

Abstract Submitted
for the APR12 Meeting of
The American Physical Society

Alternatives to Standard Puncture Initial Data for Binary Black Hole Evolution GEORGE REIFENBERGER, WOLFGANG TICHY, Florida Atlantic University — Standard Puncture initial data has been widely used for numerical analysis of black hole evolution despite its shortcomings, most notably the inherent lack of gravitational radiation existing prior to the start of any simulation. We present two initial data schemes for binary black hole evolution as alternatives to the Standard Puncture approach. Both alternatives are based on Post-Newtonian expansions that contain realistic gravitational waves. The first scheme is based on a Post-Newtonian expansion in ADMTT gauge that has been resummed to approach Standard Puncture data at the black holes. The second alternative is obtained through asymptotic matching of the 4-metrics of two tidally perturbed Schwarzschild solutions to a second-order Post-Newtonian expansion in harmonic gauge away from the black holes. When evolved, both alternatives show gravitational radiation from the onset of the evolution. Current deficiencies compared to Standard Puncture data include more eccentric trajectories during inspiral and larger violation of the constraints, for which adherence has not been enforced. The deficiencies seem to be coupled, and we expect the initial data can be further improved once the constraints are enforced.

George Reifenberger
Florida Atlantic University

Date submitted: 05 Jan 2012

Electronic form version 1.4