

Bremsstrahlung High-frequency Gravitational Wave Signatures of High-scale Non-thermal Leptogenesis

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Inflaton seeds non-thermal leptogenesis by pair producing right-handed neutrinos in the seesaw model. We show that the inevitable graviton bremsstrahlung associated with inflaton decay can be a unique probe of non-thermal leptogenesis. The emitted gravitons contribute to a high-frequency stochastic gravitational waves background with a characteristic fall-off below the peak frequency. Besides leading to a lower bound on the frequency ($\sim 10^{11}$ Hz), the seesaw-perturbativity condition makes the mechanism sensitive to the lightest neutrino mass. For an inflaton mass close to the Planck scale, the gravitational waves contribute to sizeable dark radiation, which is within the projected sensitivity limits of future experiments such as CMB-S4 and CMB-HD.

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