

Challenges in the self-consistent evolutions of extreme mass ratio inspirals.

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Extreme mass ratio inspirals (the inspiral of a small compact object into a supermassive black hole) will be an important source of gravitational waves for LISA and promise to provide a wealth of information on the properties of black hole populations in the universe. However, this will require very accurate models capable of producing the necessary waveforms for the data analysis. In an EMRI inspiral, the small object produces perturbations of the metric of the big black hole that propagates in the curved background spacetime and returns to interact with the small compact object at later times causing it to spiral in. Hence, to completely take into account all effects in a simulation, it is necessary to perform self-consistent evolutions where both the orbit and the perturbations are evolved together. I will discuss the challenges in this endeavor and describe the progress made so far in one approach to tackle this problem.