Dissipation in extreme-mass ratio binaries with a spinning secondary

Chris Kavanagh[1]

[1] *Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Am Mühlenberg 1, Potsdam 14476, Germany*

Binary black hole inspirals with an extreme mass-ratio are to date most successfully modelled using the gravitational self-force approach where the smaller body is treated as sourcing a perturbation to the spacetime of a central black hole. This perturbation forces the body to slowly inspiral with the emission of gravitational waves. The first approximation to this inspiral is the adiabatic approach, where one evolves the orbit using the orbit-averaged losses of energy and angular momentum. In order to completely reach the accuracy needs of LISA, this approximation is insufficient. At first post-adiabatic order one needs a) the full first order self-force (the orbit-averaged piece of which constitutes the fluxes) b) the second order orbit averaged self-force and c) the influence of the spin of the small body on the motion. In this talk we will present progress towards calculating part c) of this list. In particular we will present a new flux-balance law relating the local self-force to the energy fluxes for a spinning particle orbiting a black hole, and demonstrate its validity by explicit computation. Notably, this balance law deviates significantly from the standard law for non-spinning particles, and care must be taken when using it in the equations of motion.