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Phenomenological constraints on the bulk viscosity of QCD

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While small at very high temperature, the bulk viscosity of quantum chromodynamics is expected to grow in the confinement region. Although its precise magnitude and temperature-dependence in the cross-over region is not fully understood, recent theoretical and phenomenological studies [1-5] provided evidence that the bulk viscosity can be sufficiently large to have measurable consequences on the evolution of the quark-gluon plasma. In this work, a Bayesian statistical analysis is used to establish probabilistic constraints on the temperature-dependence of bulk viscosity using combined hadronic measurements from RHIC and the LHC. IP-Glasma initial conditions are used to provide realistic event-by-event fluctuations, which are understood to have an important interplay with bulk viscosity. The width of the peak of bulk viscosity, along with the position of the peak in the transition region, are investigated phenomenologically for the first time. A lower but wider peak than the parametrization used in [3-5] is found to be preferred. Constraints on the position of the peak are found to be limited, with tension observed between the values favoured by RHIC and LHC measurements. The relative effect of shear and bulk viscosities on hadronic observables, in particular momentum anisotropies, is investigated.

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Preferred Track

Collective Dynamics

Collaboration

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