Curriculum Vitae/Resume
Rupadarshi Ray

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IISER Mohali

Thesis and interests

My primary interests lie in the topics related to the analysis of manifolds: be it geometric, topological, dynamical or analytical. I have invested a lot of time on Riemann surfaces, hyperbolic manifolds and discrete subgroups of $\mathrm{Isom}(\mathbb{R}\boldsymbol{H}^n) \cong O^+(1,n)$ during my thesis:

Quasiconformal and measurable rigidity of discrete groups . . . . . Fall 2025-Spring 2026
Masters thesis under Dr. Arghya Mondal (Poster and slides from my defence) IISER Mohali

- ⋆ Tukia's quasi-conformal rigidty of discrete groups of $\mathrm{Isom}(\mathbb{R}\boldsymbol{H}^n) \cong O^+(1,n)$ that diverge at $n-1$
- ⋆ Patterson-Sullivan densities of discrete subgroups of $\mathrm{Isom}(\mathbb{R}\boldsymbol{H}^n) \cong O^+(1,n)$
- ⋆ Sulivan's measurable rigidity theorem on discrete subgroups of $\mathrm{Isom}(\mathbb{R}\boldsymbol{H}^n) \cong O^+(1,n)$ of divergent type

My broad interests also include geometric theory of holomorphic functions/quasiconformal mappings, harmonic analysis, ergodic theory, symplectic geometry and Hamiltonian flows, representation theory of Lie groups and Lie algebras, etc.

Academic referees

- Arghya Mondal, arghyamondal@iisermohali.ac.in, Assistant Professor, IISER Mohali (MS thesis supervisor)
- Kapil Hari Paranjape, kapil@iisermohali.ac.in, Professor Emeritus, IISER Mohali
- Vaibhav Vaish, vaibhav@iisermohali.ac.in, Assistant Professor, IISER Mohali
- Pranab Sardar, psardar@iisermohali.ac.in, Assistant Professor, IISER Mohali
- Soma Maity, somamaity@iisermohali.ac.in, Assistant Professor, IISER Mohali

Education

Indian Institute of Science Education and Research Mohali (IISER Mohali) 2021-2026
5 years BSMS, graduating with a Masters in Mathematics Mohali, Punjab, India

- ⋆ Graduating CPI: 8.6
- ⋆ Degree to be obtained on June 16, 2026

Techno India Group Public School (TIGPS), Balurghat 2007-2020
Primary, Middle and High Scool Balurghat, West Bengal, India

- ⋆ Standard XII CBSE board exams: 93.6%
- ⋆ Standard X CBSE board exams: 90.6%

Background and involvement

Beyond the standard curriculum for masters, I have also taken the following courses.

2022 *Geometry of curves and surfaces* following *Pressley* and *do Carmo*
2023 Audited the course on *algebraic topology* following Hatcher
2024 *Knots and braids*: Reidemeister moves, colouring invariants, Jones polynomial, Alexander module and its elementary ideals, braid groups
2024 *Riemannian geometry* following *Jack Lee*
2025 *Arithmetic of elliptic curves*
2025 *Fourier analysis*
2026 *Fuchsian groups*

After self-studying the theory of smooth manifolds and differential forms I went on to reading the following during the summers.

Sheaf theoretic proof of de Rham isomorphism . . . . . Summer 2023
Summer reading under Dr. Shane D' Mello IISER Mohali

- ⋆ *Jack Lee* on de Rham cohomology of differential forms
- ⋆ *Griffiths and Harris* on sheaf cohomology of differential forms
- ⋆ *Bott and Tu* on Cech-de Rham double complex

Representation theory of groups and Lie algebras . . . . . Winter 2023 - Summer 2024
Reading under Dr. Vaibhav Vaish IISER Mohali

- ⋆ *Fulton and Harris* on representation theory of finite groups and Lie algebras
- ⋆ *Woit* on quantum mechanics and representation theory

Ergodic theorems for actions of locally compact groups . . . . . Summer 2025
Summer reading under Dr. Jotsaroop Kaur IISER Mohali

- ⋆ Following Einsiedler and Ward, I presented proofs of ergodic theorems for measure preserving transformations and actions of Amenable groups.

