

Back to the phase space: thermal axions

Thursday 2 May 2024 12:00 (20 minutes)

Scattering and decay processes of thermal bath particles in the early universe can dump relativistic degrees of freedom in the primordial plasma. This talk will focus on the QCD axion and it will feature recent and significant improvements in the predicted amount of axion dark radiation. First, I will present novel calculations for the production rate across the different energy scales during the expansion of the universe. I will then present a phase-space approach to improve the predictions for the axion dark radiation abundance. This methodology allows for studying light particles that never reach equilibrium across cosmic history, and to scrutinize the physics of the decoupling when they thermalize instead. I will show how spectral distortions are typically expected due to a non instantaneous decoupling, and I will quantify how this translates into a corrected prediction for the dark radiation abundance.

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Session Classification: Talks