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Isolating Non-Linear Signatures of Two Colliding Black Holes RITA GARRIDO, None, NUMERICAL RELATIVITY GROUP AT GEORGIA TECH TEAM — The early and late stages of the binary-black-hole collision can be approximated by perturbations to a background, solutions to linearization of the Einstein's equations. However, once the two black holes are within several radii of each other, and ultimately collide, the solution is intrinsically non-linear. The main objective is to intuitively understand the non-linear portion of the solution to the Einstein equation by performing simulations of such mergers. I will identify the non-linear regime through a process of elimination. The early stages of the coalescence are well known by post-Newtonian theory. The end state is approximated very well by perturbation theory, the waveforms decay as a damped sinusoidal with a frequency and decay time uniquely determined by the mass and spin of the final black hole in theory. I will isolate the non-linear portion of the waveform by fitting the early stages to the post-Newtonian solution and the late stages to the perturbative solution. What remains is the non-linear region. Once isolated, we will search through the physics parameter space of the binary black holes for bulk features. These features can then be used to fine-tune the search algorithms hunting for these collisions with LIGO.

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None

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