



Contribution ID: 440

Type: **Poster**

Eta meson production of high-energy nuclear collisions at NLO

Tuesday 29 September 2015 16:30 (2 hours)

The transverse momentum spectrum of η meson in relativistic heavy-ion collisions is studied at the next-to-leading-order (NLO) within the perturbative QCD, where the jet quenching effect in the QGP is incorporated with the effective medium-modified η fragmentation functions using the higher-twist approach. We show that the theoretical simulations could give nice descriptions of PHENIX data on η meson in both $p + p$ and central $Au + Au$ at the RHIC, and also provide numerical predictions of η spectra in central $Pb + Pb$ collisions with $\sqrt{s_{NN}} = 2.76$ TeV at the LHC. The ratios of η/π^0 in $p + p$ and in central $Au + Au$ collisions at 200 GeV are found to overlap in a wide p_T region, which matches well the measured ratio η/π^0 by PHENIX. We demonstrate that, at the asymptotic region when $p_T \rightarrow \infty$ the ratios of η/π^0 in both $Au + Au$ and $p + p$ are almost determined only by quark jets fragmentation and thus approach to the one in e^+e^- scattering; in addition, the almost identical gluon (quark) contribution fractions to η and to π result in a rather moderate variation of η/π^0 distribution at intermediate and high p_T region in $A + A$ relative to that in $p + p$; while a slight higher η/π^0 at small p_T in $Au + Au$ can be observed due to larger suppression of gluon contribution fraction to π^0 as compared to the one to η . The theoretical prediction for η/π^0 at the LHC has also been presented.

On behalf of collaboration:

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Session Classification: Poster Session

Track Classification: Jets and High p_T Hadrons