

Axionic Electroweak Baryogenesis

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An axion can make the electroweak phase transition strongly first-order as required for electroweak baryogenesis even if it is weakly coupled to the Higgs sector. This is essentially because the axion periodicity helps to avoid an instability of the potential regardless of the value of the axion decay constant. Furthermore, the axion can serve as a CP phase relevant to electroweak baryogenesis if one introduces an effective axion coupling to the top quark Yukawa operator. Then, for an axion decay constant between about TeV and order 10 TeV, the observed baryon asymmetry can be explained while avoiding current experimental constraints. It will be possible to probe the axion window for baryogenesis in future lepton colliders and beam-dump experiments.

Presenter: Dr SHIN, Chang Sub (IBS CTPU)

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