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PHENIX results on global observables and flow in Au+Au collisions from the RHIC Beam Energy Scan

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The RHIC Beam Energy Scan explores the high baryon density region of the QCD phase diagram to find signatures of the critical point. PHENIX has measured global observables such as $dN_{ch}/d\eta$ and $dE_T/d\eta$ at midrapidity in Au+Au collisions at $\sqrt{s_{NN}}=7-200$ GeV as well as elliptic (v_2) and triangular (v_3) flow coefficients for identified charged hadrons at midrapidity in Au+Au collisions at $\sqrt{s_{NN}}=39-200$ GeV. The charged particle and transverse energy densities normalized by number of participants (N_{part}) stay constant within uncertainties as a function of N_{part} for collision energies $\sqrt{s_{NN}} < 39$ GeV. At higher energies the global observables scale with number of quark participants (N_{qp}), where N_{qp} is estimated using a modified Glauber model that replaces each nucleon participant with quark participants. This observation is consistent with universal number of constituent quarks scaling of flow coefficients measured for identified hadrons at higher collision energies. Both observations can indicate onset of parton degrees of freedom in the fireball. Elliptic and triangular flows were measured for identified hadrons as a function of transverse momentum and collision centrality. An energy dependent difference of the measured v_2 and v_3 values between particles and corresponding anti-particles is observed. The difference increases with decreasing beam energy and centrality of collisions. The quality of universal number of quark scaling observed for v_2 and v_3 at $\sqrt{s_{NN}}=200$ GeV deteriorates with decreasing collision energy.

On behalf of collaboration:

PHENIX

Author: MITCHELL, Jeffery (Brookhaven National Laboratory)

Presenter: MITCHELL, Jeffery (Brookhaven National Laboratory)

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