Weekly RBRC meeting 22/April/2021

Shima Shimizu

My activity

- Looking into codes which I got from Ohsumi-kun
  - Simulation study of the radiation on the EIC ZDC.
  - "g4e" package with docker
    - electronioncollider/epic-gui … Not yet fully understand.
  - Trials based on instructions from Ohsumi-kun.
    - Original g4e codes are successfully compiled and run.
    - His modifications are included.

      First attempts gave me a crash.
      Found a file which was not mentioned in the list of modified files.
      → Now compiled and run. I have a root file with 100 events of something.
    - His script doesn't work. → still trying to understand.
- Sent slides for ECCE Physics Working Group meeting (20/April/2021) (next 2 slides)
  - No feedback yet (and I haven't asked for yet.)
  - Next step in my thought: Check of MC samples
    - Is there available Photoproduction MC (i.e. background MC)?

      @ZEUS: generated using PYTHIA, but I forgot details.

Inclusive ep DIS measurements

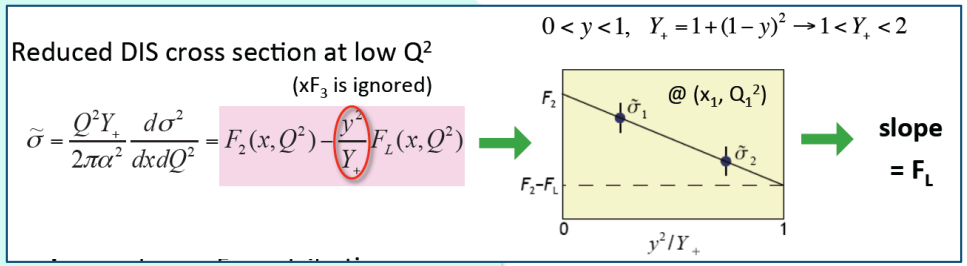
Shima Shimizu (RIKEN/JSPS)

- Target measurements:
  - **Double differential NC DIS cross sections**
  - **Double differential CC DIS cross sections**
  - if possible: **F_L measurement**

- Baseline measurements to show the detector's capability.
- **High-x** measurements can be **important cross-check for the proton PDFs including LHC data.**

- Sensitive to the **gluon PDF**.
- Only sizable at **the high-y region**.
  Can be extracted from NC cross sections at different √s energies.
- Measured only at the end of HERA (once), with a limited statistics.

EIC has advantages of variable √s energies and high luminosity.

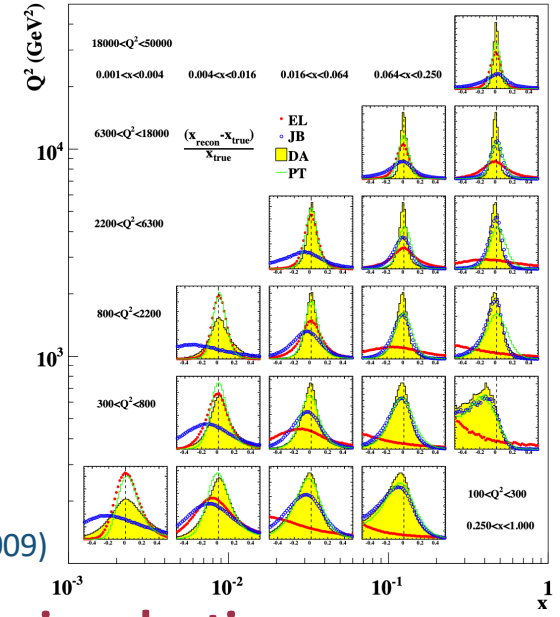


- Possible plots (→ next slide)
  - Resolution of reconstructed DIS kinematic variables (Q^2, x, y).
  - Detector acceptance incl. selection efficiency.
  - Background contamination.
  - Size of systematic uncertainties.

Possible plots

If the list is too long, the first two are more important, I think.

- **Resolution plots of DIS kinematic variables.**
  - $(x_{Reco}-x_{true})/x_{true}$ distributions in (x, Q^2) bins, also for Q^2 and y.
  - Comparison of different reconstruction methods:
    - Electron method → F_L, (high-x NC)
    - Double angle method → NC
    - Jacquet-Blondel method → CC



Thesis by R. Yongdok
(ZEUS high-Q^2 NC, 2009)

- **Efficiency and/or Acceptance map after a baseline analysis selections.**
  - $(N_{generated})^{after\ selec.}$ / $N_{generated}$ in a similar style to ones in YR.
  - Baseline analysis selections:
    - NC: selection of DIS events (electron requirement, E-p_Z)
    - CC: requirement of missing E_T,
      rejection of background events (track requirements etc.)

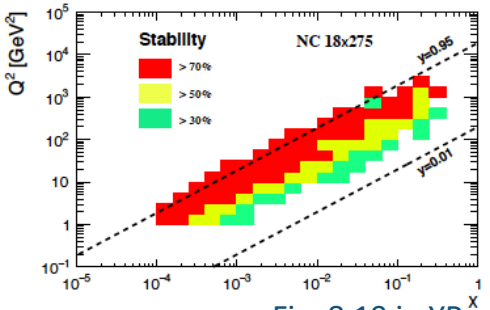
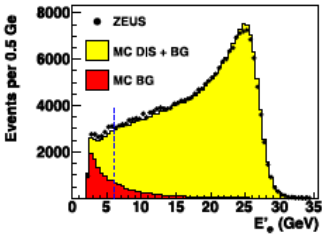


Fig. 8.19 in YR

- **Distributions of a few observables including background events.**
  - NC: e.g. E_e distributions with photoproduction MC, in a few Q^2 ranges.
    → Gives first thought on how low we can go in E_e, i.e. how high in y.
  - CC: e.g. missing p_T or ?
    (N.B. BGs not only from ep collisions but from beam-gas, cosmic μ.)



PLB 682 (2009) 8
(ZEUS F_L paper)

- **Size of systematic uncertainties from major sources in a few (x, Q^2) bins**