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Contributions of critical fluctuations and baryon annihilation to proton number cumulants at $\sqrt{s_{\rm NN}} = 7.7 - 200$˜GeV from hydrodynamics

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We present a study of net-proton number fluctuations in central Au+Au collisions at $\sqrt{s_{\rm NN}} = 7.7 - 200$ GeV using viscous hydrodynamic simulations. Proton and antiproton fluctuations are evaluated on the hydrodynamic freeze-out hypersurface via a Cooper–Frye procedure adapted to an interacting hadron resonance gas. Effects of limited experimental acceptance and global charge conservation are incorporated through a density-density correlation function. Critical fluctuations and effects of baryon annihilation are introduced into baryon number susceptibilities, utilizing the Ising-2DTExS equation of state. We discuss deviations of the resulting cumulants from the noncritical baseline, and their sensitivity to the presence of a QCD critical point. We also discuss acceptance dependence of reduced factorial cumulants as a signature of local correlations among baryons.

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