroedinger equation*
Jean-Pierre Eckmann *Classical Hamiltonian Systems, Driven out of Equilibrium, a Review*
Thierry Bodineau *From particles to linear hydrodynamic equations I*
Isabelle Gallagher *From particles to linear hydrodynamic equations, II*
Benoit Pausader *Global stability of a flat interface for the gravity-capillary water-wave model*
Alexandru Ionescu *On global solutions of water wave models*
Thomas Alazard *Control of water waves*
Andrea Montanari *Universality in polytope phase transitions and message passing algorithms*
Anne de Bouard *The stochastic Landau-Lifshitz equation*
Wilhelm Schlag *On long term dynamics of nonlinear evolution equations*
Oana Ivanovici *Dispersion for the wave and the Schrödinger equations outside strictly convex domains*
Sandra Cerrai *SPDEs on graphs as limit of SPDEs on narrow channels*
Lorenzo Zambotti *Renormalisation in regularity structures*
Thomas Duyckaerts *Blow-up of the critical norm for supercritical wave equations*
Nicolas Burq *Second microlocalization and stabilization of damped wave equations on tori*
David Kelly *Data assimilation for high dimensional nonlinear forecasting*
Jorge Kurchan *Some generic features of dynamics in a high-dimensional rugged landscape*
Pierre Germain *Long wave limit for Schr\"odinger maps*

Carl Mueller *Hitting questions and multiple points for stochastic PDE (SPDE) in the critical case*
Ioan Bejenaru *The cubic Dirac equation in $H^\frac12(\R^2)$*

An impromptu concert featuring Wilhelm Schlag (violin) and Isabelle Gallagher (piano) and a solo by Kay Kirkpatrick (piano) concluded a wonderful conference!

We think that the program of the research workshop was of the highest caliber and of broad interest. We are convinced that it helped many participants to understand the state of the art as well as the scientific importance of current research in these two interconnected fields. Of note is that 33/36 speakers agreed to be recorded, allowing many others who could not attend to watch online and leaving a great A/V library at MSRI.

In our opinion, major indicators of the success of this workshop are the following. Most participants (especially researchers at an early stage of their carriers) went to all the talks, enjoyed them and found them useful. Some of the senior participants to the program had already wide interests in most aspects of the program, but it was not necessarily the case for all, and especially for students and post-docs. A principal objective of the program was cross-pollination and a worry was that participants would split and only attend the talks in their own area. As far as we can judge, this was not at all the case. It was a pleasant surprise even to us to see the large and sustained number of participants during the two-weeks long workshop. The main reason for this success was of course the fundamental interest of the participants to open themselves to other themes and open themselves to make connections as well as the high quality of the talks and the cutting edge research presented in them. Speakers and participants alike approached many of us personally to thank us for the *great workshop.* Some other participants' comments include:

--[I] enjoyed that researchers from more applied fields such as numerical analysis or physics gave interesting general lectures. The number of such lectures was perfect.

-- wonderful!!!!

--Great workshop in fact very smooth organization

--Schedule was well planned. Lectures and speakers were exceptional. And the free Wednesday afternoon is great for catching up with work and talking to others.

We think that the program of the research workshop was of the highest caliber and of broad interest. We are convinced that it helped many participants to understand the state of the art as well as the scientific importance of current research in these two interconnected fields.

Special thanks to the fantastic staff at MSRI. They made it easy for everyone and especially for the organizers, who were thus able themselves to fully enjoy the lectures and the discussions.

Organizers

First Name	Last Name	Institution
Jonathan	Mattingly	Duke University
Andrea	Nahmod	University of Massachusetts, Amherst
Pierre	Raphael	Université Nice Sophia-Antipolis
Luc	Rey-Bellet	University of Massachusetts, Amherst
Daniel	Tataru	University of California, Berkeley

Speakers

First Name	Last Name	Institution
Thomas	Alazard	École Normale Supérieure
Ioan	Bejenaru	University of California, San Diego
Thierry	Bodineau	École Polytechnique
Nicolas	Burq	Université de Paris XI
Sandra	Cerrai	University of Maryland
Sourav	Chatterjee	Stanford University
Anne	de Bouard	École Polytechnique
Arnaud	Debussche	Ecole Normale Supérieure de Rennes
Thomas	Duyckaerts	Université de Paris XIII (Paris-Nord)
Jean-Pierre	Eckmann	University of Geneva
Isabelle	Gallagher	Institut de Mathematiques de Jussieu
Patrick	Gerard	Université de Paris XI
Pierre	Germain	New York University, Courant Institute
Martin	Hairer	University of Warwick
Zaher	Hani	Georgia Institute of Technology
Alexandru	Ionescu	Princeton University
Danela	Ivanovici	Université Nice Sophia-Antipolis
David	Kelly	New York University, Courant Institute
Davar	Khoshnevisan	University of Utah
Herbert	Koch	Rheinische Friedrich-Wilhelms-Universität Bonn
Jorge	Kurchan	École Normale Supérieure
Andrew	Majda	New York University, Courant Institute
Yvan	Martel	École Polytechnique
Andrea	Montanari	Stanford University
Carl	Mueller	University of Rochester
Benoit	Pausader	Princeton University
Jeremy	Quastel	University of Toronto
Fraydoun	Rezakhanlou	University of California, Berkeley
Wilhelm	Schlag	University of Chicago
Jalal	Shatah	New York University, Courant Institute
Gigliola	Staffilani	Massachusetts Institute of Technology
Luis	Vega	Universidad del País Vasco/Euskal Herriko Unibertsitatea
Monica	Visan	University of California, Los Angeles
Sijue	Wu	University of Michigan
Lai-Sang	Young	New York University, Courant Institute
Lorenzo	Zambotti	Université de Paris VI (Pierre et Marie Curie)

MSRI Mathematical Sciences Research Institute

New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensional systems

October 19-30, 2015

Schedule

Monday, October 19, 2015			
9:15 AM - 9:30 AM	Simons Auditorium		Welcome
9:30 AM - 10:30 AM	Simons Auditorium	Patrick Gerard	Wave turbulence for the cubic Szegö equation and beyond
10:30 AM - 11:00 AM	Atrium		Tea
11:00 AM - 12:00 PM	Simons Auditorium	Arnaud Debussche	Diffusive limits for stochastic kinetic eqution s
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Monica Visan	Symplectic non-squeezing for the cubic NLS on R^2
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Davar Khoshnevisan	Optimal Regularity for some Parabolic SPDEs

Tuesday, Ocotober 20, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Andrew Majda	An Applied Math Perspective on Climate Science, Turbulence, and Other Complex Systems
10:30 AM - 11:00 AM	Atrium		Tea
11:00 AM - 12:00 PM	Simons Auditorium	Fraydoun Rezakhanlou	Generalized Smoluchowski Equations and Scalar Conservation Laws
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Luis Vega	The Talbot effect and the evolution of Vortex Filaments
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Herbert Koch	KP-II in 2 and 3d
4:30 PM - 6:20 PM	Atrium		Reception

Wednesday, October 21, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Jeremy Quastel	The Kardar-Parisi-Zhang equation and universality class
10:30 AM - 11:00 AM	Atrium		Tea
11:00 AM - 12:00 PM	Simons Auditorium	Sijue Wu	On two-dimensional gravity water waves with angled crests

Thursday, October 22, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Yvan Martel	Exotic blow up rates for some critical nonlinear dispersive equations
10:30 AM - 11:00 AM	Atrium		Tea
11:00 AM - 12:00 PM	Simons Auditorium	Lai-Sang Young	Toward a smooth ergodic theory for infinite dimensional systems
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Sourav Chatterjee	Invariant measures and the soliton resolution conjecture
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Jalal Shatah	The large box limit of nonlinear Schrodinger equations in weakly nonlinear regime

Friday, October 23, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Martin Hairer	TBA
10:30 AM - 11:00 AM	Atrium		Tea
11:00 AM - 12:00 PM	Simons Auditorium	Gigliola Staffilani	Random Versus Deterministic Approach in the Study of Wave and Dispersive Equations
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Zaher Hani	Energy distribution and wave turbulence closures for the nonlinear Schrodinger equation
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Jean-Pierre Eckmann	Classical Hamiltonian Systems, Driven out of Equilibrium, a Review

New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensional systems

October 19-30, 2015

Schedule

Monday, October 26, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Thierry Bodineau	From particles to linear hydrodynamic equations
10:30 AM - 11:00 AM	Atrium		Tea
11:00 AM - 12:00 PM	Simons Auditorium	Isabelle Gallagher	From particles to linear hydrodynamic equations
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Benoit Pausader	Global stability of a flat interface for the gravity-capillary water-wave model
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Alexandru Ionescu	On global solutions of water wave models

Tuesday, October 27, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Thomas Alazard	Control of water waves
10:30 AM - 11:00 AM	Atrium		Tea
11:00 AM - 12:00 PM	Simons Auditorium	Andrea Montanari	Universality in polytope phase transitions and message passing algorithms
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Anne de Bouard	The stochastic Landau-Lifshitz equation
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Wilhelm Schlag	On long term dynamics of nonlinear evolution equations
4:30 PM - 6:20 PM	Atrium		Reception

Wednesday, October 28, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Oana Ivanovici	Dispersion for the wave and the Schrödinger equations outside strictly convex domains
10:30 AM - 11:00 AM	Atrium		Tea
11:00 AM - 12:00 PM	Simons Auditorium	Sandra Cerrai	SPDEs on graphs as limit of SPDEs on narrow channels

Thursday, October 29, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Lorenzo Zambotti	Renormalisation in regularity structures
10:30 AM - 11:00 AM	Atrium		Tea
11:00 AM - 12:00 PM	Simons Auditorium	Thomas Duyckaerts	Blow-up of the critical norm for supercritical wave equations
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Nicolas Burq	Second microlocalization and stabilization of damped wave equations on tori
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	David Kelly	Data assimilation for high dimensional nonlinear forecasting

Friday, October 30, 2015			
9:30 AM - 10:30 AM	Simons Auditorium	Jorge Kurchan	Some generic features of dynamics in a high-dimensional rugged landscape
10:30 AM - 11:00 AM	Atrium		Tea
11:00 AM - 12:00 PM	Simons Auditorium	Pierre Germain	Long wave limit for Schrodinger maps
12:00 PM - 2:00 PM	Atrium		Lunch
2:00 PM - 3:00 PM	Simons Auditorium	Carl Mueller	Hitting questions and multiple points for stochastic PDE (SPDE) in the critical case
3:00 PM - 3:30 PM	Atrium		Tea
3:30 PM - 4:30 PM	Simons Auditorium	Ioan Bejenaru	The cubic Dirac equation in $H^\frac12(\R^2)$

Participants		
First Name	**Last Name**	**Institution**
Andrea	Agazzi	Université de Genève
Thomas	Alazard	École Normale Supérieure
FNU	Anudeep Kumar	George Washington University
Sigurd	Assing	University of Warwick
Alexander	Azzam	University of California, Los Angeles
Yakine	Bahri	École Polytechnique
Yuri	Bakhtin	New York University, Courant Institute
Peter	Bates	Michigan State University
Peter	Baxendale	University of Southern California
Ioan	Bejenaru	University of California, San Diego
Thierry	Bodineau	École Polytechnique
Michael	Boratko	University of Massachusetts, Amherst
Justin	Brereton	University of California, Berkeley
Aynur	Bulut	MSRI - Mathematical Sciences Research Institute
Nicolas	Burq	Université de Paris XI
Oleg	Butkovsky	Technion---Israel Institute of Technology
Sandra	Cerrai	University of Maryland
Dongho	Chae	Chung-Ang University
Sourav	Chatterjee	Stanford University
Gong	Chen	University of Chicago
Yonggeun	Cho	University of California, San Diego
Charles	Collot	Université Nice Sophia-Antipolis
Erin	Compaan	University of Illinois at Urbana-Champaign
Magdalena	Czubak	Binghamton University (SUNY)
Anne	de Bouard	École Polytechnique
Thibault	de Poyferre	École Normale Supérieure
Anne-Sophie	de Suzzoni	Université de Paris XIII (Paris-Nord)
Arnaud	Debussche	Ecole Normale Supérieure de Rennes
Amir	Dembo	Stanford University
Ryan	Denlinger	New York University, Courant Institute
Giacomo	Di Gesu	École Nationale des Ponts-et-Chaussées
Benjamin	Dodson	Johns Hopkins University
Thomas	Duyckaerts	Université de Paris XIII (Paris-Nord)
Jean-Pierre	Eckmann	University of Geneva
Saleh	Elmohamed	U. C. Berkeley
Mehmet	Erdogan	University of Illinois at Urbana-Champaign
Dirk	Erhard	University of Warwick
Chenjie	Fan	Massachusetts Institute of Technology
Max	Fathi	University of California, Berkeley
Qi	Feng	Purdue University
Aingeru	Fernández	Universidad del País Vasco/Euskal Herriko Unibertsitatea
Mark	Freidlin	University of Maryland
susan	friedlander	University of Southern California
Isabelle	Gallagher	Institut de Mathematiques de Jussieu

Participants		
First Name	**Last Name**	**Institution**
Cristian Dan	Gavrus	University of California, Berkeley
Patrick	Gerard	Université de Paris XI
Pierre	Germain	New York University, Courant Institute
Anna Rita	Giammetta	Università di Pisa
Maria	Gordina	University of Connecticut
Sandrine	Grellier	Université d'Orléans
Yu	Gu	Stanford University
Boaz	Haberman	University of Chicago
Martin	Hairer	University of Warwick
Zaher	Hani	Georgia Institute of Technology
Benjamin	Harrop-Griffiths	New York University, Courant Institute
David	Herzog	Iowa State University
Jingyu	Huang	University of Kansas
Vera Mikyoung	Hur	University of Illinois at Urbana-Champaign
Alexandru	Ionescu	Princeton University
Danela	Ivanovici	Université Nice Sophia-Antipolis
Casey	Jao	University of California, Los Angeles
Jacek	Jendrej	École Polytechnique
Kamran	Kalbasi	University of Warwick
David	Kelly	New York University, Courant Institute
Davar	Khoshnevisan	University of Utah
Kunwoo	Kim	University of Utah
Kay	Kirkpatrick	University of Illinois at Urbana-Champaign
Herbert	Koch	Rheinische Friedrich-Wilhelms-Universität Bonn
Michal	Kowalczyk	Universidad de Chile
Jorge	Kurchan	École Normale Supérieure
Yang	LAN	Université de Paris XI
Andrew	Lawrie	University of California, Berkeley
Khoa	Le	University of Kansas
Marta	Lewicka	University of Pittsburgh
Xue-Mei	Li	University of Warwick
Yao	Li	University of Massachusetts, Amherst
Shiu-Tang	Li	University of Utah
Zhuo Min	Lim	Center for Mathematical Sciences
Soon Hoe	Lim	University of Arizona
Kevin	Lin	University of Arizona
Felipe	Linares	IMPA
Hans	Lindblad	Johns Hopkins University
Grace	Liu	University of California, Berkeley
Fei	Lu	University of California, Berkeley
Jonas	Luehrmann	Eidgenössische TH Zürich-Hönggerberg
Milivoje	Lukic	University of Toronto
Shishi	Luo	University of California
Andrew	Majda	New York University, Courant Institute

Participants		
First Name	**Last Name**	**Institution**
Yvan	Martel	École Polytechnique
Jeremy	Marzuola	University of North Carolina
Kanstantsin	Matetski	University of Warwick
Jonathan	Mattingly	Duke University
Anna	Mazzucato	Pennsylvania State University
Dana	Mendelson	MSRI - Mathematical Sciences Research Institute
Georg	Menz	University of California
Andrea	Montanari	Stanford University
Carl	Mueller	University of Rochester
Claudio	Muñoz	University of Chile
Jason	Murphy	University of California, Berkeley
Andrea	Nahmod	University of Massachusetts, Amherst
Giuseppe	Negro	Consejo Superior de Investigaciones Científicas (CSIC)
Brent	Nelson	University of California, Berkeley
Mac Jugal	Nguepedja	Ecole Normale Supérieure de Rennes
Sung-Jin	Oh	University of California, Berkeley
Benoit	Pausader	Princeton University
Natasa	Pavlovic	University of Texas
Victor	Payne	University of Ibadan
Fabrice	Planchon	Université Nice Sophia-Antipolis
Oana	Pocovnicu	Heriot-Watt University
Lea	Popovic	Concordia University
Jeremy	Quastel	University of Toronto
Pierre	Raphael	Université Nice Sophia-Antipolis
David	Reiss	University of Toronto
Luc	Rey-Bellet	University of Massachusetts, Amherst
Fraydoun	Rezakhanlou	University of California, Berkeley
Geordie	Richards	University of Rochester
James	Rose	Ceptual Institute
Svetlana	Roudenko	George Washington University
Wilhelm	Schlag	University of Chicago
Zachary	Selk	University of California, Davis
Sohrab	Shahshahani	University of Michigan
Jalal	Shatah	New York University, Courant Institute
Fan Ny	Shum	University of Connecticut
Gigliola	Staffilani	Massachusetts Institute of Technology
Erwin	Suazo	University of Texas
Andrei	Tarfulea	Princeton University
Maja	Taskovic	University of Texas
Daniel	Tataru	University of California, Berkeley
Joseph	Thirouin	Université de Paris XI
Lawrence	Thomas	University of Virginia
Nathan	Totz	University of Massachusetts
Li-Cheng	Tsai	Stanford University

Participants		
First Name	**Last Name**	**Institution**
Nikolaos	Tzirakis	University of Illinois at Urbana-Champaign
Henrik	Ueberschaer	Max Planck Institute of Mathematics
Luis	Vega	Universidad del País Vasco/Euskal Herriko Unibertsitatea
Monica	Visan	University of California, Los Angeles
Nicola	Visciglia	Università di Pisa
Chuntian	Wang	University of California
Klaus	Widmayer	New York University, Courant Institute
Bobby	Wilson	MSRI - Mathematical Sciences Research Institute
Sijue	Wu	University of Michigan
Bo	Xia	Université de Paris XI
W	Xie	California State Polytechnic University
Kai	Yang	George Washington University
Lai-Sang	Young	New York University, Courant Institute
Xueying	Yu	University of Massachusetts, Amherst
Jiahui	Yu	University of Massachusetts
Haitian	Yue	University of Massachusetts
Lorenzo	Zambotti	Université de Paris VI (Pierre et Marie Curie)
Chongchun	Zeng	Georgia Institute of Technology
Qiang	Zeng	MSRI - Mathematical Sciences Research Institute
Qingtian	Zhang	Pennsylvania State University
Xiaoyi	Zhang	University of Iowa
Jiqiang	Zheng	Université Nice Sophia-Antipolis
Jie	Zhong	University of Central Florida
Claude	Zuily	Université de Paris XI (Paris-Sud)

Officially Registered Participant Information

Participants		**156**

Gender		**156**
Male	76.92%	120
Female	22.44%	35
Declined to state	0.64%	1

Ethnicity*		**160**
White	56.25%	90
Asian	25.63%	41
Hispanic	3.13%	5
Pacific Islander	0.00%	0
Black	1.88%	3
Native American	0.00%	0
Mixed	1.25%	2
Declined to state	11.88%	19

* ethnicity specifications are not exclusive

msri.coord@gmail.com

Edit this form

68 responses

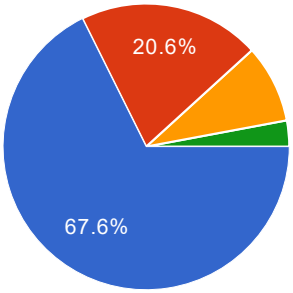
Response rate 68/156 = 43%

View all responses Publish analytics

Summary

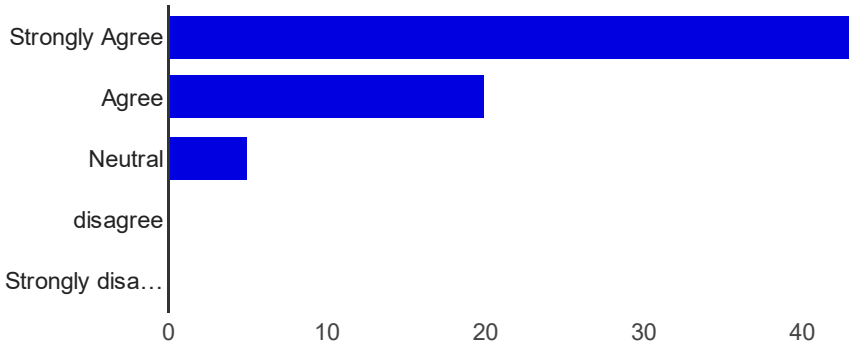
Workshop assessment

Of which group do you consider yourself part:



