Mitul Islam

<div align="right">Curriculum Vitae</div>

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Research Interests

I am interested in *geometric structures on manifolds*, *discrete subgroups of Lie groups*, *geometric group theory*, and *deformations and rigidity of group actions*.

My research focuses on discrete subgroups of general linear groups that preserve some geometric structure. I have been studying groups that preserve *real convex projective structures*, mainly from the perspectives of *geometric group theory* and *non-positive curvature*. I am also interested in the deformation spaces of such groups, for instance *Anosov representations* and their generalizations.

More recently, I have been interested in the *rigidity/flexibility* of discrete group actions on compact manifolds by homemorphisms (i.e. *discrete subgroups of homeomorphism groups*). In particular, I have been studying deformations of *standard actions*. (Some examples of standard actions are the action of a uniform lattice on its Furstenberg boundary and the action of the fundamental group of a non-positively curved compact Riemannian manifold on the visual boundary of its universal cover).

Education

Heidelberg University — *Postdoctoral Researcher*
Research Station Geometry and Dynamics — *(2021- Present)*
Mentor: Beatrice Pozzetti

University of Michigan — *Ph.D. (2016- 2021)*
Dissertation: Rank one phenomena in convex projective geometry
Advisor: Ralf Spatzier

Indian Statistical Institute — *M. Math (2014-2016)*
Thesis: Non-commutative Geometry of Baumslag-Solitar group BS(1,-1) — *P.C.Panser Gold Medal*

Jadavpur University — *Bachelor of Science (2011-2014)*
Mathematics (Honours) — *University Gold Medal*

Publications and Preprints

1. *Boundary actions of lattices and C^0 local semi-rigidity.*
   Joint with Chris Connell, Thang Nguyen, and Ralf Spatzier.
   Submitted. Available at: arXiv:2303.00543

2. *The structure of relatively hyperbolic groups in convex real projective geometry.*
   Joint with Andrew Zimmer.
   Submitted. Available at: arXiv:2203.16596

3. *Convex co-compact groups with one dimensional boundary faces.*
   Joint with Andrew Zimmer.
   Submitted. Available at: arXiv:2104.05056

4. *Convex co-compact representations of 3-manifold groups.*
   Joint with Andrew Zimmer.
   Submitted. Available at: arXiv:2009.05191

5. *Rank-one Hilbert geometries.*
   Submitted. 34 pages. Available at: arXiv:1912.13013.

6. *Convex co-compact actions of relatively hyperbolic groups.*
   Joint with Andrew Zimmer.
   Geometry & Topology (accepted). Available at: arXiv:1910.08885

7. *A flat torus theorem for convex co-compact actions of projective linear groups.*
   Joint with Andrew Zimmer.
   Journal of the London Mathematical Society (accepted). Available at: arXiv:1907.03277

Projects in preparation

1. *Rigidity and flexibility of boundary actions for graph manifolds.*
   Joint with Chris Connell, Thang Nguyen, and Ralf Spatzier.

2. *Morse boundaries in convex projective geometry.*
   Joint with Theodore Weisman.

3. *Relatively Anosov representations, Geometric Finiteness, and Convex Projective Structures.*
   Joint with Feng Zhu.

4. *Symplectic Reflection Groups*
   Joint with Beatrice Pozzetti.

Awards and Achievements

Rackham Predoctoral Fellowship, University of Michigan	2020-2021
Rackham One-Term Dissertation Fellowship, University of Michigan	2020
Mathematics Department Fellowship, University of Michigan	2019
Mathematics Department Fellowship, University of Michigan	2018
Alice Weber Glover in Math Scholarship, University of Michigan	2017
P. C. Panser Gold Medal, Indian Statistical Institute, India	2017
Kishore Vaigynaik Protsahan Yojana, Govt. of India	2010-2016
Masters' scholarship, National Board of Higher Mathematics, India	2014
University Gold Medal, Jadavpur University, India	2014

Invited Talks

Geometry seminar, Indian Institute of Science (IISc), Bangalore, India	March 2023
Seminar, Tata Institute of Fundamental Research (TIFR), Bangalore, India	March 2023
Colloquium, Tata Institute of Fundamental Research (TIFR), Mumbai, India	March 2023
Seminar, Indian Institute of Technology (IIT) - Mumbai, Mumbai, India	March 2023
Lecture Series on Projective Structures, Indian Statistical Institute, Kolkata, India	December 2022
Ergodic Theory seminar, Institut de Recherche Mathematique de Rennes (IRMAR), Rennes	May 2022
Colloquium, Indian Statistical Institute, Kolkata, India	December 2021
Young Researcher's Meeting of the GDR Platon, CIRM - Marseille	November 2021
Topology and Geometric Group Theory Seminar, Ohio State University	November 2021
Arbeitsgemeinschaft: Thin Groups and Super-strong Approximation, Oberwolfach	October 2021
Geometry Seminar, University of Virginia	March 2021
Geometry Seminar, Indiana University Bloomington	December 2020

McGill Geometric Group Theory Seminar, McGill University	November 2020
MSRI, Random and Arithmetic Structures in Topology (virtual semester)	November 2020
Nearly Carbon Neutral Geometric Topology Conference (NCNGT)	June 2020
Geometry and Topology Seminar, Louisiana State University (*cancelled*)	March 2020
Topology Seminar, University of Texas, Austin	November 2019
Indian Statistical institute, Kolkata, India	January 2019
Indian Statistical institute, Kolkata, India	July 2017

Research Visits

Tata Institute of Fundamental Research (TIFR), Mumbai	March 2023
Institut de Recherche Mathematique de Rennes (IRMAR), Rennes	May 2022
Louisiana State Univeristy	March 2020
University of Texas - Austin	November 2019

Teaching

I have taught one class at **Heidelberg University** the **primary instructor**.

Matrix Groups [(Course webpage)]   Summer 2023   Heidelberg University

I have taught six semesters at the **University of Michigan** as the **primary instructor**, following Inquiry Based Learning (IBL) philosophy.

Math 115 Differential Calculus	Fall 2019	University of Michigan
Math 115 Differential Calculus	Fall 2018	University of Michigan
Math 115 Differential Calculus	Winter 2018	University of Michigan
Math 115 Differential Calculus	Fall 2017	University of Michigan
Math 115 Differential Calculus	Winter 2017	University of Michigan
Math 105 Pre-calculus	Fall 2016	University of Michigan

Mentoring

Laboratory of Geometry - LoG(M), University of Michigan (January-April 2020)
Project: *Entropy degeneration of ideal projective pants*

Role: Co-mentored a group of three undergraduate students, alongside two faculty mentors Harrison Bray and Giuseppe Martone. Helped run lectures and discussion sessions. Contributed in the discussion sessions on the computational/ coding component of the project.

Outreach

Organizer: **Department of Applied Mathematics, University of Calcutta, India** (December 2021)
Title of the talk: *Hyperbolic Geometry and Beyond - An Algebraic and Dynamical Perspective*

Acted as a resource person and gave a talk at a webinar organized by University of Calcutta on December 2021. The webinar was targeted towards young students with a goal towards motivating them for mathematics and research.

Service and Organization

Reviewer Mathematische Zeitschrift

Organization (Heidelberg University)

Differential Geometry seminar (co-organizer)   October 2021 - Present

Organization (University of Michigan)

Learning seminar (*"Super-rigidity of higher rank lattices"*)   February - June 2020
Learning seminar (*"Benoist's work on convex divisible sets"*)   February - April 2019
Student Geometry/ Topology seminar (co-organizer)   January 2019 - April 2020
Student Dynamics seminar (co-organizer)   January 2019 - April 2020