

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: December 2, 2021 (Thursday)

Time: 10:00-11:00 (Hong Kong Time)

Zoom Link: <https://cuhk.zoom.us/j/98846779826>

A geometric boundary value problem in general relativity

*Speaker: Professor Lan-Hsuan Huang
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Abstract: Constructing Riemannian metrics of zero scalar curvature with prescribed boundary geometry is of fundamental importance in general relativity and differential geometry. This talk will focus on a special class of metrics of zero scalar curvature, called static vacuum. A static vacuum metric produces a Ricci flat manifold of one dimension higher and is related to scalar curvature deformation and gluing. There were very limited examples of static vacuum metrics without symmetry. For example, the celebrated Uniqueness Theorem of Static Black Holes says that any asymptotically flat, static vacuum metric with minimal surface boundary must be rotationally symmetric. In contrast, motivated by his quasi-local mass program, R. Bartnik conjectured that one should always find an asymptotically flat, static vacuum metric with quite arbitrarily prescribed boundary geometry. I will discuss recent progress toward this conjecture. It is based on joint work with Zhongshan An.

Bio: Prof. Huang received her B.S. in mathematics in 2004 at National Taiwan University, and her Ph.D. in 2009 at Stanford University, under the supervision of Prof. Richard Schoen. After that, she became a Ritt Assistant Professor at Columbia University and later moved to University of Connecticut, where she is currently a Professor of Mathematics. The research interests of Prof. Huang lie at the intersection of mathematical general relativity and geometric analysis. Prof. Huang has made fundamental contributions to many geometric problems arising in general relativity. Her work has been highly influential to both the mathematics and physics community. In recognition of these, Prof. Huang has received numerous awards, including the NSF CAREER Award in 2015, Simons Fellow in 2018, von Neumann Fellow at Institute for Advanced Study, and she is an invited speaker at the International Congress of Mathematical Physics in 2021.