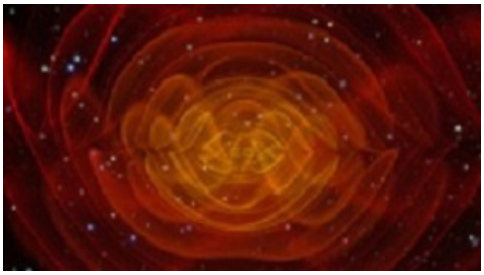

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The nonspinning binary black hole merger scenario revisited

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We present the results of 14 simulations of nonspinning black hole binaries with mass ratios $q = m_1/m_2$ in the range $1/100 \leq q \leq 1$. For each of these simulations we perform three runs at increasing resolution to assess the finite difference errors and to extrapolate the results to infinite resolution.
For $q \geq 1/6$, we follow the evolution of the binary typically for the last ten orbits prior to merger.
By fitting the results of these simulations, we accurately model the peak luminosity, peak waveform frequency and amplitude, and the recoil of the remnant hole for unequal mass nonspinning binaries. We verify the accuracy of these new models and compare them to previously existing empirical formulas.
These new fits provide a basis for a hierarchical approach to produce more accurate remnant formulas in the generic precessing case.
They also provide input to gravitational waveform modeling and allow comparisons with perturbation theory.

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