26aSC-3 Scaling Properties of Identified Hadron Transverse Momentum Spectra in Au+Au and Cu+Cu Collisions at RHIC-PHENIX

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Identified hadron analyses in heavy ion collisions at RHIC show particle type dependences of hadron yield, especially a baryon/meson difference at intermediate p_T (2~5 GeV/c). In central Au+Au collisions at $\sqrt{s_{NN}}$ = 200 GeV, there is a significant suppression in meson yield compared to expectations from scaled p+p results. In contrast, a large enhancement of baryons relative to mesons is observed in this p_T region. Moreover, in elliptic flow (v_2) measurements, a baryon/meson difference is also found in its magnitude.

The intermediate p_T region is considered to have both soft and hard hadron production mechanisms. Here, soft part includes hydrodynamic flow, quark recombination, and hard part includes jet fragmentation. We also observe some indications of transition from soft to hard hadron production, for example, in proton/pion ratio. Therefore, a detailed study of identified hadron spectra and ratios in low to intermediate p_T region could be effective to separate multiple hadron production mechanisms mentioned above.

One powerful way for the study is a systematic scan over different collisions systems (colliding species, beam energies). In addition to heavy ion data obtained in the past RHIC runs, we have now high statistics 200 GeV p+p data and newly obtained (from Run-6) 62.4 GeV p+p data. The p+p data provides baseline spectra to heavy ion data, and it is important to quantify in-medium nuclear effects in heavy ion collisions.

We will show scaling properties of identified hadron p_T spectra (π/K/p) in different collision systems (Au+Au, Cu+Cu, p+p at 62.4/200 GeV). Particle yields, particle ratios, nuclear modification factors, and v_2 strengths will be presented as a function of number of participants, transverse energy, eccentricity. Then similarities / differences on the hadron production will be discussed.