Me and my work on the KdV Equation

About myself:

- Name: Mateusz Piorkowski, from Vienna, Austria
- Graduated from Vienna University, August 2021
- Supervisor: Gerald Teschl
- Postdoc at the MSRI
- Interests: integrable wave equations (KdV), orthogonal polynomials, Sturm–Liouville

  Riemann-Hilbert problems

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My work on the KdV equation

- R-H analysis of dispersive shock waves origination for steplike initial data
  $\hookrightarrow$ modulated Its–Matveev solution in the transition region
  (with I. Egorova and G. Teschl)
- Scalar R-H problem on the torus for the Its–Matveev solution
  (with G. Teschl)

My work on local parametrix problems and outlook

My work on local parametrix problems (and orthogonal polynomials)

- Method for avoiding local parametix problems using a priori estimates
- Derivation of a priori estimates for orthogonal polynomials on $[-1, 1]$
- Error estimates in Plancherel–Rotach asymptotics for a new class of singular weight functions (e.g. log singularities at the edge...)

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Outlook

- Looking for R-H problems leading to unsolvable local parametrix problems
- Long-time behaviour of transversal Ising chain via R-H methods (with P. Deift)
- R-H problems on Riemann surfaces