- PDE/Harmonic Analysis	46	67.6%
- Probability/SPDE	14	20.6%
- Both	6	8.8%
Other	2	2.9%

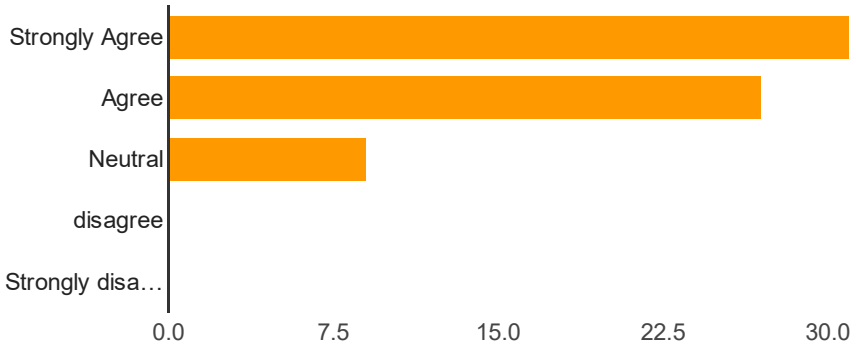
The Deterministic PDE talks were useful/interesting



Strongly Agree	43	63.2%
Agree	20	29.4%

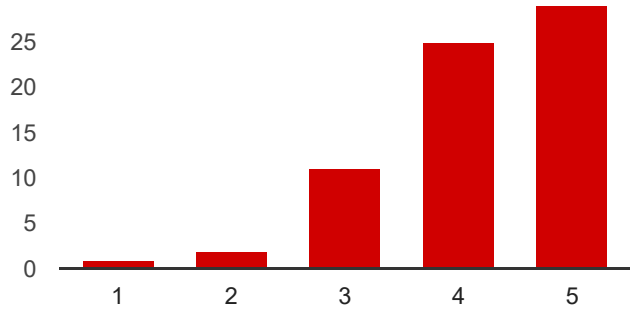
Neutral	5	7.4%
disagree	0	0%
Strongly disagree	0	0%

The SPDE/Probability talks were useful/interesting



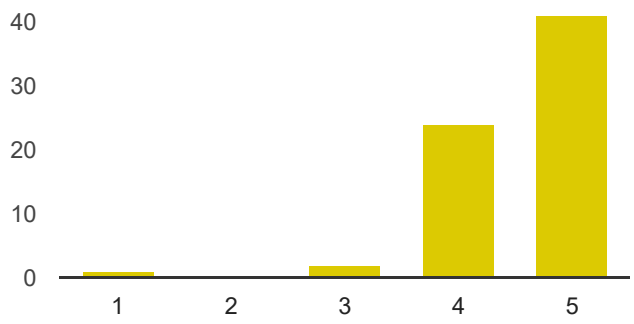
Strongly Agree	31	46.3%
Agree	27	40.3%
Neutral	9	13.4%
disagree	0	0%
Strongly disagree	0	0%

Mixing the two communities together in one conference was a good idea



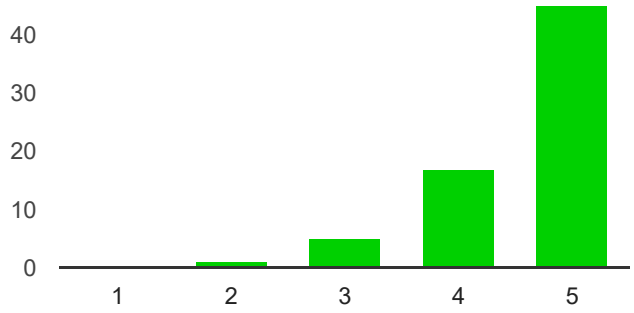
Not at all:	1	1	1.5%
	2	2	2.9%
	3	11	16.2%
	4	25	36.8%
Very:	5	29	42.6%

The overall experience of the workshop was worthwhile



Not at all:	1	1	1.5%
	2	0	0%
	3	2	2.9%
	4	24	35.3%
Very:	5	41	60.3%

The time between lectures was adequate for discussion



Not al all:	1	0	0%
	2	1	1.5%
	3	5	7.4%
	4	17	25%
Very:	5	45	66.2%

Additional comments on the workshop organization

wonderful!!!

Being a generalist, I am fully supportive of cross seeding ideas among diverse fields. No

one person or research group is omniscient. Fresh frames of reference advance productivity. I fully support the effort and hope the separate communities appreciate the opportunities and take full advantage of expanding their horizons.

please, make sure that there is no construction going on while there are lectures, it was hard to hear sometimes with the construction noise going on

excellent

Great workshop in fact

very smooth organization

A very smooth organization of the workshop! The impromptu concert at the end was a wonderful addition to the scientific and social components.

Mixing the two communities has obvious advantages, in particular to facilitate collaboration between the two. But since personally I'm not familiar enough with probability/SPDEs it is hard for me to judge to what extent this was successful. On the other hand a two week conference was a bit tiring for me. Even though I had more time between the talks I generally have a hard time optimally using between-the-talk breaks unless I'm talking to someone else. Again, this seems to be personal and I have no strong opinions one way or the other.

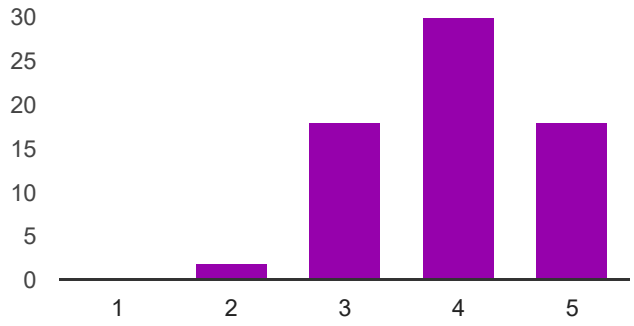
ADEQUATE

I also enjoyed that researchers from more applied fields such as numerical analysis or physics gave interesting general lectures. There number of such lectures was perfect.

Schedule was well planned. Lectures and speakers were exceptional. And the free Wednesday afternoon is great for catching up with work and talking to others.

Personal assessment

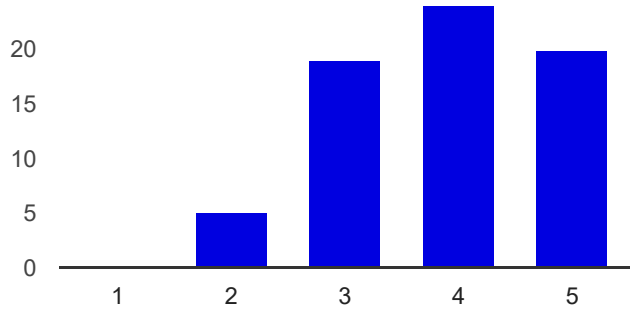
I was well prepared to benefit from the lectures



Not at all: 1 0 0%

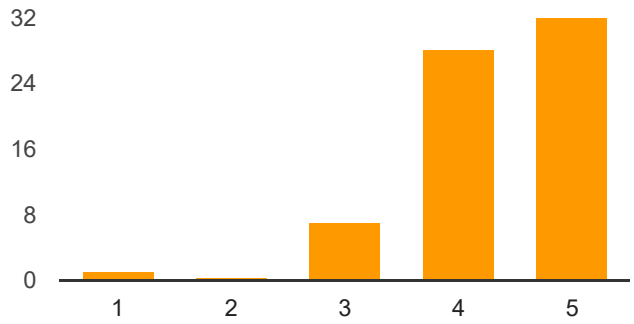
	2	2	2.9%
	3	18	26.5%
	4	30	44.1%
Very:	5	18	26.5%

I will likely start working on new problems because of this conference



Niot at all:	1	0	0%
	2	5	7.4%
	3	19	27.9%
	4	24	35.3%
Very:	5	20	29.4%

The workshop helped me meet people with similar scientific interests



Not at all:	1	1	1.5%
	2	0	0%
	3	7	10.3%
	4	28	41.2%
Very Much:	5	32	47.1%

Additional comments on your personal assessment

Perfect!!

Please see my prior survey impression above.

as a physicist, I was a bit outside of focus

I already new most of the speakers

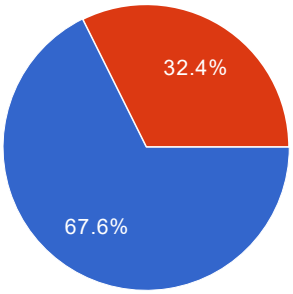
A VERY CHALLENGING EXPERIENCE

Some workshop participants were rather elusive (e.g. by skipping talks or otherwise not being around), making it difficult to meet and talk to them.

Being aware of new and interesting problems is surely a benefit from a workshop, but even if one stays in one's field of research it allows to give a new point of vue on it, which can also be very useful.

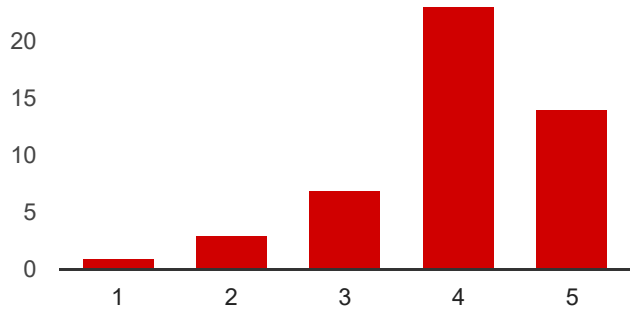
Additional Activities

Did you attend the reception?



Yes	46	67.6%
No	22	32.4%

If you did attend the reception, did it help to solidify the contacts you made in the workshop?



Not at all:	1	1	2.1%
	2	3	6.3%
	3	7	14.6%
	4	23	47.9%
Very much:	5	14	29.2%

Please provide any comments on the reception

Magnificent!

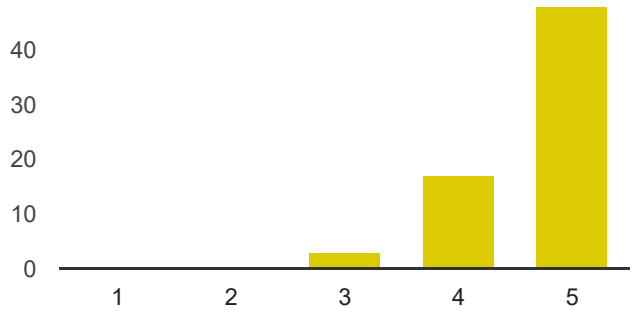
Circumstances prevented my attending; but I took full advantage of making contacts despite the missing it. I fully support the usse of receptions at future workshops.

The food was good

WELL ORGANIZED

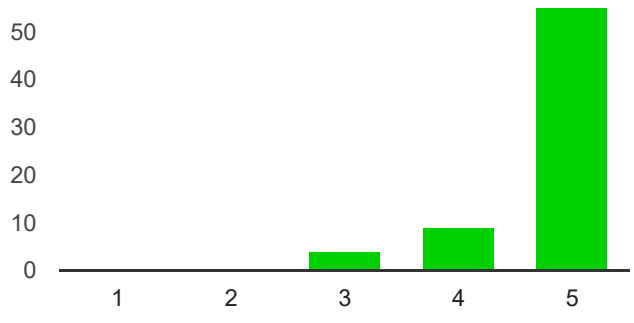
Venue

I found the MSRI staff helpful



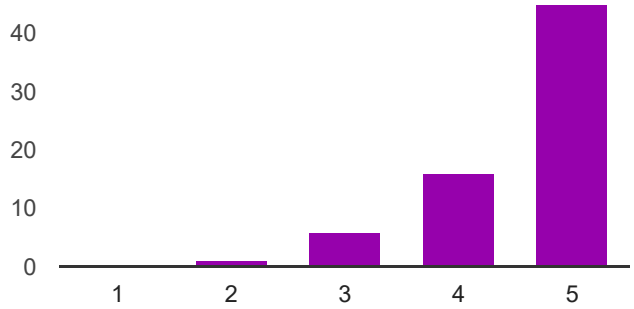
Not at all:	1	0	0%
	2	0	0%
	3	3	4.4%
	4	17	25%
Very:	5	48	70.6%

The MSRI physical facilities were conducive for such a workshop



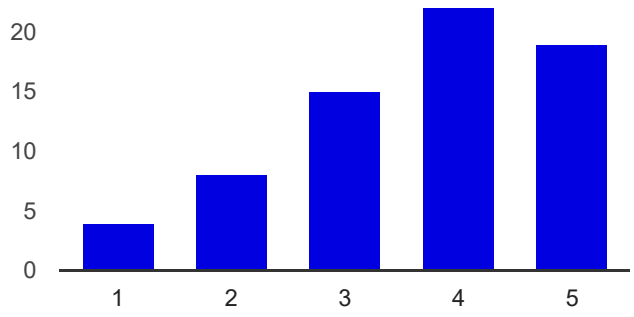
3	4	5.9%
4	9	13.2%
Very: 5	55	80.9%

The MSRI computer facilities were adequate for such a workshop

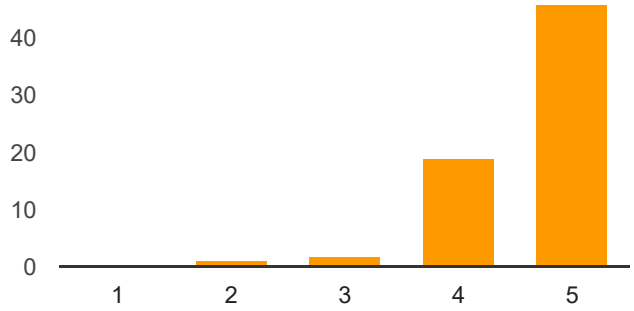


Not at all: 1	0	0%
2	1	1.5%
3	6	8.8%
4	16	23.5%
Very: 5	45	66.2%

The MSRI lunch arrangements were satisfactory



The MSRI tea arrangements were satisfactory



Not at all:	1	0	0%
	2	1	1.5%
	3	2	2.9%
	4	19	27.9%
Very:	5	46	67.6%

Additional comments on the venue

The noise outside due to construction was really bad at times

Most helpful!

it would be nice if MSRI had its own cafeteria !

I would have liked some more information on the acomodations, in particular in order to were it is convenient to stay

MSRI is a wonderful place. the staff is fantastic and the venue is breathtaking

It did seem like the person running the video controls was never paying attention to anything other than his phone/laptop, and so the response to the speaker moving from board to board, or from slides to board, was always rather delayed.

I had too much food.

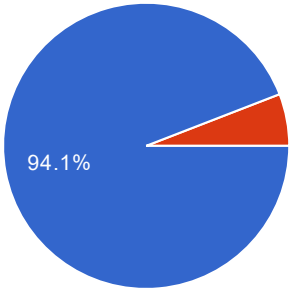
I brought my own lunch, so I can't comment on the lunch arrangements.

VERY CONDUCIVE

MSRI staff is very helpful and friendly.

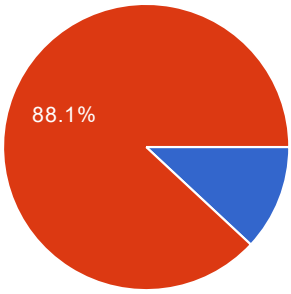
MSRI Wireless Network

Did you use MSRI's wireless network?



Yes	64	94.1%
No	4	5.9%

Did you experience any difficulties with the network?



Yes	8	11.9%
No	59	88.1%

If you did experience difficulties with the network, please explain:

Excellent gathering. The diversity was refreshing and very useful.

The network connection was not very strong. I would lose the connection inside and outside the building.

I had difficulties for connecting my personal computer to the network some days

Some times the connection was slow.

sometimes the internet was slow or did not work

msri_sec is often slow and the connection occasionally drops.

On busy days the connections was a bit slow, but I expect that is normal.

I DID NOT

Occasional weak signal.

Thank you for completing this survey

We welcome any additional comments or suggestions you may have to improve the overall experience for future participants.

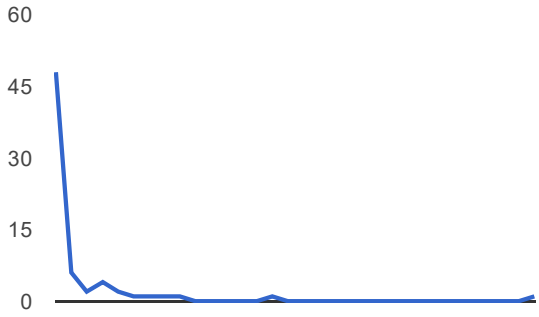
I think it would be nicer to start earlier, say at 9am or even 8:30am and have a longer interval between first and second lecturer

It was a great experience

Many thanks!

Overall, a good experience

Number of daily responses



Hot Topics: Cluster algebras and wall-crossing

March 28, 2016 - April 01, 2016

MSRI, Berkeley, CA, USA

Organizers:

Mark Gross (University of Cambridge)

Paul Hacking (University of Massachusetts, Amherst)

Sean Keel (University of Texas)

Lauren Williams (University of California, Berkeley)

Report on the MSRI Workshop

"Hot Topics: Cluster algebras and wall-crossing"

March 28, 2016 – April 1, 2017.

Organizers

- Mark Gross (University of Cambridge)
- Paul Hacking (University of Massachussetts, Amherst)
- Sean Keel (University of Texas, Austin)
- Lauren Williams (University of California, Berkeley)

1. Scientific description

Cluster algebras were introduced in 2001 by Fomin and Zelevinsky to capture the combinatorics of canonical bases and total positivity in groups. Since then they have revealed a rich combinatorial and group-theoretic structure, and have had significant impact beyond these initial subjects, including algebraic geometry, mirror symmetry, and string theory. In 2015, the first three co-organizers and Kontsevich released a preprint entitled "Canonical Bases for Cluster Algebras," introducing mirror symmetry techniques into the subject which resolved several long-standing conjectures, including the construction of canonical bases for cluster algebras and positivity of the Laurent phenomenon (also recently proved in restricted cases by Li and Schiffler). This preprint, which we refer to as GHKK here, reformulates the basic construction of cluster algebras in terms of scattering diagrams (or wall-crossing structures). These led to the proofs of the conjectures and to new constructions of elements of cluster algebras. But fundamentally they provide a new tool for thinking about cluster algebras.

The goal of the workshop was two-fold. First, the organizers hoped to provide introductory lectures explaining the ideas behind GHKK. Second, we hoped to bring together many of the different users of cluster algebras to achieve a synthesis of these new techniques with many of the different aspects of the subject. In particular, we were particularly interested in making connections with a variety of different subjects, as outlined below.

Connections with mirror symmetry. The work of Gross, Hacking, Keel, and Kontsevich was motivated by constructions in mirror symmetry. At the same time, work of Goncharov–Shen, as well as work of Rietsch and various collaborators (including Marsh, Pech, and L. Williams) on mirror symmetry for flag varieties and Grassmannians, uses cluster algebras in a fundamental way, and should be related to GHKK. Since some of Rietsch's results are quite explicit (drawing on explicit descriptions of cluster charts and variables in the case of flag varieties and Grassmannians), they might help to shed some

light on the constructions of GHKK.

Connections with stability conditions in derived categories. Recent work of Bridgeland and Sutherland demonstrates connections between cluster algebras and stability conditions on 3-dimensional Calabi-Yau categories defined using quivers with potential.

Connections with string theory. There is a significant body of work of Gaiotto, Moore and Neitzke constructing hyperkahler manifolds from wall-crossing structures arising from Donaldson-Thomas invariants. These are expected to coincide in many interesting cases with cluster varieties.

2. The presentations.

The first two days were largely focussed on exposition of the basics of GHKK. Denis Auroux explained some of the aspects of mirror symmetry from a symplectic viewpoint: this can be viewed as part of the cultural background necessary to motivate the constructions of GHKK. Lauren Williams followed this with an introductory talk on cluster algebras, geared to the non-experts. During this talk, a question of Curtis McMullen suggested that the classification of cluster algebras of finite type by Dynkin diagrams should be related to the classification of finite subgroups of the Cremona group of birational transformations of projective space.

Sean Keel gave two talks, one Monday afternoon and one Tuesday afternoon, outlining the general philosophy of GHKK, motivated by the study of canonical bases of regular functions on (open) Calabi-Yau varieties. In particular, he described how many of the techniques of toric geometry generalize to the case of cluster varieties. Mark Gross also gave two talks, focussed much more on the nitty-gritty of the basic ingredients in GHKK — scattering diagrams, broken lines, and theta functions — which yield the tools necessary to prove significant cluster conjectures, such as the positivity of the Laurent phenomenon.

