Day 2: ***Initial-state and final state effects for quarkonia***

Quarkonia are complementary probes of the structure of nucleons and nuclei and can provide unique insights into their gluon content. In electron-nucleus collisions shadowing effects and final-state interactions can further alter the production rates of the J/psi and Upsilon families. The theory that relates the quenching of quarkonia to the transport properties of cold nuclear matter needs further development. At this workshop, we intend to work toward strategies that can help us separate the initial-state and final-state effects.

1. Continued discussion of near threshold production
   - Is the connection to the mass radius understood? Is the role of 2-gluon vs 3 gluon exchange independently confirmed?

2. Experimental results – RHIC, LHC and light Nuclei
   - Are initial and final state effects disentangled experimentally? Are the measurements consistent with any theoretical picture? What is the role of regeneration?

3. Light nuclei
   – how can we better study shadowing. Is the black limit ever reached? How are we going to distinguish leading twist shadowing and saturation. How will J/psi constrain the gluons nuclei. Measure diffractive PDFs. EIC model-independent pdfs. Higher twist, leading twist and saturation. Is sub milliradian angle doable at the EIC and a few milliradian acceptance – second IR case?

4. What are the connections between different transport models? Energy loss vs screening vs dissociation. We use different language but we found that the screening is not the dominant effect – dissociation. How important is recominatin in models and where

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4. Suppression of highly excited states
   - Comparing suppression of highly suppressed states – for example the Upsilon(3S) - the Open quantum system calculation vs the transport calculation. What is nuclear absorption and where does it come into play (nor relevant for EIC?)

5. Short talks
   - How strong is collisional dissociation? When can results be ready for EIC?
   - What can the systematics of J/psi and psi(2S) suppression tell us about the EIC.
   - Frame can be chosen to maximize differences between LDMEs (via shape functions). What statistics at the EOC is needed to make improvement at the EIC?
   -

Discussion: Quarkonium production and interactions

HQ production near threshold (proton and nuclei)

- Vector dominance assumption: Status, limitations?
- Kinematics: At what momenta do we probe the HQ-nucleon interaction?

HQ production at small x (proton and nuclei)

- Nuclear suppression: How to distinguish the “leading-twist shadowing” and “saturation” scenarios?
- Theoretical uncertainties: What needs to be provided for EIC?

HQ interactions with hot/dense medium

- Concepts: Up to what distances are color-mediated interactions & QQ-bar potential meaningful?
- Formation time: Medium interactions in quark-gluon vs hadronic description?
- Other applications of NRQCD: Hadroquarkonia, LHCb pentaquark