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Hadronization data in cold nuclear medium: past, present and future (Jefferson Lab and EIC)

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The propagation of colored quarks and subsequent formation of hadrons in the nuclear medium are the phenomena closely related to the fundamental processes in QCD. This topic has captivated the interest of diverse scientific communities, ranging from Deep Inelastic Scattering (DIS) to Drell-Yan and Heavy-Ion collisions. A unique feature of semi-inclusive DIS is its ability to investigate time-dependence of color propagation and hadronization processes by embedding it in well understood nuclear medium of increasing size allowing for studies of a variety of important partonic and hadronic processes. These include characteristics of light and heavy hadron formation and attenuation, quark energy loss, diquark searches, di-hadron and Bose-Einstein correlations which will be discussed in this talk in the framework of experimental data gathered from Jefferson Lab and complimented by QCD-based phenomenological analyses.

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