Paul Hacking gave an example based lecture on Tuesday morning, focussing on relatively simple examples where it is possible to describe many of the features of the theory of GHKK. His talk included a description of the scattering diagram in the acyclic case in terms of representations of quivers (based on work of Reineke).

These talks completed the introductory, expository part of the conference. The remaining talks represented the various connections described in the previous section, beginning with Andrew Neitzke's Tuesday afternoon talk, which explained the connection between cluster theory and his work with Gaitto and Moore on Hitchin systems and spectral networks.

On Wednesday and Friday, Tom Sutherland talked about work of Bridgeland on sta-

bility conditions for 3-dimensional Calabi-Yau categories associated to representations of quivers with potential. This builds on work of Kontsevich–Soibelman and Reineke (already discussed by Hacking). Linhui Shen gave two talks on Wednesday and Thursday about his recent work with Goncharov on the cluster structures on the moduli spaces of local systems on punctured Riemann surfaces, making a connection with Kontsevich–Soibelman and GHKK via Donaldson–Thomas transformations.

On Thursday, Clelia Pech and Lauren Williams each gave talks on connections between mirror symmetry for homogeneous spaces, especially Grassmannians, and cluster theory. Pech also gave a second talk on Friday. Williams' talk described joint work with Rietsch identifying the Newton–Okounkov body of the Grassmannian with the polytope defined by the tropicalization of Landau-Ginzburg potential function W on the mirror variety. Keel explained that this observation can be generalized to other cluster varieties using the description of W as a sum of theta functions in GHKK. Similarly, it should be interesting to interpret the explicit mirror pair examples in Pech's talks in the framework of GHKK.

Harold Williams gave the last talk on Thursday on Lagrangian surfaces inside symplectic 4-folds, with surgeries corresponding to cluster transformations. In the case of surfaces of genus 1, this corresponds under mirror symmetry to the blow-up description of cluster varieties of Gross–Hacking–Keel. Williams also explained how to describe the Fukaya category of the symplectic 4-fold using a Lagrangian skeleton built from the cluster data. According to the homological mirror symmetry conjecture, this should correspond to a description of the derived catgeory of coherent sheaves on the mirror.

Friday began with a talk by Bernd Siebert explaining some of the history of the Gross–Siebert program for understanding mirror symmetry. Dating from 2001, the program led to many of the concepts (scattering diagrams, broken lines, etc.) which were used in GHKK. Christof Geiss presented a talk on the Lie and representation theoretic aspects of cluster algebras. The original motivation for the definition of cluster algebra came from the study of Lusztig and Kashiwara's canonical and semi-canonical bases, and this talk presented some of these connections. In particular, Geiss explained joint work with Leclerc and Schroer which describes certain cluster algebras in Lie theory in terms of the derived category of modules over a preprojective algebra (a 2-dimensional Calabi–Yau category). As Yanki Lekili explained, this category also arises as the Fukaya category of an open Calabi–Yau surface obtained as a plumbing of Lagrangian spheres. This suggests that mirror symmetry plays a role here, too.

Organizers

First Name	Last Name	Institution
Mark	Gross	University of Cambridge
Paul	Hacking	University of Massachusetts, Amherst
Sean	Keel	University of Texas
Lauren	Williams	University of California, Berkeley

Speakers

First Name	Last Name	Institution
Denis	Auroux	University of California, Berkeley
Christof	Geiss	UNAM - Universidad Nacional Autonoma de Mexico
Alexander	Goncharov	Yale University
Mark	Gross	University of Cambridge
Paul	Hacking	University of Massachusetts, Amherst
Sean	Keel	University of Texas
Andrew	Neitzke	University of Texas
Clelia	Pech	University of Kent at Canterbury
Linhui	Shen	Northwestern University
Bernd	Siebert	Universität Hamburg
Tom	Sutherland	Università di Pavia
Lauren	Williams	University of California, Berkeley
Harold	Williams	University of Texas

Hot Topics: Cluster algebras and wall-crossing

March 28, 2016 - April 01, 2016

Schedule

Monday, March 28, 2016			
9:45 AM -10:00 AM	Simons Auditorium		Welcome
10:00 AM - 11:00 AM	Simons Auditorium	Denis Auroux	SYZ mirror symmetry in the complement of a divisor and regular functions on the mirror
11:00 AM - 11:30 AM	Break		Break
11:30 AM - 12:30 PM	Simons Auditorium	Lauren Williams	Cluster algebras and cluster varieties
12:30 PM - 2:30 PM	Atrium		Lunch
2:30 PM - 3:30 PM	Simons Auditorium	Sean Keel	Theta Functions for Log Calabi-Yau manifolds I -II
3:30 PM - 4:00 PM	Atrium		Tea
4:00 PM - 5:00 PM	Simons Auditorium	Mark Gross	Scattering diagrams, broken lines and theta functions

Tuesday, March 29 2016			
10:00 AM - 11:00 AM	Simons Auditorium	Paul Hacking	Examples of cluster varieties and their scattering diagrams.
11:00 AM - 11:30 AM	Atrium		Break
11:30 AM - 12:30 PM	Simons Auditorium	Mark Gross	Scattering diagrams, broken lines and theta functions
12:30 PM - 2:30 PM	Atrium		Lunch
2:30 PM - 3:30 PM	Simons Auditorium	Sean Keel	Theta Functions for Log Calabi-Yau manifolds I -II
3:30 PM - 4:00 PM	Atrium		Tea
4:00 PM - 5:00 PM	Simons Auditorium	Andrew Neitzke	Spectral networks and noncommutative cluster algebras
5:00 PM - 6:20PM	Atrium		Reception

Wednesday, March 30, 2016			
10:00 AM - 11:00 AM	Simons Auditorium	Tom Sutherland	Scattering diagrams from stability conditions
11:00 AM - 11:30 AM	Atrium		Break
11:30 AM - 12:30 PM	Simons Auditorium	Alexander Goncharov	Donaldson-Thomas transformations for moduli spaces of G-local systems on surfaces

Thursday, March 31, 2016			
10:00 AM - 11:00 AM	Simons Auditorium	Alexander Goncharov	Donaldson-Thomas transformations for moduli spaces of G-local systems on surfaces
11:00 AM - 11:30 AM	Atrium		Break
11:30 AM - 12:30 PM	Simons Auditorium	Clelia Pech	Mirror symmetry for homogeneous spaces
12:30 PM - 2:30 PM	Atrium		Lunch
2:30 PM - 3:30 PM	Simons Auditorium	Lauren Williams	Cluster duality and mirror symmetry for the Grassmannian
3:30 PM - 4:00 PM	Atrium		Tea
4:00 PM - 5:00 PM	Simons Auditorium	Harold Williams	Cluster Algebras and Exact Lagrangian Surfaces

Friday, April 1, 2016			
10:00 AM - 11:00 AM	Simons Auditorium	Bernd Siebert	Wall structures in mirror symmetry
11:00 AM - 11:30 AM	Atrium		Break
11:30 AM - 12:30 PM	Simons Auditorium	Clelia Pech	Mirror symmetry for homogeneous spaces
12:30 PM - 2:30 PM	Atrium		Lunch
2:30 PM - 3:30 PM	Simons Auditorium	Christof Geiss	Generic bases are dual semicanonical bases for unipotent cells
3:30 PM - 4:00 PM	Atrium		Tea
4:00 PM - 5:00 PM	Simons Auditorium	Tom Sutherland	Stability conditions and cluster varieties

Participants		
First Name	**Last Name**	**Institution**
Efim	Abrikosov	Yale University
Dylan	Allegretti	Yale University
Denis	Auroux	University of California, Berkeley
Lara	Bossinger	Universität zu Köln
Patrick	Browne	National University of Ireland, Galway
Eric	Bucher	Louisiana State University
Joe	Buhler	Reed College
Kathryn	Burton	University of Notre Dame
Man-Wai	Cheung	University of California, San Diego
Raquel	Coelho Simoes	Faculdade de Ciências da Universidade de Lisboa
Colin	Diemer	University of Alberta
Ron	Donagi	University of Pennsylvania
Zhijie	Dong	University of Massachusetts Amherst
Tyler	Foster	University of Michigan
Benjamin	Gammage	University of California, Berkeley
Alexander	Garver	University of Minnesota Twin Cities
Christof	Geiss	UNAM - Universidad Nacional Autonoma de Mexico
Michael	Gekhtman	University of Notre Dame
Alexander	Goncharov	Yale University
Mark	Gross	University of Cambridge
Emily	Gunawan	University of Minnesota, Twin Cities
Paul	Hacking	University of Massachusetts, Amherst
Kohei	Iwaki	Nagoya University
Xin	Jin	Northwestern University
Theo	Johnson-Freyd	Northwestern University
Yuki	Kanakubo	Sophia University
Dogancan	Karabas	King's College London
Steven	Karp	University of California, Berkeley
Sean	Keel	University of Texas
Tyler	Kelly	Center for Mathematical Sciences
Omar	Kidwai	University of Oxford
Maitreyee	Kulkarni	Louisiana State University
Daniel	Labardini-Fragoso	UNAM - Universidad Nacional Autonoma de Mexico
Lisa	Lamberti	University of Michigan
Li	Li	Oakland University
Andrew	Macpherson	IHES
Timothy	Magee	University of Texas
Travis	Mandel	University of Utah
George	Melvin	University of California, Berkeley
Lang	Mou	University of California, Davis
Motohico	Mulase	University of California, Davis
Gregory	Muller	University of Michigan
John	Murray	University of California, Davis
Alfredo	Nájera Chávez	Max-Planck-Institut für Mathematik

Participants		
First Name	**Last Name**	**Institution**
Tomoki	Nakanishi	Nagoya University
Andrew	Neitzke	University of Texas
Bach	Nguyen	Louisiana State University
Danny	Orton	University of Notre Dame
David	Pauksztello	University of Manchester
Clelia	Pech	University of Kent at Canterbury
Nathan	Reading	North Carolina State University
Helge	Ruddat	Johannes Gutenberg-Universität Mainz
Daniil	Rudenko	Higher School of Economics
Dylan	Rupel	University of Notre Dame
Sergei	Sagatov	University of Chicago
Karl	Schmidt	University of Oregon
Gus	Schrader	University of California, Berkeley
Linhui	Shen	Northwestern University
Bernd	Siebert	Universität Hamburg
David	Speyer	University of Michigan
Salvatore	Stella	Istituto Nazionale di Alta Matematica "Francesco Severi" (INdAM)
Zhe	Sun	Tsinghua University
Haoyu	Sun	University of California, Berkeley
Tom	Sutherland	Università di Pavia
Kurt	Trampel	Louisiana State University
Alek	Vainshtein	University of Haifa
Yadira	Valdivieso Diaz	UNAM - Universidad Nacional Autonoma de Mexico
Jeff	Viaclovsky	University of Wisconsin-Madison
Daping	Weng	Yale University
Lauren	Williams	University of California, Berkeley
Harold	Williams	University of Texas
Weiwei	Wu	CRM - Centre de Recherches Mathématiques
Peng	Zhou	Northwestern University

Officially Registered Participant Information

Participants		**73**

Gender		**73**
Male	83.56%	61
Female	15.07%	11
Declined to state	1.37%	1

Ethnicity*		**78**
White	68.49%	50
Asian	26.03%	19
Hispanic	5.48%	4
Pacific Islander	0.00%	0
Black	0.00%	0
Native American	0.00%	0
Mixed	4.11%	3
Declined to state	2.74%	2

* ethnicity specifications are not exclusive

58 responses

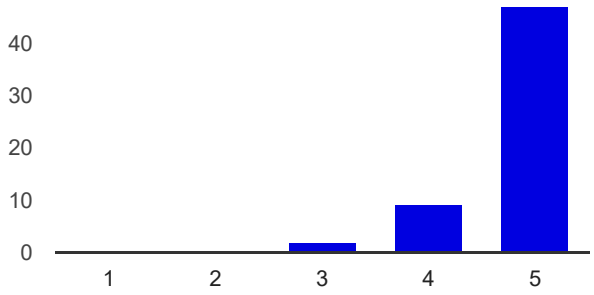
58 out of 79 participants = 79% response rate

Publish analytics

Summary

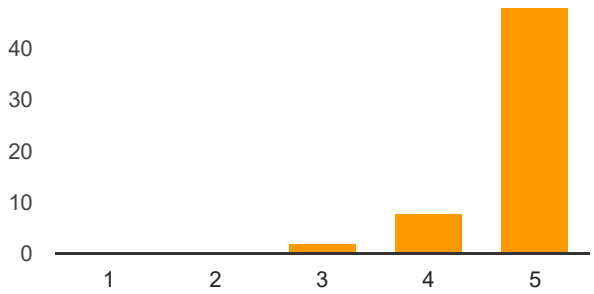
Workshop assessment

The workshop was intellectually stimulating



Not at all:	1	0	0%
	2	0	0%
	3	2	3.4%
	4	9	15.5%
Very:	5	47	81%

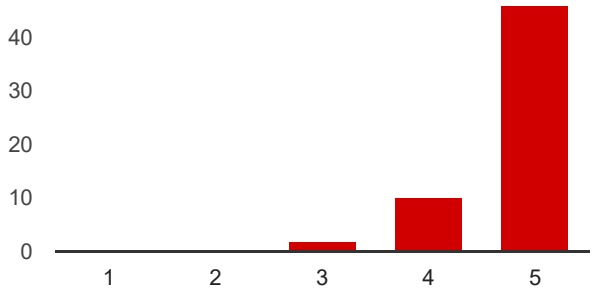
The overall experience of the workshop was worthwhile



Not at all:	1	0	0%

2	0	0%
3	2	3.4%
4	8	13.8%
Very: 5	48	82.8%

The time between lectures was adequate for discussion



Not al all: 1	0	0%
2	0	0%
3	2	3.4%
4	10	17.2%
Very: 5	46	79.3%

Additional comments on the workshop organization

session chairs let talks run 10-15 minutes late

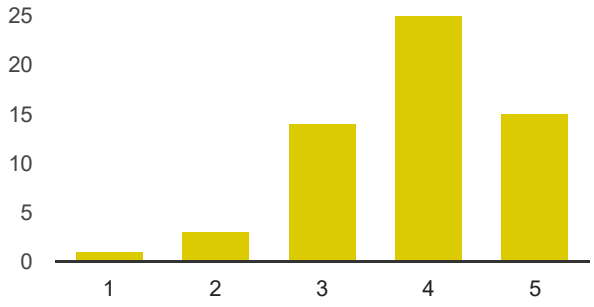
Great!

There was a lot of discussion and follow up questions after each lecture.

So of the speakers on days 1 and 2 made zero effort for anyone new to certain parts of the subject area. Only one speaker actually gave a definition of the area she was speaking in. After days 1 an 2, the research talks were good.

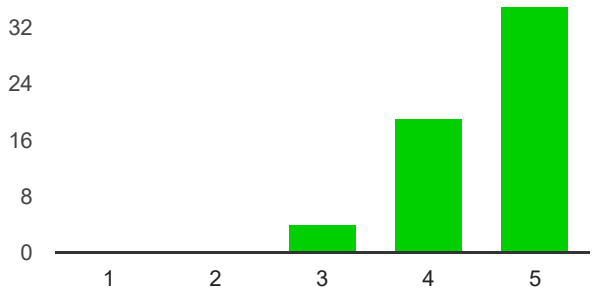
Personal assessment

I was well prepared to benefit from the lectures



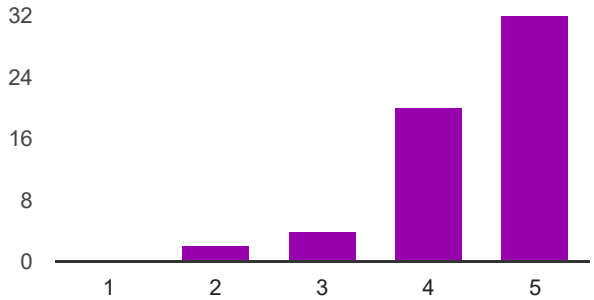
Very:	5	15	25.9%

My interest in the subject matter was increased by the workshop



Niot at all:	1	0	0%
	2	0	0%
	3	4	6.9%
	4	19	32.8%
Very:	5	35	60.3%

The workshop helped me meet people with similar scientific interests



Not at all:	1	0	0%
	2	2	3.4%

	3	4	6.9%
	4	20	34.5%
Very Much:	5	32	55.2%

Additional comments on your personal assessment

My advisor is one of the organizers, and many other talks discussed or were closely related to papers I have been reading lately. I don't know how prepared I would have been to benefit from the lectures and discussions had this not been the case.

For me at least, this "Hot Topics" workshop did exactly what it intended: Gave me an entrance into scattering diagrams at exactly the right time, when it is very relevant to my research.

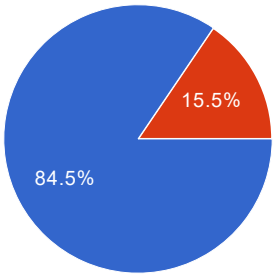
Would have liked there to have been some more introduction lectures.

It was difficult to be well prepared for all lectures since they covered a very broad spectrum of mathematics

I was one of the organizers of this workshop, but I am by no means an expert on all aspects of the subject. So it was very useful and stimulating for me to interact with a wide variety of researchers studying the topic from different perspectives.

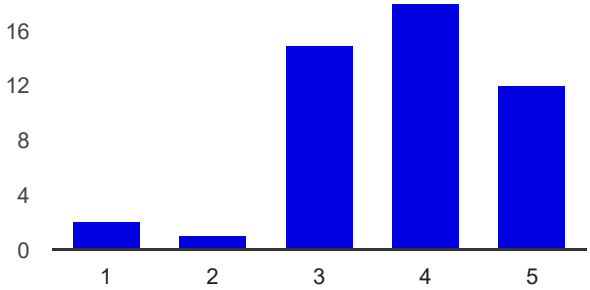
Additional Activities

Did you attend the reception?



Yes	49	84.5%
No	9	15.5%

If you did attend the reception, did it help to solidify the contacts you made in the workshop?



Not at all:	1	2	4.2%
	2	1	2.1%
	3	15	31.3%
	4	18	37.5%
Very much:	5	12	25%

Please provide any comments on the reception

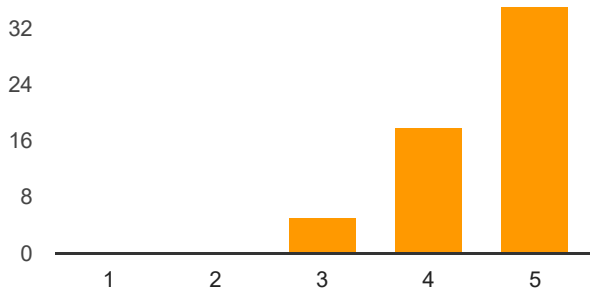
I only sort of attended the reception. At the beginning of the reception, another participant introduced herself to me, said she had been reading my paper, and asked me some questions about it. By the time we had finished discussing research, the reception was basically over. So it was very productive for us, and I hope it will lead to a collaboration, but I guess I can't say much about the reception itself.

I was so focused on a discussion that I forgot to eat or drink during the reception at all.

It would have been even more beneficial a bit later in the week, after I heard more talks.

