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Rigidity of Riemannian Penrose inequality with corners and its implications

Motivated by the rigidity case in the localized Riemannian Penrose inequality, we show that suitable singular metrics attaining the optimal value in the Riemannian Penrose inequality is necessarily smooth in properly specified coordinates. If applied to hypersurfaces enclosing the horizon in a spatial Schwarzschild manifold, the result gives the rigidity of isometric hypersurfaces with the same mean curvature. This is a joint work with Pengzi Miao.