

Abstract Submitted
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Effect of the GUP on the Entropy Density, Speed of Sound, and Bulk to Shear Viscosity Ratio of an Ideal QGP NASSER DEMIR, Kuwait University — One of the candidates to reconcile quantum mechanics with general relativity is the generalization of the Heisenberg Uncertainty Principle to incorporate gravitational effects. As a result, the Generalized Uncertainty Principle (GUP) "deforms" the commutation relation given by the Heisenberg Uncertainty Principle via a GUP parameter α . We present a calculation of the entropy density, speed of sound, and the resulting impact on the bulk viscosity to shear viscosity ratio of an ideal quark gluon plasma when the effects of the GUP are taken into consideration. When the GUP parameter tends to zero, we obtain the value of the speed of sound for an ideal gas of massless particles i.e. $c_s^2 = 1/3$ and the expected result that the bulk viscosity vanishes. In addition, in the high temperature limit, the speed of sound tends to $c_s^2 = 1/4$. The consequence this has on the bulk viscosity is that in the high temperature limit, the ratio of the bulk to shear viscosity tends to $\zeta/\eta = 5/48$. Our results suggest that the GUP introduces a scale into the system breaking the a priori conformal invariance of a system of massless noninteracting particles. We sketch an attempt to find GUP modifications to the KSS bound.

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