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Gravitational waves from the quasi-circular inspiral of compact binaries in Einstein-aether theory CHAO ZHANG, XIANG ZHAO, ANZHONG WANG, Baylor University, BIN WANG, Yangzhou University, Yangzhou, China, KENT YAGI, University of Virginia, NICOLAS YUNES, University of Illinois at Urbana-Champaign, WEN ZHAO, University of Science and Technology of China, TAO ZHU, Zhejiang University of Technology — We study gravitational waves (GWs) emitted by a binary system of non-spinning bodies in a quasi-circular inspiral within the Einstein-aether theory. In particular, we compute explicitly and analytically the expressions for the time-domain and frequency-domain waveforms, GW polarizations, and response functions for both ground- and space-based detectors in the post-Newtonian (PN) approximation. We find that, when going beyond leading-order in the PN approximation, the non-Einsteinian polarization modes contain terms that depend on both the first and the second harmonics of the orbital phase. We also calculate analytically the corresponding parameterized post-Einsteinian parameters, generalizing the existing framework to allow for different propagation speeds among scalar, vector and tensor modes. Such results allow for the easy construction of Einstein-aether templates that could be used in Bayesian tests of general relativity in the future.

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