



Contribution ID: 79

Type: Poster

Resummed thermodynamics of QCD and N=4 supersymmetric Yang-Mills theory

Wednesday 6 April 2022 18:14 (4 minutes)

In this talk I review recent progress in resummed perturbative calculations of the equation of state of QCD and N=4 supersymmetric Yang-Mills (SUSY) theory. In the case of QCD, I will review progress that has been made using hard-thermal-loop perturbation theory (HTLpt) at finite temperature and quark chemical potential(s), focussing on recent NNLO HTLpt predictions for the quadratic and quartic curvatures of the QCD phase transition line in different physics cases. The NNLO HTLpt predictions are found to agree well with available lattice data for the curvature coefficients where available, and provide predictions for these coefficients in cases where they have not been accurately determined on the lattice. In the second part of my talk, I will discuss recent results which extend the perturbative determination of N=4 SUSY thermodynamics through second-order in the 't Hooft coupling. The final result contains non-analytic terms which are not present in the strong-coupling limit and the resummed perturbative series shows signs of having a finite and large radius of convergence.

References:

- [1] N. Haque and M. Strickland, Phys. Rev. C 103, 031901 (2021).
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Session Classification: Poster Session 1 T02 / T03

Track Classification: QCD matter at finite temperature and density