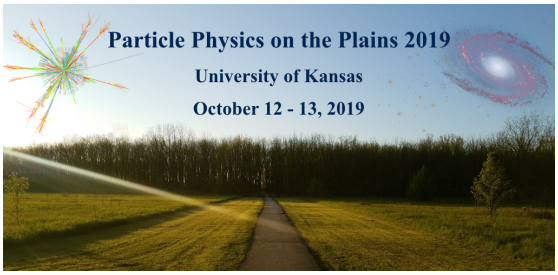

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Strong First-Order Electroweak Phase Transitions in the Standard Model with a Singlet Extension

Saturday 12 October 2019 09:00 (20 minutes)

A common assumption about the early universe is that it underwent an electroweak phase transition (EWPT). Though the standard model (SM) is able to restore the electroweak symmetry through a smooth cross over PT, we require a strongly first-order PT to ensure electroweak baryogenesis, requiring us to look at new physics beyond the SM. The simplest case to extend the SM is to add a real singlet field, which allows first-order EWPTs (FOEPT) to occur.

Starting with the most general higgs+singlet lagrangian, we then fixed four of its coupling constants as functions of parameters whose range of values had more experimental motivation. Then by requiring a FOEPT and performing a Monte-Carlo scan over five free parameters, we were able to study the parameter space in this allowed region. Most notably, we observed the triple higgs coupling (λ_3) take on values between 1.2 and 2.5. The possible values of λ_3 could serve as motivation for future collider experiments to improve sensitivity in this range when looking at the cross sections of pp—>hh versus λ_3.

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