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Signals of primordial black holes at gravitational wave interferometers

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Primordial black holes (PBHs) can form as a result of primordial scalar perturbations at small scales. This PBH formation scenario has associated gravitational wave (GW) signatures from second-order GWs induced by the primordial curvature perturbation, and from second-order GWs produced by the gravitational potential of the PBHs themselves. We investigate the ability of next generation GW experiments, including BBO, LISA, and CE, to probe this PBH formation scenario in a wide mass range ($10 - 10^{27}$g). Measuring the stochastic GW background with GW observatories can constrain the allowed parameter space of PBHs including a previously unconstrained region where light PBHs ($< 10^{9}$g) temporarily dominate the energy density of the universe before evaporating. We also show how PBH formation impacts the reach of GW observatories to the primordial power spectrum and provide constraints implied by existing PBH bounds.

Summary

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