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Doubly peaked induced stochastic gravitational wave background: Testing baryogenesis from primordial black holes

Hawking evaporation of primordial black holes (PBHs) can facilitate the generation of matter-antimatter asymmetry. We focus on ultra-low mass PBHs that briefly dominate the universe and evaporate before the big bang nucleosynthesis. We propose a novel test of this scenario by detecting its characteristic doubly peaked gravitational wave (GW) spectrum in future GW observatories. Here the first order adiabatic perturbation from inflation and from the isocurvature perturbations due to PBH distribution, source tensor perturbations in second-order and lead to two peaks in the induced GW background. These resonant peaks are generated at the beginning of standard radiation domination in the presence of a prior PBH-dominated era. This unique GW spectral shape would provide a smoking gun signal of non-thermal baryogenesis from evaporating PBHs, which is otherwise impossible to test in laboratory experiments due to the very high energy scales involved or the feeble interaction of the dark sector with the visible sector. The work is based on the publication JHEP 07 (2022) 130

Summary

Primary author: Dr GHOSHAL, Anish (University of Warsaw, Poland)

Presenter: Dr GHOSHAL, Anish (University of Warsaw, Poland)

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