

# Characteristic momentum of Hydro+ and a bound on the sound speed enhancement near the QCD critical point

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Near the critical point in the QCD phase diagram, hydrodynamics breaks down at a momentum where the frequency of the fastest hydrodynamic mode becomes comparable with the decay rate of the slowest non-hydrodynamic mode. Hydro+ was developed as a framework which extends the range of validity of hydrodynamics beyond that momentum. In this talk, we first discuss the analytic structure of the spectrum of linear perturbations in single-mode Hydro+; this contains a single slow mode in addition to the hydro modes. We then show that the slow mode falls out of equilibrium if the momentum of flow is greater than a characteristic momentum value. That characteristic momentum turns out to be set by the branch points of the dispersion relations. Applying these results to the Hydro+ near the critical point, we find a temperature-dependent upper bound for the sound speed enhancement near the critical point in the QCD phase diagram.

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