Contribution ID: **23** Type: **not specified**

Consistent Thermal Resummation and Phase Transitions with 2PI Methods

Thursday, 20 November 2025 10:30 (1 hour)

The scalar potential at finite temperature is often used to track the thermal evolution of the universe and in the study of cosmological phase transitions (PTs). As observables, such as the spectrum of gravitational waves (GWs), can ultimately be derived from this quantity, it must be computed accurately. We first review the calculation of the finite-temperature effective potential, emphasizing the need for resummation to address infrared divergences at finite temperature. After an overview of the resummation schemes commonly used in phenomenological studies, we clarify their regimes of validity. We then employ the two-particle irreducible (2PI) formalism as a framework for consistent thermal resummation, demonstrating its treatment of high- and low-temperature corrections on an equal footing. Considering a toy model with two scalar fields, we compute the PT parameters (the temperature, duration, and strength of the transition), and compare the results obtained across resummation schemes. Finally, we use these PT parameters to evaluate the resulting GW spectra, demonstrating how the choice of resummation scheme can significantly affect the predicted signal.

Presenter: BANIK, Amitayus (Chungbuk National University)

Session Classification: Session 1