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The impact of memory-burdened primordial black holes on high-scale leptogenesis

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We explore the impact of the back-reaction of evaporation on the quantum state of Primordial Black Holes (PBHs), known as "memory burden", on the baryon asymmetry production in the Universe through high-scale leptogenesis. Focusing on PBH masses ranging from 1 to 1000 grams, we investigate the interplay between the non-thermal production of heavy sterile neutrinos and the entropy injection within this non-standard cosmological framework. By assuming appropriate values for the memory-burden parameters, q = 1/2 and k = 1, we derive mutual exclusion limits between PBHs and thermal leptogenesis in the mixed parameter space. Our analysis reveals that the primary contribution of PBHs to baryon asymmetry stems from entropy injection. Indeed, we find that, differently from earlier studies based on the semi-classical Hawking evaporation, the memory- burden effect suppresses the non-thermal source term in the PBH mass range explored. This has significant implications for understanding baryogenesis in such alternative cosmological scenarios.

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