

Diffusion of charm quarks in jets in high-energy heavy-ion collisions

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The radial distribution of D^0 mesons in jets probes the diffusion of charm quark relative to the jet axis and provides a new perspective to study the interaction mechanisms between heavy quarks and the medium in the nucleus-nucleus collisions. The in-medium parton propagations are described by a Monte Carlo transport model which uses the next-to-leading order (NLO) plus parton shower (PS) event generator SHERPA as input and includes elastic (collisional) and inelastic (radiative) interaction for heavy quarks as well as light partons. At low D^0 meson p_T , the radial distribution significantly shifts to larger radius indicating a strong diffusion effect which is consistent with the recent experimental data. We demonstrate that the angular deviation of charm quarks declines with p_T and is very sensitive to the collisional more than radiative interaction at $p_T < 5$ GeV. As predictions, we present the D^0 meson radial distribution in jets in p+p and 0 – 10% Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV at the RHIC, and also estimate the nuclear modification factor of charm jet in central Au+Au collisions at 200 GeV at the RHIC and central Pb+Pb collisions at 5.02 TeV at the LHC.

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