Theoretical Statistics and Mathematics Unit

Indian Statistical Institute

203 B.T. Road, Kolkata - 700108

SEMINAR

Date: November 30, 2026
Time: 4:15 PM

VENUE:

L-Infinity, 5th Floor, A.N. Kolmogorov Bhavan, ISI Kolkata

SPEAKER:

Balarka Sen

TIFR, Mumbai

TITLE:

What is scalar curvature?

ABSTRACT:

Since antiquity, geometry has revolved around measurement of shapes by calculating various scalar quantities: length, area, circumference, volume, etc. Around 100 years ago, Hermann Weyl defined what is known in modern mathematics as a manifold, synthesizing a unified notion for the concept of a "shape" from the works of Gauss, Riemann and Poincaré.

Scalar curvature of a Riemannian manifold at a point is the simplest scalar quantity that measures the curvature of the manifold at that point: it is defined as the average sectional curvature of all tangent 2-planes passing through the point, upto a dimensional constant. The central question in the study of scalar curvature is to understand the features (or the "shape") of a Riemannian manifold with positive scalar curvature. To this end, Misha Gromov in 1986 put forth the idea that a measuring stick we can use to understand positive scalar curvature manifolds is the notion of Urysohn width. He formulated several key questions pertaining to scalar curvature and Urysohn width, which were eventually answered by OpenAI on Oct 6th, unceremoniously ending a four decade long quest.

In this talk, I will discuss the approach put forth by Gromov, as well as the motivations and questions surrounding it. Then, I will discuss some surprising results found in joint works with Aditya Kumar (UMD), which indicate, along with other circumstantial evidence scattered throughout the history of the subject, that perhaps, scalar curvature and Urysohn width were the wrong measuring sticks all along!

ALL ARE CORDIALLY INVITED

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