Abstract Submitted
for the APR05 Meeting of
The American Physical Society

**A global binary black hole metric via asymptotic matching of post-Newtonian and black hole perturbation expansions** NICOLAS YUNES, Penn State, WOLFGANG TICHY, Florida Atlantic University, BENJAMIN J. OWEN, BERND BRUEGMANN, Penn State — We present an astrophysically realistic approximate global metric for a binary black hole spacetime that could be used to construct initial data for numerical relativity. This metric is obtained by asymptotically matching a post-Newtonian metric for a binary system to a perturbed Schwarzschild metric for each hole. In the *internal zone* near each black hole, the metric is given by the Schwarzschild solution plus a quadrupolar perturbation corresponding to an external gravitational field. In the *near zone*, well outside each black hole but less than a reduced wavelength from the center of mass of the binary, the metric is given by a post-Newtonian expansion including the lowest-order deviations from flat spacetime. When the near zone overlaps each internal zone in a *buffer zone*, the post-Newtonian and perturbed Schwarzschild metrics can be asymptotically matched to each other. By demanding matching (over the 3-volume of the buffer zone) rather than patching (choosing a particular 2-surface in the buffer zone), we guarantee that the metric and all of its derivatives are asymptotic to each other in the buffer zone.

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Date submitted: 17 Dec 2004 Electronic form version 1.4