Jet section in WG5 chapter of HL-LHC Yellow Report

Marta Verweij
23 Jan, 2018

Yellow Report

Goal: report on physics opportunities with HL-LHC and HE-LHC

Working Groups (each writes one chapter):

- WG1: QCD, EWK and top
- WG2: Higgs
- WG3: BSM
- WG4: Flavour
- WG5: Heavy Ions

Report has to be finalized by November 2018.
Each chapter will be submitted separately to arXiv.

Our task: write section on jets for WG5 chapter

WG5 Chapter

Outline provided by WG5 conveners (see attached document on indico)

0) Introduction
1) Physics opportunities in high-density QCD with HI and proton beams at the LHC
2) Accelerator performance with heavy-ion beams
X) Jets Observables
X) Open Heavy Flavour
X) Quarkonia
X) Chiral restoration via dileptons and thermal radiation via dileptons & photons
X) Flow/Correlations
X) Small systems (also includes jet quenching in small systems)
X) nPDF/small-x
X) Other opportunities (photon-photon, fixed target, etc)
X) HE-LHC

Order of topical physics sections not decided yet

Jet section: the team

Experiment:

- ALICE: Mateusz Ploskon, Peter Jacobs, Leticia Cunqueiro
- ATLAS: Anne Sickles, Martin Spousta
- CMS: Yen-Jie Lee, Marta Verweij (coordinator)
- LHCb: none. Might contribute on HF fragmentation functions

Theory:

- Guilherme Milhano, Korinna Zapp

In addition: several people contributing within experiments for certain studies. Theory: don't know.

Total length of chapter is max 150 pages. Jet section: 20 pages

What to write about?

For all studies two important aspects

- Gain from the increased luminosity
  - PbPb: 10/nb for ALICE,ATLAS,CMS at ~5 TeV
  - pPb: 1000/nb for ATLAS,CMS and 50/nb for ALICE at 8.16 TeV
    - pPb total lumi numbers might change
- Gain due to detector upgrades
  - Do we want to include studies with full simulation of upgraded detectors?
  - Is it feasible to do full simulation for the experiments?

What to write about?

From Korinna at October meeting

- shrink error bars
  - clarify whether there is enhancement in FF at large z
  - clarify jet $p_\perp$ dependence of z_g modification
  - ...
- study jet sub-structure in V+jet
  - better handle on initial kinematics
- compare γ+jet and Z+jet
  - different mass scale $\rightarrow$ different initial virtuality
- look at rare events
  - e.g. sub-structure of sub-leading jet in high-A_J events

To add to this list (based on discussions in October): precision energy loss with X+jet, jet R_{AA}, heavy quark jets, jet deflection, …