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Distinguishing Galactic Compact Binaries in LISA's Observations

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The Laser Interferometer Space Antennae (LISA), a joint ESA-NASA mission set to launch in 2035, will revolutionise our understanding of gravitational waves, targeting a frequency range of 0.1 mHz to 1 Hz. Among its many observational challenges, one key question is whether Galactic compact binaries composed of black holes and neutron stars can be distinguished from the abundant double white dwarf binaries that are expected in the same frequency band. In this study, we perform a mock analysis of 300 binary systems consisting of black holes and neutron stars. By recovering the system masses from fiducial gravitational wave signals, drawn from an astrophysically motivated Galactic population, we explore the feasibility of distinguishing these systems from the larger population of Galactic double white dwarfs. Our results provide insight into the potential of LISA to resolve these systems, contributing to the mission's capability to discern astrophysical populations and advance our understanding of compact binary evolution in the Milky Way.

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