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Memory Burden effects mimic the reheating signatures on SGWB from ultra low mass PBHs

Ultra-low mass primordial black holes (PBH), briefly dominating the expansion of the universe, would leave detectable imprints in the secondary stochastic gravitational wave background (SGWB). Such a scenario leads to a characteristic doubly peaked spectrum of SGWB and strongly depends on the Hawking evaporation of such light PBHs. However, these observable signatures are significantly altered if the memory burden effect during the evaporation of PBHs is taken into account.

We show that for the SGWB induced by PBH density fluctuations, the memory burden effects on the Hawking evaporation of ultra-low mass PBHs can mimic the signal arising due to the non-standard reheating epoch before PBH domination. This degeneracy can be broken by the simultaneous detection of the first peak in the SGWB, which is typically induced by the inflationary adiabatic perturbations.

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