

DIFFERENTIAL GEOMETRY/PDE SEMINAR

TUESDAY, APRIL 1, 2008

PDL C-36

1:30–2:30PM

Vacuum solutions of the Einstein constraint equations with
freely specified mean curvature

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Initial data for the Cauchy problem in General Relativity must itself solve a nonlinear system of PDEs known as the Einstein constraint equations. On a given manifold, it is important to understand the set of all possible initial data. The conformal method, initiated by Lichnerowicz in the 1940's and substantially extended by York and others in the 1970's, has been the most widely used technique for constructing large classes of solutions of the constraint equations. It has been used to parameterize the set of all solutions with constant mean curvature (CMC) on compact and other types of manifolds, and it has been applied to construct near-CMC solutions in some settings.

Until very recently, however, no results were known concerning the applicability of the conformal method without restrictions on the mean curvature. In 2007, Holst, Nagy, and Tsogtgerel proved that the conformal method could be used to construct a class of solutions with freely specified mean curvature. These solutions, however, all require the presence of matter. In this talk we present a relatively mild sufficient condition under which the conformal method can produce vacuum solutions. One consequence of this theorem is the existence of a class of vacuum solutions of the constraint equations with freely specified mean curvature.

For more information about this seminar, visit the DG/PDE Seminar Web page (from the Math Department home page, www.math.washington.edu, follow the link **Seminars, Colloquia, and Conferences**).

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