## Phenomenology 2025 Symposium



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## Warm Inflation with Pseudo-scalar Couplings

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Inflaton couplings during warm inflation result in the production of a thermal bath. Thermal friction and fluctuations can dominate the standard de Sitter analogues, resulting in a modified slow-roll scenario with a new source of density fluctuations. Due to issues with back-reaction, it is advantageous to consider inflaton couplings with the thermal bath that are pseudo-scalar in nature, e.g., derivative interactions or topological  $F\tilde{F}$  couplings. We demonstrate in the context of a perturbative toy model that the model-dependent chemical potentials modify the fluctuation-dissipation theorem, making the relationship between the thermal friction and thermal fluctuations model-dependent. In extreme cases, these chemical potentials can cause the friction term to vanish while thermal fluctuations remain non-zero. We demonstrate how to calculate the chemical potentials, thermal friction, and thermal fluctuations using both the Boltzmann equations and by calculating thermal expectation values, showing explicitly that the two approaches give the same result.

## Mini Symposia (Invited Talks Only)

## Plenary (Invited talks only)

**Authors:** HOOK, Anson (University of Maryland); BROADBERRY, Edward (University of Maryland, College Park); MONDAL, Sagnik (Maryland Center for Fundamental Physics, Department of Physics, University of Maryland, College Park, MD 20742, U.S.A.)

**Presenter:** MONDAL, Sagnik (Maryland Center for Fundamental Physics, Department of Physics, University of Maryland, College Park, MD 20742, U.S.A.)

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