Chapter structure and task distribution

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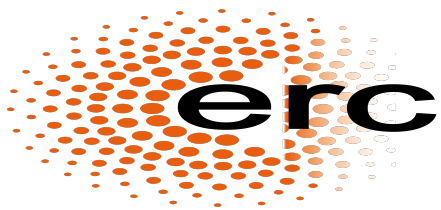

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Scope of document and outcome of meeting from 5.2.

- part of the heavy-ion section of the HL/HE yellow report
- gather physics opportunities with ion-beams in the 2020'ies focus Run 3-4
  $\rightarrow$ important to highlight gain w.r.t. existing possibilities
- working title: "UPC (without $\gamma - \gamma$) and pPb pQCD aspects"
- overall heavy-ion part: 100-150 pages
  $\rightarrow$ this chapter around 20 pages
- substructure in the following slides based on proposal and discussion on 5.2. present: Mark S., Spencer K., Michael W., Ilkka H., Fred O., Cyrille M., Nestor A.
- for ATLAS/CMS often listed both, obviously one should be sufficient in case of overlapping capability
- points to be clarified, *Authors*
- page numbers rough scale
- ToDo list afterwards

Large structure

- Intro: intrinsic motivation & contextualisation w.r.t. other projects (EIC, LHeC) & importance for other areas & content overview: O(1-2) pages *Nestor Armesto*
- "UPC" O(10) pages: substructure/authors following slides
- *p*Pb O(5-7) pages: substructure/authors following slides
- nPDF-fit with *p*Pb and UPC inputs: O(3-5) pages; substructure/authors following slides

UPC-part

1. explanation of experimental capabilities, overview of observables with yields: exclusive observables + inclusive observables
   cuts based on existing measurements, exclusive dileptons/dihadrons ALICE/CMS/LHCb, dijets/diphotons ATLAS

   additional observables: responsibility of experiments to contact theorists in charge or vice-versa in case of interest

2. physics discussion including new calculations for dijets in view of nuclear pdfs and diffractive nuclear pdfs and incoherent quarkonium production by *Mark Strikman, Vadim Guzey et al.*
   additional persons needed to cover all observables/aspects including γ-proton in pA?

3. tentative part spectroscopy $\rightarrow$ LHCb, ALICE

4. γ-induced reactions in peripheral collisions: theory *Spencer Klein*, ALICE collaboration for experiment

For rate estimates:

Take numbers from Mark Strikman et al., if something missing could cover with Starlight. Since Starlight is available as public code and available in all experiments might be useful to have these numbers as well as reference.

pPb part

same structure as for UPC-part: first observables afterwards physics discussion

Experiment input: hard and electroweak production

- W, Z, **dijet** (ATLAS/CMS)
- gamma/Z/W-jet (ATLAS/CMS)? $\rightarrow$ to be clarified what's the gain in terms of energy scale uncertainty, whether machinerie in place
- **top** (ATLAS/CMS)
  $\rightarrow$ contact: Yen-Jie Lee(CMS), Cvi Citron (ATLAS)
- W, Z, **Drell-Yan,** γ γ-jet? (LHCb): contact Michael Winn
- **Jets,** γ including forward instrumentation Marco von Leuwen (ALICE)

Experiment input: heavy-flavour

- Quarkonium: contact Anton Andronic (own subchapter, but projections useful here) (ALICE)
- Open heavy-flavour: Elena Bruna (own subchapter, but projections useful here) (ALICE)
- double-heavy flavour including correlations: Michael Winn (LHCb)
- new observables: contact experiments, names given here

Theory

- in view of p_T-broadening, energy loss: Francois Arléo
- in view of saturation phenomena: Cyrille Marquet

nPDF part

Groups nCTEQ represented by Fred Olsen, Aleksander Kusina and Ingo Schienbein
EPPS represented by Hannu Paukkunen and Ilkka Helenius intereted in UPC-constraints
experimental input

- based on previous slides inputs, both from pPb and UPC

ToDo List

- unit, naming, formulae, citing, structure conventions, abbrevations as README for tex-file $\rightarrow$ Michael Winn, other convenors from other parts
- collect existing material (kinematical cuts, existing papers for UPC and other areas) and propagate info to theorists: $\rightarrow$ Michael Winn
- after collection of existing measures, list of people (tbc) that can be contacted for new observables:
  $\rightarrow$ UPC-ALICE: *Christoph Mayer, Eugenio Scapparone*
  $\rightarrow$ UPC-LHCb *p*Pb: *Ronan McNulty*
  $\rightarrow$ γ-induced in peripheral events: *Michael Weber* for dielectrons
  $\rightarrow$ Hard-Production and heavy-flavour, quarkonia, see previous slides
- define rough dead-lines: WG5 convenors

Appendix 1: Luminosities

Run 3/ Run 4
if observables: need more luminosity should be not omitted, but pointed out clearly **PbPb:**

- ALICE/ATLAS/CMS: 10 nb^{-1}@5.5 TeV
- LHCb: to be defined

pPb:

- ALICE/ATLAS: 1 pb^{-1}@ 8.79 TeV
- LHCb: 160 nb^{-1} @8.79 TeV
- ALICE: 50 nb^{-1}@ 5.5 TeV

take full energy or current energy?

Appendix 2: Answers to LHCb-related questions

Luminosity numbers for LHCb:

- **pPb**: 160 nb^{-1} for LHCb equivalent pPb lumi to 1 pb^{-1} CMS/ATLAS
- **PbPb**: to be defined

  to give a rough idea: propably factor 10-30 less than ATLAS/CMS/ALICE should be feasible without strong penalty for others

Inclusive UPC Dijets with LHCb:

- from η-distribution (thanks to Ilkka): difficult for LHCb
  $\rightarrow$ for the moment, we(LHCb) will not look into that in detail, for ATLAS/CMS probably also best for rather forward dijets at the given rates and veto-requirements

Rapidity gaps and multiplicity correlations with LHCb:

- scintillator arrays at forward/backward useful in principle; but for the moment, no man-power in contact with one group, but not at the time scale of the report & not yet clear to which extent feasible
- best to contact ATLAS/CMS directly

UPC spectroscopy with LHCb:

- being looked at by LHCb spectroscopy group at already available data at the moment