Contribution ID: **114** Type: **not specified**

Strong First-order Phase Transitions and Gravitational waves in an Extended Supersymmetric Model

A Strong First-Order Electroweak Phase Transition (SFOEWPT) is a necessary ingredient for Electroweak Baryogenesis (EWBG) to explain the observed Baryon asymmetry of the Universe. Supersymmetric models with singlet extensions can easily accommodate single or multi-step first-order phase transitions (FOPT). In this work, we study the possibility and the dynamics of an SFOEWPT as a pre-requisite to EWBG by extending the Z3-invariant Next-to-Minimal Supersymmetric Standard Model (NMSSM) with a right-handed neutrino superfield, consistent with the collider, neutrino, and flavour physics constraints. We examine the role of the new parameters compared to NMSSM on the phase transition dynamics and have observed that the occurrence of a FOPT mostly favours a light right-handed sneutrino state below 125 GeV. We also investigate the prospects of detecting the stochastic gravitational waves (GW), which can arise from such phase transitions, in the upcoming space-based interferometer and we find promising GW spectrum that can be detected within the sensitivity range of DECIGO-corr, U-DECIGO, U-DECIGO-corr, etc. Our investigation offers a complementary probe, beyond the colliders, for Physics beyond the Standard Model.

Authors: Mr BORAH, Pankaj (Indian Institute of Technology Delhi); Prof. GHOSH, Pradipta (Indian Institute of Technology Delhi); Prof. ROY, Sourov (Indian Association for the Cultivation of Science); Dr SAHA, Abhijit Kumar (Indian Association for the Cultivation of Science)

Presenter: Mr BORAH, Pankaj (Indian Institute of Technology Delhi)