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Post-Sphaleron Darkogenesis

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A supercooled phase transition in a nearly conformal dark sector can provide a natural setting for darkogenesis via its out-of-equilibrium dynamics, where a particle-antiparticle number asymmetry in the dark sector can be reprocessed into the visible sector, yielding the observed baryon asymmetry and an asymmetric dark matter. We consider a scenario where the number asymmetry is generated from the decay of a mother particle produced via parametric resonance during the phase transition induced due to its coupling to the dilaton associated with spontaneous breaking of scale invariance. It is shown that the correct baryon asymmetry and dark matter abundance can be realized for a dark phase transition at $\mathcal{O}(1)\,\mathrm{GeV}$, which can also explain the nano-Hz gravitational wave signal reported by pulsar timing array experiments. The scenario will be tested further in neutron-antineutron oscillation experiments.

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