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Transport coefficients of QCD at NLO

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I will give an overview of the determination of the transport coefficients of QCD at next-to-leading order. It is known that leading-order perturbative computations give values of the shear viscosity over entropy density (η/s) that are significantly larger than phenomenological values and AdS/CFT computations. I will thus explain the recent improvements in our understanding of thermal amplitudes at light-like separations. This in turn can be used to extend the Arnold-Moore-Yaffe effective kinetic theory of QCD to NLO. I will explain the physical picture behind the NLO corrections and then use this kinetic theory to determine the NLO transport coefficients. First-order transport coefficients such as η/s show a rather poor convergence, but do become comparable to phenomenological values when extrapolated to the QCD transition region. On the other hand, second-order relaxation (τ_π) can be shown to obey a lower bound in any kinetic theory, which is approximately twice the AdS/CFT result, and NLO corrections push the value further away from the bound. Hence, second-order relaxation provides a natural way to distinguish strongly-coupled systems from those described by kinetic theory.

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