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# Time-domain model for kiloHertz gravitational-waveforms from neutron star merger remnants

The remnant star of a neutron star merger is an anticipated loud source of kiloHertz gravitational waves that conveys unique information on the equation of state of hot matter at extreme densities. Observations of such signals are hampered by the photon shot noise of ground-based interferometers and a challenge for gravitational-wave astronomy. We develop an analytical time-domain waveform model for postmerger signals informed by numerical-relativity simulations. The model completes effective-one-body waveforms for quasi-circular nonspinning binaries in the kiloHertz regime. We show that a template-based analysis can detect postmerger signals with signal-to-noise (SNR) ratios of 9. Thus, events like GW170817 will be targeted by third-generation interferometers. Using Bayesian model selection and the complete waveform model it is possible to infer whether the merger outcome is a prompt collapse or a remnant star. We further discuss how to investigate the equation of state's stiffness at extreme densities using postmerger observations.

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