

Abstract Submitted
for the APR06 Meeting of
The American Physical Society

Perfecting the Frankenstein Approach: Improved asymptotically matched initial data for non-spinning black hole binaries NICOLAS YUNES, Penn State, WOLFGANG TICHY, Florida Atlantic University — The accuracy of gravitational wave templates produced by numerical simulations is partially determined by the initial data chosen. A promising method to construct accurate data employs asymptotic matching to construct an approximate global 4-metric. In this talk, we will apply this method to a binary system of non-spinning black holes and discuss improvements. A global metric can be constructed by asymptotically matching two tidally perturbed Schwarzschild metrics in isotropic coordinates valid near each hole to an ADMTT post-Newtonian metric valid far from them. As a result, adjacent metrics agree in the matching region up to uncontrolled remainders in the approximations. We build a smooth global 4-metric with transition functions, carefully constructed to avoid introducing errors larger than those in the approximations. The main improvement arises by using metrics in similar coordinates before performing the matching. This similarity leads to adjacent metrics that are similar even near the horizons, thus allowing for a smoother transition and constraint violations. We also construct a map that takes this metric to Kerr-Schild coordinates near each hole.

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Date submitted: 13 Jan 2006

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