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# EMRIs around $j=1$ black holes with synchronised hair

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## Abstract

We study extreme mass ratio inspirals (EMRIs) due to an infalling Light Compact Object (LCO) onto a generic class of stationary and axi-symmetric massive compact objects (MCO - with or without a horizon). Using the quadrupole hybrid formalism we obtain a master formula for the evolution of the radius of the LCO and find qualitatively different behaviours depending on the geodesic structure of the MCO. We then specialize the MCO to a black hole with synchronised scalar hair (BHsSH). To allow a comparison with a highly spinning Kerr BH, we consider BHsSH with dimensionless spin,  $j=1$ . This yields two distinct sequences of solutions. The first harbours Kerr-like solutions with maximal hairiness of  $\sim 10$

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