LA-UR-21-20714

Open Heavy Flavor and Jet studies for the EIC

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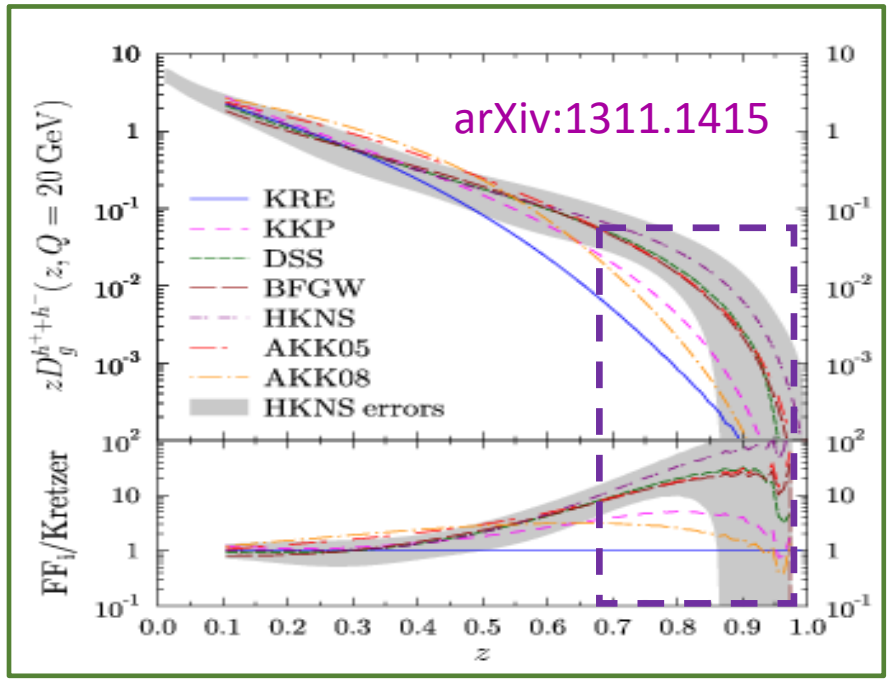
This work is supported by LANL LDRD 20200022DR project!

EIC opportunities Snowmass Heavy Flavor session, Jan. 29th, 2021

Heavy Flavor production serves as one of the golden channel to explore the hadronization at the EIC

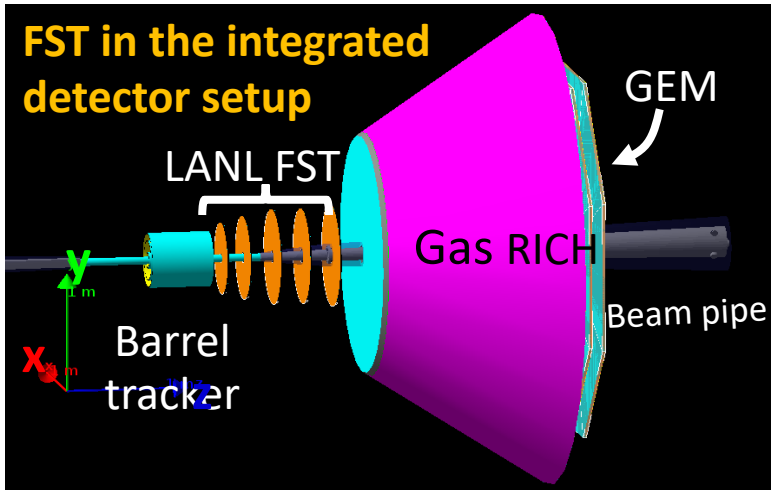
- EIC will provide a clean environment to explore how quarks and gluons form visible matter inside the vacuum/medium, which is referred to as the hadronization process.

