

Probing electroweak phase transition and cosmology in the early universe at colliders

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The Standard Model extended with a complex or real singlet scalar can admit a strong first order electroweak phase transition as needed for electroweak baryogenesis. The real singlet component that mixes with the Standard Model Higgs boson leads to the possibility of di-Higgs and di-boson final states in pp collisions. The complex component can provide a dark matter (DM) candidate that leads to the possibility of a $b\bar{b}+\text{MET}$ final state, which is a brand new search channel at the LHC. Focusing on these channels, I will discuss the prospective reach at the LHC for a heavy singlet-like scalar in regions of (c)SM parameter space compatible with a SFOEWPT (and DM phenomenology).

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