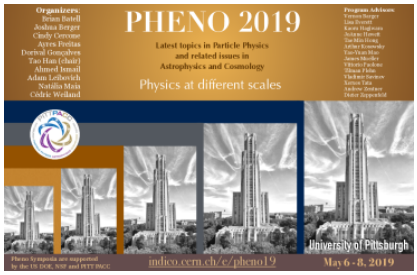

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Collider and Gravitational Wave Complementarity in Exploring the Singlet Extension of the Standard Model

Tuesday 7 May 2019 17:45 (15 minutes)

We present a dedicated complementarity study of gravitational wave and collider measurements of the simplest extension of the Higgs sector: the singlet scalar augmented Standard Model. We study the following issues: (i) the electroweak phase transition patterns admitted by the model, and the proportion of parameter space for each pattern; (ii) the regions of parameter space that give detectable gravitational waves at future space-based detectors; and (iii) the current and future collider measurements of di-Higgs production, as well as searches for a heavy weak diboson resonance, and how these searches interplay with regions of parameter space that exhibit strong gravitational wave signals. We carefully investigate the behavior of the normalized energy released during the phase transition as a function of the model parameters, address subtle issues pertaining to the bubble wall velocity, and provide a description of different fluid velocity profiles.
On the collider side, we identify the subset of points that are most promising in terms of di-Higgs and weak diboson production studies while also giving detectable signals at LISA, setting the stage for future benchmark points that can be used by both communities.

Summary

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