

Nuclear modification factors for high transverse momentum pions and protons at LHC

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Including conversions between quark and gluon jets in a quark-gluon plasma (QGP) via both elastic $qg \leftrightarrow gq$ and inelastic $qq \leftrightarrow gg$ reactions, we have predicted the nuclear modification factor for both protons and pions as well as their ratios at large transverse momenta in central Pb+Pb collisions at $s_{NN}^{1/2} = 5.5$ TeV [1]. As shown in the left window of Fig. 1, the nuclear modification factor R_{AA} for large transverse momenta pions increases from 0.18 at $p_T = 5$ GeV to 0.4 at $p_T = 40$ GeV due to a smaller drag coefficient at large transverse momenta. The R_{AA} of protons has a similar behavior, but its value is smaller because of stronger suppression of gluon than quark jets. The resulting p/π^+ ratio shown by the solid line in the right window of Fig. 1 approaches that in p+p collisions at same energy when the transverse momenta become very large. At lower transverse momenta, the p/π_+ ratio remains, however, smaller than that in p+p collisions, which is different from that in heavy ion collisions at RHIC as a result of the larger ratio of gluon to quark jets at LHC. Without conversions between quark and gluon jets, the p/π^+ ratio decreases by a factor of two as shown by the dotted line.

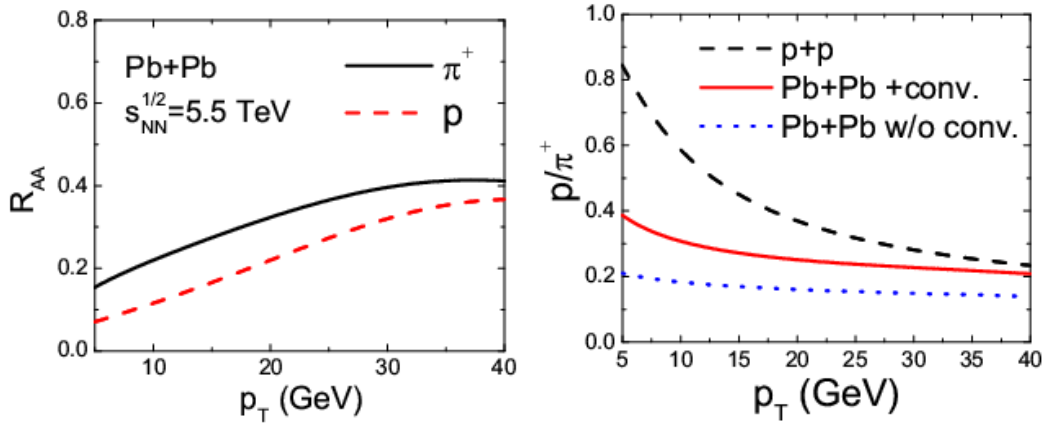


Figure 1. Left window: Nuclear modification factor R_{AA} for π^+ (solid line) and proton (dashed line) in central Pb+Pb collisions at $s_{NN}^{1/2} = 5.5$ TeV. Right window: p/π^+ ratio without (dotted lines) or with jet conversions (solid lines). Dashed lines correspond to p+p collisions at same energy.

[1] N. Armesto *et al.*, J. Phys. G **35**, 054001 (2008).