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Approximate binary black hole initial data from matched asymptotic expansions NICOLAS YUNES, Pennsylvania State University, WOLFGANG TICHY, Florida Atlantic University, BENJAMIN OWEN, Pennsylvania State University, BERND BRUEGMANN, Friedrich-Schiller-Universitaet Jena — We present astrophysically realistic approximate initial data for a binary black hole system. Near each black hole, the metric is given by the Schwarzschild solution plus a tidal perturbation due to the presence of the other black hole. Well outside each black hole, the metric is given by a post-Newtonian expansion. We use asymptotic matching together with a smooth transition function to glue the post-Newtonian and perturbed Schwarzschild solutions together. This procedure results in a smooth C^∞ initial data set that is globally valid. We present explicit results for the 3-metric, extrinsic curvature, lapse, and shift. We also discuss both the errors in the physical content of these data and how well these data satisfy the constraint equations of General Relativity.

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