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Suppression of baryon diffusion in a baryon rich strongly coupled quark-gluon plasma

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Five dimensional black hole geometries describing the QCD crossover transition seen in (2+1)-flavor lattice QCD calculations at zero and nonzero baryon densities are used to obtain holographic predictions for the baryon susceptibility, baryon conductivity, baryon diffusion constant, and thermal conductivity of the strongly coupled quark-gluon plasma in the range of temperatures 130 MeV ≤ T ≤ 300 MeV and baryon chemical potentials 0 ≤ μB ≤ 400 MeV. Diffusive transport is predicted to be suppressed in this region of the QCD phase diagram, which is consistent with the existence of a critical end point at larger baryon densities. We also calculate the fourth-order baryon susceptibility at zero baryon chemical potential and find quantitative agreement with recent lattice results. The baryon transport coefficients computed in this work can be readily implemented in hydrodynamic codes used to investigate the hot and baryon dense QGP produced at RHIC's beam energy scan.

Summary

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