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Probing the nature of the electroweak phase transition/baryogenesis from the particle colliders to the gravitational wave detectors

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We report on the first joint analysis of observational signatures from the electroweak baryogenesis in both gravitational wave (GW) detectors and particle colliders to explore the nature of the electroweak phase transtion. Working with both the effective field theory and concrete models ,we show that a modified Higgs potential can keep the observed 125 GeV Higgs mass and produce a strong first order phase transition (SFOPT) for the electroweak baryogenesis and interestingly predict new phenomena in the Higgs sector, which can be tested at colliders such as the Large Hadron Collider (LHC) and the planning Circular Electron Positron Collider (CEPC). We point out this SFOPT can also lead to detectable signals for the GW interferometers , such as eLISA. Our present study on the electroweak phase transition/baryogenesis bridges the particle physics at colliders with the astrophysics and cosmology in the early universe.

Summary

Primary author: HUANG, Fa Peng (IHEP)

Presenter: HUANG, Fa Peng (IHEP)

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