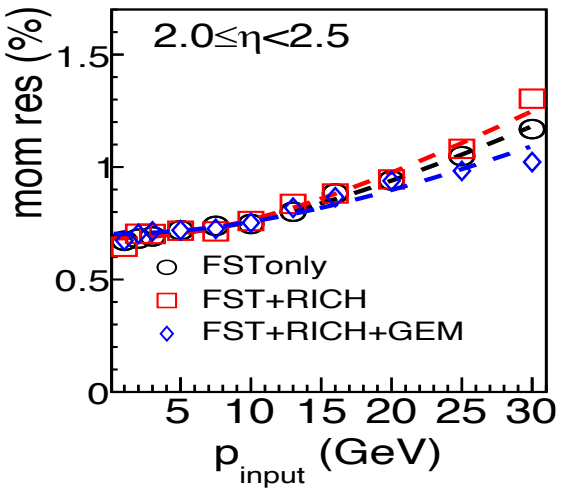
gluon FF

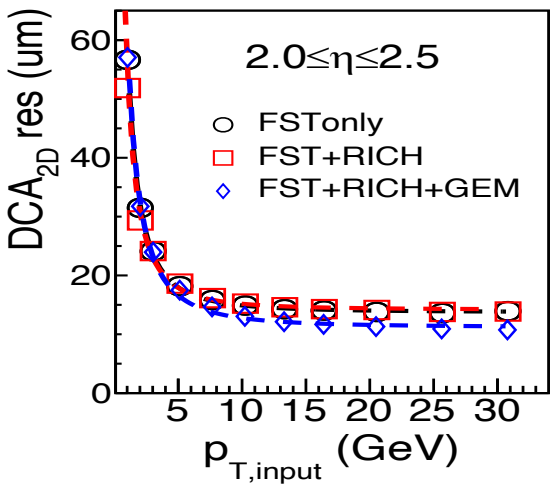


- Initial detector design for a proposed Forward Silicon Tracker (FST) and its performance have been studied.

arXiv:2009.02888

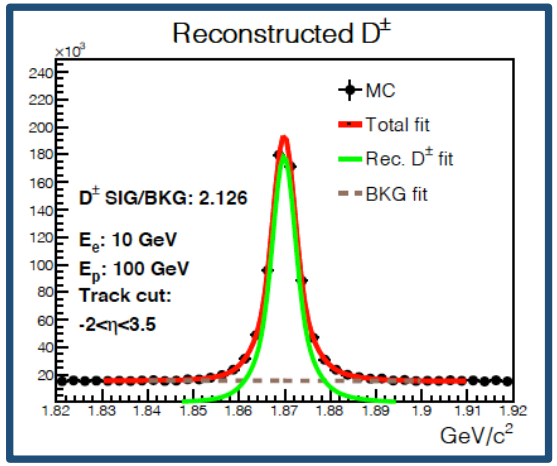


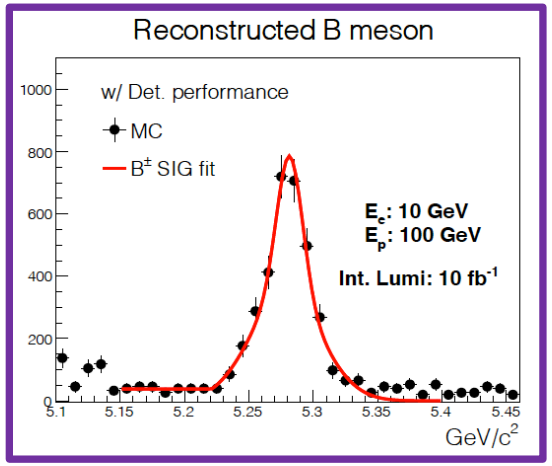


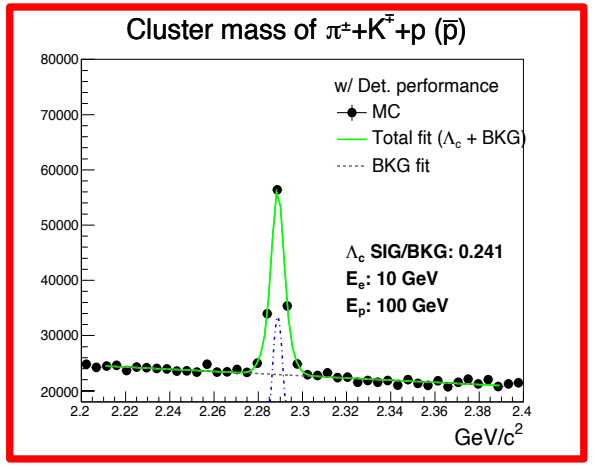


Reconstructed Heavy Flavor Hadrons at the EIC provide strong discriminating power on the hadronization in medium

- Reconstructed HF hadron mass distributions.



