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WIMPy Leptogenesis in Non-Standard Cosmologies

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We study the possibility of generating baryon asymmetry of the universe from dark matter (DM) annihilations during non-standard cosmological epochs. Considering the DM to be of weakly interacting massive particle (WIMP) type, the generation of baryon asymmetry via leptogenesis route is studied where WIMP DM annihilation produces a non-zero lepton asymmetry. Adopting a minimal particle physics model to realise this along with non-zero light neutrino masses, we consider three different types of non-standard cosmic history namely, (i) fast expanding universe, (ii) early matter domination and (iii) scalar-tensor theory of gravity. By solving the appropriate Boltzmann equations incorporating such non-standard history, we find that the allowed parameter space is consistent with DM relic and observed baryon asymmetry gets enlarged with the possibility of lower DM mass in some scenarios. While such lighter DM can face further scrutiny at direct search experiments, the non-standard epochs offer complementary probes on their own.

Session

Astroparticle Physics and Cosmology

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