

Cosmological phase transition thermodynamics: pushing perturbation theory to its limits

Friday, 9 December 2022 11:00 (1 hour)

Gravitational waves (GW) from cosmological phase transitions bear huge discovery potential and can be probed by planned future space-based GW observatories. Complementary to current and future collider experiments, such GW signatures can offer a powerful probe for beyond the Standard Model physics. Predictions for stochastic GW spectrum of a cosmological origin are often plagued by large theoretical uncertainties related to low-order perturbative computation of thermodynamic properties of a phase transition. In this talk, I will discuss how the most accurate predictions to date – that reduce theoretical uncertainties by orders of magnitude – have been obtained, in terms of effective field theory methods in high temperature field theory. Despite these improvements, computation of thermodynamic properties should still be improved in order to make reliable predictions for the GW spectrum. I will discuss perturbative expansion of thermal parameters, and an ambitious task to push perturbation theory to its limits, by computing all first few available orders, before expansion becomes non-perturbative due to the Linde's Infrared Problem.

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