Curriculum Vitae
Reed Meyerson

Current Position

Mathematics Postdoctoral Researcher at University of Helsinki 2021-Present
Inverse Problems Research
Supervisor: Matti Lassas

Education

PhD in Mathematics 2016-2021
University of Washington
Thesis: *Intersection Rigidity*
Advisor: Gunther Uhlmann

BA in Mathematics 2012-2016
New College of Florida
Undergraduate Thesis: *The Heat Content of Triangles*
Advisor: Patrick McDonald

Current Research

I am interested in geometric inverse problems, manifold learning, and metric geometry. These areas appeal to me not just because of their mathematical beauty, but also for their applications to engineering, physics, and data science. Here are some of my current research questions.

1. **The Geometry of Perception** (with Lauri Ylinen and Matti Lassas)
   Suppose we have a large database of images. For every possible choice of three images A, B, C, suppose we ask people whether image A is closer to image B or image C. This tells us whether the perceived distance from A to B is greater than the perceived distance from A to C. From this information, can we assign an actual value to all distances that is consistent with the perceived comparisons? We phrase the question in terms of metric geometry as follows: suppose X is an intrinsic length space. To what extent does the set $\{(x,y,z) \in X^3 | |xy| \leq |xz|\}$ determine the geometry of X?

2. **Fractional Diffusion Rigidity for Complete Manifolds** (with Lauri Ylinen and Matti Lassas)
   Does the local source-to-solution operator for fractional diffusion on a complete Riemannian manifold determine the geometry of the manifold?

3. **Sticky Diffusion** (with Patrick McDonald)
   A manifold with corners is a geometric object with a nesting of substructures: Vertices $\subset$ Edges $\subset$ Faces $\subset \cdots$. On a manifold with corners, we consider Brownian motion starting in the interior. Upon hitting a substructure, the Brownian motion then continues within that substructure. This repeats until it hits a vertex. We would like to understand the geometric invariants that can be constructed from this process.

Previous Research

Mathematics PhD research at University of Washington 2016-2021
Supervisor: Gunther Uhlmann
PhD research focusing on geometric inverse problems. Solved problems related to geodesic measurements of Riemannian manifolds with boundary.

Undergraduate mathematics thesis project at New College of Florida 2015-2016
Supervisor: Patrick McDonald
Undergraduate thesis project on geometric inverse problem related to heat flow. Showed that a triangle is determined by its heat content.

Computational chemistry research at University of South Florida Summer 2015
Supervisor: Lee Woodcock

Implemented algorithms in C and Python related to computational chemistry.

Computational chemistry research at Texas A&M University   Summer 2014
Supervisor: Steven Wheeler (now at University of Georgia)
Implemented optimization algorithms in C and C++ to find minimal configuration energies of large intra-molecular compounds constrained to a Lie group.

Publications

1. Reed Meyerson. Stitching data: Recovering a manifolds geometry from geodesic intersections. *The Journal of Geometric Analysis*, 32(3):1–22, 2022

2. Reed Meyerson and Patrick McDonald. Heat content determines planar triangles. *Proceedings of the American Mathematical Society*, 145(6):2739–2748, 2017

In-Progress Papers

1. *Intersection Rigidity*

Technical Skills

- Python

- MATLAB

- C, and C++

- Haskell

- Linux

Teaching

- Calculus Integration at University of Helsinki   Winter 2021

- Linear Analysis (Math 309) at University of Washington   Spring 2021

- Linear Analysis (Math 309) at University of Washington   Fall 202

- Linear Analysis (Math 309) at University of Washington   Winter 202

- Linear Analysis (Math 309) at University of Washington   Fall 2019

- Matrix Algebra with Applications (Math 308) at University of Washington   Winter 2019

- Linear Analysis (Math 309) at University of Washington   Fall 2018

- Introduction to Differential Equations (Math 307) at University of Washington   Spring 2018

- TA for Calculus III (Math 126) at University of Washington (two sections)   Winter 2018

- TA for Calculus III (Math 126) at University of Washington (two sections)   Fall 2017

- General math help at MSC at University of Washington   Summer 2017

- TA for Calculus III (Math 126) at University of Washington (two sections)   Spring 2017

- TA for Calculus III (Math 126) at University of Washington (two sections)   Winter 2017

- TA for Calculus I (Math 124) at University of Washington (two sections)   Fall 2016

Talks

Intersection Rigidity (anticipated) May 2022
Inverse Problems: Modelling and Simulation, Melleiha, Malta

Squishing Manifolds with Boundary Along a Vector Field January 2020
Math + X Symposium, Rice University, Houston

Heat Content Determines Planar Triangles May 2017
Inverse Problems Seminar, University of Washington, Seattle

Awards

Craig McKibben and Sarah Merner Endowed Fellowship in Mathematics 2017