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Ultra-light primordial black holes from first-order phase transition with unique gravitational wave spectrum

We study ultra-light Primordial Black hole (PBH) formation from first-order phase transition (FOPT) by considering bubble collisions and false vacuum collapse as the leading mechanisms. While FOPT leads to the generation of gravitational wave (GW) spectrum with typical blue and red-tilted spectrum around a peak frequency, the ultra-light PBH, if dominates the universe for a finite epoch, can act as a separate source of GW having a blue-tilted spectrum. These two sources of GW lead to a unique GW spectrum which can be probed at future GW experiments like LISA, DECIGO, ET etc. Such a signature can not only probe a PBH dominated phase in the early universe, but also their formation mechanism.

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