

Collider and gravitational wave signals for electroweak phase transition

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The knowledge of the Higgs potential is crucial for understanding the origin of mass and the thermal history of our Universe. We show how collider measurements and observations of stochastic gravitational wave signals can complement each other to explore the multiform scalar potential in the two Higgs doublet model. In our investigation, we analyze critical elements of the Higgs potential to understand the phase transition pattern. Specifically, we examine the formation of the barrier and the uplifting of the true vacuum state, which play crucial roles in facilitating a strong first-order phase transition. Furthermore, we explore the potential gravitational wave signals associated with this phase transition pattern and investigate the parameter space points that can be probed with LISA. Finally, we compare the impact of different approaches to describing the bubble profile on the calculation of the baryon asymmetry.

Author: GONÇALVES, Dorival (Oklahoma State University)

Presenter: GONÇALVES, Dorival (Oklahoma State University)

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