

Primordial Black Holes or else? Tidal tests on subsolar gravitational-wave observations

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The detection of a subsolar object in a compact binary merger is regarded as one of the smoking gun signatures of a population of primordial black holes (PBHs). We critically assess whether these systems could be distinguished from stellar binaries, for example composed of white dwarfs or neutron stars, which could also populate the subsolar mass range. At variance with PBHs, the gravitational-wave signal from stellar binaries is affected by tidal effects, which dramatically grow for moderately compact stars as those expected in the subsolar range. We forecast the capability of constraining tidal effects of putative subsolar neutron star binaries with current and future LIGO-Virgo-KAGRA (LVK) sensitivities as well as next-generation experiments like Einstein Telescope and Cosmic Explorer. We show in particular that the improvement in sensitivity for 3G detectors can rule out or confirm different exotic compact object models, as well as better distinguish between signals generated by PBHs and BNSs.

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