Continuous dependence on the geometrical initial data for the Einstein vacuum equations

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The Cauchy problem of Einstein equations deals with the construction of a Lorenztian manifold from given geometric quantities on an initial sub manifold. The solutions consists of two major steps, namely, solution of the constraint and evolution equations. The constraint equations can be written as an elliptic system on the initial manifold and their solutions provide the initial data for the evolution equations. Under the harmonic gauge the evolution equations are reduced to quasilinear wave equations. The common methods to solve these central problems in asymptotically flat spacetime is to consider the constraint equations in a weighted Sobolev spaces, while the quasilinear wave equation are dealt in the ordinary unweighted Sobolev spaces. Therefore it is impossible to obtain well–posedness of these equations by this approach. We treat both central type of equations in the weighted Sobolev spaces, and hence we are able to derive the well–posedness of the Cauchy problem for Einstein equations in asymptotically flat spacetime, including continuous depending of the Lorentzian metric on the initial geometrical data.
The talk is based on a joint work with U. Brauer.