Rapidity, system size and energy dependence of the nuclear modification factor

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Weak dependence on rapidity of the nuclear modification factor in Au+Au collisions at the top RHIC energy is still not well understood [1]. Large particle suppression at midrapidity is explained by parton energy loss in multiple scatterings in the strongly interacting dense medium. It is of great importance to identify the mechanisms responsible for the small value of R_{AA} observed at large rapidities. Flow analysis at BRAHMS shows similar values of ν_2 in mid-rapidity and forward rapidity regions [2]. This results suggest common mechanisms underlying the observed suppression in the wide rapidity range, which leads to the conclusion that QGP extends up to $|y| \approx 3$. Alternative approaches focus on growing role of the initial state effects such as existence of the Color Glass Condensate (CGC) in the incoming nuclei or leading-twist perturbative-QCD shadowing.
Early analysis shows that the nuclear modifcation factors at various centralities and rapidities scale with energy density (derived from famous Björken formula). In the talk I will present a comprehensive picture of the high-p_T suppression phenomena focusing on the centrality and rapidity dependence of the nuclear modification factor for two colliding systems (Au + Au and Cu + Cu) at two energies ($\sqrt{s_{NN}} = 200\,\mathrm{GeV}$ and $\sqrt{s_{NN}} = 62.4\,\mathrm{GeV}$).

References

[1] D. Rohrich, QM05 proceedings.
[2] H. Ito for BRAHMS Collaboration, QM05 proceedings.