Abstract Submitted
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Transition of EMRIs through resonance: higher order corrections in resonant flux enhancement[1] DEYAN MIHAYLOV, Univ of Cambridge, JONATHAN GAIR, University of Edinburgh — Extreme mass ratio inspirals (EMRIs) are candidate events for gravitational wave detection in the millihertz range (by detectors like LISA and eLISA). These events involve a stellar-mass black hole, or a similar compact object, descending into the gravitational field of a supermassive black hole, eventually merging with it. Properties of the inspiraling trajectory away from resonance are well known and have been studied extensively, however little is known about the behaviour of these binary systems at resonance, when the radial and lateral frequencies of the orbit become commensurate. There are two resonance models in the literature, the instantaneous frequency function by Gair, Bender, and Yunes, and the standard two timescales approach devised by Flanagan and Hinderer. We argue that the Gair, Bender and Yunes model provides a valid treatment of the resonance problem and extend this solution to higher order in the size of the on-resonance perturbation. The non-linear differential equations which arise in treating resonances are interesting from a mathematical view point. We present our algorithm for perturbative solutions and the results to third order in the infinitesimal parameter, and discuss the scope of this approach.

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