Department of Mathematics,
University of California San Diego

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Joint UCI-UCR-UCSD Seminar

Pengzi Miao

University of Miami

Minimal hyper surfaces and boundary behavior of compact manifolds with nonnegative scalar curvature.

Abstract:

On a compact Riemannian manifold with boundary having positive mean curvature, a fundamental result of Shi and Tam states that, if the manifold has nonnegative scalar curvature and if the boundary is isometric to a strictly convex hypersurface in the Euclidean space, then the total mean curvature of the boundary is no greater than the total mean curvature of the corresponding Euclidean hypersurface. In 3-dimension, Shi-Tam's result is known to be equivalent to the Riemannian positive mass theorem.

In this talk, we will discuss a supplement to Shi-Tam's theorem by including the effect of minimal hypersurfaces on a chosen boundary component. More precisely, we consider a compact manifold with nonnegative scalar curvature, whose boundary consists of two parts, the outer boundary and the horizon boundary. Here the horizon boundary is the union of all closed minimal hypersurfaces in the manifold and the outer boundary is assumed to be a topological sphere. In a relativistic context, such a manifold represents a body surrounding apparent horizon of black holes in a time symmetric initial data set. By assuming the outer boundary is isometric to a suitable 2-convex hypersurface in a Schwarzschild manifold of positive mass m, we establish an inequality relating m, the area of the horizon boundary, and two weighted total mean curvatures of the outer boundary and the hypersurface in the Schwarzschild manifold. In 3-dimension, our result is equivalent to the Riemannian Penrose inequality. This is joint work with Siyuan Lu.

Special Note:
Please note the special day, time, and location of this seminar. If you would like to attend and need a ride to UCR, please talk to Lei Ni.

Friday, April 21, 2017
3:00 PM
UC Riverside, Surge Bldg 284

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