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## Detecting Dark Matter in the LISA era: Gravitational Waves from Intermediate Mass Ratio Inspirals

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The observation of Gravitational Waves (GWs) has opened up a whole new avenue for constraining and detecting particle Dark Matter (DM). One of the most promising systems to study is the Intermediate Mass Ratio Inspiral (IMRI): a stellar-mass compact object such as a black hole or neutron star inspiraling towards an intermediate mass black hole, thousands of times more massive than the Sun. Sub-hertz GWs emitted during the inspiral should be detectable by future space-based observatories such as LISA. But the presence of DM in the system can have subtle dynamical effects on the inspiral, altering the waveform and allowing for a detection of DM almost independently of its particle properties. I will discuss ongoing work to study these systems carefully and self-consistently, incorporating the effects of feedback on the DM halo, in order to determine whether such a signal can be detected and what we can learn about Dark Matter if it is.

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