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Spontaneous Leptogenesis in Continuum-Clockwork Axion Models

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The mechanism of “spontaneous leptogenesis”—in which the matter-antimatter asymmetry is generated via motion of a scalar field coupled to the electroweak gauge bosons —provides an interesting alternative to more traditional thermal leptogenesis models. While an axion-like field is a natural candidate for these models, the observed asymmetry requires an axion mass so large it decays shortly after leptogenesis. In this talk, we demonstrate how effective axion potentials that arise from continuum clockwork models can yield simultaneously sufficient production of baryon asymmetry, and a stable dark matter candidate with the appropriate abundance. Moreover, we find non-trivial dynamics early in the axion field evolution which exhibit a “tracking” behavior —similar to that found in quintessence models —where the axion follows a radiation-like equation of state before undergoing coherent oscillations. As a result of these dynamics, axion-photon isocurvature perturbations are generically suppressed, thereby enlarging the viable parameter space for our model.

Parallel Session

Dark Matter, Astroparticle Physics

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