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The role of dark matter in the origin and dynamical evolution of massive black binaries towards the LISA band

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The typical binaries of massive black holes that the LISA gravitational wave detector will observe are in the range 10^4-10^6 solar masses. In the low redshift Universe, observations of active galactic nuclei and other types of sources suggest that such black holes preferentially reside in dwarf galaxies. Dwarf galaxies are notoriously dark matter dominated down to their cores. I will show how the process of pairing and binary formation of massive black holes inside dwarf galaxies is heavily affected by the dark matter density profile. This, in turn, carries information on the nature of dark matter, with the caveat that baryonic physics effects might also play a role in shaping the evolution of dwarf galaxies' dark matter profiles. In particular, successful formation of a binary of massive black holes seems to be disfavoured in cored dark matter profiles, which are predicted in some dark matter models alternative to Cold Dark Matter. The rate of LISA sources as a function of redshift might thus carry precious information on the nature of the host dark matter halos. I will conclude with a digression on another important aspect, also relevant to GW astronomy, namely how dark matter might have influenced, directly or indirectly, the formation of the seeds of massive black holes at high redshift.

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