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Scattering Theory and Hadrons Gas

Wednesday 6 April 2022 12:50 (20 minutes)

In this talk I shall review how the S-matrix formalism can be applied to study the thermal properties of interacting hadrons.

The central idea of this approach is to compute an effective density of state from the scattering phase shifts. As the phase shifts encode a wealth of information about the hadronic interactions, the method can robustly handle many dynamical structures, e.g. overlapping resonances, poles and roots, and assess their influences on thermal observables.

As an application I will present an analysis on proton and Lambda yields from the heavy ion collision experiments at the LHC. I will discuss how inconsistencies between theory and experiment, e.g. the proton puzzle and the proton to Lambda ratio, may be resolved by considering some essential features of the empirical baryon spectrum. These dynamical features are also crucial for understanding the Lattice results on thermal QCD, such as the baryon electric charge correlation.

Lastly I will report on some recent progress in analyzing in-medium effects within the S-matrix formalism.

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