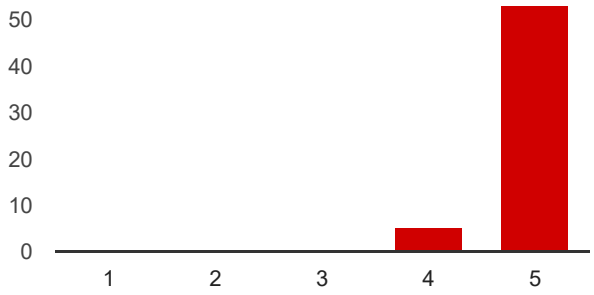
Venue

I found the MSRI staff helpful



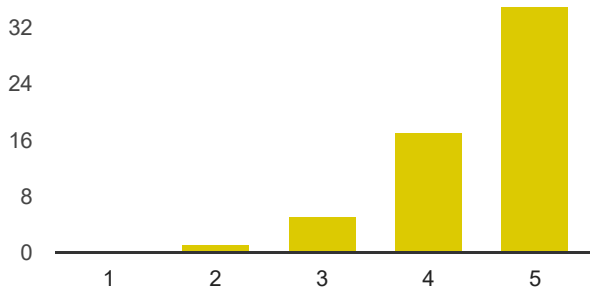
Not at all:	1	0	0%
	2	0	0%
	3	5	8.6%
	4	18	31%
Very:	5	35	60.3%

The MSRI physical facilities were conducive for such a workshop



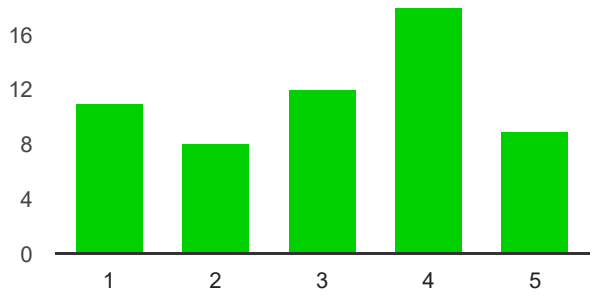
3	0	0%
4	5	8.6%
Very: 5	53	91.4%

The MSRI computer facilities were adequate for such a workshop



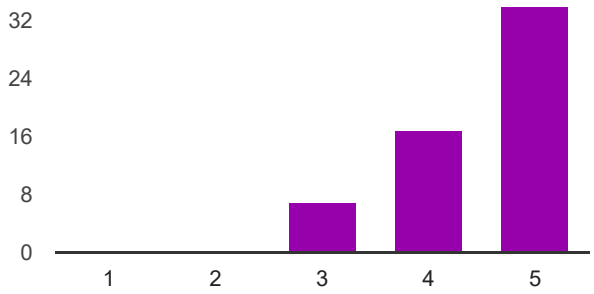
Not at all: 1	0	0%
2	1	1.7%
3	5	8.6%
4	17	29.3%
Very: 5	35	60.3%

The MSRI lunch arrangements were satisfactory



Not at all:	1	11	19%
	2	8	13.8%
	3	12	20.7%
	4	18	31%
Very:	5	9	15.5%

The MSRI tea arrangements were satisfactory



Not at all:	1	0	0%
	2	0	0%
	3	7	12.1%
	4	17	29.3%
Very:	5	34	58.6%

Additional comments on the venue

I didn't use the MSRI computer facilities so I'm not sure how to appropriately answer.

The stuffed inn lunch was not satisfactory.

The lunch at the end of the week was much better

I packed lunch after the first day. There weren't any respectable vegetarian options. I suggest putting a vegetarian in charge of the veggie options. Much less important: at tea, the snacks were generally all sweet. Maybe more things like the cheese and crackers would be nice?

An area to use skype to contact collaborators would be incredibly useful, especially with such a lengthy lunch period.

Unfortunately, the only downside of the MSRI workshop remains to be the lunch part...

Great tea and breakfast, but as a vegetarian the lunch options were not satisfactory and expensive.

The caterer on Monday and Tuesday was dreadful.

Need better lunch food.

Please change the caterer. The first day I had to eat cold pasta without sauce (for $8!) because they had run out of vegetarian food. After that I brought my own lunch.

The MSRI building is amazing! and exactly where a mathematician should be. Perhaps time the lectures to better fit in with the Hill bus, you often missed the bus by 5min and had to wait another 20min. A simple 15min offset in lecture start times would solve this ?

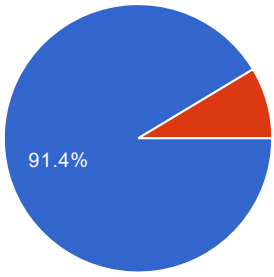
Healthier choices for dead would have been nice. Too many carbs.

My only contact with the MSRI computer facilities was via the Wifi, which worked very well

Allowing tea and coffee in the lecture room would be nice.

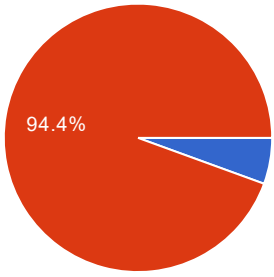
MSRI Wireless Network

Did you use MSRI's wireless network?



Yes	53	91.4%
No	5	8.6%

Did you experience any difficulties with the network?



Yes	3	5.6%
No	51	94.4%

If you did experience difficulties with the network, please explain:

almost no signal in the library closed to conference room

Some difficulty with wifi connection/signal in certain parts of the building.

Thank you for completing this survey

We welcome any additional comments or suggestions you may have to improve the overall experience for future participants.

I am grad student and think the first two days were good since they were mostly expository but for the rest research talks I could not get much since my area is not directly this. It is better if we can separate these two or annouce this before trip plan

Several of these questions should have a "not applicable" option (i.e. I did not use the computer facilities or interact with the staff, so I just made up a number)

Thanks for a great conference!

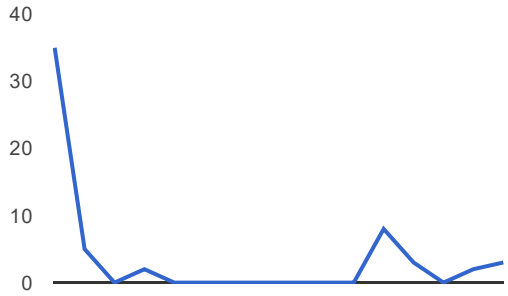
Coordinating better with the bus schedule would be incredibly useful. An extra bus in the morning and in the afternoon would be useful.

MSRI is a great place, I met incredible people and would love to come back anytime!

The strict no drinks (other than water) rule should include tea with a lid - most of the conference organisers brought tea with a lid in, and so did I after day 3.

For foreign participants payment of reeimbursment via cheque can be a little headache, maybe bank transfer would be more convenient

Number of daily responses



Modern Math Workshop 2015

October 28, 2015 - October 29, 2015

Gaylord National Resort & Convention Center, Washington, DC, USA

Organizers:

Hélène Barcelo (MSRI - Mathematical Sciences Research Institute)

Helen Chamberlin (Ohio State University)

Ricardo Cortez (Tulane University)

Sujit Ghosh (NC State University)

Dagan Karp (Harvey Mudd College)

Anne Pfister (MSRI - Mathematical Sciences Research Institute)

Christian Ratsch (University of California)

Ivelisse M. Rubio (University of Puerto Rico)

Mariel Vazquez (University of California, Davis)

Talithia Williams (Harvey Mudd College)

Modern Math 2015 Organizer Report

As part of the *Mathematical Sciences Collaborative Diversity Initiatives*, nine mathematics institutes hosted their annual SACNAS pre-conference event, the **2015 Modern Math Workshop (MMW)** from October 28-29, 2015. The Modern Math Workshop was intended to encourage minority undergraduates to pursue careers in the mathematical sciences and to assist undergraduates, graduate students and recent PhD's in building their research networks.

The Modern Math Workshop took place at Gaylord National Resort and Convention Center in Washington, DC immediately preceding the Annual Meeting of SACNAC, the Society for Advancement of Chicanos and Native Americans in Science. This allowed people already attending the SACNAS meeting to attend the workshop, and allowed people who came for the Modern math workshop to stay for the SACNAC meeting.

The Modern Math Workshop presented 2 mini-courses for undergraduates and talks related to the research programs at the math institutes that were of interest to graduate students and early career researchers. The workshop culminated on Thursday, Oct. 29 with a plenary lecture by Dr. Freeman Hrabowski, President of UMBC (The University of Maryland, Baltimore County).

Undergraduate Activities at MMW 2015

As part of the undergraduate program at the Modern Math Workshop, each student attended one of the two mini-courses presented on Wed., Oct. 28, 1-5pm:

1) Harshad Numbers and Sage Programming

A Harshad number is a positive integer that is divisible by the sum of its digits. The word "Harshad" comes from the Sanskrit harsa (joy) + da (give), meaning joy-giver, which was defined by the Indian mathematician D.R. Kaprekar. All one digit numbers are Harshad numbers and it is fairly simple to determine which two digit numbers are Harshad. In 1994, H. Grundman generalized the concept to b-Harshad (or b-Niven) numbers. Simply put, for $b > 1$, a b-Harshad number is a positive integer that is divisible by the sum of the digits of its base b expansion. The mini-course provided undergraduate students with an opportunity to learn about Harshad numbers and how to compute some of their properties using the freely available mathematical program Sage. No prior programing experience was required.

Organizers: **Alejandra Alvarado** is an Assistant Professor at Eastern Illinois University. Her research interests are in number theory and Diophantine equations. She received her PhD from Arizona State University under the supervision of Dr. Andrew Bremner. In her spare time she enjoys running.

Helen G. Grundman is a Professor of Mathematics at Bryn Mawr College. She received her PhD from the University of California, Berkeley, held a C.L.E. Moore Instructorship at MIT, a Postdoctoral Research Fellowship at MSRI, a Science Fellowship at the Bunting Institute of Radcliffe College, and the Rosalyn R. Schwartz Lectureship at Bryn Mawr College. Last year, she was awarded the Christian R. and Mary F. Lindback Award for Distinguished Teaching. Her research areas include algebraic number fields, Hilbert modular varieties, Galois realizability, elementary number theory, modular forms, and computational number theory. Her teaching ranges from courses for math-phobic undergraduates through graduate level courses in algebra and mathematics pedagogy. She has supervised over 30 student research projects at levels ranging from sophomore undergraduate through PhD.

Pamela E. Harris is a Mexican-American Davies Research Fellow of the National Research Council with a dual appointment at the United States Military Academy (West Point, NY) and the Army Research Lab (Adelphi, MD). She will join the faculty of Williams College in the fall of 2016. Dr. Harris received her PhD from the University of Wisconsin at Milwaukee in May 2012 under the supervision of Dr. Jeb Willenbring. Her research interests focus on combinatorial problems related to the representation theory of Lie algebras and more recently she has begun work on problems in analytic number theory, image processing, and mathematical biology. Dr. Harris is firmly dedicated to improving diversity and retention rates among women and minorities in the mathematical sciences. As part of her outreach, she commits time to organizing scientific symposia during the national SACNAS conference and is a member of the organizing committee for the Infinite Possibilities Conference.

2) An Introduction to the Theory of Sandpiles

The sandpile model developed by Bak, Tang, and Wiesenfeld in 1987 is a mathematical model first used to exemplify the concept of self-organized criticality (SOC). SOC is a property of certain dynamical systems that naturally evolve toward critical states and it is considered to be one of the mechanisms by which complexity arises in nature. The abelian sandpile model 8.5.15 introduced by Dhar in 1990 is a special class of sandpile model defined on a combinatorial graph whose dynamic structure is encoded in a finite abelian group known as the sandpile group. This algebraic structure has played a central role in the study of diverse properties of the abelian sandpile model. Moreover, the sandpile group has also been an important object of study in several distinct areas of mathematics, including algebraic combinatorics, algebraic, tropical and arithmetic geometry, the theory of computation, and the study of pattern formation.

In this mini-course, the instructor gave an introduction to the theory of sandpiles. In particular, he discussed the interactions between the combinatorics of the graph, the algebraic information of the sandpile group and the dynamics of the abelian sandpile model.

Organizer: **Luis David Garcia-Puente** is an Associate Professor of Mathematics at Sam Houston State University. He received his B.S. in Mathematics degree from the Universidad Nacional Autonoma de Mexico in 1999 and his Ph.D. in Mathematics from Virginia Tech in 2004. He has held postdoc appointments at U.C. Berkeley, the Mathematical Sciences Research Institute and at Texas A&M University. His work focuses on computational algebraic geometry and its applications. He has been involved in Research Experience with Undergraduate programs in Mathematics for 15 years and several resulting projects have culminated in award-winning student presentations or joint research publications. When he is not at work, he enjoys playing board games with his daughters or spending time in a racquetball court. He used to be known as a good salsa dancer, but those days are long gone.

Graduate and Early Career Activities at MMW 2015

As part of the graduate/early career program at the Modern Math Workshop, the following talks were presented by the representative of the Mathematical Institutes:

Dr. Naiomi Cameron, AIM

Naiomi Cameron was born in Washington, DC and raised in Providence, RI. She received her BS (1995) and PhD (2002) in mathematics from Howard University. Her PhD thesis in combinatorics was titled: “Random Walks, Trees and Extensions of Riordan Group Techniques.” Currently, she is an Associate Professor of Mathematics at Lewis & Clark College, where she has been since 2006. Her research interests fall into areas of enumerative and algebraic combinatorics and number theory, including the theory of the Riordan group, lattice path enumeration, combinatorial identities, permutation patterns and statistics, and the theory of dessins.

Title: "Belyi Maps for Trees of a Given Passport"

Abstract: Dessin is short for *dessin d'enfant*, which is French for "child's drawing." Introduced in the late 1990s by A. Grothendieck, a dessin can be described as a connected bicolored graph where the edges around every vertex are cyclically ordered. Grothendieck proposed that dessins can be realized by Belyi maps, which are meromorphic functions from a Riemann surface to the extended complex plane having at most three critical values. In this talk, I will discuss the origins, outcomes, and future of a research project that was designed to determine Belyi maps that realize certain classes of bicolored trees embedded on the complex sphere.

Dr. Michael Mahoney, IAS/PCMI

Michael Mahoney is at the University of California at Berkeley in the Department of Statistics and at the International Computer Science Institute (ICSI). He works on algorithmic and statistical aspects of modern large-scale data analysis. Much of his recent research has focused on large-scale machine learning, including randomized matrix algorithms and randomized numerical linear algebra, geometric network analysis tools for structure extraction in large informatics graphs, scalable implicit regularization methods, and applications in genetics, astronomy, medical imaging, social network analysis, and internet data analysis. He received him PhD from Yale University with a dissertation in computational statistical mechanics, and he has worked and taught at Yale University in the mathematics department, at Yahoo Research, and at Stanford University in the mathematics department. Among other things, he is on the national advisory committee of the Statistical and Applied Mathematical Sciences Institute (SAMSI), he was on the National Research Council's Committee on the Analysis of Massive Data, he runs the biennial MMDS Workshops on Algorithms for Modern Massive Data Sets, and he spent fall 2013 at UC Berkeley co-organizing the Simons Foundation's program on the Theoretical Foundations of Big Data Analysis.

Title: "Mathematics and Modern Massive Data Set Analysis"

Abstract: The ability to generate enormous quantities of data provides important challenges and opportunities in the natural and social sciences, in economics, finance, and electronic commerce, and in social media, public policy, and many other areas important to our society and world. It also provides important challenges and opportunities for mathematics, including areas of applied mathematics such as theoretical computer science and theoretical statistics. This talk with provide an overview of some mathematical challenges associated with modern large-scale data analysis, including a discussion of some of the topics that will appear in the 2016 Park City Math Institute's program on the "Mathematics of Data."

Dr. Edray Goins, ICERM

Edray Herber Goins grew up in South Los Angeles, California. The product of the Los Angeles Unified (LAUSD) public school system, he attended the California Institute of Technology, where he majored in mathematics and physics, and earned his doctorate in mathematics from Stanford University. He is currently an Associate Professor of Mathematics at Purdue University in West Lafayette, Indiana. He works in the field of number theory, as it pertains to the intersection of representation theory and algebraic geometry.

Title: "Fuchsian Differential Equations with Prescribed Monodromy: An Introduction to Solving a Quintic Without Using Radicals"

Abstract: We all learn at an early age how to find the roots of a quadratic polynomial using square roots via the Quadratic Formula. In the 1540's, Gerolamo Cardano published a method of finding the roots of both cubic and quartic polynomials using both square roots and cube roots. In 1823, Niels Henrik Abel gave a proof which showed that the roots of quintic polynomials cannot be expressed in terms of radicals. But in 1858, Charles Hermite showed that such roots can be expressed in terms of hypergeometric functions!

In this talk, we explain how to express such roots in terms of these functions by reducing the problem to inverting rational functions by using solutions to certain differential equations. This is a report on work done as part of the Research Experiences for Undergraduate Faculty (REUF) with Torina Lewis (Clark Atlanta University), Katie

Quertermous (James Madison University), Chris Seaton (Rhodes College), and Alfredo Villanueva (Savannah State University).

Dr. Romeo Awi, IMA

Starting from Fall 2015, Romeo Awi will be a postdoctoral fellow at the Institute for Mathematics and its Applications (IMA). After a Bachelor's degree in Electrical and Computer Engineering, a Bachelor's degree in Mathematics and a Master's degree in Mathematics at the University of Abomey-Calavy (Benin Republic), he got his PhD in Mathematics from Georgia Institute of Technology in 2015. His current research interests are Calculus of Variations, Partial Differential Equations and Numerical Analysis.

Title: "Minimization Problems and Polyconvexity"

Abstract: We will consider minimization problems in the calculus of variations. The existence of minimizers of integral problems is closely related to the properties of the functional to minimize. We will introduce the important concepts of quasiconvexity and polyconvexity. Inspired by finite element methods from Numerical Analysis, we introduce a perturbed problem which has some interesting uniqueness properties.

Dr. Isabel Meirelles, IPAM

Isabel Meirelles is a designer and educator whose intellectual curiosity lies in the relationships between visual thinking and visual representation. She is a Professor in the Faculty of Design and a researcher in the Visual Analytics Lab at the Ontario College of Art and Design (OCAD) University, Toronto, Canada. Isabel's research focuses on the theoretical and experimental examination of the fundamentals underlying how information is structured, represented, and communicated in different media. Meirelles is the author of "Design for Information: An introduction to the histories, theories, and best practices behind effective information visualizations" (Rockport Publishers, 2013).

Title: "Visualization of cultural phenomena: An overview"

Abstract: The talk will present an overview of analytical and visual/spatial methods of reasoning about cultural phenomena. I will start by presenting a few historical examples that will help situate present efforts. The focus will be on recent visualization trends involving computational and mathematical techniques for the analysis of large sets of cultural data that are available digitally, ranging from written language to sonic experiences, from static to moving images.

Dr. Talitha Washington, MBI

Dr. Talitha Washington is an Associate Professor of Mathematics at Howard University. She has been an Assistant Professor of Mathematics at the University of Evansville and The College of New Rochelle, and a VIGRE Research Associate in the Department of Mathematics at Duke University. She earned her master's and doctoral degrees in mathematics from the University of Connecticut, and completed her undergraduate studies in mathematics at Spelman College. Dr. Washington's current fields of interest include applying ordinary and partial differential equations to problems in biology and engineering.

Title: "Workshops, Conferences, and REUs Oh My! My Experiences at MBI"

Abstract: The Mathematical Biosciences Institute (MBI) has a plethora of activities for both students and faculty alike. In this talk, I will give a tour of the various programs in which I have participated.

Dr. Talia Fernós, MSRI

Originally from Puerto Rico, Dr. Talia Fernós is an associate professor at the University of North Carolina, in Greensboro. She completed an undergraduate degree in math and physics at the Evergreen State College. In 2006 she received a Ph. D. in mathematics, on Relative Property (T), at the University of Chicago (in Chicago). Her research interests lie in the study of infinite groups and more recently on CAT (0) cube complexes.

Title: "Playing Ping Pong with Free Groups"

Abstract: The question of determining when two groups are isomorphic is undecidable in general. Fortunately, the Ping Pong Lemma offers an elegant and handy way to recognize when a group is free (i.e. elements satisfy only the trivial relations required to make it a group). Only basic group theory will be required to understand this elementary talk where we will discuss and prove this wonderful lemma.

Dr. Suzanne O'Regan, NIMBioS

Suzanne O'Regan received her PhD in Applied Mathematics from University College Cork, Ireland, 2011. She was a postdoctoral researcher in the Odum School of Ecology at the University of Georgia prior to beginning a NIMBioS postdoctoral fellowship in January 2015. At NIMBioS, she is developing mathematical tools to anticipate emergence and elimination of infectious diseases.

Title: "Anticipating critical transitions in infectious diseases"

Abstract: Predicting abrupt shifts in state ("critical transitions") of complex systems is a key research topic in a variety of scientific domains. Small smooth changes in underlying drivers leading to a sudden change in system behavior, mathematically described as a bifurcation, is a mechanism for critical transitions that is of considerable interest. Bifurcations may be detectable because prior to reaching the dynamical threshold, the system may exhibit "critical slowing down." Statistical signatures of critical slowing down have been detected from temporal and spatial data in biological systems ranging from the global climate system, ecosystems, experimental microcosms and physiological systems. Anticipating infectious disease emergence and documenting progress in disease elimination are important applications for the theory of critical transitions. Non-parametric approaches that are independent of model-fitting would advance infectious disease forecasting significantly. In this talk, I consider compartmental epidemiological SIS and SIR models that are slowly forced through a critical transition. I develop expressions for the behavior of several candidate indicators during the approach to emergence or elimination. I show that moving-window estimates of the candidate indicators may be used for anticipating critical transitions in infectious disease systems. Although leading indicators of elimination were highly predictive, I found the approach to emergence to be much more difficult to detect. It is hoped that these results, which show the anticipation of critical transitions in infectious disease systems to be theoretically possible, may be used to guide the construction of online algorithms for processing surveillance data.

