

26th International Conference on Supersymmetry and Unification of Fundamental Interactions (SUSY2018)



Contribution ID: 165

Type: **Talk (closed)**

Multistep Single-Field Strong Phase Transitions from New TeV Scale Fermions

Thursday 26 July 2018 15:30 (20 minutes)

In spite of the vast literature on the subject of first order Electroweak Phase Transitions (EWPT), which can provide the necessary conditions for generating the Baryon Asymmetry in the Universe, fermion-induced EWPTs still remain a rather uncharted territory. In this talk, we consider a simple fermionic extension of the Standard Model (SM) involving one $SU(2)_L$ doublet and two singlet

Vector-Like Leptons (VLLs), strongly coupled to the Higgs scalar and with masses close to the TeV scale. We show how such a simple scenario can give rise to a non-trivial thermal history of the Universe, involving strongly first order multistep phase transitions occurring at temperatures close to the electroweak (EW) scale. Finally, we investigate the distinct Gravitational Wave (GW) signatures of these phase transitions at future GW detectors, such as eLISA, and briefly discuss how the VLLs can be searched for at the LHC.

Parallel Session

Cosmology and Gravitational Waves

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Session Classification: Cosmology and Gravitational Waves