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Realizing Electroweak Baryogenesis in connection to dark sector

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We propose that electroweak baryogenesis (EWBG) scenario can be operative with the help of an additional SM scalar singlet which is not only responsible for making the electroweak phase transition strongly of first order but also acts as a mediator between the SM and a dark sector. The dark sector is equipped with a singlet-doublet fermion framework that, apart from explaining the observed relic abundance, provides the source of CP violation required for EWBG. This dark sector CP violation is transported in front of the bubble walls and generates a chiral asymmetry for dark sector particles, which in turn gives rise to a SM leptonic chemical potential. This net lepton charge asymmetry is then converted into a baryon number asymmetry through the weak Sphaleron processes. We identify regions of parameter space that can simultaneously explain the observed baryon asymmetry and the correct dark matter relic density and estimate the gravitational wave production as an outcome of strongly first order electroweak phase transition.

Designation

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Reference publication/preprint

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