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H. Silva: Tests of general relativity at the merger of black-hole binaries

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The coalescence of compact binaries and the gravitational waves produced in this process provide an unique view into gravity in its dynamical, nonlinear regime. Proeminent during a black-hole coalescence is the plunge-merger stage, when the black holes collide at a large fraction of the speed of light and around which the gravitational-wave luminosity peaks. How robust are the predictions of general relativity at this stage? I will present a new parametrized waveform model within the effective-one-body formalism that allows for deviations from general relativity in the plunge-merger-ringdown stage of nonprecessing, quasicircular black-hole binaries. I will discuss the application of this waveform model to analyze the black-hole binary events GW150914 and GW200129. I will use GW200129 to discuss the importance of waveform systematics and of data-quality when interpreting tests of general relativity with present day gravitational-wave observations.

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