Contribution ID: **211** Type: **not specified**

Gravitational Waves from an Inflation Triggered First-Order Phase Transition

Tuesday 10 May 2022 16:30 (15 minutes)

Large excursion of the inflaton field can trigger interesting dynamics. One important example is a first-order phase transition in a spectator sector which couples to the inflaton. Gravitational waves (GWs) from such a first-order phase transition during inflation, an example of an instantaneous source, have an oscillatory feature. In this work, we show that this feature is generic for a source in an era of accelerated expansion. We also demonstrate that the shape of the GW signal contains information about the evolution of the early universe following the phase transition. In particular, the slope of the infrared part of the GW spectrum is sensitive to the evolution of the Hubble parameter when the GW modes reenter the horizon after inflation. The slope of the profile of the intermediate oscillatory part and the ultraviolet part of the GW spectrum depend on the evolution of the Hubble parameter when the modes exit horizon during the inflation and when they reenter the horizon during the reheating. The ultraviolet spectrum also depends on the details of the dynamics of the phase transition. We consider the GW signal in several models of evolution during and after inflation, and compare them with the minimal scenario of quasi-de Sitter inflation followed by radiation domination after a fast reheating, and demonstrate that the shape of the GW can be used to distinguish them. In this way, the GW signal considered in this paper offers a powerful probe to the dynamics of the early universe which is otherwise difficult to explore directly through CMB, large scale structure, big bang nucleosynthesis (BBN), and other well-studied cosmological observables.

Presenter: LYU, Kunfeng (University of Minnesota)

Session Classification: Cosmology IV