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Shear Viscosity over Entropy Ratio of Hot Hadronic Matter

RAINER FRIES, ZHIDONG YANG, Texas A&M University — The ratio of shear viscosity to entropy density η/s typically exhibits a minimum at phase transitions, which is prominent in the case of true phase transitions and is smooth if the transition is a crossover [1]. For quark gluon plasma both lattice QCD and extractions from data hint at a very small value of η/s , close to the conjectured lower bound $1/4\pi$, as the temperature approaches T_c from above. On the other hand, hadronic transport is predicting η/s to be as large as $10/4\pi$ when the temperature approaches T_c from below [2]. This discrepancy is uncomfortably large. In this talk we review the current results for η/s from the literature and discuss the importance of a reliable estimate of η/s for hot hadronic matter. We introduce the idea of extracting η/s from data through an analysis of the freeze-out process using a Navier-Stokes approximation [3]. We quantify uncertainties from this extraction and correct for known biases. This method suggests a smooth minimum of η/s at T_c and a gradual rise below T_c . We discuss possible consequences of this scenario. [1] L.P. Csernai, J.I. Kapusta, L.D. McLerran, PRL 97, 152303 (2006) [2] J.-B. Rose et al., PRC97, 055204 (2018) [3] Z. Yang, R.J. Fries, arXiv:1807.03410

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