

Can we identify primordial black holes? Analysis and physical implications of candidate subsolar gravitational-wave events

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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 gravitationalwave 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. We show that, should LVK O4 run observe subsolar neutron-star mergers, it could measure the (large) tidal effects with high significance. Also, we show possible consequences of the detection of such important candidates, both from the cosmological and the nuclear-physics points of view.

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