

It is timely to consider how we want to reflect our work in the actual Yellow Report...

A draft outline is available at [http://www.eicug.org/web/sites/default/files/YRs\\_Outline\\_v6\\_draft.pdf](http://www.eicug.org/web/sites/default/files/YRs_Outline_v6_draft.pdf)

It is linked from the Overview section of the Yellow Report on the EICUG website

Chapter 7 is one of the chapters of particular relevance.

Start with a short summary outlining the overarching EIC physics goals, then defining various science topics and how they are intertwined through the processes and tools. Introduce the big matrix linking the science topics through measurements to the chosen five detector requirements processes. Explain why the focus on processes not on topics. May be also an overview what are new and recent science topics of interest. Here we have to watch out a bit since we are not writing a new WP. We are not rewriting the physics case here but simple broaden the range of physics that an EIC can address.

As JHQ conveners we sent strawman annotations on this chapter's outline to all PWG conveners last week. As with all strawmen, input is sought and welcome. The below reproduces the structure in the draft with the strawman annotations for further discussion.

## 7.1 Global properties and parton structure of hadrons

7.1.1 Spin structure of proton and neutron

7.1.2 Mass of the nucleon and mesons

7.1.3 Multi-parton correlations

7.1.4 Inclusive diffraction

Suggest to *add a section* on the unpolarized structure of the nucleon with JHQ contributions:

Charm-jet tagging and the unpolarized strangeness distribution

Heavy-quark structure functions

Suggest to *add a section* "Global event shapes and the strong coupling constant" with:

1-jettiness and event-shapes

Precision  $\alpha_s$  extraction

Suggested JHQ contributions to existing section 7.1.1:

$A_{LL}$  with jets and the longitudinal spin structure of the proton

$A_{LL}$  with heavy quarks and the longitudinal spin structure of the proton

Chapter 7 structure with JHQ strawman annotations:

## **7.2 Multi-dimensional imaging of hadrons**

7.2.1 GPDs and 3D-imaging

7.2.2 TMDs and 3D-imaging

7.2.3 Wigner Functions

7.2.4 Form factors and 2D-imaging in position space

Suggested JHQ contributions to existing section 7.2.2:

Transverse energy-energy correlators

Accessing TMDs with jets

## **7.3 A Laboratory for Dense QCD**

7.3.1 High parton densities and saturation

7.3.2 Diffraction

7.3.3 Particle propagation through matter and energy loss

7.3.4 Collective effects (shadowing, anti-shadowing, ridge, other emergent phenomena)

7.3.5 Special opportunities with jets and heavy quarks

7.3.6 Short-range correlations, origin of nuclear force

7.3.7 Structure of light (polarized) nuclei

Suggested JHQ contributions to existing section 7.3.1:

Small-x improved TMD factorization from the LHC to the EIC

Suggest to re-title 7.3.3 to become “Particle propagation in matter and transport properties of nuclei”

Parton propagation in nuclei, nuclear transport properties

Suggested JHQ contributions to existing section 7.3.5

Nuclear parton densities with jets

Nuclear parton densities with heavy quarks

Chapter 7 structure with JHQ strawman annotations:

## 7.4 Understanding Hadronization

7.4.1 Hadronization in the vacuum

7.4.2 Hadronization in the nuclear environment

7.4.3 Particle production for identified hadron species

7.4.4 Production mechanism for quarkonia and exotic states

7.4.5 Spectroscopy

Suggested JHQ contributions to existing section 7.4.1 and 7.4.2:

Hadronization studies using jet angularities

Hadronization studies using light and heavy mesons

Suggested JHQ contributions to existing section 7.4.4

Studies of quarkonium production and exotics, nature of exotics

## 7.5 Connections with Other Fields

7.5.1 Electro-weak physics

7.5.2 Neutrino physics

7.5.3 Cosmic ray/astro-particle physics 7.5.4 BSM physics

7.5.5 Other connections to pp, pA, AA

Suggested JHQ contributions to existing section 7.5.5

Small systems.