Gravitational waves from extreme mass ratio inspirals: Preliminary results from a hybrid approach to generate adiabatic waveforms
PRANESH SUNDARARAJAN, MIT, GAURAV KHANNA, University of Massachusetts - Dartmouth, SCOTT HUGHES, MIT, STEVE DRASCO, JPL — Extreme mass ratio inspirals (in which a stellar mass compact object perturbs a massive black hole spacetime) are an important source of gravitational radiation. We present preliminary results from a hybrid time-frequency domain approach to solve the Teukolsky perturbation equation and thus generate adiabatic waveforms from such inspirals. Recently, we have developed a code which treats the Teukolsky equation as a (2+1) PDE and solves it in the time domain. The key feature of this code is its ability to generate waveforms corresponding to any spacetime trajectory of the point-like compact object. A Fourier decomposition of the Teukolsky equation is possible when the compact object is constrained to a bound geodesic. The radiated fluxes from such a Fourier mode based frequency-domain code can be used to construct an adiabatic inspiral trajectory for the smaller object. Combining the accuracy of this frequency-domain trajectory with the versatility of the time-domain code allows us to generate adiabatic waveforms.

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