MSRI
Mathematical Sciences Research Institute

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

NOTETAKER CHECKLIST FORM

(Complete one for each talk.)

Name: Chanel Lee **Email/Phone:** chanelclee@gmail.com

Speaker's Name: Natalie Paquette

Talk Title: (0,2) Dualities & 4-Simplex

Date: 08/15/2019 **Time:** 11:00 **am** / pm (circle one)

Please summarize the lecture in 5 or fewer sentences: This lecture covers basic results from building up a program to associate piecewise-linear 4-manifold to supersymmetric field theories.

CHECK LIST

(This is **NOT** optional, we will **not pay** for **incomplete** forms)

☑ Introduce yourself to the speaker prior to the talk. Tell them that you will be the note taker, and that you will need to make copies of their notes and materials, if any.

☑ Obtain ALL presentation materials from speaker. This can be done before the talk is to begin or after the talk; please make arrangements with the speaker as to when you can do this. You may scan and send materials as a .pdf to yourself using the scanner on the 3rd floor.

- **Computer Presentations**: Obtain a copy of their presentation
- **Overhead**: Obtain a copy or use the originals and scan them
- **Blackboard**: Take blackboard notes in black or blue **PEN**. We will **NOT** accept notes in pencil or in colored ink other than black or blue.
- **Handouts**: Obtain copies of and scan all handouts

☑ For each talk, all materials must be saved in a single .pdf and named according to the naming convention on the "Materials Received" check list. To do this, compile all materials for a specific talk into one stack with this completed sheet on top and insert face up into the tray on the top of the scanner. Proceed to scan and email the file to yourself. Do this for the materials from each talk.

☑ When you have emailed all files to yourself, please save and re-name each file according to the naming convention listed below the talk title on the "Materials Received" check list.
(YYYY.MM.DD.TIME.SpeakerLastName)

☑ Email the re-named files to notes@msri.org with the workshop name and your name in the subject line.

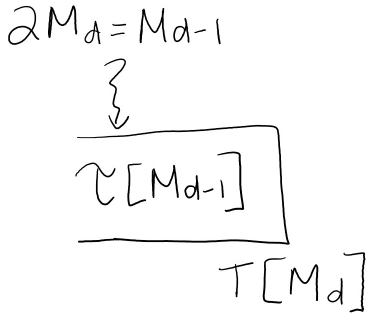
$(0,2)$ Dualities & 4 - Simplex

Natalie Paquette

August 15, 2019

Goal: 2d Susy's field theories $\leftrightarrow$ triangulated (PL) 4-mflds
Background: 6d superconformal field theories

$\chi[g]$ $gADE$ $\aleph = (2,0)$ - label for number of supercharges in physics
$g = s\ell$ M5-brane
$G = SU(2)$
$\mathbb{R}^{5,1} \to M_d \times \mathbb{R}^{5-d,1}$ compactify
$\mathbb{R}^6 \to M_d \times \mathbb{R}^{6-d}$ dimensional reduction
$\tau[M_d]$ twist



$\underline{d=2}$: $\underline{4d\ \aleph = 2}$ Class S [G,GMN] C w/ punctures
$\underline{d=3}$: $\underline{3d\ \aleph = 2}$ [Y-T,D-G-G]
$\underline{d=4}$: $\underline{2d\ \aleph = (d,2)}$ [G-G-P, "]
Top down in $d = 2$

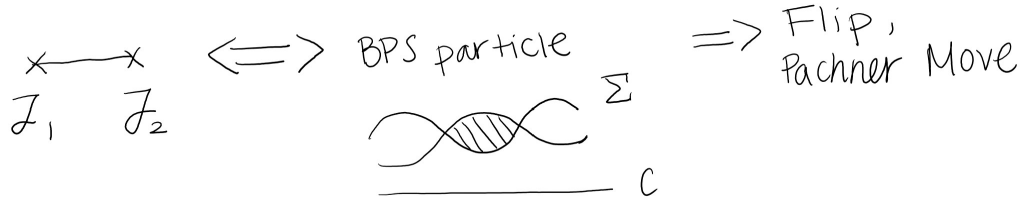
Triangulations [GMN]
$C \to T[C,P]$ 4d $\aleph$=2
Moduli space of vacua, B Columb branch
Seiberg-Witten Theory $\longleftrightarrow$ BPS particles/interactions

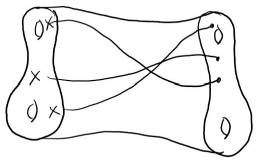
$\sum CT^*C$, 2-fold branched cover
SW diff'ℓ λ $\sum$: $\lambda^2 = \rho(z)dz^2 \to$ quadratic diff'ℓ on C

Ideal Triangular

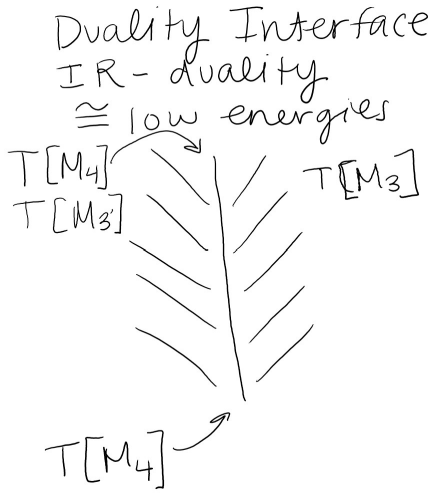
- all vertices at punctures
- at least one edge per vertex
- each triangle contains a zero

