

LHCb news and proposal for skeleton

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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: probably 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
→ 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

Heavy-ion working group & time-lines

- ▶ WG-convenors will provide time-lines soon
- ▶ next working group meeting at CERN: 6-7.3.
→ contact us, if there is something that you want to bring up that wasn't yet properly discussed

Scope of document

- ▶ 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
→ 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
→ this chapter around 20 pages
- ▶ substructure:
 - first proposal in the following slides based on the discussions
 - I put tentative names in red corresponding to the interactions so far: to be confirmed/replaced/completed
 - apologies, if I am unprecise or forgot someone

Large structure

- ▶ Intro: contextualisation w.r.t. other projects (EIC, LHeC) & importance for other areas in interest & content overview: O(1-2) pages
Authors: **Nestor Armesto**, *1 experimentalist*
- ▶ "UPC" O(10) pages: **contributions by Spencer Klein et al., Mark Strikman, Vadim Guzey et al.**, see details next slides
- ▶ p Pb O(5-7) pages: theory part: experiment contacts + **Cyrille Marquet**(saturation oriented), **Francois Arléo**(collinear oriented)
- ▶ nPDF-fit with p Pb and UPC inputs: O(3-5) pages: **Ilkka/Hannu et al.** (incl. UPC), **Fred Olness/Aleksander Kusina/Ingo Schienbein et al.** experimental contacts for nPDF: Marco Van Leuwen(ALICE), Cvi Citron (ATLAS), Yen-Jie Lee(CMS), Michael Winn (LHCb)

UPC-part

proposal by Spencer: separate numbers from physics discussion

1. observables and rate table and explanation of experimental capabilities: exclusive observables + inclusive observables → Spencer Klein + ?
2. physics discussion by Strikman, Vadim Guzey et al. + add. people, if not fully covered
3. tentative part spectroscopy → LHCb, ALICE?
4. γ -induced reactions in peripheral collisions: someone from ALICE?

Question: interest to write about p Pb UPC?

For rate estimates:

My understanding: numbers in the intro don't need to be very precise, even O(10-30%) precision would be sufficient, I would prefer to use Starlight, since all experiments have it implemented and it is publicly available code, of course that doesn't prevent to use other inputs; of course for the physics discussions, any calculation/comparison suited to make an argument should be fine.

For measurements where final state already measured, yield numbers should be sufficient.

If argument requires much lower systematic uncertainty than achieved ones: need to contact experimentalists.

p Pb part

- ▶ yield estimates: either up-scaling from existing measurements or via pp:
W, Z, dijet, gamma-jet (ATLAS/CMS)
W, Z, Drell-Yan (LHCb)
(multiple) heavy-flavour B,D, quarkonium (ALICE/LHCb) and their correlation
- ▶ physics discussion: **Cyrille, Francois**

experimental contact as for nPDFs

nPDF part

- ▶ inputs from experiments according to lumi's also assumed above
- ▶ reweighting as done for earlier studies for future dijet measurement or now for $J/\psi/D$ recently
- ▶ if possible: nice to have a global scenario
- ▶ time-scale for numbers from LHCb: \approx Quark Matter