Contribution ID: **17** Type: **not specified**

Bottomonium suppression in the QGP –From EFTs to non-unitary quantum evolution

Friday 28 October 2022 17:00 (30 minutes)

The strong suppression of bottomonia in ultrarelativistic heavy-ion collisions is a smoking gun for the production of a deconfined quark-gluon plasma (QGP). In this talk, I will discuss recent work that aims to provide a more comprehensive and systematic understanding of bottomonium dynamics in the QGP. The new paradigm is based on an open quantum system approach applied in the framework of the potential non-relativistic QCD EFT (pNRQCD), which has recently been extended to next-to-leading order in the binding energy over temperature. I demonstrate that the computation of bottomonium suppression can be reduced to solving a Lindblad-type equation for the evolution of the b-bbar reduced density matrix including both singlet and octet states and transitions between them. To solve the resulting Lindblad equation, we make use of a quantum trajectories algorithm which can be deployed in a massively parallel manner. Our computation depends on two fundamental transport coefficients that have been evaluated independently using lattice QCD. Comparisons with experimental data for bottomonium suppression and elliptic flow show very good agreement between theory and experiment.

Reference: JHEP 2022, 303 (2022)

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