

THE UNIVERSITY



OF HONG KONG

*Institute of Mathematical Research
Department of Mathematics*

Special PDE Seminar

On Kerr Black Hole Formation and a New Approach Toward Penrose Inequality

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Abstract

Black hole formation is a central question in mathematical general relativity, involving nonlinear wave equations, geometric analysis, and mathematical physics. In this talk I will present a recent joint work with Taoran He. For the 3+1 dimensional Einstein vacuum equations, we extend Christodoulou's celebrated trapped surface formation theorem to a black hole formation result. Without time-symmetric assumption, we further introduce a new approach and prove the spacetime Penrose inequality in perturbative regimes of sub-extremal Kerr black holes.

Date:	December 5, 2025 (Friday)
Time:	3:30 – 4:30 pm
Venue:	Room 210, Run Run Shaw Building, HKU

All are welcome