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Shaken, not stirred: test particles in binary black hole merger environments.

In 2015 gravitational wave event GW150914 was detected by the advanced Laser Interferometer Gravitational-wave Observatory (aLIGO), with a possible weak transient electromagnetic counterpart GW150914-GBM detected by the Fermi Gamma-ray Burst Monitor (GBM) 0.4s after the detection of the gravitational wave signal. No other such detections have occurred since (specifically with respect to BH-BH mergers), with literature predicting that Binary Black Hole mergers cannot radiate significantly in the electromagnetic spectrum. In light of these detections, we simulate the dynamics of ambient test particles in the gravitational potential well of a binary black hole system following a first-order coalescing orbit, with the eventual end goal of simulating the associated electromagnetic radiation and resulting spectral energy density distribution of such a binary black hole the system, as this could shed light on binary black hole systems as high-energy accelerators and possible detection thresholds of electromagnetic counterparts to binary black hole mergers. The potentials and particle trajectories are numerically calculated using embedded Runge-Kutta methods, under the assumption of non-rotating black holes with the post-Newtonian Paczynski-Wiita potential approximation in tandem with retarded time concepts analogous to electrodynamics.

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