MATH-IMS Joint Pure Mathematics Colloquium Series
The Chinese University of Hong Kong

This Colloquium Series in Pure Mathematics is organized by the Department of Mathematics and the Institute of Mathematical Sciences (IMS) at The Chinese University of Hong Kong. The series focuses on all areas of pure mathematics together with theoretical developments and applications.

Date: April 14, 2023 (Friday)
Time: 9:30AM-10:30AM (Hong Kong Time)
Zoom Link: https://cuhk.zoom.us/j/98846779826

Applying the Null Distance to define Spacetime Intrinsic Flat Convergence

Speaker: Professor Christina Sormani
Lehman College and CUNY Graduate Center

Abstract: In order to define a new notion of convergence for sequences of spacetimes (N_j, g_j), we plan to first convert the spacetimes into metric spaces endowed with time functions (X_j, d_j, τ_j). This can be done in a canonical way using the Andersson-Howard-Galloway Cosmological time function $\tau_j : N_j \to [0, \tau_{max}]$ on spacetimes where this time function is regular by taking the distance function d_j to be the null distance defined by Sormani-Vega. Sakovich-Sormani proved that if τ_j is also proper then one can recover the causal structure from the information on (X_j, d_j, τ_j). Applying this result combined with work of Hawking et al, they prove that if there is a time preserving isometry from (X_1, d_1, τ_1) to (X_2, d_2, τ_2) then there is a Lorentzian isometry from (N_1, g_1) to (N_2, g_2). This talk will present these results in detail and explain how this can next be applied to define a spacetime intrinsic flat convergence using this method. For more information about intrinsic flat convergence see https://sites.google.com/site/intrinsicflatconvergence/ .

Bio: Professor Sormani obtained her PhD at Courant Institute in 1996 under the supervision of Professor Jeff Cheeger. In 1999, Professor Sormani joined the Lehman College and has been promoted to full professor in 2010. Professor Sormani's research interest broadly covers a variety of topics in Geometric Analysis, Riemannian Geometry, Metric Spaces, and Geometric Measure Theory, especially on the geometry of Ricci curvature and compactness theory in geometry. She has made tremendous contributions in these areas, particularly on her recent compactness theory in scalar curvature geometry. Prof. Sormani became a Fellow of the American Mathematical Society in 2015 and has served on various editorial boards including Transactions of the AMS.