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Inclusive and tagged beauty jets in Pb+Pb collisions at the LHC

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Heavy flavor jets at the LHC have emerged as a new tool to test the theory of heavy flavor production and parton shower formation initiated by prompt b-quarks. They provide new insights into the mechanism of heavy flavor propagation and energy loss in dense QCD matter. B-jets are also an important physics thrust of the RHIC heavy ion program. In this talk we present recent theoretical advances in understanding single inclusive beauty jet production, as well as photon-tagged and B-meson-tagged b-jet production in heavy ion collisions at the LHC. We find that predictions for the nuclear-induced attenuation of inclusive b-jets, based on the theory of coherent energy loss in the QGP, agree well with recent CMS experimental data at a center-of-mass energy 2.76 TeV. We further extend our results to photon-tagged and B-meson tagged b-jet production at 5.1 TeV for comparison to data from the upcoming LHC Pb+Pb run. We find that photon-tagged b-jets exhibit smaller momentum imbalance shift in nuclear matter, and correspondingly smaller energy loss, than photon-tagged light flavor jets. Our results show that B-meson tagging is most effective in ensuring that the dominant fraction of recoiling jets originate from prompt b-quarks. Interestingly, in this channel the large suppression of the cross section is not accompanied by a significant momentum imbalance shift, a behavior quite different from the one observed in dijet asymmetry distributions. Last but not least, we present comparison between the b-jet attenuation and the quenching of open heavy flavor (D and B mesons) in heavy ion collisions.

[1]. J. Huang, Z. Kang and I. Vitev, Phys. Lett. B726, 251.

[2]. J. Huang, Z. Kang, I. Vitev and H. Xing, arXiv:1505.03517.

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