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Neutrino Electroweak Baryogenesis

We investigate if the CP violation necessary for successful electroweak baryogenesis may be sourced by the neutrino Yukawa couplings. In particular, we consider an electroweak scale Seesaw realization with sizable Yukawas where the new neutrino singlets form (pseudo)-Dirac pairs, as in the linear or inverse Seesaw variants. We find that the baryon asymmetry obtained strongly depends on how the neutrino masses vary within the bubble walls. Moreover, we also find that flavour effects critically impact the final asymmetry obtained and that, taking them into account, the observed value may be obtained in some regions of the parameter space. This source of CP violation naturally avoids the strong constraints from electric dipole moments and links the origin of the baryon asymmetry of the Universe with the mechanism underlying neutrino masses. Interestingly, the mixing of the active and heavy neutrinos needs to be sizable and could be probed at the LHC or future collider experiments.

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