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Thermal Effects in Particle Production

Thursday 25 September 2025 14:18 (18 minutes)

In this talk, we explore the role of non-equilibrium dynamics within a thermal plasma in the context of processes in the early Universe and astrophysical environments. Our approach is based on one-particle-irreducible (1PI) resummed propagators computed within the real-time formalism of thermal field theory, allowing us to consistently include thermal masses, widths, and other non-trivial plasma effects. Notably, we account for multiple soft scatterings with the thermal medium, described by the Landau-Pomeranchuk-Migdal (LPM) effect, which can significantly alter particle production rates. We discuss the implications of these corrections for the accurate prediction of particle abundances in cosmological and astrophysical settings, e.g., in the context of freeze-in production of scalar dark matter.

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