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On choosing the start time of binary black hole ringdown II: Results[1] SWETHA BHAGWAT, Syracuse University, MARIA OKOUNKOVA, California Institute of Technology, STEFAN BALLMER, DUNCAN BROWN, Syracuse University, MATTHEW GIESLER, MARK SCHEEL, SAUL TEUKOLSKY, California Institute of Technology — The final stage of a binary black hole merger is ringdown, in which the system is described by a Kerr black hole with quasinormal mode 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 quasinormal mode 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 discuss the results of applying the framework outlined in the previous talk, "On choosing the start time of binary black hole ringdown I: Theory" on a numerical relativity simulation with parameters consistent with GW150914 - the first gravitational wave detection. We find that the choice of ringdown start time of 3 ms after merger used in the GW150914 study to test general relativity corresponds to a high dimensionless perturbation amplitude of $\sim 7.5 \times 10^{-3}$ in the strong-field region. This suggests that in higher signal-to-noise detections, one would need to start analyzing the signal at a later time for studies that depend on the validity of black hole perturbation theory.

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