When can long-range charge fluctuations serve as a QGP signal?

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Abstract

We critically discuss recent suggestion to use long-range modes of charge (electric or baryon) fluctuations as a signal for the presence of Quark-Gluon Plasma at the early stages of a heavy ion collision. We evaluate the rate of diffusion in rapidity for different secondaries, and argue that for conditions of the SPS experiments, it is strong enough to relax the magnitude of those fluctuations almost to its equilibrium values, given by hadronic resonance gas. We further argue that experimental data from SPS agree with this conclusion. We evaluate the detector acceptance needed to measure such "primordial" long-range fluctuations at RHIC conditions. We conclude with an application of the charge fluctuation analysis to the search for the QCD critical point.