F_λ some $\theta \in \mathbb{R}/2\pi\mathbb{Z}$
$\lambda_{ij} \cdot \partial_+ \in e^{i\theta\mathbb{R}^+}$
where ∂_+ is a tangent vector



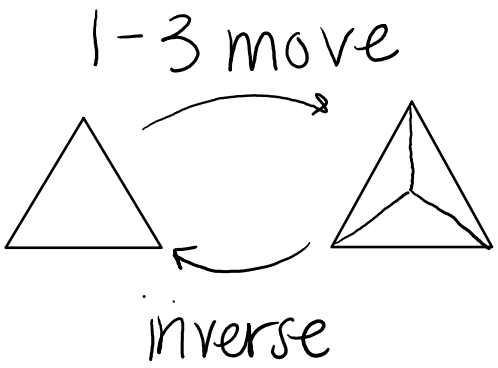


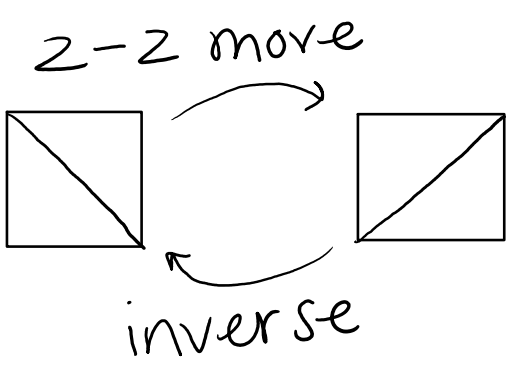
Δ^4 ideal simplex
$T[\partial\Delta^4] = 3d\ \aleph = 2$ field theory ideal triangulation
$M = \cup_{i\in I}\Delta_i^d$



Any 2 triangulations of M are related by finite of Pachner moves

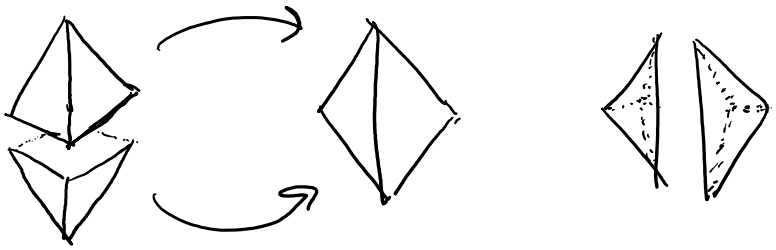
d-d-m Pachner moves $\leftrightarrow \Delta^{d+1}$ where $1 \leq n \leq d+1$ and n indicates Pachner moves





$d = 3 : (1,4), \boxed{(2,3)} \leftarrow \Delta^4$

$(2,3)$

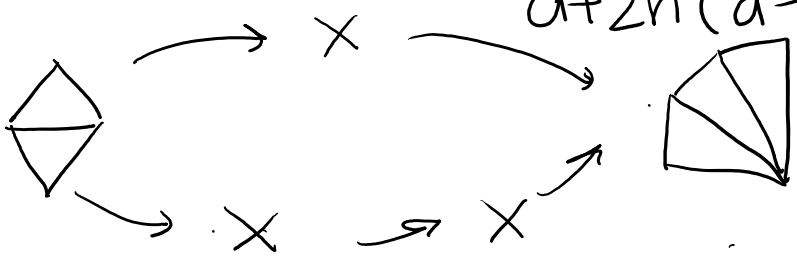


$(n, d+2-n)$ move $\leftrightarrow$ $n(d-1)$ moves

$\Re$

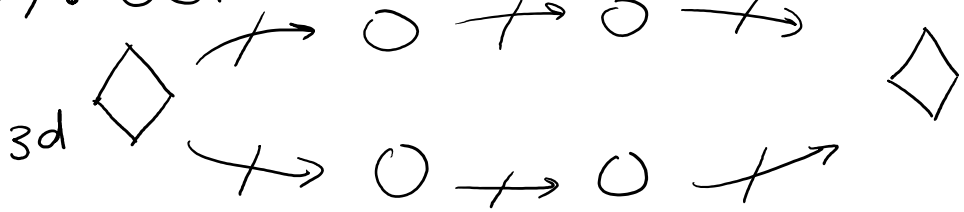
$d+2n(d-1)$ moves

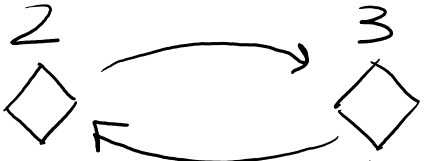
$(2,3)$:



$(3,3)$: octahedra

interfaces





3d $\mathcal{N}=2$ | 3d $\mathcal{N}=2$