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Discovering the QCD critical point with net-proton fluctuations

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In light of the net-proton number fluctuations recently measured by STAR in the BES program at RHIC, we discuss to what extent a critical point in the QCD phase diagram could be responsible for the observed beam energy dependence. Assuming QCD to belong to the 3d Ising model universality class, we analyze the imprint of critical fluctuations in the chiral order parameter onto the net-proton fluctuations in a non-dynamical framework. We quantify the effect of a limited detector acceptance on the fluctuation signals and show that for a sufficiently strong coupling of hadrons to the order parameter those signals even survive late stage hadronic processes such as resonance decays. This study serves as an essential guideline for the dynamical modeling of fluctuations in heavy-ion collisions, for which we report recent advances.

On behalf of collaboration:

None

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