Dr. Christopher Strickland, SAMSI

Christopher Strickland is a Postdoctoral Fellow at SAMSI and the University of North Carolina, Chapel Hill. He received his PhD in mathematics at Colorado State University in December 2013, under the joint supervision of Dr. Gerhard Dangelmayr and Dr. Patrick Shipman.

Currently, he conducts research modeling, analyzing, and optimizing systems in ecology as part of SAMSI's Program on Mathematical and Statistical Ecology. His background is in applied mathematics, including mathematical modeling, dynamical systems theory, and mathematical biology, and some of his current projects include modeling water resource dynamics in Australian savanna, exploring the dynamics of ecological invasive spread on networks, and modeling the wind-borne dispersal of tiny insects for biocontrol.

Title: "A Stochastically Driven Model for Savanna Water Resource Dynamics"

Abstract: Modeling has become an essential part of understanding ecosystem dynamics, and within the savanna ecology community, models are used as a key tool to advance theories about the determinants of savanna as an ecological state between forest and grassland. However, many models have paid little attention to intra-annual water resource availability by adopting mean annual precipitation (MAP) as the primary variable for water resources, despite the fact that savannas typically persist in locations with strong rainfall seasonality.

In this talk, I will introduce a new analytic model that explores the relationship between savanna stand structure, seasonal water resource availability, and fire disturbance in Australia. The model demonstrates how variation in dry season length, rather than mean annual precipitation, can determine savanna stability as an underlying woody total basal area equilibrium. This equilibrium may then be estimated numerically using the daily rainfall record, with fire disturbance acting as a perturbation away from this state. Finally, I will describe the specific woody

population dynamics predicted by the model, including the effect of various re regimes and stochastic fire disturbances.

[This is a joint work with Adam C. Liedloff (CSIRO, Australia), Gerhard Dangelmayr (Colorado State Univ.) and Patrick D. Shipman (Colorado State Univ.)]

Plenary Lecture

At the conclusion of the workshop, Dr. Freeman Hrabowski presented the plenary lecture:

"Rethinking the Culture of STEM Education in America: Promoting Student Success and Minority Achievement"

Biography: Dr. Freeman A. Hrabowski, President of UMBC (University of Maryland, Baltimore County) since 1992, is a consultant on science and math education to national agencies, universities, and school systems. He was recently named by President Obama to chair the newly created President's Advisory Commission on Educational Excellence for African Americans. He also chaired the National Academies' committee that produced the recent report, Expanding Underrepresented Minority Participation: America's Science and Technology Talent at the Crossroads.

Named one of the 100 Most Influential People in the World by TIME (2012) and one of America's Best Leaders by U.S. News & World Report (2008), he also received TIAA-CREF's Theodore M. Hesburgh Award for Leadership Excellence (2011), the Carnegie Corporation's Academic Leadership Award (2011), and the Heinz Award (2012) for contributions to improving the "Human Condition." UMBC has been recognized as a model for academic innovation and inclusive excellence by such publications as U.S. News, which the past six years ranked UMBC the #1 "Up and Coming" university in the nation.

Abstract: Rapid and dramatic demographic and technological changes present our nation's schools and universities with enormous challenges for preparing students – particularly those from diverse backgrounds – for careers in science, technology, engineering, and math (STEM) fields. Over the past four decades, Freeman Hrabowski has studied student achievement, focusing special attention on the participation and performance of underrepresented minorities and women in STEM fields. Drawing on the success of UMBC's Meyerhoff Scholars Program, a national model for preparing high-achieving minority students, the National Academies' report, Expanding Underrepresented Minority Participation: America's Science and Technology Talent at the Crossroads, and his most recent book, Holding Fast to Dreams: Empowering Youth from the Civil Rights Crusade to STEM Achievement, Dr. Hrabowski will discuss innovation in undergraduate STEM education that promotes student success, inclusive excellence, and achievement for all students in STEM.

Dr. Hrabowski is known for being passionate about empowering minorities to succeed in stem disciplines and mathematics in particular. His talk was engaging, inspiring, and drew the participation of the audience with exceptional success. Questions poured in both during and at the end of his talk. The students were electrified by his talk and wanted more advice on how to be successful in "stem careers." It was an excellent way to end the modern math workshop.

Organizers

First Name	Last Name	Institution
Helene	Barcelo	MSRI - Mathematical Sciences Research Institute
Helen	Chamberlin	Ohio State University
Ricardo	Cortez	Tulane University
Sujit	Ghosh	NC State University
Dagan	Karp	Harvey Mudd College
Anne	Pfister	MSRI - Mathematical Sciences Research Institute
Christian	Ratsch	University of California, Los Angeles
Ivelisse M.	Rubio	University of Puerto Rico
Mariel	Vazquez	University of California, Davis
Talithia	Williams	Harvey Mudd College

Speakers

First Name	Last Name	Institution
Alejandra	Alvarado	Eastern Illinois University
Romeo	Awi	Mathematics and its Applications
Naiomi	Cameron	Lewis & Clark College
Talia	Fernós	University of North Carolina, Greensboro
Luis	Garcia-Puente	Sam Houston State University
Edray	Goins	Purdue University
Helen	Grundman	Bryn Mawr College
Pamela	Harris	United States Military Academy
Freeman	Hrabowski	University of Maryland, Baltimore County
Michael	Mahoney	University of California, Berkeley
Suzanne	O'Regan	NIMBios
Isabel	Pmeirelles	Onatrio College of Art and Design University
Christopher	Strickland	University of North Carolina, Chapel Hill
Talithia	Washington	Howard University

General Schedule

2015 Modern Math Workshop (MMW)

Gaylord National Resort & Convention Center
201 Waterfront St., National Harbor, MD 20745

Wednesday, October 28	Time	Room
REGISTRATION (Graduate students & Early Career Researchers set-up their posters in National Harbor Rm 3)	12:00 pm to 1:00 pm	In hall way in front of National Harbor Rm 3 (Level 3)
2 Undergraduate Mini-Courses	1:00 pm to 5:00 pm	
Harshad Numbers and Sage Programming	1:00 pm to 5:00 pm	National Harbor 4 (Level 3)
Break (30 minutes)	3:00 pm to 3:30 pm	National Harbor 7 (Level 3)
An Introduction to the Theory of Sandpiles	1:00 pm to 5:00 pm	National Harbor 5 (Level 3)
Presentations by Math Institutes, part I	1:00 pm to 4:00 pm	National Harbor 2 (Level 3)
Poster Session for Graduate Students, Early Career Researchers & Math Institute Representatives (Set-up posters 12-1pm in NH Rm 3)	4:00 pm to 5:00 pm	National Harbor 3 (Level 3)
Reception for Undergraduates, Graduate Students, Early Career Researchers & Math Institute Representatives	5:00 pm to 7:00 pm	National Harbor 3 (Level 3)
Thursday, October 29	**Time**	**Room**
Presentations by Math Institutes, part II	9:00 am to 10:25 am	National Harbor 2 (Level 3)
Break (35 minutes)	10:25 am to 11:00 am	National Harbor 2
Plenary lecture by Dr. Freeman Hrabowski President of UMBC (The University of Maryland, Baltimore County) *"Rethinking the Culture of STEM Education in America: Promoting Student Success and Minority Achievement"*	11:00 am to Noon	National Harbor 2 (Level 3)

Participants		
First Name	**Last Name**	**Institution**
Frank	Aguirre	California State Polytechnic University
Vanessa	Aguirre	University of Hawaii at Hilo
Leyda	Almodovar Velazquez	University of Iowa
Alejandra	Alvarado	Eastern Illinois University
Gabriel	Andrade	University of Massachusetts
Rene	Ardila	University of Iowa
Joshua	Austin	University of Maryland, Baltimore County
Romeo	Awi	Institute of Mathematics
Edwin	Baeza	Purdue University
TaShara	Bailey	University of Maryland, Baltimore County
Hélène	Barcelo	MSRI - Mathematical Sciences Research Institute
Kainalu	Barino	Waimea High School
Timothy	Benavidez	Harvard University
Michael	Briden	Pacific Lutheran University
Christopher	Broll	Loyola College
Caleb	Bugg	Morehouse College
Ethan	Bush	University of Michigan, Flint
Naiomi	Cameron	Lewis and Clark College
Alejandra	Castillo	Pomona College
Helen	Chamberlin	Ohio State University
Anastasia	chavez	University of California, Berkeley
Steven	Collazos	University of Minnesota, Twin Cities
Ricardo	Cortez	Tulane University
Isabel	Darcy	University of Iowa
Dennis	Davenport	Howard University
Gelonia	Dent	Medgar Evers College
Victoria	Diaz	Florida International University
Alexander	Diaz Lopez	University of Notre Dame
Kyle	Duke	James Madison University
Daniel	Eckhardt	Rensselaer Polytechnic Institute
Gabriel	Elvin	University of California
Devin	Etcitty	Columbia University
Ricela	Feliciano-Semidei	University of Montana
Talia	Fernós	University of North Carolina
Maria Mercedes	Franco	Queensborough Community College (CUNY)
Daniel	Garbin	Queensborough Community College
Luis	Garcia-Puente	Sam Houston State University
Natalie	Gasca	University of Washington
Sujit	Ghosh	NC State University
Duncan	Gichimu	Towson University
Miguel	Gil	University of California, Davis
Edray	Goins	Purdue University
Oscar	González	University of Puerto Rico
Helen	Grundman	Bryn Mawr College

Participants		
First Name	**Last Name**	**Institution**
Pamela	Harris	United States Military Academy
William	Howell	None
Freeman	Hrabowski	University of Maryland, Baltimore County
Claude	Ibrahimoff	MSRI - Mathematical Sciences Research Institute
Genesis	Islas	California State University
Monica	Jackson	American University
Leo	Johnson	University of Maryland Baltimore County
Joanna	Kania-Bartoszynska	National Science Foundation
Nandini	Kannan	National Science Foundation
Dagan	Karp	Harvey Mudd College
Victoria	Kelley	James Madison University
Andre	Keyser	University of Maryland
Bethany	Kubik	University of Minnesota
Beauttie	Kuture	Pomona College
Richard	Laugesen	University of Illinois at Urbana-Champaign
Oscar	Leong	Swarthmore College
Ying	Liu	College of the Sequoias
Christopher	Loa	University of Tennessee
Deborah	Lockhart	National Science Foundation
Luis	Lomeli	Max-Planck-Institut fÃ¼r Mathematik
Guadalupe	Lozano	University of Arizona
Megan	Ly	University of Colorado
Crystal	Mackey	Youngstown State University
Michael	Mahoney	University of California, Berkeley
Austin	Marstaller	The University of Texas at Dallas
Marco	Martinez	North Central College
Maria	Martinez	University of California, Berkeley
Robert	Megginson	University of Michigan
Isabel	Meirelles	Ontario College of Art and Design University
Calandra	Moore	College of Staten Island, CUNY
Armando	Morales	California State University Channel Islands
Rosa	Moreno	California State University of Channel Islands
Joanna	Navarro	University of California
Miguel	Nieves	U.S. Naval Academy
Susan	Nuar	Marygrove College
Annabel	Offer	Texas Tech University
Suzanne	O'regan	National Institute for Mathematical and Biological Synthesis NIMBioS
Stacy	Orozco	IPAM - Institute for Pure and Applied Mathematics
Jennifer	Pearl	National Science Foundation
Jose	Perea	Michigan State University
Darleen	Perez-Lavin	University of Kentucky
Maxime	Pouokam	University of California, Davis
Alicia	Prieto Langarica	Youngstown State University
Christian	Ratsch	University of California

Participants		
First Name	**Last Name**	**Institution**
Andres	Rodriguez	Universidad de los Andes
Ivelisse M.	Rubio	University of Puerto Rico
Alberto	Ruiz Sandoval	University of Puerto Rico
Brandon	Russell	U.S. Naval Academy
Michael	Santana	University of Illinois at Urbana-Champaign
Julian	Sass	University of Maryland Baltimore County
Paul	Schmidt	Towson University
Rebecca	Spencer-Strong	Towson University
Miles	Stevens	Morehouse College
Christopher	Strickland	SAMSI - Statistical and Applied Mathematical Sciences Institute
Ian	Stringer	Baltimore City Community College
Kelly	Sturner	National Institute for Mathematical and Biological Synthesis NIMBioS
Jason	Suagee	George Washington University
Alexis Jane	Torre	University of Arizona
Victor	Torres	University of Maryland, Baltimore County
Denise	Tracy	Syracuse University
Mimi	Tsuruga	University of California, Davis
Renetta	Tull	University of Maryland, Baltimore County
Wencel	Valega	University of Puerto Rico
Roger	Vargas	Williams College
Mariel	Vazquez	University of California, Davis
Alejandro	Velez-Santiago	University of California, Riverside
Michael	Vogelius	National Science Foundation
Henry	Warchall	National Science Foundation
Talitha	Washington	Howard University
Talithia	Williams	Harvey Mudd College
Ulrica	Wilson	Morehouse College
Robin	Wilson	California State Polytechnic University
Cynthia	Wyels	California State University Channel Islands
Nicole	Yamzon	San Francisco State University
Sarah	Yoseph	Loyola Marymount University
Mario	Zepeda	Universidad de Puerto Rico

Officially Registered Participant Information

Participants		120

Gender		120
Male	51.67%	62
Female	47.50%	57
Declined to state	0.83%	1

Ethnicity*		153
White	32.50%	39
Asian	6.67%	8
Hispanic	43.33%	52
Pacific Islander	0.83%	1
Black	25.00%	30
Native American	2.50%	3
Mixed	15.83%	19
Declined to state	0.83%	1

* ethnicity specifications are not exclusive

MMW 2015 Exit Survey

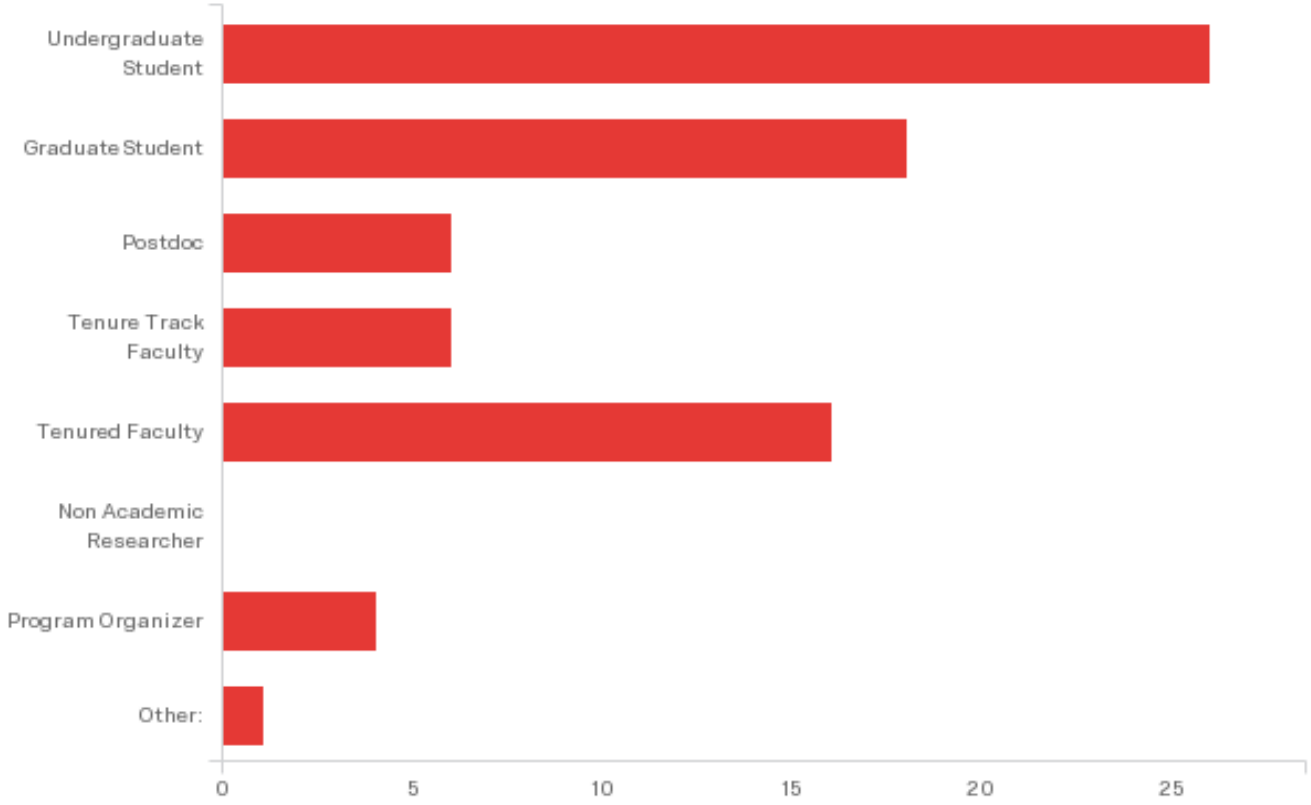
Modern Math Workshop 2015

May 6th 2016, 3:44 pm PDT

77 responses out of 120 participants = 64% response rate

Note: Q1 was a text placeholder

Q2 - I am a(n):



Answer	%	Count
Undergraduate Student	33.77%	26
Graduate Student	23.38%	18
Postdoc	7.79%	6
Tenure Track Faculty	7.79%	6
Tenured Faculty	20.78%	16

Non Academic Researcher	0.00%	0
Program Organizer	5.19%	4
Other:	1.30%	1
Total	100%	77

Other:

Other:
NSF staff

Q3 - During the course of this conference, have you made any new scientific connections with other participants?

Answer	%	Count
Yes	80.26%	61
No	19.74%	15
Total	100%	76

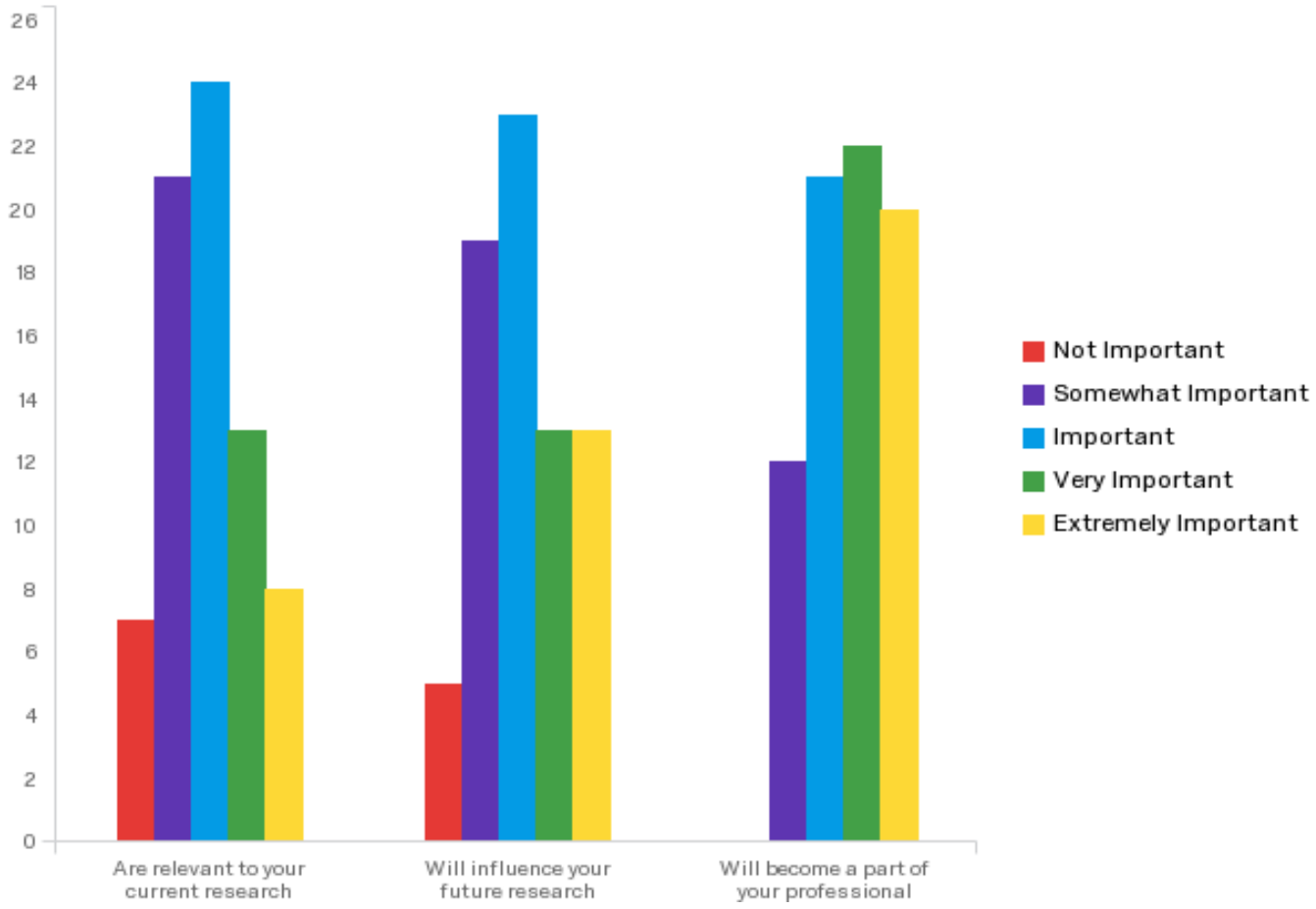
Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count	Bottom Box	Top Box
During the course of this conferenc e, have you made any new scientific conn...	1.00	2.00	1.20	0.40	0.16	76	100.00%	100.00%

Q4 - How many new scientific connections would you say you have made during this conference?

