DPDF Meeting

May 16

```
* number of events to be generated
*
NEVENT 100000
*NEVENT 21
*  The default settings of these additional parameters are:
*     ppin /820.0/ plepin/-30.0/
*
* ++++++++++++++++++ Kinematic parameters +++++++++++++++
*                                      !
     'PPIN'     1       0       100.0 ! (D=820)
*                                      !
     'PLEP'     1       0      -10.0  ! (D=-30.)
*                                      !
     'LEPI'     1       0       11    ! (D=11) LUND e KF code
     'HADI'     1       0       2212  ! (D=2212) LUND proton KF code
*                                      !
     'QMIN'     1       0        5.0  ! (D=5.) Q2MIN of electron
     'QMAX'     1       0      200.0  ! (D=10.D8) Q2MAX of electron
*                                       ! do not switch on for HERACLES
     'YMIN'     1       0       0.05  ! (D=0.) YMIN of electron
     'YMAX'     1       0       0.8   ! (D=1.) YMAX of electron
*     'THEM'     1       0      172.50 ! (D=180.) theta_max of sc. elec
*     'THEI'     1       0      157.00 ! (D=180.) do not switch on for HERACLES
*                                      ! theta_min of sc. elec
* ++++++++++++ Parton shower                      ++++++++++++
     'IFPS'     1       0        0    ! (D=0) P.S.
*                                     ! =1 initial state PS
*                                     ! =2 final state PS
*                                     ! =3 initial and final state PS
*                                     ! IFPS = 10 ARIADNE
*                                     !
```

Formulas For MC reduced cross section

$$\frac{d^3\sigma}{dx_{\mathbb{P}}d\beta dQ^2} = \frac{N_i}{(\Delta x_{\mathbb{P}})_i(\Delta\beta)_i(\Delta Q^2)_i}\frac{1}{\mathcal{L}^{\text{int.}}_{\text{MC}}}$$

$$\mathcal{L}^{\text{int.}}_{\text{MC}} = \frac{N_{\text{MC}}}{\sigma_{\text{MC}}}$$

$$\frac{d^3\sigma}{dx_{\mathbb{P}}d\beta dQ^2} = \frac{2\pi\alpha^2}{\beta Q^4}Y_+\sigma_r^{D(3)}(\beta, Q^2, x_{\mathbb{P}})$$

$$Y_+ = 1 + (1-y)^2$$

$$\sigma_r^{D(3)}(\beta, Q^2, x_{\mathbb{P}}) = F_2^{D(3)}(\beta, Q^2, x_{\mathbb{P}}) - \frac{y^2}{Y_+}F_L^{D(3)}(\beta, Q^2, x_{\mathbb{P}})$$

Notes from last week

A log uniform binning should work for Q^2, but also maybe for the other two variables.

In principle the bin width should be 3-5 times the bin by bin resolution to minimize the bin migration.

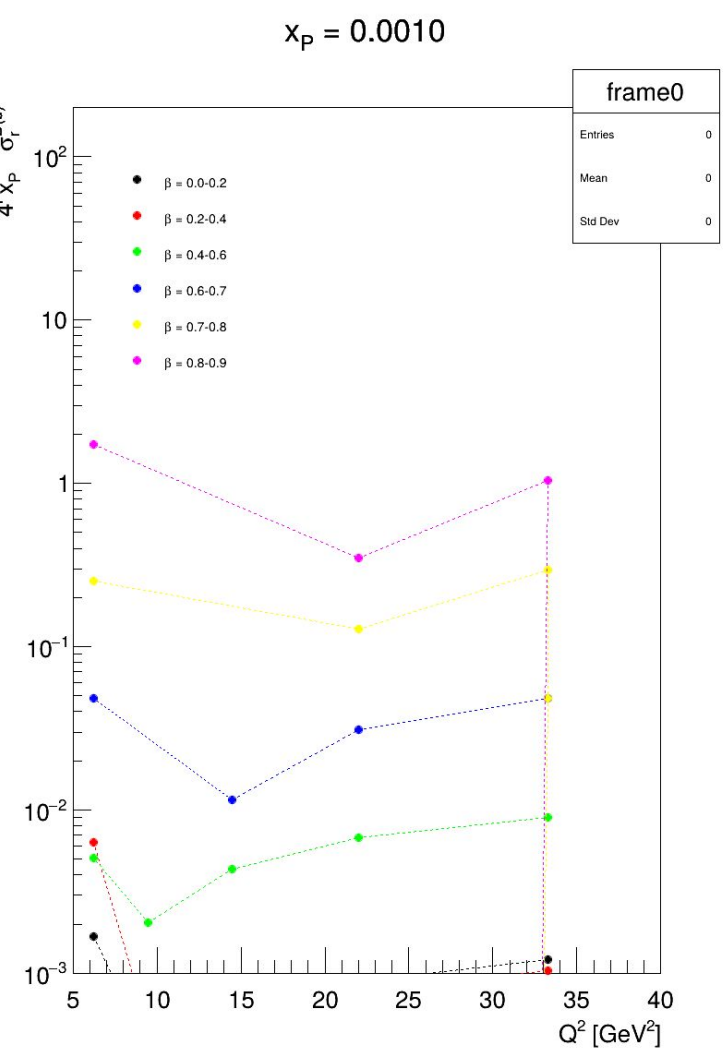
I don’t have an answer for the events with x_Pom near 1.

