Abstract Submitted
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On choosing the start time of binary black hole ringdown I: Theory[1] MARIA OKOUNKOVA, SWETHA BHAGWAT, Caltech, STEPHAN BALLMER, DUNCAN BROWN, Syracuse, MATTHEW GIESLER, MARK SCHEEL, SAUL TEUKOLSKY, Caltech — The final stage of a binary black hole (BBH) merger is ringdown, in which the system is described by a Kerr BH with quasinormal mode (QNM) perturbations. It is far from straightforward to identify the time at which the ringdown begins. Yet determining this time is important for precision tests of the general theory of relativity that compare an observed signal with QNM descriptions of the ringdown, such as tests of the no-hair theorem. We present an algorithmic method to analyze the choice of ringdown start time in the observed waveform. This talk will outine the theoretical framework used in this analysis, and the following talk, "On choosing the start time of binary black hole ringdown II: Results", will discuss the results. This method is based on determining how close the strong field is to a Kerr BH (Kerrness). Using numerical relativity simulations, we characterize the Kerrness of the strong-field region close to the BH using a set of local, gauge-invariant geometric and algebraic conditions that measure local isometry to Kerr. We produce a map that associates each time in the gravitational waveform with a value of each of these Kerrness measures; this map is produced by following outgoing null characteristics from the strong and near-field regions to the wave zone.

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