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An isoperimetric concept for the mass in General Relativity

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Abstract

The total energy of an isolated gravitating system such as a star or a black hole can be described in terms of a geometric invariant of an asymptotically flat 3-manifold arsing as a spacelike slice in a Lorentuzian 4-manifold. It turns out that this geometric invariant can be characterised in terms of isoperimetric properties of the 3-manifold. The proof of its major properties relies on techniques from mean curvature flow and inverse mean curvature flow discussed in the previous lectures.