



Module PMRF-ISSS059/2022

Introduction to Hyperbolic Geometry

Name of the PMRF student

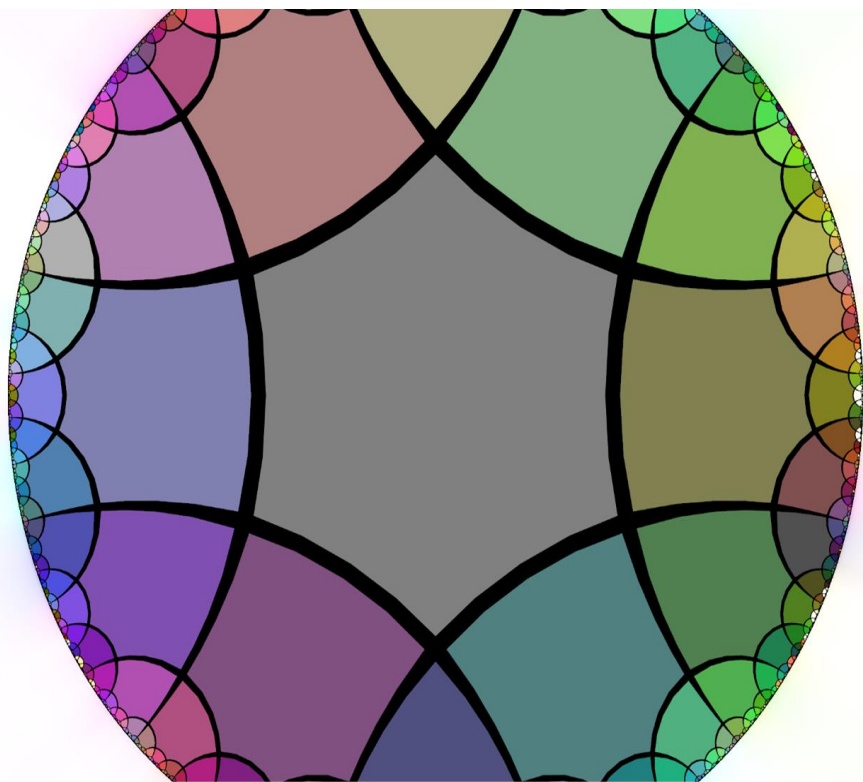
ABHISHEK PANDEY

Required background of the students taught

Basic knowledge of Euclidean geometry,
topology and complex analysis

Online session coordinator

Will be chosen from the list of registrants



Schedule of the module

Start Date: March 31, 2023

End Date: May 26, 2023

Timings: Fridays, 6PM to 7PM

If required, extra discussion lectures are encouraged

Details of the content of the module

The discovery of Hyperbolic Geometry goes back to the first half of the **nineteenth** century as an attempt to understand the fifth postulate of Euclidean geometry. Hyperbolic geometry is one of the non-Euclidean geometry which is connected to many fields of mathematics such as complex analysis, differential geometry, topology, Riemann surfaces etc. In this series of talks we are going to **discuss** the following content

1.) Background of hyperbolic geometry

Abstract: Euclidean geometry and its five postulates, fifth postulate is independent from the other four postulates? Gauss **legacy**, Birth of non-Euclidean geometry, curved surface of constant negative curvature represent non-Euclidean geometry, Comparison between Euclidean and Hyperbolic geometry, Ingredients for the Upper half plane and **unit** disk model of hyperbolic geometry.

2.) Models of Hyperbolic Geometry

Abstract: Upper half plane model, Hyperbolic line, length and distance in Hyperbolic geometry, Hyperbolic geodesics, Isometries, The Poincare disk model.

3.) Hyperbolic metric and its connection with GFT

Abstract: Properties of hyperbolic metric, hyperbolic metric on simply connected domains, Curvature and Ahlfors lemma, hyperbolic metric on hyperbolic region.

References:

1. J. W. Anderson, Hyperbolic Geometry.
2. A. F. Beardon and D. Minda, Hyperbolic metric and geometric function theory
3. Linda Keen, Hyperbolic geometry from local view point
4. A. F. Beardon, Geometry of discrete groups

Meeting link : Will be shared later

[Link](#)

contact email ID: issss.forum@gmail.com

Registration link:

<https://docs.google.com/forms/d/e/1FAIpQLScMyjDaEyyeo8npAbgdQ4NefYihVZhfWSSDfMEukVmHEqRK2g/viewform>