

DIFFERENTIAL GEOMETRY/PDE SEMINAR

WEDNESDAY, MARCH 29, 2006

PADELFORD C-36

3:50-5PM

The Liu-Yau quasi-local mass in spherical gravity

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Liu and Yau recently introduced a new quasi-local mass in General Relativity. It is a function on a 2-surface in a 4-manifold. They showed that it was positive. It is the maximum of the Brown-York energy over all 3-slicings containing the given 2-surface. The Liu-Yau mass has unpleasant features, it looks much more like an energy than a mass. In particular it is unboundedly large on any solution of the Einstein equations, including Minkowski space! In spherical symmetry, however, it has a natural physical interpretation. Consider a regular spherical 3-slice filling the interior of the given 2-slice. Take the integral of the energy density of the interior. The Liu-Yau mass of the boundary is the minimum of this total energy content over all regular fillings. No other quasi-local mass gives such interior information.

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