Answer	%	Count
1 to 5	75.41%	46
6 to 10	16.39%	10
More than 10	8.20%	5
Total	100%	61

Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count	Bottom Box	Top Box
How many new scientific connections would you say you have made during this...	1.00	3.00	1.33	0.62	0.38	61	100.00%	100.00%

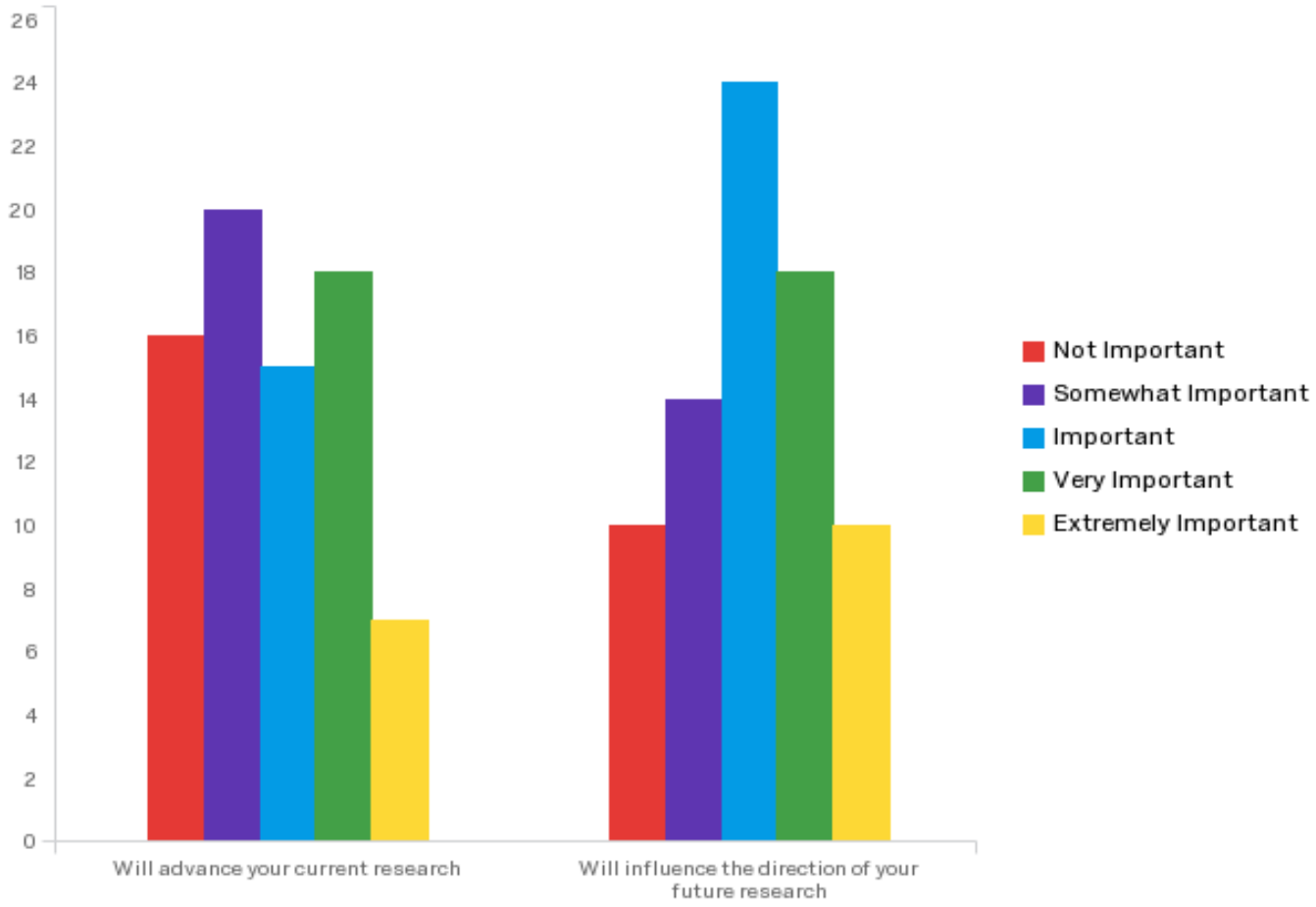
Q5 - Rate the importance of the connections made during Modern Math that:



Question	Not Important	Somewhat Important	Important	Very Important	Extremely Important	Total
Are relevant to your current research	7	21	24	13	8	73
Will influence your future research	5	19	23	13	13	73
Will become a part of your professional network	0	12	21	22	20	75

Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count	Bottom Box	Top Box
Are relevant to your current research	1.00	5.00	2.92	1.13	1.28	73	71.23%	61.64%
Will influence your future research	1.00	5.00	3.14	1.19	1.41	73	64.38%	67.12%
Will become a part of your professional network	2.00	5.00	3.67	1.04	1.08	75	44.00%	84.00%

Q6 - Rate the importance of the knowledge gained during Modern Math that:



Question	Not Important	Somewhat Important	Important	Very Important	Extremely Important	Total
Will advance your current research	16	20	15	18	7	76
Will influence the direction of your future research	10	14	24	18	10	76

Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count	Bottom Box	Top Box
Will advance your current research	1.00	5.00	2.74	1.28	1.64	76	67.11%	52.63%
Will influence the direction of your future research	1.00	5.00	3.05	1.21	1.47	76	63.16%	68.42%

Q7 - What, if anything, did you like best about the Modern Math Workshop?

What, if anything, did you like best about the Modern Math Workshop?
Specific track for grad students.
The interaction of the speaker with the audience, and newness of the topic on sandpiles.
excellent organization and exposition to several research topics
different talks...
The minicourse I attended was well-organized. It gave me tools for learning about the subject independently.
I liked how the speaker brought in different fields of math, from stochastic processes to abstract algebra, all for one research question/ theme.
I liked just being among peers that also enjoy math and like to support each other.
The organization and opportunity to meet other mathematicians from underrepresented minorities
The extra motivation to continue my studies to graduate school and the networking opportunities I encountered
SACNAS had a math session at the same time as Modern Math Workshop, which was bad organization on SACNAS part.
The chance to let participants know about opportunities at the math institutes. Also, the plenary speake was stellar.
The freedom to choose which minicourse I attended.
Meeting new people and networking with colleagues. See the future programs at the Math institutues
I enjoyed meeting other students and learning about opportunities offered at different institutions across the country.
variety of presentations, information about the math institutes
The entire workshop was extraordinary. I learned from *every single speaker*. I don't remember the last time that this actually happened... perhaps when I still was a student. Very informative and enlightening.
Strengthened prior math connections and there was a good presence of mathematicians in Algebra and Number Theory.
I liked the array of topics that were presented at the Modern Math Workshop.
The keynote speaker. His talk was inspiring and empowering.
The very careful and judicious choice of speakers covering not only a large spectrum of mathematics, but also representing diversity of gender, age, institutional affiliation, career stage and ethnicity (which is particularly important in an URM conference like SACNAS). The talks were of very high quality, even exceptional, and well focused on an audience primarily consisting of students and young professionals.
I had the chance to learn to code a bit even though it was quite difficult it was still pretty fun.
Hearing math talks from diverse speakers and having a friendly atmosphere to interact with people.
Talking with the graduate school recruiters.

Hearing from Freeman Hrabowski
Hearing from the math organizations during the reception; listening to the presentation about data visualization; discussing the merits of learning math and science (biology) together
There was plenty of time to mingle and make connections. It was also very well organized.
Freeman Hrabowski's talk
It was a nice introduction in to possible future research I may do.
An extremely positive, encouraging atmosphere for discussing first-rate mathematics.
Interacting with others who are interested in diversity issues.
I will add snacks to the "breaks".
Hearing about the opportunities that each institute offers.
Poster session
Dr. Hrabowski talk time to INTERACT with math institutes representatives
The instructors for the mini-course were incredible. I really enjoyed they style in which they incorporated Sage into the lesson about Harshad numbers. Also, the talk by the UMBC president was one of the best speeches I've attended. He was motivational and honest, so it was a great experience.
The best part of the MMW was the opportunities that were highlighted for graduate students.
I enjoyed the personal enrichment that MMW provided. The professional presentations that I attended allowed me to experience many aspects of Mathematics that I may have otherwise thought of.
The opportunity to meet new students and colleagues from diverse backgrounds.
The diversity of topics and the collegiality of the participants.
The awesome presentations by distinguished speakers from many governmental agencies and industry. It was very informative and helpful!
the community
The opportunity to share my research with other mathematicians and the chance to meet mathematicians with successful careers, who are members of under represented minorities.
I really liked the math talks interwoven with the Institute talks. Past years this program has felt stale and less interesting, but this year the talks were very diverse and engaging, and was great to see what work people did at the respective institute.
I liked learning about a different field in math.
Presentors
I enjoyed obtaining an overview of all the math institutes and their offerings.
The camaraderie among the student participants.
The open questions were challenging and inspiring
As an undergrad in the very early stages of my math journey what I liked the best was simply the exposure to the ideas presented. I felt it was personally expansive.
The subject itself was very interesting
talks were short allowing for more variety
Opportunity to meet undergraduate students, particularly minority students. My job as Director of Graduate

Studies is to identify and recruit good students!
The topics were interesting, but the best thing I enjoyed about the MMW was the people I met.
The diverse speakers and topics
The wide range of topics that the talks covered
I heard about different mathematical research areas and I had the opportunity to present my research to a broad audience at a crucial stage of my career.
I very much enjoyed learning about all of the institutes and the services they provide. While this did not impact my research directly, I believe it impacted my department. One example is knowing the open source/access list available on the AIM website, and another is the posibility of having speakers paid for by MBI to visit my department.
I really enjoyed the networking. Because my sisters and I are first generation, I had never been exposed to so many professionals with Ph.Ds. I was able to identify and talk about the struggles that come with being a Latina in a STEM field.
I enjoyed meeting and networking with other graduate students/postdocs. I also did meet several faculty members who gave me advice on my ventures into the job market this year.
I liked the reception at the end. I enjoyed talking to people at the booths and the food was delicious, especially the crab cakes.
The Graduate Poster session was very cool.

Q8 - What, if anything, did you like least about the Modern Math Workshop?

What, if anything, did you like least about the Modern Math Workshop?
Split in 2 days with no meals included.
n/a
I gave a poster presentation, but very few (one or two) older researchers stopped by my poster to ask questions or to give me feedback.
That lunch wasn't provided and there wasn't a long enough break to get lunch
The topics were not that interesting to me. They could have been more interactive. Next year the work should focus on statistics or applied math.
Too short!
It would have been nice to have a panel geared towards undergraduates about how to apply to graduate school in mathematics.
NA
No complaints. I wish more people had been there to benefit from this workshop.
That it was my last Modern Math Workshop as a postdoc.
The Mini-course could have been more interactive.
Only one "big" break between talks.
It was apparent that a lack of funding resulted in fewer students benefitting from the workshop, particularly the half-day minicourses. The presenters worked very hard, and their efforts deserved a wider dissemination comparable to that of years past (at least twice as large as this year).
I didn't get much time and weren't many people to socialize with.
I think the poster easels should have been set up for us before hand, so that there was a better flow of people looking at the posters. As it was, some faced the inside of the room, some faced the outside, and I think it was hard for people to visit all the posters.
There were other SACNAS mathematics sessions taking place during MMW that forced people to choose. In the future, it would be nice if SACNAS could space out the talks so that everyone can attend all events.
Large focus on theoretical math in the presentations; some of the organization presenters focused on undergraduate programs rather than graduate and beyond
It was in the middle of the week, I almost couldn't participate as a result.
I think the funding level for math students from SACNAS was low this year, which led to a lower attendance than in previous years. I understand that SACNAS leadership has committed to improving this in the coming years.
Having it before SACNAS caused me to miss too many classes. Particularly since the Field of Dreams Conference is the following week.
The workshop was very good. I didn't like the lack of including Mathematics Education, for example.
Some of the speakers were not good speakers. That is not on you but on the institutes.
research talks from most of the? math institutes
N/A

I thought it was unfortunate that the graduate events and the math talks were held at the same time since I really wanted to attend both.
Only the break coffee; it stunk. This is not the organizers' fault.
The jet lag!
not too many people and the sacnas registration was separate which was odd
No talks about my specific area of research.
Lack of snacks/meals
Sand piles was interesting...
The food that was served.
The breaks were scheduled so that there was no coffee or tea left for the students in the minicourses.
Too long
I was disappointed that the MMW overlaped with one of the math sessions for SACNAS. I ended up missing some talks that I wanted to attend because of it.
I was not convinced of the overall impact of the activity. That is, did the activity encourage anyone to pursue studies or a career in mathematics who otherwise would not?
nothing
I would have liked the workshop to have been more interactive, instead of just being lectured
individual talks not listed for all sessions in online schedule.
Lack of a lunch on the Wednesday.
The lack of food available. I was really hungry during the middle of the lecture/workshop and there were no easily available food items.
That it was not held during the SACNAS conference
Would have wanted more talks
Not enough food at the reception, and no alcohol at the reception. These are important for facilitating informal interactions and new connections.
I did not like the location of the workshop. I found the resort unecessarily extravagant, especially that a more frugal approach could increase the number of participants. I understand that it is probably SACNAS who organized the workshop there .
I disliked that it was joined with SACNAS, but then it wasn't. I was misinformed about the events plenty of times, and the SACNAS application was very glitchy. The MMW was downplayed and not as promoted as SACNAS. The registration time frame was very limited, and I was told that if you missed the registration period, one couldn't register anymore. I thought it was very difficult to navigate as a first-timer to the conference. More than anything, I disliked the how I was falsely lead to believe that the conferences coincided, but then they didn't. Lots of misinformation from the SACNAS staff, and the WiFi wasn't working well, making it difficult to access the schedule for the MMW.
I didn't really find the speakers relevant to my specific situation.
I least liked how long the computer session was for undergrads, but it was a fun session. I also would've liked lunch that first day.
Nothing comes to mind.

Q9 - What, if any, suggestions do you have for improving the Modern Math Workshop experience?

What, if any, suggestions do you have for improving the Modern Math Worksho...
Talks should include more application research.
Clear directions to the workshop room :)
n/a
I think people were either already too tired to attend the poster session or there weren't people interested in what I was doing. (On other hand, the presenters who were near me ran into a similar problem, if I remember correctly.) I feel I left the poster session empty-handed in terms of new research ideas or things to improve in the way I present. Perhaps trying to ensure that somehow graduate students and professors actually interact would be a good idea. One way might be to "match" professors with graduate students so that during the poster session, professors can see the presentation (for at least five minutes, say) of the students they were matched with.
Maybe more breaks/ longer ones
Yes, more female organizers, the topics should be on statistics, applied mathematics, computational mathematics, or simply offer a survey of many different fields of math and the research that can be done to us, as undergraduate students. The courses should also be better structured so that it can be more interactive, and that each student walks aways nothing something more about an area that they knew nothing about before.
I hope it continues. I've attended three of the last four. The material covered and the speakers are always great.
Expand it.
It would be interesting to have a computer science aspect to the workshop.
a meet and greet with directors from the math institutes
continie this effort, continue to increase your audience/# of participants. I understand that this is sometimes tied to funding and not necessarily easy to scale up
Perhaps a talk by a SACNAS mathematician that has studied or has done a postdoc abroad. I saw IHES listed as a Math Institute once and was curious, is there someone working in a traditional discipline like Algebraic Geometry?
Please make the mini-courses more interactive and offer a wider variety of them.
I think undergraduates should be given a choice about which session they wish to attend.
Inviting one exceptionally distinguished but inspiring speaker on each occasion (like Dr. Hrabowski this time) is a great tradition that should definitely continue. Perhaps a mini-networking event (an ice-breaker where participants introduce themselves) would make the implicit networking goals a bit more intentional/explicit.
Definitely providing more mathematical areas to talk about in workshops and applying them to real world problems. Also more coding examples.
None. I felt really comfortable during my time in the workshop.
The only thing I would say is maybe have larger poster board available to place the poster on. The SACNAS conference had larger poster sizes than the MMW.
More breaks; Panel talks rather than individual presentations about the math organizations present

Moving the conference to another time. Would it be possible to have it in the spring?
Provide snacks on the tea of coffee break.
Suggesting to the institutes to bring good speakers.
better research talks. maybe not even talks more workshops for junior faculty. I am happy I went since allow me to go to teh SACNAS conference, but workshop was not very useful
None, great work!
It would be great if MMW would allow graduate students to give short talks on their research.
I think that working scheduling so that undergrads could attend more conferences would be helpful
None, really.
Keep up the great work!
Lunch provided would be nice. As a grad student I'm always jealous of the undergrad workshops available. I would love to see a skill-building session for grad students too (Python, Sage, R perhaps?)
Probably have more topics than just two
The experience was great.
It would be good if the keynote speaker was not scheduled at the same time as some of the scientific sessions of SACNAS.
Set up time to meet one on one with researchers
none
It would be interesting to explore whether there is a different mechanism for outreach to groups underrepresented in mathematics that might have greater impact in recruitment for the field.
nothing
Make the workshops more interactive, since they are long workshops
Most of the undergraduate seniors wanted to attend to the graduate poster session but we had to go to our mini course. For next years it would be really great that undergrads could attend to this poster session.
Panel about mathematics graduate school - I'd be happy to serve as a panelist.
Have trays of small food items such as sandwiches/wraps available.
More talks
A better reception! People have travelled a long way and would like to have decent food to look forward to. Because I was starving and had to get dinner, I did not do as much networking at the reception as I should have.
I think it would have been nice to have snacks, as people congregate around them, thereby facilitating interaction.
This was my first time ever attending a conference like this. I believe the only thing that made it a bit easier to navigate through this conference was that I was rooming with a Ph.D math student from UCBerkeley. Had it not been for her, I would have been in oblivion. I think new comers should be paired with veterans of the conference.
I think that the poster presentation was good, but perhaps having some parallel sessions in which grad students/postdocs/faculty could speak about their own research would be highly beneficial! The SACNAS conference only allowed for two pure mathematics talks.
Have more opportunities to network (maybe snacks with the coffee and tea), and have all of the undergraduates meet-introduce them before/after the two workshops.
Mote coffee (not really important)

Theory of Neural Computation

October 05, 2015 - October 07, 2015

MSRI, Berkeley, CA, USA

Organizers:

Dmitri Chklovskii (Simons Foundation)

David Eisenbud (MSRI - Mathematical Sciences Research Institute)

Gary Marcus (New York University)

Bruno Olshausen (University of California, Berkeley)

Christos Papadimitriou (University of California, Berkeley)

Terrence Sejnowski (Salk Institute for Biological Studies)

Fritz Sommer (University of California, Berkeley)

Organizers

First Name	Last Name	Institution
Dmitri	Chklovskii	Simons Foundation
David	Eisenbud	MSRI - Mathematical Sciences Research Institute
Gary	Marcus	New York University
Bruno	Olshausen	University of California, Berkeley
Christos	Papadimitriou	University of California, Berkeley
Terrence	Sejnowski	Salk Institute for Biological Studies
Fritz	Sommer	University of California, Berkeley

