

Theoretical uncertainties for cosmological phase transitions

mercredi 31 mars 2021 14:45 (15 minutes)

A first-order phase transition in the early universe would have given rise to a stochastic gravitational wave background which may be observable today. Starting from a particle physics Lagrangian, the first step in making predictions of the gravitational wave signal is to understand the thermodynamics of the phase transition. In this talk, I will discuss the current situation regarding the theory of the thermodynamics of cosmological phase transitions. In particular, I will focus on the crucial problem of making reliable predictions in the face of infrared Bose enhancements at high temperature. Such enhancements lead to stronger effective couplings, and consequently to large theoretical uncertainties in perturbative calculations. I will outline recent developments in overcoming these problems, and will comment on open questions and future directions.

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Classification de Session: Contributed talks: Cosmology