INDIAN STATISTICAL INSTITUTE
Theoretical Statistics and Mathematics Unit, Kolkata

SEMINAR

Date: November 21, 2024
Time: 04:00 PM

VENUE:

L- infinity

(5th Floor, A.N. Kolmogorov Bhavan), ISI Kolkata

TITLE:

Polyhedral complex structure of maximal Gromov hyperbolic spaces with finite boundary

SPEAKER:

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ABSTRACT:

For a boundary continuous Gromov hyperbolic space, we have canonical cross-ratios for quadruple of points on Gromov boundary, with respect to the visual metrics (i.e. all visual metrics on the Gromov boundary gives the same cross-ratio). It is well-known that isometries between boundary continuous Gromov hyperbolic spaces extend to a Möbius homeomorphism (cross-ratio preserving homeomorphism) between their Gromov boundaries. The natural question to ask if the converse is true :
Does a Möbius homeomorphism between the Gromov boundaries extend to isometry of the underlying spaces? This is the Möbius rigidity problem, related to other problems such as the marked length spectrum rigidity and geodesic conjugacy problem for negatively curved manifolds.

For "good" (i.e. proper geodesically complete) Gromov hyperbolic spaces the Gromov boundary is a special type of compact metrizable space called quasi-metric antipodal space. Biswas gave a positive answer to the Möbius rigidity problem for a special class of good Gromov hyperbolic spaces called 'maximal Gromov hyperbolic spaces'. These Gromov hyperbolic spaces are 'maximal' in the sense, any other good Gromov hyperbolic space with the same Gromov boundary isometrically embeds into them, i.e. it is the maximal hyperbolic filling. Biswas showed that given any quasi-metric antipodal space one can naturally construct the maximal Gromov hyperbolic space, hence establishing an equivalence of categories between the quasi-metric antipodal spaces and maximal Gromov hyperbolic space.

In this talk, we delve into maximal Gromov hyperbolic spaces with finite Gromov boundaries. We will demonstrate that these spaces possess a finite-dimensional polyhedral complex structure. We will see that the combinatorics of the polyhedral complex is determined by a particular type of relation called 'antipodal relation' on the Gromov boundary, and discuss the dimension of cells. Furthermore, we will investigate the space of deformations of such maximal Gromov hyperbolic spaces and introduce an associated Teichmuller space. This work is based on joint work with Prof. Kingshook Biswas.

ALL ARE CORDIALLY INVITED