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Medium effects on the transport coefficients of a pion gas

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The shear and bulk viscosities, as well as the thermal conductivity of a pion gas at finite temperature are obtained by solving the relativistic transport equation in the Chapman-Enskog approximation. The in-medium effects are introduced in the $\pi\pi$ cross section through one-loop self-energies of the exchanged ρ and σ mesons. The effect of early chemical freeze-out in heavy ion collisions is implemented through a temperature-dependent pion chemical potential. These show a noticeable effect in the temperature dependence of the viscosities and thermal conductivity.

Summary

The interaction cross-section for $\pi\pi$ scattering gets modified in the presence of a hot and dense medium, which in turn affects the temperature dependence of transport coefficients significantly. These realistic modifications are needed to be taken care of, since they could affect the quantitative estimates of signals of heavy ion collisions, such as the p_T spectra and elliptic flow of hadrons.

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