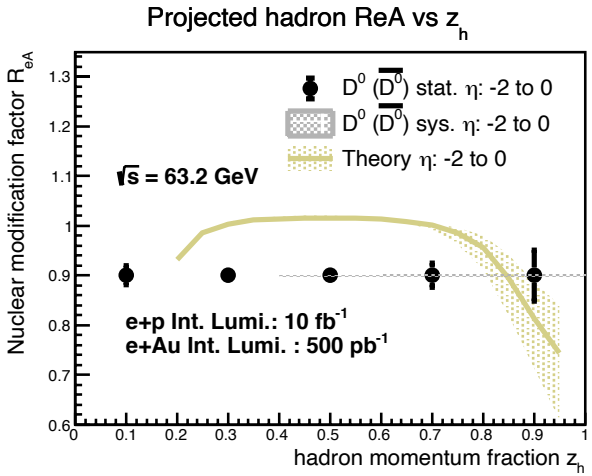


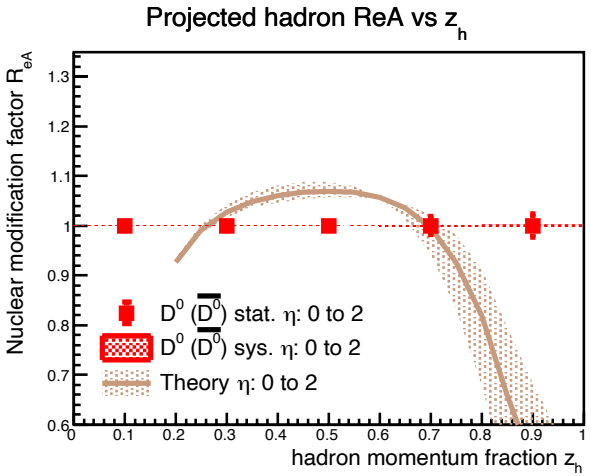


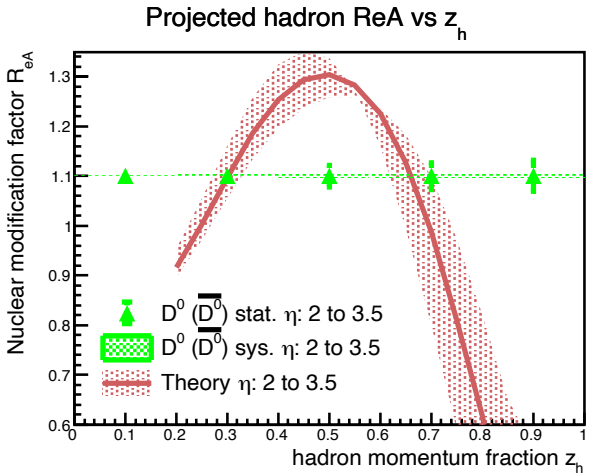
arXiv:2009.02888

- Reconstructed $D^{\pm}$
- Reconstructed $B^{\pm}$
- Reconstructed $\Lambda_c^{\pm}$

z_h dependent R_{eA} for D^0 meson







Theoretical calculations from the HF tomography in EIC, arXiv: 2007.10994

New observables: flavor tagged jet angularity

- A new probe to explore the hadronization origin and process: jet angularity.

