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Medium modifications of girth distributions for inclusive jets and Z^0 +jets in relativistic heavy-ion collisions at the LHC

In this paper, we investigate the medium modifications of girth distributions for inclusive jets and Z^0 tagged jets with a small radius ($R=0.2$) in Pb+Pb collisions with 2.76TeV at the LHC. The partonic spectra in the initial hard scattering of elementary collisions are obtained by an event generator POWHEG+PYTHIA, which matches the next-to-leading order (NLO) matrix elements with parton showering, and the energy loss of a fast parton traversing the hot/dense QCD medium is calculated by Monte Carlo simulation within the higher-twist formalism of jet quenching in heavy-ion collisions. We present the model calculations of event normalized girth distributions for inclusive jets in p+p and Pb+Pb collisions at 2.76TeV, which give good descriptions of ALICE

measurements. It is shown that the girth distributions of inclusive jets in Pb+Pb are shifted to lower girth regions relative to those in p+p. Thus, the nuclear modification factor of girth distributions for inclusive jets is larger than unity at small girth regions and smaller than unity at large girth regions. This behavior results from softer fragments inside

a jet as well as the fraction alteration of gluon/quark initiated jets in heavy-ion collisions. We further predict the girth distributions for boson tagged jets in Pb+Pb collisions at 2.76TeV and demonstrate that the medium modification on girth distributions for Z^0 tagged jets is less pronounced compared to that for inclusive jets because the dominant components of Z^0 tagged jets are quark-initiated jets.

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