NLO transverse momentum broadening and QCD evolution of jet transport parameter HONGXI XING, ZHONG-BO KANG, Los Alamos National Laboratory, ENKE WANG, Central China Normal University, XIN-NIAN WANG, Lawrence Berkeley National Laboratory — There have been a lot of efforts focused on qualitative and quantitative studies of the properties of the sQGP through jet quenching. However, it is not clear whether the properties of the medium such as the jet transport parameter as probed by a propagating jet is unique and intrinsic to the medium, independent of the hard processes that produce the energetic jets. This is a problem of factorization of multiple scattering in QCD and so far has eluded many theoretical efforts. In this talk, we show you the first complete NLO calculation of transverse momentum broadening in SIDIS e+A , Drell-Yan and Higgs in p+A collisions. We demonstrate for the first time how QCD factorization holds for multiple parton scattering and the universality of the associated quark-gluon and gluon-gluon correlation functions or properties of nuclear matter contained therein as probed by a propagating parton, independent of the hard processes that create the fast partons. Our calculation also identifies the QCD evolution equation for this quark-gluon and gluon-gluon correlation functions, which determines the QCD scale and jet energy dependence of the jet transport parameter. We further solve the QCD evolution equation of jet transport parameter numerically and determine the scale and energy dependence of the jet transport parameter in cold and hot dense medium, which paves the way to extract the precise information of nuclear medium.

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