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Transport Coefficients from pQCD to the Hadron Resonance Gas at finite BSQ densities

We present calculations of the shear viscosity in two limits using perturbative QCD and an excluded-volume hadron resonance gas at finite BSQ densities. We then develop a framework that interpolates these two limits to calculate shear viscosity across a wide range of finite BSQ densities. The pQCD and hadron resonance gas calculations have different BSQ densities dependence, leading to a non-trivial shear viscosity at finite densities. In addition, we extend the next-to-leading order weak-coupling shear viscosity of QCD to finite baryon chemical potential μ, and we show that the convergence is better at $\mu > T$ than at $\mu = 0$. Finally, we present leading order calculations of flavor diffusion for weak-coupling QCD at finite baryon chemical potential μ for three flavors.

Category

Theory

Collaboration (if applicable)

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