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Self-consistent Cooper-Frye freeze-out of a viscous fluid to particles

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Comparing hydrodynamic simulations to heavy ion data inevitably requires the conversion of the fluid to particles. This conversion, typically done in the Cooper-Frye formalism, is ambiguous for viscous fluids. We compute self-consistent phase space corrections by solving the linearized Boltzmann equation and contrast the solutions to those obtained using the ad-hoc "democratic Grad" ansatz typically employed in the literature where coefficients are independent of particle dynamics. Solutions are calculated analytically for a massless gas and numerically for both a pion-nucleon gas and for the general case of a hadron resonance gas. We find that the momentum dependence of the corrections in all systems investigated is best fit by a power close to $\frac{3}{2}$ rather than the typically used quadratic ansatz. The effects on flow coefficients are also calculated and found to be substantial for elliptic flow, thus the form of these corrections should be taken into account when extracting medium properties from experimental data.

On behalf of collaboration:

None

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