John M. Lee
(University of Washington)

The two-body problem at Asymptopia

Some open problems

In my talk, I described joint work with Jim Isenberg and Iva Stavrov-Allen, in which we showed that two asymptotically hyperbolic (AH) vacuum initial data sets for the Einstein field equations can be glued together at infinity, to produce a new AH initial data set that includes arbitrarily close approximations of the original ones, and such that the new conformal infinity is connected if the original ones were.

1. Can our gluing construction be generalized to accommodate non-vacuum initial data (i.e., containing matter fields)?

2. Can it be adapted to handle non-constant mean curvature initial data?

3. Can the regularity of our glued data sets be improved? If we start with polyhomogeneous data sets (i.e., expandable in powers of ρ and $\log \rho$, where ρ is a smooth defining function for the boundary), our construction also produces a polyhomogeneous result. If we begin with data sets (such as those produced by Lars Andersson and Piotr Chruściel) with "optimal" polyhomogeneous regularity, can the glued data sets be constructed with the same optimal regularity?

4. What can be said about the time-evolution of these glued initial data sets? Are they globally hyperbolic? Do they continue to be asymptotically hyperbolic as they evolve?

5. Can the "localization" methods of Corvino/Schoen, Chruściel/Delay, and Chruściel/Isenberg/Pollack be adapted to this situation, to show that two AH initial data sets can be glued in such a way that they *exactly* match the original ones outside the gluing region?