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On interaction between scalar curvature and boundary mean curvature

Scalar curvature and mean curvature are some of the most basic curvature quantities associated to a Riemannian manifold and its hypersurfaces, respectively. In a relativistic context, scalar curvature relates to matter distribution in a spacetime and mean curvature is used to compute the quasi-local mass of a finite body. In Riemannian geometry, existence and non-existence of positive scalar curvature metrics is a fundamental question on closed manifolds. If the manifold is noncompact, important results on metrics with nonnegative scalar curvature include the Riemannian positive mass theorem and the Riemannian Penrose inequality. In this talk, we discuss how nonnegative scalar curvature in the interior of a compact manifold influences the mean curvature of its boundary hypersurface. Part of the talk is based on joint work with Siyuan Lu.