For Favour of Posting

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Room 220, Lady Shaw Building, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong

Joint Geometric Analysis Seminar

(Part of MIST program)

Static Black Holes with a Negative Cosmological Constant

Dr. Brian Harvie
University of Copenhagen

Abstract

The classification of stationary black hole solutions of the Einstein field equations, broadly referred to as the "no-hair conjecture", is a challenging and fundamental line of research in general relativity. The problem is more tractable for black hole spacetimes which are static, but even under this stronger assumption the existing results are mostly limited to static black holes with zero or positive cosmological constant. In this talk, I will present a geometric inequality for isolated static vacuum black holes with a negative cosmological constant which has far-reaching implications for their geometry and uniqueness. The inequality relates the surface gravity, area, and topology of a horizon in a static spacetime to its conformal infinity, and equality is achieved only by the Kottler black holes. From this, we deduce several new static uniqueness theorems for Kottler. Namely, we show: (1) the Kottler black hole over the sphere which minimizes surface gravity is unique, (2) the Kottler black hole over the torus is unique, assuming the horizons have non-spherical topology, and (3) uniqueness for the higher-genus Kottler black holes is equivalent to the Riemannian Penrose inequality. This is based on joint work with Ye-Kai Wang.

Date: November 3, 2026 (Tuesday)
Time: 1:30pm-2:30pm
Venue: LSB 222

All are Welcome