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Imprints of high-scale non-thermal leptogenesis in cosmic microwave background

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We study the imprints of high-scale non-thermal leptogenesis on cosmic microwave background (CMB) from the measurements of the inflationary spectral index (n_s) and tensor-to-scalar ratio (r), which otherwise is inaccessible to the conventional laboratory experiments. We argue that non-thermal production of baryon (lepton) asymmetry from subsequent decays of inflaton to heavy right-handed neutrinos (RHN) and RHN to SM leptons is sensitive to the reheating dynamics in the early Universe after the end of inflation. Such dependence provides detectable imprints on the $n_s - r$ plane which is well constrained by the Planck experiment. We investigate two separate cases, (I) inflaton decays to radiation dominantly, and (II) inflaton decays to RHN dominantly which further decays to the SM particles to reheat the Universe adequately. Considering a class of $\alpha-$ attractor inflation models, we obtain the allowed mass ranges for RHN for both cases and thereafter furnish the estimates for n_s and r. The prescription proposed here is quite generic and can be implemented in various kinds of single-field inflationary models given the conditions for non-thermal leptogenesis is satisfied.

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