High Energy Physics - Phenomenology

Photon-tagged heavy meson production in high energy nuclear collisions

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We study the photon-triggered light and heavy meson production in both p+p and A+A collisions. We find that a parton energy loss approach that successfully describes inclusive hadron attenuation in nucleus-nucleus reactions at RHIC can simultaneously describe well the experimentally determined photon-triggered light hadron fragmentation functions. Using the same framework, we generalize our formalism to study photon-triggered heavy meson production. We find that the nuclear modification of photon-tagged heavy meson fragmentation functions in A+A collision is very different from that of the photon-tagged light hadron case. While photon-triggered light hadron fragmentation functions in A+A collisions are suppressed relative to p+p, photon-triggered heavy meson fragmentation functions can be either enhanced or suppressed, depending on the specific kinematic region. The anticipated smaller energy loss for b-quarks manifests itself as a flatter photon-triggered B-meson fragmentation function compared to that for the D-meson case. We make detailed predictions for both RHIC and LHC energies. We conclude that a comprehensive comparative study of both photon-tagged light and heavy meson production can provide new insights in the details of the jet quenching mechanism.

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