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Characterizing template-based and model-independent gravitational waveform reconstruction for binary black hole systems[1] SUDARSHAN GHONGE, Georgia Institute of Technology, KATERINA CHATZIIOANNOU, Flatiron Institute, JAMES ALEXANDER CLARK, Georgia Institute of Technology, TYSON LITTENBERG, NASA Marshall Space Flight Center, MARGARET MILLHOUSE, University of Melbourne, NEIL CORNISH, Montana State University, LAURA CADONATI, Georgia Institute of Technology, LIGO COLLABORATION — The first LIGO-Virgo Gravitational Wave Transient Catalog (GWTC-1) contains gravitational wave (GW) signals from ten binary black hole (BBH) systems. The signal waveforms in the catalog have been reconstructed with two independent approaches: a template-based analysis for compact binary coalescence (CBC) and a model-independent, wavelet-based analysis. The comparison between results from these analyses serves as a consistency check for the CBC assumption. To characterize the agreement between the two approaches over the full range of CBC systems detectable by ground based GW detectors, we applied the above two analysis techniques to simulated CBC signals in detector noise and studied the agreement between their signal reconstructions. We also explored the agreement in the presence of less accurately modeled effects. These could be astrophysical effects, such as higher order spherical harmonic modes and deviations from GR which may not be included in CBC templates, as well as instrumental or environmental artifacts which can corrupt template-based parameter estimation. We present the results of the reconstruction comparison techniques applied to events from GWTC-1, and the ongoing investigations of some of the less-explored scenarios described above.

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