Rupadarshi Ray

rupadarshiray.github.io   Fifth year mathematics major   rupadarshi2014@gmail.com
IISER Mohali

Thesis

[Rigidity of locally symmetric spaces](...) . . . . Fall 2025-Spring 2026
Masters thesis under Dr. Arghya Mondal   IISER Mohali

- ⋆ Mostow rigidity theorem for locally symmetric spaces of non-compact type
- ⋆ Boundary of CAT(0) symmetric spaces

Academic interests

My primary interests lie in

- Differential geometry: Riemannian manifolds, symplectic manifolds and Lie groups
- Dynamics on manifolds: Hamiltonian flows, geodesic flows and ergodic theory
- Symmetric spaces of non-compact type, their boundaries and rigidity of locally symmetric spaces

I also am interested in the following areas

- Representation theory of Lie groups and Lie algebras
- Hyperbolic surfaces and Teichmuller theory
- Discrete subgroups of semi-simple Lie groups, arithmetic lattices
- Riemann surfaces and complex manifolds, their deformations and rigidity

Education

MS21, IISER Mohali 2021-
5 years BSMS   Mohali, Punjab

- ⋆ current CPI: 8.42

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

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

Talks

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 **Ergodic theorems for actions of locally compact groups**, Summer reading presentation, IISER Mohali, Summer 2025

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

2025 **Symplectic manifolds and Hamiltonian flows**

Introductory talk titled "When does a vector field kill area?" in the Graduate Students Seminar, IISER Mohali, Spring 2025

A talk with regards to the orbit method in representation theory, Summer 2025

2025 A talk on **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 A talk on **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

Background and involvement

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

- ⋆ 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

Knots and braids . . . . Semester 6
Mathematics course instructed by Dr. Shane D' Mello IISER Mohali

- ⋆ Jones polynomial of knots and links
- ⋆ Universal Abelian cover of knot complements and Alexander polynomial

Riemannian geometry . . . . Semester 7
Mathematics course instructed by Dr. Soma Maity IISER Mohali

Arithmetic of elliptic curves . . . . Semester 8
Mathematics course instructed by Dr. Abhik Ganguli IISER Mohali

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

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 with tripling property

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

Misselaneous

2025　Volunteered to give a talk on Fourier series in a Science festival 2025 in IISER Mohali
2023　Volunteered in official help sessions on linear algebra for first year students in IISER Mohali in Monsoon 2023
2023　Wrote a route-map for introductory resources for mathematics and physics.
2019　**Electronics project in Standard XII:** Implementation of $A \cdot B + C$ using resistance-transistor logic