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Study of the kurtosis out-of-equilibrium

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The search for the Quantum Chromodynamics (QCD) critical point is underway at the Relativistic Heavy-Ion Collider (RHIC) Beam Energy Scan II. The primary signature of the critical point is a peak (divergence) in the kurtosis of the net-proton number distribution, κ_4 . Most previous studies of kurtosis have focused on equilibrium physics, whereas it is well-known that out-of-equilibrium effects are vital in understanding the Quark Gluon Plasma (QGP). Out-of-equilibrium effects near the vicinity of the critical point can dramatically alter the trajectory through the QCD phase diagram from equilibrium. We find that the size and shape of the critical region play an important role in whether or not the critical point will be effectively seen in the dynamic evolution. Critical regions which extend in the T direction have a stronger dip in the speed of sound, which focus trajectories towards the critical point and influence the kurtosis.

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