Gamma-hadron spectra in $p + Pb$ collisions at $\sqrt{s_{NN}} = 5.02$ TeV

Thursday, 4 June 2020 13:50 (20 minutes)

Under the assumption that a quark-gluon plasma droplet is produced in $p + A$ collisions, $\gamma$-triggered hadron spectra [1,2] are studied within a next-to-leading-order perturbative QCD parton model with the medium-modified parton fragmentation functions in $p + Pb$ collisions at $\sqrt{s_{NN}} = 5.02$ TeV. The initial conditions and space-time evolution of the small system of hot and dense medium is simulated by superSONIC hydrodynamic model [3] and parton energy loss in such a medium is described by the high-twist (HT) approach [4]. The scaled jet transport coefficient $\hat{q}/T^3$ in this HT approach is extracted from single hadron in central $A + A$ collisions because its values from single and dihadron suppressions are similar [5]. Numerical results show that $\gamma$-hadron spectra for $p_T = 12 − 40$ GeV/c in this scenario are suppressed by $10\% \sim 20\%$ in the most central $0 - 10\% p + Pb$ collisions at $\sqrt{s_{NN}} = 5.02$ TeV. The suppression becomes weaker with higher transverse momentum of the triggered-$\gamma$. As a comparison, $\gamma$-hadron suppression in Pb + Pb collisions at $\sqrt{s_{NN}} = 2.76$ and 5.02 TeV is also predicted.

References

Collaboration (if applicable)

Track
Jets and High Momentum Hadrons

Contribution type
Contributed Talk

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Presenter: XIE, Man (Central China Normal University)
Session Classification: Parallel
Track Classification: Jets and High Momentum Hadrons