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Shear Viscosity to electric conductivity ratio for the Quark-Gluon Plasma

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Transport coefficients of strongly interacting matter are currently subject of intense studies due to their relevance for the characterization of the quark-gluon plasma (QGP) produced in ultra-relativistic heavy-ion collisions (uRHIC).

We discuss the connection between the shear viscosity to entropy density ratio, η/s , and the electric conductivity, σ_{el} : we find that a minimal η/s is consistent with a low value of electric conductivity as measured in recent lattice QCD calculations.

More generally we show that the ratio of η/s over σ_{el}/T supplies a measure of the quark to gluon scattering rates whose knowledge would allow to significantly advance in the understanding of the QGP phase.

We also predict that $(\eta/s)/(\sigma_{el}/T)$, independently on the running coupling $\alpha_s(T)$, should increase up to about ~ 20 for $T \rightarrow T_c$, while it goes down to a nearly flat behaviour around $\simeq 4$ for $T \geq 4T_c$.

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