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Shear viscosity of a multi-component hadronic system

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Shear viscosity η and entropy density s of a hadronic resonance gas are calculated consistently within the Chapman-Enskog
approximation using the K-matrix parameterization of hadronic cross sections which preserves the unitarity of the T-matrix. In the $\pi - K - N - \eta$ mixture considered, a total of 82 resonances up to 2 GeV were included. Comparisons are also made to results with other hadronic cross sections such as the Breit-Wigner (BW) and, where available, experimental phase shift (EXP) parameterizations. The BW parameterization fails to preserve unitarity of the $T-$matrix for nearby resonances, whereas experimental phase shifts are not available for all resonances considered. Hadronic interactions among the many resonances are shown to decrease the shear viscosity and increase the entropy density leading to a reduction of η/s as the QCD phase transition temperature is approached.

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