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Leptogenesis in Cosmological Relaxation with Particle Production

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Cosmological relaxation of the electroweak scale is improved by using particle production to trap the relaxation. We combine leptogenesis with such a relaxation model that has no extremely small parameters or large e -foldings. Scanning happens after inflation now allowed to be at a high scale over a sub-Planckian relaxation field range for an $O(100)$ TeV cut-off scale of new physics. Particle production by the relaxation also reheats the universe and generates the baryonic matter-antimatter asymmetry. We propose a realisation in which out-of-equilibrium leptons, produced by the relaxation, scatter with the thermal bath through interactions that violate CP and lepton number via higher-dimensional operators. Such a minimal effective field theory setup, with no new physics below the cut-off, naturally decouples new physics while linking leptogenesis to relaxation particle production; the baryon asymmetry of the universe can thus be intrinsically tied to a weak scale hierarchy.

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