

Max-Planck-Institut for Mathematics in the Sciences  
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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 homomorphisms (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

### Max-Planck-Institut for Mathematics in the Sciences (Leipzig)

Division: Geometry, Groups, and Dynamics (led by Anna Wienhard)

*Postdoctoral Researcher*  
(2023- Present)

### Heidelberg University

Research Station Geometry and Dynamics  
Mentor: Beatrice Pozzetti

*Postdoctoral Researcher*  
(2021- 2023)

### University of Michigan

Dissertation: Rank one phenomena in convex projective geometry  
Advisor: Ralf Spatzier

*Ph.D.* (2016- 2021)

### Indian Statistical Institute

Thesis: Non-commutative Geometry of Baumslag-Solitar group  $BS(1,-1)$

*M. Math* (2014-2016)  
*P.C.Panser Gold Medal*

### Jadavpur University

Mathematics (Honours)

*Bachelor of Science* (2011-2014)  
*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 (61 pages). Available at: [arXiv:2303.00543](https://arxiv.org/abs/2303.00543)
2. *The structure of relatively hyperbolic groups in convex real projective geometry.*  
Joint with Andrew Zimmer.  
Submitted (31 pages). Available at: [arXiv:2203.16596](https://arxiv.org/abs/2203.16596)
3. *Convex co-compact groups with one dimensional boundary faces.*  
Joint with Andrew Zimmer.  
Submitted (24 pages). Available at: [arXiv:2104.05056](https://arxiv.org/abs/2104.05056)

4. *Convex co-compact representations of 3-manifold groups.*  
Joint with Andrew Zimmer.  
Submitted (40 pages). Available at: [arXiv:2009.05191](https://arxiv.org/abs/2009.05191)
5. *Rank-one Hilbert geometries.*  
Submitted (34 pages). Available at: [arXiv:1912.13013](https://arxiv.org/abs/1912.13013).
6. *Convex co-compact actions of relatively hyperbolic groups.*  
Joint with Andrew Zimmer.  
**Geometry & Topology** 27 (2023) 417-511 (98 pages).  
Available at: [arXiv:1910.08885](https://arxiv.org/abs/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** (2021) Vol 3 Issue 2 470-489 (19 pages).  
Available at: [arXiv:1907.03277](https://arxiv.org/abs/1907.03277)

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#### 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.

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#### AWARDS AND ACHIEVEMENTS

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

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#### INVITED TALKS

Mini-course (3-part) titled “ <b>Actions of lattices on boundaries</b> ”, Groups and Rigidity Around Zimmer Program (GRAZP conference), Ventotene	Sept. 2023
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 (3-part) titled “ <b>Convex Projective Structures</b> ”, ISI Kolkata, India	December 2022
Geometriy seminar, Florida State University	November 2022

Geometric Analysis seminar, IIT Bombay, India	November 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 ( <i>cancelled</i> )	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

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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

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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.

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

## MENTORING

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**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

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- **Celebrating the Poincaré Conjecture** (Millenium Prize Problems Mathfest, Heidelberg University, July 2022)  
Event: A set of public events and lectures on the Poincaré conjecture aimed at the general public. Workshops were organized for school students.  
Role: Worked in the team that created the [website](#) (aimed at explaining the Poincaré conjecture to the public) and helped with the rest of the aspects of the event organization.
  - Public webinar titled **Hyperbolic Geometry and Beyond - An Algebraic and Dynamical Perspective** (Department of Applied Mathematics, Calcutta University, December 2021)  
Event: A webinar was targeted towards young students with a goal towards motivating them for mathematics and research.  
Role: Acted as a resource person and gave a talk at a webinar organized by University of Calcutta on December 2021.

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#### SERVICE AND ORGANIZATION

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**Quick Opinions/Reviewer** Mathematische Zeitschrift, Commentarii Mathematici Helvetici

**Organization (Heidelberg University)**

Differential Geometry seminar (co-organizer)

October 2021 - July 2023

**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