Contribution ID: **235** Type: **Oral presentation**

Novel relaxation time approximation: a consistent calculation of transport coefficients with QCD-inspired relaxation times

Tuesday 5 April 2022 18:30 (20 minutes)

The relativistic generalization of the relaxation time approximation proposed by Anderson and Witting [1] is widely used in several fields of physics and, in particular, in the study of the hydrodynamization of the matter produced in ultrarelativistic heavy ion collisions. We demonstrate that the approximation proposed by Anderson and Witting contains basic flaws, not being consistent with fundamental properties of the Boltzmann collision operator [2]. This makes it impossible to consistently model relativistic gases using energy dependent relaxation times or more general choices of the local equilibrium state. We propose a new relaxation time approximation which fixes these fundamental flaws [2]. In this contribution, this new formulation is used to consistently calculate the bulk and shear viscosity coefficients using QCD-inspired energy-dependent relaxation times [3] and phenomenological thermal masses obtained from fits to lattice QCD thermodynamics [4].

[1] J. L. Anderson and H. Witting, Physica 74, 466 (1974).

[2] G. S. Rocha, G. S. Denicol and J. Noronha, Phys. Rev. Lett. 127, no. 4, 042301 (2021).

[3] K. Dusling, G. D. Moore and D. Teaney, Phys. Rev. C 81, 034907 (2010).

[4] M. Alqahtani, M. Nopoush and M. Strickland, Phys. Rev. C 92, no.5, 054910 (2015).

Authors: SOARES ROCHA, Gabriel; SOARES NARCISO FERREIRA, Antonio Mauricio (University of Campinas); DENICOL, Gabriel (Universidade Federal Fluminense); NORONHA, Jorge (University of Illinois at Urbana-Champaign)

Presenter: SOARES ROCHA, Gabriel

Session Classification: Parallel Session T01: Initial state physics and approach to thermal equilibrium

Track Classification: Initial state physics and approach to thermal equilibrium