

Heavy flavour in the medium: introduction

G. Bruno

Agenda of the session

14:00	Introduction <i>Meeting room, ECT* - Villa Tambosi</i>	<i>Dr Giuseppe Bruno</i> 14:00 - 14:05
	Heavy flavors as probe of nuclear medium <i>Meeting room, ECT* - Villa Tambosi</i>	<i>Ivan Vitev</i> 14:05 - 14:35
	HF meson production at RHIC and LHC <i>Meeting room, ECT* - Villa Tambosi</i>	<i>Rongrong Ma</i> 14:35 - 15:05
15:00	HF baryon production from e+e- to Pb-Pb <i>Meeting room, ECT* - Villa Tambosi</i>	<i>Pietro Antonioli</i> 15:05 - 15:35
	Coffee break <i>Villa, ECT*</i>	15:35 - 16:05
16:00	Open heavy flavor production and reconstruction at EIC <i>Meeting room, ECT* - Villa Tambosi</i>	<i>Dr Christian Weiss</i> 16:05 - 16:30
	Low-energy interactions of heavy quarkonium with matter <i>Meeting room, ECT* - Villa Tambosi</i>	<i>Peter Schweitzer</i> 16:30 - 17:00
17:00	Heavy quarkonium production at RHIC and LHC <i>Meeting room, ECT* - Villa Tambosi</i>	<i>Enrico Scomparin</i> 17:00 - 17:30

Setting up the Working Group (WG)

- Mandate of the WG: contribute to the target document of this workshop, which is supposed to be ready by the next June, with a section/chapter about the opportunities for studies of Heavy Flavour in the media at the EIC
- There may be a few overlaps with other WGs
 - we consider that with a positive attitude
- Conveners of the WG: Christian Weiss and G.B.
- Members of the working group
 - speakers of today sessions + everyone willing to contribute actively
 - it+ does not to be a large WG
 - we would like to define a mailing list
 - please just send an e-mail to Christian or myself to be included.

Preparatory meeting 2 weeks ago

- topics to be covered by our WG have been outlined
 - slides of presentation by Christian are attached to the agenda

Open heavy flavour

- Interaction of energetic heavy quarks with matter

Effects: p_T broadening, energy loss, jet structure and evolution, . . .

Mechanisms: Induced radiation, collisions, time/distance scales

ep/eA at EIC: Variable energy $\nu = \text{few } 10 - 100 \text{ GeV}$

Controlled initial-state kinematics through electron detection

HF reconstruction using next-gen PID (π/K), vertex detection, mome

Possibility of correlation measurements

ep/eA theory: HF production mechanism in ep well studied, higher or

- Hadronic interactions of heavy mesons/baryons

Cross sections of $D, B, \Lambda_{c,b}$ with nucleons: Heavy \leftrightarrow light comparison

Scattering amplitudes: Re/Im, intermediate states?

ep/eA at EIC: Light nuclei deuteron, ^3He , ^4He

Detection of nuclear breakup state, spectator tagging

Input to theory calculations of structure & FSI in spectroscopy

Input to transport models for heavy-ion final states

- Hadronization of heavy quarks in vacuum and in matter

HF fragmentation: Mechanism, first-principles theory calculations?

HF hadronization: Color neutralization \leftrightarrow hadronization, time/distance scales

ep/eA at EIC: [Same as above]

ep/eA theory: [Same as above]

- Open HF production as probe of partonic initial state

Nuclear modification of gluons: EMC effect $x > 0.3$, antishadowing $x \sim 0.1$, shadowing $x \ll 0.1$

HF production as initial-state probe if final-state effects can be corrected/eliminated

ep/eA at EIC: Combined nuclear ratio measurements of $F_2(\text{light})$ and $F_2(\text{charm})$ for relative luminosity control

ep/eA theory: Nuclear gluons from either $F_{2,L}(\text{light}) + \text{DGLAP}$ or from $F_2(\text{charm})$ test universality and production mechanism

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Heavy Quarkonia

- High-energy interaction of heavy quarkonia with matter
 - Color transparency: Fundamental prediction of QCD, necessary for factorization theorems
 - Coherent phenomena in heavy quarkonium production on nuclei
 - ep/eA at EIC: Wide range of x and $Q^2 \leftrightarrow$ coherence length and dipole size
 - Forward detection of coherent nuclear scattering, diffractive breakup
 - ep/eA theory: Collinear factorization, dipole model, NRQCD, phenomenology
 - Sensitivity to heavy quarkonium wave function, incl. excited states
 - Connection with nuclear GPDs, nuclear shadowing
- Low-energy interaction of heavy quarkonia with matter
 - Multipole expansion, Van-der-Waals force of QCD
 - Nuclear bound states \leftrightarrow Pentaquarks
 - Quantum numbers and excited states ψ, ψ' . Polarization phenomena?
- Heavy quarkonium production mechanism on nucleon
 - Puzzles and uncertainties in pp : Can ep help understand pp ?

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now room to the presentations to set the stage for a general discussion at the end of the session