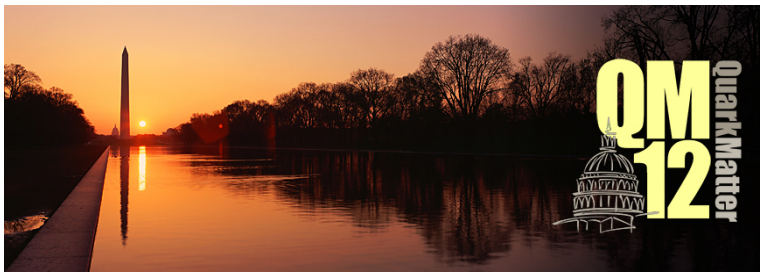

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Deviation from quark number scaling of the anisotropy parameter v2 of pions, kaons, and protons in Au+Au collisions at 200 GeV

Wednesday, 15 August 2012 11:00 (20 minutes)

The number of quark (n_q) scaling, which is manifested as $v_2^{hadron}(p_T) \approx n_q * v_2(p_T/n_q)$, is an approximate scaling that comes from the addition of the valence quark momenta at hadronization. The observation of n_q scaling has been claimed that a partonic matter with quark-like degrees of freedom and significant collectivity has been generated in heavy ion collisions~\ref{1,2}. However, there are several theoretical considerations that suggest that the n_q scaling should be violated in certain conditions. For example, the contribution of sea quarks and gluons have been shown to affect the n_q scaling in the models including higher Fock states. And models that consider recombination between "thermal" and "shower" partons predict centrality dependent deviations from n_q scaling.

Understanding the limits of the recombination domain is important in relation to viscous hydrodynamics and the extraction of the shear viscosity over entropy density (η/s) from the data, as well as for developing a unified approach in describing jet energy loss and high p_T v_2. Searches for deviations from n_q scaling are also important for the low-energy scan program at RHIC as they have been considered as a signature of the transition between sQGP formation and a hadronic system. In this talk, we will report on high-statistics measurements of the second order Fourier coefficient v_2 for identified pions, kaons and protons, which extend to relatively high p_T around 6 GeV/c. Comparisons with published measurements of K_S^0 and Λ are shown for the different centralities. With these new measurements, the p_T limits and centrality dependence of the n_q scaling deviations are being carried out in PHENIX.

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Primary author: Dr HUANG, shengli (PHENIX Collaboration)

Presenter: Dr HUANG, shengli (PHENIX Collaboration)

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