7th International Conference on High Energy Physics in the LHC Era



Contribution ID: 155

Type: Parallel talk

The minimal fermionic model of electroweak baryogenesis

Tuesday 9 January 2018 17:40 (20 minutes)

We present the minimal model of electroweak baryogenesis induced by fermions. The model consists of an extension of the Standard Model with one electroweak singlet fermion and one pair of vector like doublet fermions with renormalizable couplings to the Higgs. A strong first order phase transition is radiatively induced by the singlet- doublet fermions, while the origin of the baryon asymmetry is due to asymmetric reflection of the same set of fermions on the expanding electroweak bubble wall. The singlet-doublet fermions are stabilized at the electroweak scale by chiral symmetries and the Higgs potential is stabilized by threshold corrections coming from a multi-TeV ultraviolet completion which does not play any significant role in the phase transition. We point out that fermion induced electroweak baryogenesis has irreducible phenomenology at the 13 TeV LHC since the new fermions must be at the electroweak scale, have electroweak quantum numbers and couple strongly with the Higgs.

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Session Classification: Parallel Session 2

Track Classification: Higgs Physics