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## Kinetic transport is needed to reliably extract shear viscosity from pA and AA data

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The azimuthal anisotropies of particle spectra measured in proton-nucleus (pA) and nucleus-nucleus (AA) collisions play a key role in constraining QCD matter properties like the shear viscosity over entropy density ratio  $\eta/s$ . We compare calculations of  $v_n$ 's from viscous fluid dynamics and from kinetic transport which start both from the same initial conditions and which implement the same matter properties. We observe that both approaches lead to parametrically different  $\eta/s$ -dependencies of the elliptic anisotropy  $v_2$ , and they may thus lead to quantitatively different results for the phenomenologically inferred value of  $\eta/s$ . The parametric differences can be traced to the boost-invariant longitudinal expansion of pA and AA collisions which induces in fluid dynamic results of the  $\eta/s$ -dependence of  $v_2$  a dominant sensitivity on the initial conditions. Transport theory is free of this problem and it accounts for the order of magnitude of experimentally observed signal strengths  $v_n$  with sizeable mean free path.

### Content type

Theory

### Collaboration

### Centralised submission by Collaboration

Presenter name already specified

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