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Detection prospects for the GW background of Galactic (sub)solar mass PBHs

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The discovery of subsolar mass black holes would provide compelling evidence for the primordial origin of these objects. In this talk, I explore how gravitational wave (GW) signals from a Galactic population of (sub)solar mass primordial black hole (PBH) binaries could be identified by LISA (arXiv: 2410.04522). By modeling the formation and evolution of PBH binaries that end up in the Milky Way halo at the present epoch, we find that their highly eccentric orbits generate a GW background that peaks in the millihertz range, where LISA's sensitivity is optimal. While this background is below LISA's detection threshold for PBH fractions of 1% of dark matter, it exceeds the detection limits of DECIGO and BBO for PBH masses of order 0.01-0.1 solar mass. Additionally, in five years of observation LISA could identify up to $O(100)$ loud Galactic PBH binaries in the (sub)solar mass range for a PBH fraction of 1%, or $O(1)$ for a fraction of 0.1%.

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