Definition: $$\tau_a \equiv \tau_a^{pp} \equiv \frac{1}{p_T} \sum_{i \in J} p_T^i \left(\Delta \mathcal{R}_{iJ}\right)^{2-a}$$

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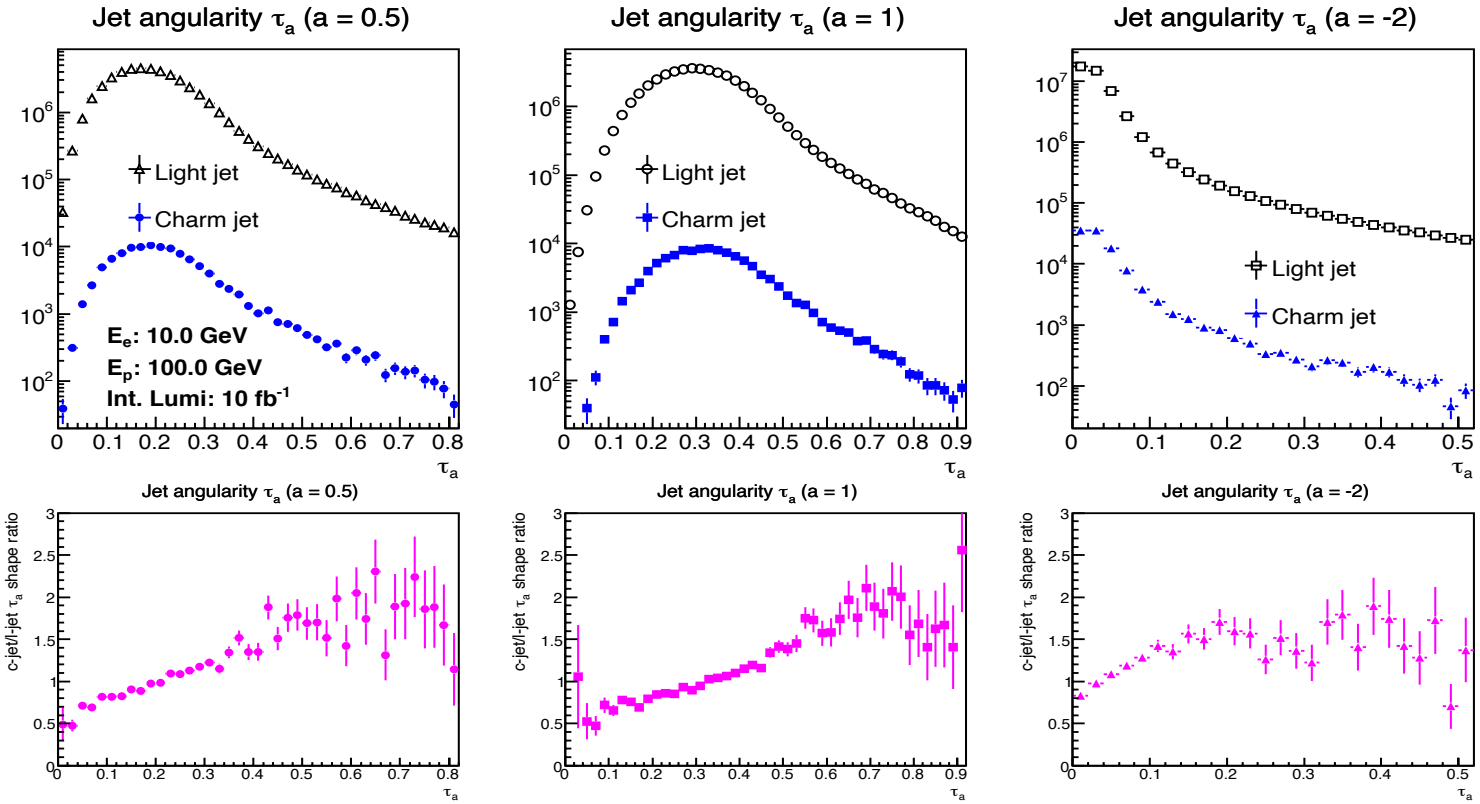
Initial studies in arXiv: 2007.14417



- Jet origin from a quark/gluon can be distinguished from this study.
- Shed light into how quark/gluon recombined into final hadrons with different masses.
- Impacts by nuclear medium effects will be studied in e+A collisions.

Heavy flavor studies open a new era at the EIC!