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Properties of the Binary Neutron Star Merger GW170817

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Observations of binary neutron star mergers such as GW170817 by the LIGO and Virgo gravitational-wave detectors provide unique ways of constraining the equation of state through tidal interactions and potential observations of a post-merger signal. In this work we improve initial estimates of the parameters of GW170817 using the known source location, improved waveform modeling, additional data down to 23 Hz compared to the 30 Hz in the initial analysis, and re-calibrated Virgo data. We compare results inferred using several waveform models which incorporate additional physical effects as compared to the initial TaylorF2 waveform reported with the discovery of GW170817. These effects include precession, the spin induced quadrupole moment, and tidal effects calibrated with numerical simulations. We report updated constraints on the masses, spins, and tidal parameters, and compare these results to predictions from various equation of state models. Finally, we perform an unmodeled Bayesian analysis to place upper limits on the amplitude and spectral energy density of the unobserved post-merger signal.

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