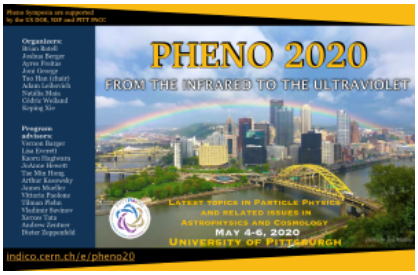

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Strong First-Order Electroweak Phase Transitions in the Standard Model with a Singlet Extension

Monday 4 May 2020 15:15 (15 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 ($_3$) take on values between 1.2 and 2.5. The possible values of $_3$ could serve as motivation for future collider experiments to improve sensitivity in this range when looking at the cross sections of $pp \to hh$ versus $_3$.

Summary

Primary authors: Mr HOOPER, Anthony (University of Nebraska-Lincoln); Dr HUANG, Peisi (University of Nebraska-Lincoln)

Presenter: Mr HOOPER, Anthony (University of Nebraska-Lincoln)

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