Speakers

First Name	Last Name	Institution
Alessandra	Angelucci	University of Utah
Carina	Curto	Pennsylvania State University
Rob	Fergus	New York University, Courant Institute
Mark	Goldman	University of California, Davis
Daniel	Kersten	University of Minnesota
Alexei	Koulakov	Cold Spring Harbor Lab
Adam	Marblestone	Massachusetts Institute of Technology
Gary	Marcus	New York University
Stephanie	Palmer	University of Chicago
Terrence	Sejnowski	Salk Institute for Biological Studies
Murray	Sherman	University of Chicago

Theory of Neural Computation

October 05-07, 2015

Schedule

Monday, Oct 5, 2015			
8:45 AM - 9:00 AM	Simons Auditorium		Welcome/Intro
9:00 AM - 10:15 AM	Simons Auditorium	Gary Marcus	The Atoms of Neural Computation
10:15 AM - 10:30 AM	Atrium		Break
10:30 AM - 11:45 AM	Simons Auditorium	Wolfgang Maass	Searching for Principles of Brain Computation
11:45 AM - 1:45 PM	Atrium		Poster + Lunch
1:45 PM - 3:00 PM	Simons Auditorium	Murray Sherman	A View of Cortex from the Thalamus
3:00 PM - 3:15 PM	Atrium		Tea
3:15 PM - 4:30 PM	Simons Auditorium	Mitya Chklovskii	Similarity matching: a principle of neural computation
4:30 PM - 6:00 PM	Atrium		Reception

Tuesday, Oct 6, 2015			
9:00 AM - 9:45 AM	Simons Auditorium	Stephanie Palmer	Understanding vision through the lens of prediction
9:45 AM - 10:30 AM	Simons Auditorium	Alessandra Angelucci	Feedforward, lateral and feedback interactions s in visual cortex
10:30 AM - 10:45 AM	Atrium		Break
10:45 AM - 11:30 AM	Simons Auditorium	Daniel Kersten	How far can Bayesian theories of vision take us
11:30 AM - 12:00 PM	Simons Auditorium		General discussion
12:00 PM - 2:00 PM	Atrium		Poster + Lunch
2:00 PM - 2:45 PM	Simons Auditorium	Rob Fergus	End-to-End Memory Networks
2:45 PM - 3:30 PM	Simons Auditorium	Surya Ganguli	The Statistical Physics of Deep Learning
3:30 PM - 3:45 PM	Atrium		Tea
3:45 PM - 4:30 PM	Simons Auditorium		General discussion

Wednesday, October 7, 2015			
9:00 AM - 9:45 AM	Simons Auditorium	Jackie Gottlieb	Why attention is important for decision making
9:45 AM - 10:30 AM	Simons Auditorium	Mark Goldman	The challenge of constructing a robust short-term memory network
10:30 AM - 10:45 AM	Atrium		Break
10:45 AM - 11:30 AM	Simons Auditorium	Carina Curto	Bringing math into the loop
11:30 AM - 12:00 PM	Simons Auditorium		General discussion
12:00 PM - 2:00 PM	Atrium		Poster + Lunch
2:00 PM - 2:45 PM	Simons Auditorium	Adam Marblestone	Rosetta Brain Maps and What They Might Teach Us
2:45 PM - 3:30 PM	Simons Auditorium	Alexei Koulakov	TBA
3:30 PM - 3:45 PM	Atrium		Tea
3:45 PM - 4:30 PM	Simons Auditorium		General discussion

Participants		
First Name	**Last Name**	**Institution**
Reza	Abbasi Asl	University of California
Tsvi	Achler	Optimizing Mind
Alexander	Anderson	University of California, Berkeley
Alessandra	Angelucci	University of Utah
lauren	barghout	UC Berkeley
Peter	Bates	Michigan State University
Ruairidh	Battleday	University of California, Berkeley
Christopher	Beitel	University of California, Davis
Kristofer	Bouchard	Lawrence Berkeley National Laboratory
Simina	Branzei	Aarhus University
Joan	Bruna	uc berkeley
Alex	Bujan	University of California, Berkeley
Daniel	Burke	Lawrence Berkeley National Lab
Paolo	Calafiura	Lawrence Berkeley Laboratory
Elizabeth	Carroll	University of California, Berkeley
Matteo	Causo	University of California
Josh	Chartier	University of California, San Francisco
Yubei	Chen	University of California
Yuansi	Chen	University of California
Dmitri	Chklovskii	Simons Foundation
Gavin	Crooks	Lawrence Berkeley Laboratory
YUWEI	CUI	Numenta, Inc
Carina	Curto	Pennsylvania State University
Kate	Derosier	University of California, San Francisco
Anthony	Di Franco	University of California
Benjamin	Dichter	University of California, San Francisco
Eric	Dodds	University of California, Berkeley
Alexandra	Dotterweich	UC Berkeley
Vasha	Dutell	University of California Berkeley
David	Eisenbud	MSRI - Mathematical Sciences Research Institute
Noureddine	El Karoui	UC Berkeley
Julie	Elie	University of California Berkeley
Saba	Emrani	North Carolina State University
jerome	feldman	University of California, Berkeley
Rob	Fergus	New York University, Courant Institute
Chelsea	Finn	University of California
Alyson "Allie"	Fletcher	University of California, Berkeley
Carlos	Florensa Campo	University of California
Fedor	Fomin	University of Bergen
Christopher	Gagne	University of California, Berkeley
Charles	Garfinkle	University of California, Berkeley
Galin	Georgiev	GammaDynamics, LLC
Shiry	Ginosar	University of California
Mark	Goldman	University of California, Davis

Participants		
First Name	**Last Name**	**Institution**
Jacqueline	Gottlieb	Columbia University
Ian	Greenhouse	University of California, Berkeley
Jason	Hartford	University of British Columbia
Marina	Hovhannisyan	University of California, Berkeley
Colin	Hoy	University of California, Berkeley
Guy	Isely	University of California, Berkeley
xoxi	ixchel	homeschool
Anna	Jafarpour	Helen Wills Neuroscience Institute
John	Jameson	Jameson Robotics
Pentti	Kanerva	University of California, Berkeley
Su Chen	Kang	University of Kansas
Daniel	Kersten	University of Minnesota
Doyeon	Kim	University of California, Berkeley
Stanley	Klein	UC Berkeley
Antonina	Kolokolova	Memorial University of Newfoundland
Robert	Korsan	Carnegie Mellon University
Alexei	Koulakov	Cold Spring Harbor Lab
Eero	Lehtonen	University of Turku
Dennis	Levi	University of California, Berkeley
Michael	Levy	University of California, Berkeley
Jesse	Livezey	University of California, Berkeley
Michael	Maddock	University of California, Davis
Adam	Marblestone	Massachusetts Institute of Technology
Gary	Marcus	New York University
Sarah	Marzen	University of California, Berkeley
Patrick	McDonald	New College of Florida
Georg	Menz	University of California
Katie	Morrison	Pennsylvania State University
Mayur	Mudigonda	UC Berkeley
Amin	Muh	Inholland University
Alexander	Naka	UC Berkeley
Lucine	Oganesian	University of California
Oluwatobi	Olabiyi	Toyota ITC
Bruno	Olshausen	University of California, Berkeley
Dylan	Paiton	University of California, Berkeley
Stephanie	Palmer	University of Chicago
Sakunthala	Panditharatne	Andreessen Horowitz
Christos	Papadimitriou	University of California, Berkeley
Samantha	Petti	Georgia Institute of Technology
Georgios	Piliouras	Singapore University of Technology and Design
Jussi	Poikonen	University of Turku
Douglas	Poland	Lawrence Livermore National Laboratory
Art	Pope	Google, Inc.
Mr	Prabhat	UC Berkeley

Participants		
First Name	**Last Name**	**Institution**
Ji	Qiang	Lawrence Berkeley National laboratory
Daniel	Reichman	UC Berkeley
Paul	Rhodes	Evolved Machines
Ian	Robertson	University of California, Berkeley
Tim	Roughgarden	Stanford University
Manuel	Sabin	University of California
Sujayam	Saha	University of California, Berkeley
Mojtaba	Sahraee-Ardakan	University of California, Santa Cruz
Mike	Schachter	University of California, Berkeley
Matt	Schalles	Veterans Affairs
Tobias	Schmid	University of California, Berkeley
Ronen	Segev	Ben Gurion University of the Negev
Terrence	Sejnowski	Salk Institute for Biological Studies
Jacob	Shenker	California Institute of Technology
Murray	Sherman	University of Chicago
Daniel	Silversmith	University of California, San Francisco
Utkarsh	Singhal	University of California, Berkeley
Katarina	Slama	UC Berkeley
Somayeh	Sojoudi	University of California
Fritz	Sommer	University of California, Berkeley
Suresh	Srinivasamurthy	Kansas State University
David	Steinberg	Fiddletown Institute
Arjen	Stolk	University of California, Berkeley
Edward	Stres	University of California, Berkeley
Mathew	Summers	University of California, Berkeley
Robert	Sumner	UC Santa Cruz
Gregory	Telian	University of California Berkeley
riva	tez	Permutation Ventures
Chayut	Thanapirom	University of California, Berkeley
Ryan	Thorngren	University of California, Berkeley
Robert	Uomini	ChiaraMail Corp.
Andres	Vargas	University of California, Berkeley
Xin	Wang	The Salk Institute for Biological Studies
David	Warland	UC Davis
Chris	Warner	UC Berkeley Math Faculty
Carter	Wendelken	UC Berkeley
Sandra	Wittenbrock	Lawrence Berkeley Laboratory
James	Wright	University of British Columbia
Ryan	Zarcone	University of California, Berkeley

Officially Registered Participant Information

Participants		**127**

Gender		**127**
Male	72.44%	92
Female	23.62%	30
Declined to state	3.94%	5

Ethnicity*		**137**
White	74.80%	95
Asian	11.81%	15
Hispanic	4.72%	6
Pacific Islander	0.00%	0
Black	0.79%	1
Native American	0.00%	0
Mixed	3.94%	5
Declined to state	11.81%	15

* ethnicity specifications are not exclusive

msri.coord@gmail.com

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39 responses

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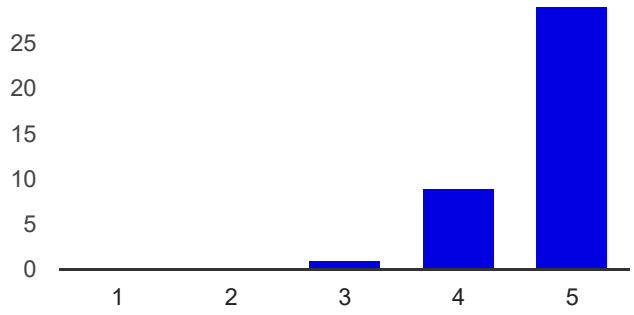
Summary

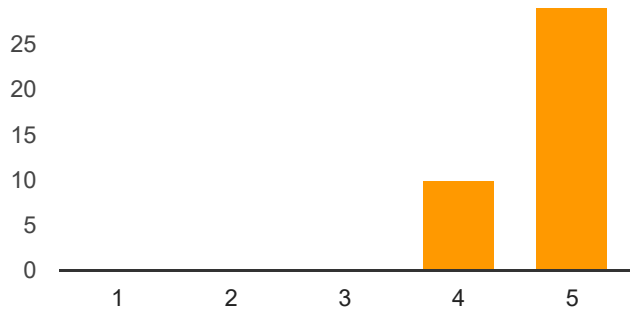
Workshop assessment

The workshop was intellectually stimulating

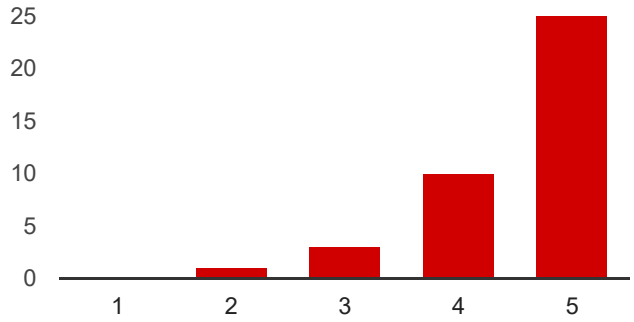


Not at all:	1	0	0%
	2	0	0%
	3	1	2.6%
	4	9	23.1%
Very:	5	29	74.4%

The overall experience of the workshop was worthwhile



The time between lectures was adequate for discussion.



Not al all:	1	0	0%
	2	1	2.6%
	3	3	7.7%
	4	10	25.6%
Very:	5	25	64.1%

Additional comments on the workshop organization

Attempt to establish benchmark problems would be great. This was mentioned but not worked upon

lunch could have been a little shorter

Time for discussion was good.

Audio/Video was well handled, talk & discussion format worked well

The lunch/poster sessions were far too long. Otherwise, the timing of talks and breaks was great! It might also be nice to have a more structured way for students to interact with faculty.

On this particular topic, more explicit guidance from the conveners would have been valuable.

The structure was great. I love the emphasis on discussion and time left for questions!

The diversity of talks and topics and choice of speakers was excellent. Just one small

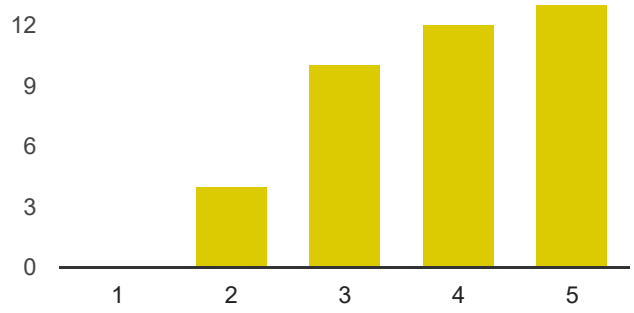
comment -- it would be nice to have more clear time for and directions to posters.

The talks on the first day I think were a little too long; it effectively becomes a full on lecture rather than a presentation.

Very timely to get a group of researchers from neuroscience, cognitive psychology and deep learning to start thinking about how to merge their theoretical bases and form a foundation for multi-disciplinary research and models. Excellent group of speakers and participants - both depth and breadth.

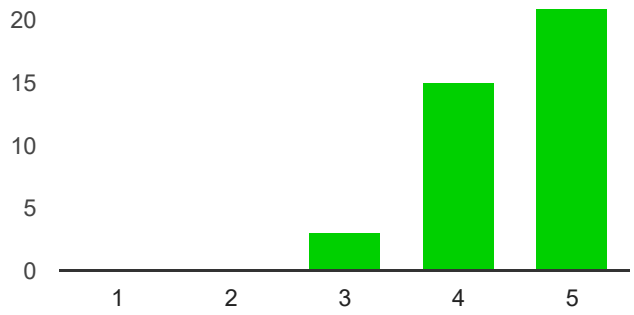
Personal assessment

I was well prepared to benefit from the lectures



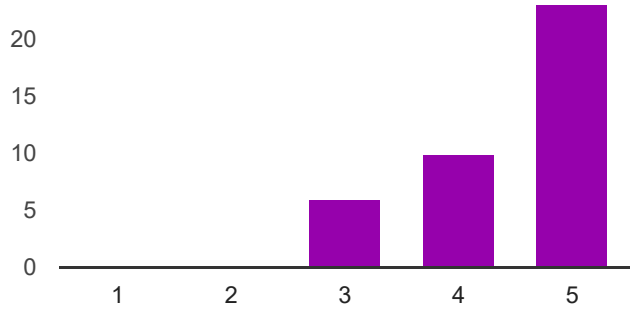
Not at all:	1	0	0%
	2	4	10.3%
	3	10	25.6%
	4	12	30.8%
Very:	5	13	33.3%

My interest in the subject matter was increased by the workshop



Niot at all:	1	0	0%
	2	0	0%
	3	3	7.7%
	4	15	38.5%
Very:	5	21	53.8%

The workshop helped me meet people with similar scientific interests



Not at all:	1	0	0%
	2	0	0%
	3	6	15.4%
	4	10	25.6%
Very Much:	5	23	59%

Additional comments on your personal assessment

I was prepared for the CS talks.

I just don't have enough background to get maximum benefit and understanding of the material. Working on it though!

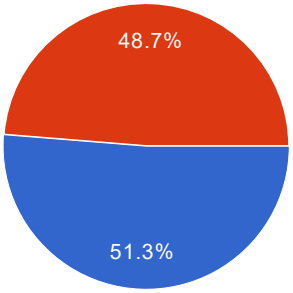
I am a mathematician and found it stimulating

This workshop brought together people from a variety of disciplines, which made it very exciting, even if non-trivial to follow sometimes.

Had an opportunity to, and did, establish potentially valuable and very stimulating connections outside of my immediate area (deep learning) - looking forward to multi-disciplinary collaborations and broadened perspectives.

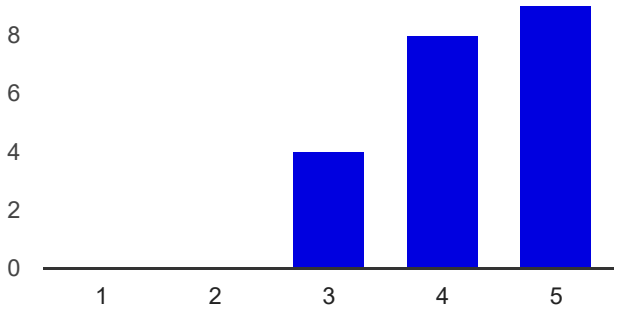
Additional Activities

Did you attend the reception?



Yes	20	51.3%
No	19	48.7%

If you did attend the reception, did it help to solidify the contacts you made in the workshop?



Not at all:	1	0	0%
	2	0	0%
	3	4	19%
	4	8	38.1%
Very much:	5	9	42.9%

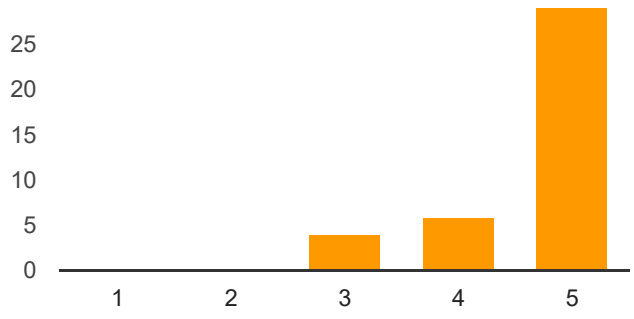
Please provide any comments on the reception

Amazing food

I had a prior commitment that prevented me from attending reception.

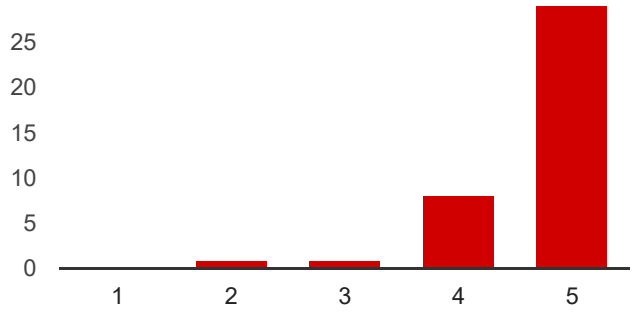
Venue

I found the MSRI staff helpful



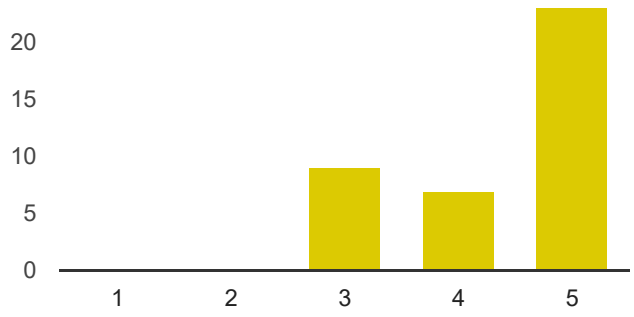
2	0	0%
3	4	10.3%
4	6	15.4%
Very: 5	29	74.4%

The MSRI physical facilities were conducive for such a workshop

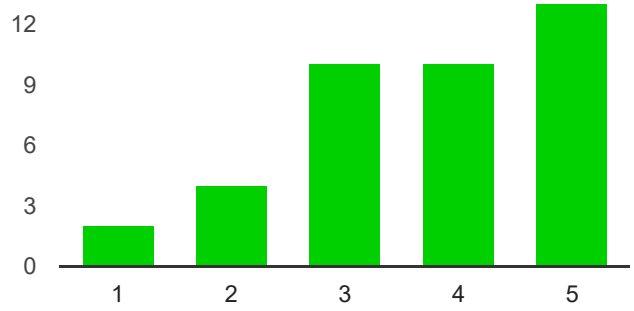


Not at all: 1	0	0%
2	1	2.6%
3	1	2.6%
4	8	20.5%
Very: 5	29	74.4%

The MSRI computer facilities were adequate for such a workshop

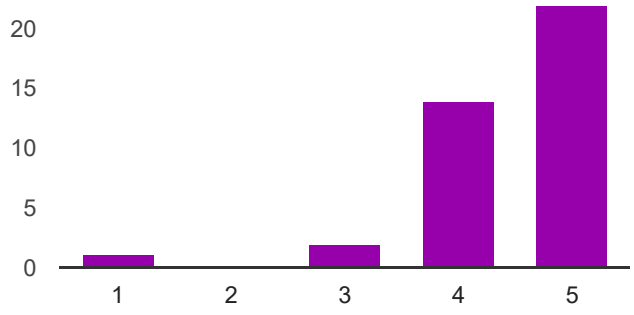


The MSRI lunch arrangements were satisfactory



Not at all:	1	2	5.1%
	2	4	10.3%
	3	10	25.6%
	4	10	25.6%
Very:	5	13	33.3%

The MSRI tea arrangements were satisfactory



Not at all:	1	1	2.6%
	2	0	0%
	3	2	5.1%
	4	14	35.9%
Very:	5	22	56.4%

Additional comments on the venue

more non-caffeine teas

did not have the pleasure to sample the lunches, use the computers, or interact with MSRI personnel

Poster arrangements were sub-par. People were attaching posters to the shelving. Bigger easels and more space is better for a poster session.

