Abstract Submitted
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Nuclear viscosity and viscosity to entropy ratio[1] DANI FU, ARAM MEKJIAN, Rutgers University — Both a classical and a quantum mechanical evaluation of the shear viscosity of hadronic matter is developed and compared. The classical evaluation involves the scattering angle produced by a potential while a quantum description is based on phase shifts from this potential. A hard sphere potential and an attractive square well potential are considered. The classical evaluation of the scattering angle can be cast into a form that has the structure of Snell's refraction law for an attractive potential. The limit of a large index of refraction gives the hard sphere result. The high wave number limit of the quantum result for a hard sphere has a scaling law associated with it. This scaling law is similar to a result which gives a factor of two increase of the hard sphere geometric scattering cross section. This increase is associated with diffraction of the wave around the sphere. The quantum mechanical evaluation is discussed in the unitary limit of infinite scattering length. In the limit of large scattering length the effective range to quantum thermal wavelength appears as a limiting scale. The viscosity to entropy density ratio is developed. Results are compared with the string theory limit for this ratio involving Planck's constant.

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