

Influence of the QCD Equation of State by System Size

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A long standing question in the field of heavy-ion collisions is whether charm quarks are thermalized within the Quark Gluon Plasma. In recent years, progress in lattice QCD simulations has led to reliable results for the equation of state of a system of 2+1 flavors (up, down, and strange) and 2+1+1 flavors (up, down, strange, and charm). We find that the equation of state strongly affects differential flow harmonics and a preference is seen for thermalized charm quarks at the LHC. Predictions are also made for the event-plane correlations at RHIC Au–Au $\sqrt{s_{NN}} = 200$ GeV collisions, and the scaling of differential flow observables and factorization breaking for all charged particles at LHC Pb–Pb $\sqrt{s_{NN}} = 5.02$ TeV collisions compared to LHC Xe–Xe $\sqrt{s_{NN}} = 5.44$ TeV collisions, which could be useful in answering the question: are charm quarks thermalized?

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