Seminars and workshops that I have attended/participated in

Geometric Aspect of Algebraic Varieties . . . . . Spring 2025
Conference and celebration of mathematical legacy of Dr. Kapil Hari Paranjape IISER Mohali

Meromorphic functions on Riemann surfaces . . . . . Summer 2025
Seminar organized by self IISER Mohali

- ⋆ Talk by Dr. Kapil Hari Paranjape on etale space of sheaf of holomorphic and meromorphic functions, ringed space definition of Riemann surfaces
- ⋆ Student talks on constructing meromorphic functions on Riemann surfaces, Riemann-Roch theorem, Abel's theorem and Jacobi's inversion theorem

Rigidity of Discrete Groups . . . . . June 30 - July 4, 2025
Workshop organized by Dr. Krishnendu Gongopadhyay and Dr. Pranab Sardar IISER Mohali

- ⋆ Attended talks by Dr. Marc Bourdon, Dr. C S Rajan
- ⋆ Attended talks on the Mostow rigidity theorem for hyperbolic 3-manifolds by Dr. Arghya Mondal

Singapore-Bangalore "What is ...?" Workshop on Mathematics . . . . . Fall 2025
Workshop organized by NUS Singapore and IISc Bangalore IISc Bangalore

Boundary of symmetric spaces . . . . . Fall 2025
Seminar organized by Dr. Arghya Mondal IISER Mohali

- ⋆ Symmetric spaces of non-compact type, $P(n, \mathbb{R})$ and its totally geodesic submanifolds
- ⋆ Boundary of CAT(0) symmetric spaces

Talks that I have given

2026 A talk on computing the **genus of modular curves**, for the course on *Fuchsian groups*, IISER Mohali, Spring 2026

2026 Two talks on the proof of **Sullivan's measure rigidity theorem**, *Boundary of symmetric spaces* seminar, IISER Mohali, Spring 2026

2026 An elementary proof of **Selberg's lemma for** $SL(2, \mathbb{C})$, for the course on *Fuchsian groups*, IISER Mohali, Spring 2026

2026 Multiple talks on the construction of **Patterson-Sullivan measures on limit sets**, *Boundary of symmetric spaces* seminar, IISER Mohali, Spring 2026

2026 An elementary talk on **proper actions and properly discontinuous actions** on topological spaces

2025 An introductory talk on **deformations and rigidity** of geometric structures: Teichmuller spaces and Mostow's rigidity following an article by Lizhen Ji

2025 **Reductive subgroups of** $GL(n, \mathbb{R})$ **and totally geodesic submanifolds of** $P(n, \mathbb{R})$: *Boundary of symmetric spaces* seminar, IISER Mohali, Fall 2025

2025 A talk on a sketch of the proof of **Gelfand-Naimark theorem** for C^*-algebras, for a series of talks on *harmonic analysis*

2025 Multiple talks on the proof of **Ergodic theorems for actions of locally amenable compact groups**, as presentations for a summer reading, IISER Mohali, Summer 2025

2025 **Abel's theorem and Jacobi's inversion theorem**: for the seminar on *Meromorphic functions on Riemann surfaces*, IISER Mohali, Summer 2025

2025 An introductory talk on **symplectic manifolds and Hamiltonian flows** titled "When does a vector field kill area?" in the Graduate Students Seminar, IISER Mohali, Spring 2025

2025 **Construction of Haar measure on locally compact Hausdorff groups**: for the course on Fourier analysis, IISER Mohali, Semester 8

2025 A short talk on **construction of Riemann surface of holomorphic functions** for the course on seminar delivery, IISER Mohali, Semester 8

2025 **Periods of elliptic curves**: for the course on Arithmetic of elliptic curves, IISER Mohali, Semester 8

2024 A talk on **Knower's and liar's paradoxes and their formalizations** titled "What does a knower and a liar have in common?", course on Philosophy of language, IISER Mohali, Semester 7

2024 A short talk on **topological conjuacy of linear flows** for the course on seminar delivery, IISER Mohali, Semester 7

2024 A talk on **some comparison theorems in Riemannian geometry** for the course on Riemannian geometry, IISER Mohali, Semester 7

Skills

English TOEFL iBT (November 2025) scored 99/120 (R: 25, L: 28, S: 24, W: 22)

Teaching I have taught physics and mathematics to students at the undergraduate level, in particular for courses such as linear algebra, geometry of curves and surfaces, ordinary differential equations.

Python Experience in NumPy, Sympy and Matplotlib for data analysis, algebra and visualization. Also used libraries such as SnapPy and Sage.

LaTeX Proficient in creating complex documents, including academic papers and presentations.

Notetaking I use Obsidian for taking notes on mathematics. I have experience in organizing and structuring information effectively, spread over hundreds of notes, using this tool.

Vector art 10 years of experience in vector art design using Adobe Illustrator such as my MS thesis poster

Other Familiar with C, C++, MATLAB, R, HTML, CSS, Javascript, Adobe Photoshop