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Leptogenesis in Cosmological Relaxation with Particle Production

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Among cosmological relaxation solutions to the weak-scale hierarchy problem, gauge boson production is a particularly efficient backreaction mechanism for trapping the relaxion. In these models, scanning can even happen after inflation and the relaxion field range can be sub-Planckian, with no extremely small parameters or large e-foldings involved. We consider a model where particle production by the relaxion also reheats the universe and generates the baryonic matter-antimatter asymmetry. Out-of-equilibrium leptons scatter with the thermal bath through interactions that violate CP and lepton number via higher-dimensional operators. Such an effective field theory setup, with no new physics below the cut-off, is sufficient to achieve successful leptogenesis. The baryon asymmetry is thus intrinsically tied to a weak-scale hierarchy.

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