A uniquely inspiring venue, a treasure.

Discussants should have used microphones more

Beautiful spot! I would definitely come here again. Paying for lunch was disappointing though.

Parking was actually painless, which surprised me for Berkeley! Between the foyer, lobby and library, and balconies, there was plenty of excellent space for socializing, catching up on email, etc. Very nice physical space.

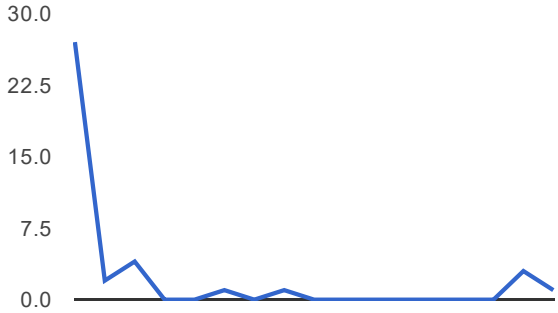
I'm allergic to gluten and the accomodations for that weren't great, but I was able to bring food and microwave it, so that worked at least.

Thank you for completing this survey

We welcome any additional comments or suggestions you may have to improve the overall experience for future participants.

The conference center was very nice and it was a good way to get acquainted with some new collegues. Were the talks recorded?

Number of daily responses


30.0
22.5
15.0
7.5
0.0

Math Circle - Mentorship and Partnership Program

September 10, 2015 - September 12, 2015

University of Colorado, Denver, USA

Organizers:

Diana White (University of Colorado, Denver)

Brandy Wiegers (Central Washington University)

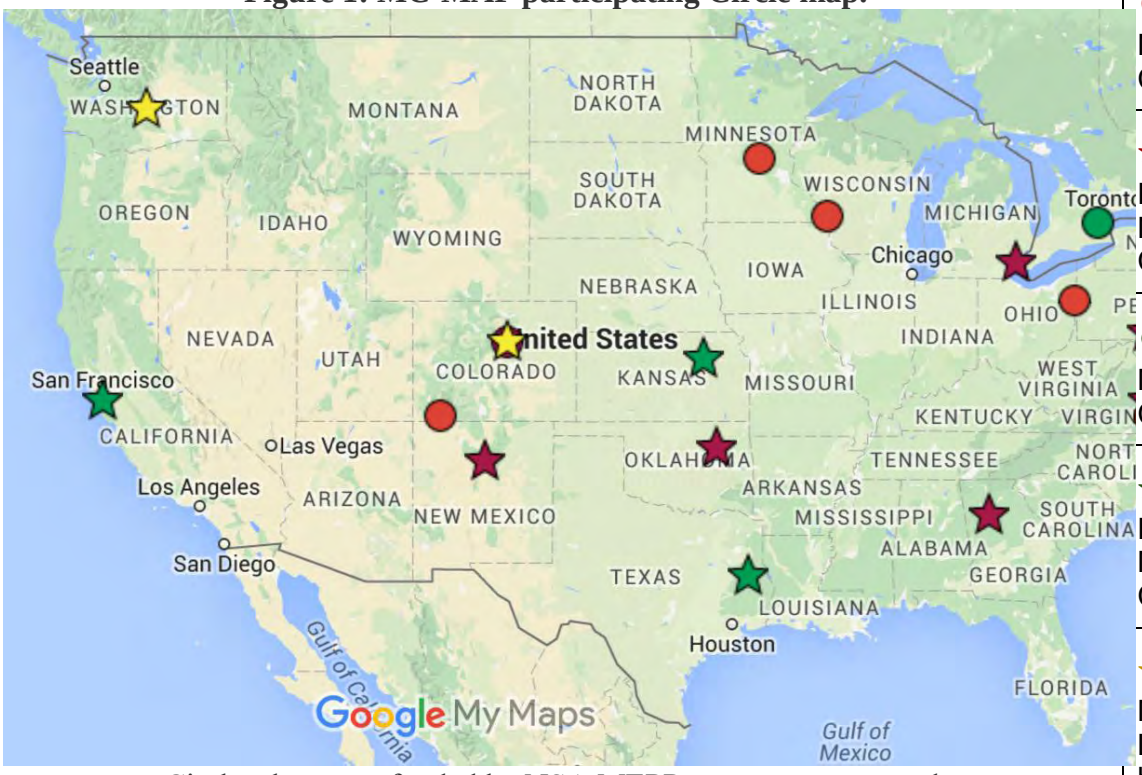
Summary of 2015-16 Math Circle Mentorship and Partnership (MC-MAP) program

NAMC piloted the Math Circle Mentorship and Partnership (MC-MAP) program to facilitate opportunities for informal training of Novice Math Circle leaders by experienced Math Circle leaders. This program is currently supporting six Novice Math Circles and three Mentor Math Circles with funding from the National Security Agency for the 2015-2016 pilot program. An additional eight teams are participating in the training program without funding support.

Program Participants

A group of thirty-nine mathematicians and educators from across the country are currently participating in the MC-MAP program. These leaders represent fourteen novice Math Circle leadership teams that have come together in partner teams to develop the academic and administrative components for a local Math Circle, as is shown in the map below these selected Circles represent interest across the country in developing Math Circle programs.

Figure 1: MC-MAP participating Circle map.



Circles that were funded by NSA MEPP program are starred.

Novice Circle

★ Funded Novice Circle

Mentor Circle

★ Funded Mentor Circle

★MC-MAP Leadership

The MC-MAP yearlong program provided training and structured planning time for novice Math Circle leaders in academic, pedagogical, and administrative components of Math Circles. Mentees learned effective teaching techniques, shared resources for finding quality Math Circle lessons, and gained knowledge of effective support for Math Circle leaders.

To complete the training the 2015-2016 program leveraged the resources of NAMC with further material development for Novice Circles, a three-day MC-MAP Workshop in September, a regular webinar training and regular check-ins between mentors to assist in the progress of creating a new Circle. Additional details of each of these program components are provided below.

Material Development

An extensive sixty-page training manual was prepared for the MC-MAP training teams. Refer to the attached documents for the full manual. The manual includes recommendation for creating initial Math Circle program structures, tips for instructing at the Circle sessions, and a review of other areas of support. To support the manual a folder of electronic documents was collected, reviewed and shared by Dr. Wiegers electronically to provide the Novice Circle leaders a set of starting materials for initial Math Circle planning. After the Workshop in September more than 80% of the participants indicate that these are enough resources to start their program. Specifically, several different novice leaders mentioned that these resources were the support that they'd be missing for planning their Circle and they looked forward to using the resources throughout this next year as they continue to prepare to begin their new outreach endeavours.

We envision that both of the training manual and electronic resources will continue to grow over the next several years as other experienced Math Circle leaders across the country contribute and support this project. We look forward to using the 2015-16 MC-MAP teams contributing to the development and refinement of the materials to supplement the 2016-2017 MC-MAP cohort.

2015 Training Workshop - September 10-12, 2015

The MC-MAP program is organized around and powered by relationships. The September workshop provided the initial introduction between leaders of established Math Circles with leaders of novice Math Circles. The workshop was designed to nurture rapport and community among program participants as well as to demonstrate the kinds of informal, discovery-oriented learning experiences that are at the heart of Math Circles. This shared workshop allowed mentors and mentees to meet in person, and begin to establish a strong working relationship through structured planning and shared experiences. Novice Math Circle leaders were able to take advantage of the expertise of their more experienced peers through a variety of contexts during the meeting: structured planning sessions, guided observation and structured debriefing of a demonstration Math Circle session, and an opportunity to practice important skills via a one-day Julia Robinson Math Festival open to local students. These experiences supported the mentees in learning effective teaching techniques, sharing resources for finding quality Math Circle lessons, and gaining knowledge about effective support for Math Circle leaders that will be teaching at their Math Circle. In addition the workshop sessions addressed logistical issues (e.g. fundraising, recruiting and advertising, administrative essentials and emergency plans); effectively facilitating a meaningful experience for participants; and content issues (how to develop or identify a rich problem or activity). When asked about this workshop one participant said, "What a great opportunity. We almost never get to sit 'outside' a learning environment to watch, learn, and discuss."

To support the training experience of the workshop participants the NAMC supported CU Denver in organizing their first ever Colorado Julia Robinson Festival. The festival was

financially supported by the Julia Robinson Math Festival organization and directed by Dr. Diana White and Dr. Michael Ferrara with support of local teacher Lorraine Garrison and Dr. Brandy Wiegers. The morning event brought together 324 students from seven middle schools across the greater Denver metro area. The seven schools were selected to take field trips to attend the festival based on either the socioeconomic (an average of 33% of the students on free and reduced lunch) status, racial profile, or academic success of the students at the schools (one-third these schools have less than 50% of their 8th grade students scoring proficient levels on standardized tests). Workshop participants found that working with the middle school students was helpful for their development as Math Circle leaders. Students defied their expectations of middle school student behavior with their focus on the problems and enthusiasm. As stated by one participant, "The Julia Robinson Math Festival … gave practice on Math Circles mentality."

At the end of the workshop, participants took a post-survey. Feedback from the survey was almost uniformly positive, with all participants stating that overall the workshop and the resources they acquired were very useful to them. They were excited about meeting other professionals working with Math Circles and building relationships with other participants. Eighty percent of participants indicated that the Julia Robinson Math Festival was useful to their Math Circle development and organization. Seventy-seven percent of participants indicated that the Rocky Mountain Math Teachers' Circle observation was useful as well. As stated by one participant, "It is easy to say that you want to help children learn mathematics and problem solving in a different way. The workshop is practically a complete bridge between talking about it and doing it."

Continued Yearlong Mentorship: MC-MAP Listserv, Webinar, and Mentor/Mentee Support

While the MC-MAP training materials and workshop was a strong start to the MC-MAP program the support to the novice Circle leaders did not end in September. Instead regular contact was maintained through the MC-MAP listserve and regular Math Circle training webinars.

- Math Circle Safety & Logistics (October 2015)
- Mentor & Novice Check-in Webinar (Winter 2016)
- Grant Writing (February 2016)
- Wrapping up the Math Circle for the year including tips on evaluation (April 2016)

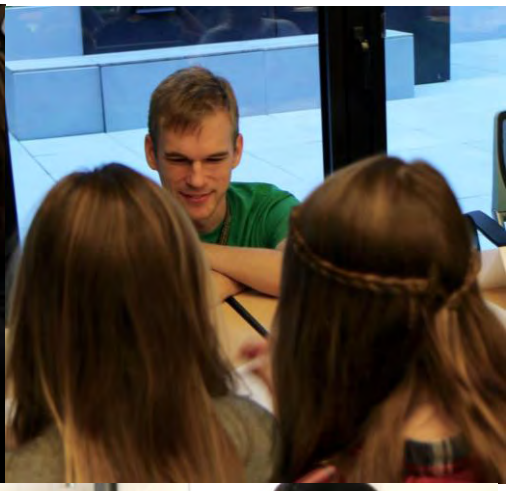
The topics for these webinars were requested by the novice Circle leaders. A full year of webinars will be scheduled for the 2016-2017 cohort.

Conclusion

In addition to the hands-on experiences of the Julia Robinson Math Festival and Rocky Mountain Math Teachers' Circle observation, participants spent time planning with their leadership teams, receiving feedback from their mentors and other participants, learning about available resources for planning sessions, and hearing about other resources available to them from NAMC and other organizations whose missions overlap with ours. Throughout the academic year we will continues to provide support through a listserv and monthly webinars, as well as by having mentors and novice Math Circles visit each other to exchange ideas. The MC-MAP Workshop

successfully kicked off our year-long program, which we hope to repeat each year with a new cohort of novice Math Circles.

MC-MAP 2015 Workshop



Summary of MC-MAP 2015-2016 Participants:

Total MC-MAP participants:

Organizers:

- Dr. Diana White, CU Denver and National Association of Math Circles Director
- Dr. Brandy Wiegers, Central Washington University and NAMC Associate Director

Master Mentors:

- Dr. Amanda Serenevy, Riverbend Community Math Center
- Josh Zucker MS, Julia Robinson Math Festival

6 mentor Math Circle leaders:

- Lorraine Garrison, York International School
- Dr. Jane Long, Stephen F. Austin State University
- Dr. Natasha Rozhkovskaya, Kansas State University
- Addie Schnirel MS, San Francisco State University Center
- Rodi Steinig MS, Talking Stick Learning Center
- Dr. Maria Wesslen, University of Toronto Mississauga

14 novice Math Circle leadership teams from the following institutions:

- Colorado School of Mines
- Emory University
- Fort Lewis College
- Randolph-Macon College
- Rutgers University
- Santa Fe Preparatory School
- Shippensburg University
- St. Cloud State University
- University of Michigan - Dearborn
- University of Tulsa
- University of Wisconsin-La Crosse
- Villanova University
- Virginia State University
- Youngstown State University

MC- MAP 2015 Workshop Schedule

All Sessions will be held in the CU Denver Student Commons Building (SCB - 1201 Larimer Street)

Campus Map: http://www.ahec.edu/about-auraria-campus/maps

Day 1 – Thursday

Time	Event	Location	Supplies
	Please explore Denver. We won't have a lot of downtime so if you're interested in spending anytime downtime in Denver please do so. We'll start check-in at 2pm at 4021.	Exploration ideas: walk along river, visit REI, 16th Street Mall, Performing Arts Center	
2:00 - 3:00	**Welcome Packets, Informal games and puzzles**	4021 (East end)	
3:00 - 3:30 pm	**Math Circle Ice Breakers** Facilitator: Brandy Wiegers	4021 (East end)	
3:30 - 4:30 pm	**MC- MAP Introductions & Overview** Facilitator: Diana White	4021 (East end)	
4:30 - 4:45 pm	*Break*		
4:45 - 6:15 pm	**Dinner Panel - Experienced Math Circle leaders will share their Math Circle Model** Panelists: *Addie Evans, SFMC* *Jane Long, East Texas MTC* *Rodi Steinig, Talking Stick MSC* *Maria Wesslen, University of Toronto Mississauga MSC*	4128 (West open area)	
6:15 - 6:45 pm	*Break - anyone willing head down to 2500 to help set-up for JRMF the next day*		
6:45 - 7:45 pm	**Julia Robinson Festival Training** Facilitators: Mike Ferrara and Josh Zucker	2500	Bring copies of your assigned JRMF problem.
7:45- 8:45 pm	Informal mathematical puzzles and games, practice JRMF problems with other teams	Marriott Lobby	

Day 2 – Friday			
Time	Event	Location	Supplies
8:00 - 9:15 am	**Planning/Reflecting for Novice Circles** Facilitator: Diana White	4021	MC-MAP Notebook (Brainstorming)
9:25 -12:15	**Julia Robinson Math Festival**	1600, 2500	Bring copies of your assigned JRMF problem.
10:35 - 10:45	Rotate Tables to your 2nd problem.		
after 11:00	Lunch.	2nd Floor	
12:30-1:00 pm	*Personal Downtime*		
1:00 - 2:00 pm	**Julia Robinson Math Festival Debrief** Facilitator: Diana White	4021	
2:00-2:30	**Planning/Reflecting for Novice Circles** Facilitator: Brandy Wiegers	4021	MC-MAP Notebook (Brainstorming/ Planning)
2:30 - 2:45 pm	*Break*		
2:45 - 3:45 pm	**Planning/Reflecting for Novice Circles** Facilitator: Brandy Wiegers	4113, 4117, 4017, 4021	Computer
3:45 - 4:00 pm	*Break*		
4:00 - 5:00 pm	**Continue planning with administration information.** Facilitator: Brandy Wiegers	4021	Computer & Notebook
5:30-7:15	**Planning Team Dinners- Reservations at 5:30**	Downtown Denver	
7:30-9:00	**Informal mathematical puzzles and games**	Marriott Lobby	
Day 3 – Saturday			
Time	Event	Location	
8:00 - 8:20 am	**MTC Overview**	4021	Notebook

	Facilitator: Diana White		
8:20 - 8:30	Break up groups	4113, 4117, 4017, 4021	
8:30 am – Noon	**Observe Math Teachers' Circle**		
	Facilitators: Amanda Serenevy and Josh Zucker		
12:00 - 12:15 pm	*Break*		
12:15 - 1:00 pm	**Lunch Panel - Experienced Math Circle participant Q&A**	4021	
	Facilitators:		
1:00 - 1:30 pm	Final Q&A, Next Steps – webinars and program expectations, post-workshop evaluation.	4021	Notebook
	Facilitator: Diana White		
1:30 - 2:20 pm	Final Math Circle Planning	4021	Notebook
	Facilitator: Brandy Wiegers		
2:20 - 2:30 pm	Closing. Goodbyes	4021	
	Facilitator: Diana White		

Participants		
First Name	**Last Name**	**Institution**
Kimberly	Adams	University of Tulsa
Cecilia	Arias	Rutgers University
Bret	Benesh	College of Saint Benedict and Saint John's University
Chirashree	Bhattacharya	Randolph-Macon College
Ann	Bomberger	Rutgers University
Lori	Brown	Academy for Technology & the Classics
Lance	Bryant	Shippensburg University
Sarah	Bryant	Shippensburg University
Debra	Carney	Colorado School of Mines
Amanda	Clemm	Emory University
Donna	Farrior	University of Tulsa
Lorraine	Garrison	Mapleton Public Schools
Whitney	George	University of Wisconsin
Melissa	Hanzsek-Brill	St. Cloud State University
Kathryn	Haymaker	Villanova University
Marilyn	Howard	The University of Tulsa
Jane	Long	Stephen F. Austin State University
Beth	Malmskog	Villanova University
Anne	McCarthy	Fort Lewis College
Nicholas	Ormes	University of Denver
Sandra	Richardson	Virginia State University
Natalia	Rozhkovskaya	Kansas State University
Addie	Schnirel	San Francisco State University
Amanda	Serenevy	Riverbend Community Math Center
Pamela	Smith	Fort Lewis College
Rodi	Steinig	Talking Stick Learning Center
James	Taylor	Santa Fe Preparatory School
Sarah	Trebat-Leder	Emory University
Thomas	Wakefield	Youngstown State University
Patrice	Waller	Virginia State University
Nathan	Warnberg	University of Wisconsin
Maria	Wesslen	University of Toronto, Mississauga
Diana	White	University of Colorado, Denver
Brandy	Wiegers	Central Washington University
Alan	Wiggins	University of Michigan-Dearborn
Andrew	Wills	Randolph-Macon College
Heather	Wukelich	Austintown Local Schools
Yunus	Zeytuncu	University of Michigan - Dearborn
Joshua	Zucker	AIM - American Institute of Mathematics

Officially Registered Participant Information

Participants		39

Gender		39
Male	40.82%	10
Female	59.18%	29
Declined to state	0.00%	0

Ethnicity*		39
White	87.18%	34
Asian	2.56%	1
Hispanic	2.56%	1
Pacific Islander	0.00%	0
Black	5.13%	2
Native American	2.56%	1
Mixed	0.00%	0
Declined to state	0.00%	0

* ethnicity specifications are not exclusive