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Building a testable shear viscosity across the QCD phase diagram

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Current experiments at the Relativistic Heavy Ion Collider (RHIC) are probing
finite baryon densities where the shear viscosity to enthalpy ratio $\eta T/w$
of the Quark Gluon Plasma remains unknown. We use the Hadron Resonance Gas
(HRG) model with the most up-to-date hadron list to calculate $\eta T/w$ at low
temperatures and at finite baryon densities ρ_B. We then match $\eta T/w$
to a QCD-based shear viscosity calculation within the deconfined phase to
create a table across $\{T, \mu_B\}$ for different cross-over and
critical point scenarios at a specified location [1]. We find that these new $\eta T/w(T, \mu_B)$ values would require
initial conditions at significantly larger
ρ_B, compared to ideal hydrodynamic trajectories, in order to reach the
same freeze-out point.
[1] E. McLaughlin, J. Rose, T. Dore, P. Parotto, C. Ratti, and J. Noronha-Hostler, arXiv:2103.02090

Collaboration

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