## Abstract Submitted for the APR21 Meeting of The American Physical Society

Gravitational wave echoes from compact binary coalescence SIZHENG MA, YANBEI CHEN, Caltech — It is suggested that delayed and repeating gravitational wave echoes, following gravitational waves emitted by compact binary coalescence, can be produced if the binary contains Exotic Compact Objects (ECOs) that mimic black holes, or if there are near-horizon quantum structures surrounding black holes. If gravitational wave echoes exist, they will serve as an important tool to study the physics of black holes or exotic compact objects. We present an echo waveform model, based on inspiral-merger-ringdown waveforms computed from numerical relativity (reproduced by NR surrogate models), and linear perturbation theory of the final spinning compact object. In constructing this model, we divide the compact binary coalescence spacetime into a strong field region, and a "weak field region" in which linear perturbation theory of a Kerr spacetime applies. The echoes we construct arise from the weak-field region, hence incorporate those generated from reflections from the near-horizon region of the final compact object. Our model is parametrized by the ECO's reflectivity, as well as the location of the interface between the strong- and weak-field regions. We also discuss the detectability of echoes with current and future detectors.

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Date submitted: 07 Jan 2021 Electronic form version 1.4