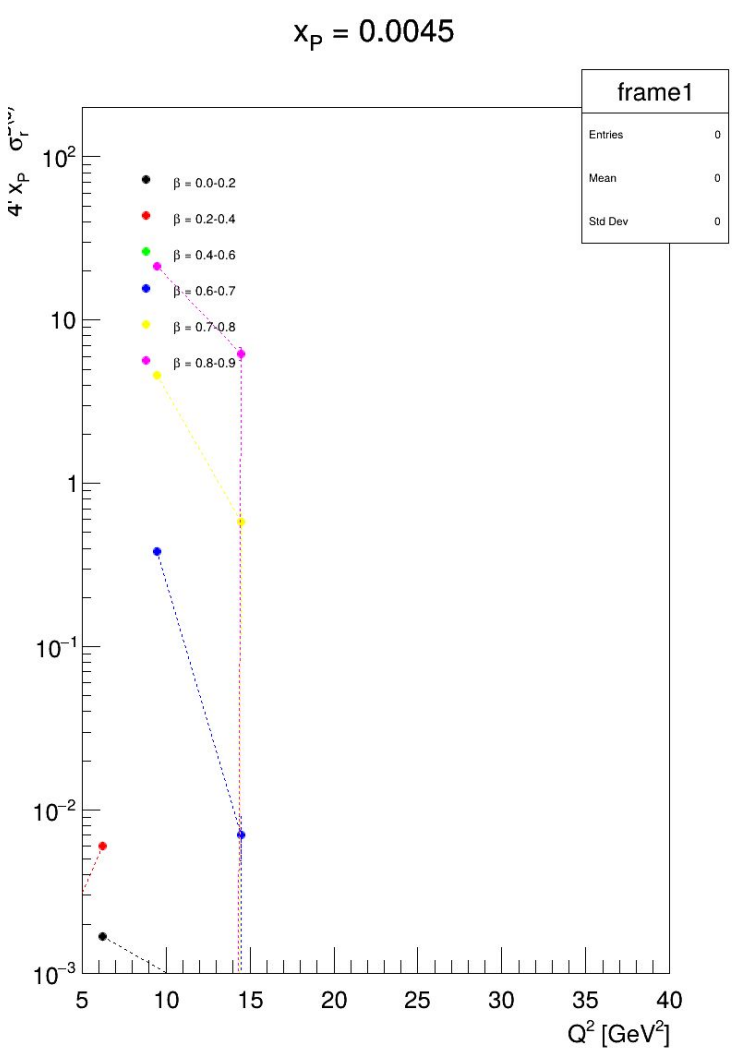
To Do: Acceptance correction, efficiency, purity for the recon. xsection

binnings

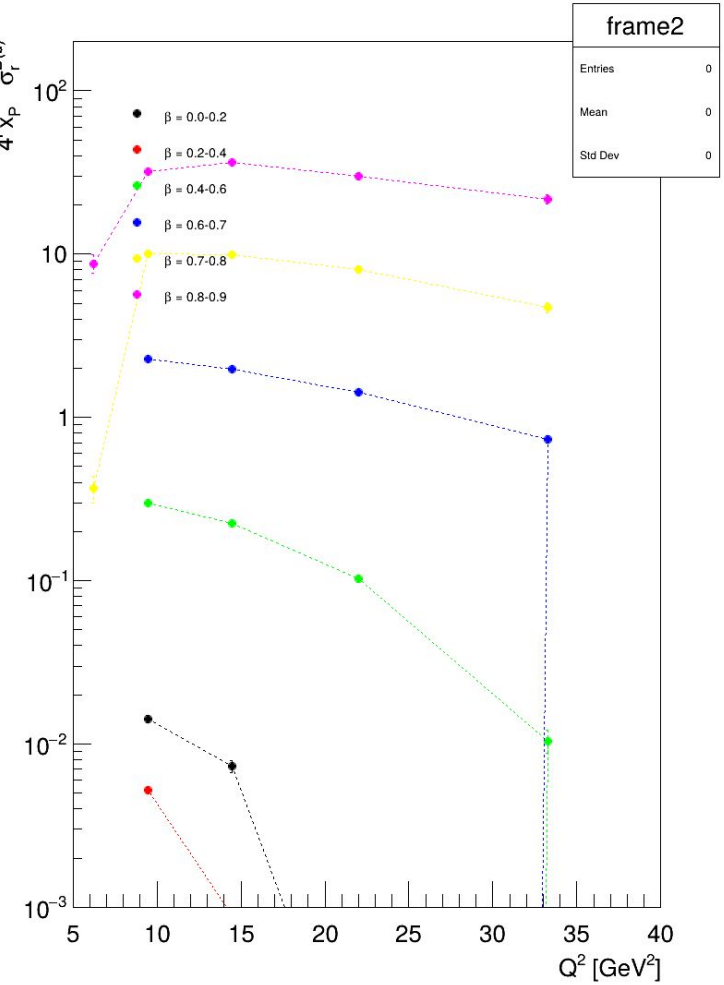
Inspired by ZEUS,

```
// distribution for cross-section
    // Define binning
    const int nQ2 = 5;
    double Q2_bins[nQ2+1] = {5, 7.5, 11.5, 17.5, 26.5, 40};

    const int nBeta = 6;
    double beta_bins[nBeta+1] = {0.0, 0.2, 0.4, 0.6, 0.7, 0.8, 0.9};

    const int nXPom = 4;
    double xPom_bins[nXPom+1] = { 0.001, 0.00447, 0.02, 0.08994, 0.2};
```

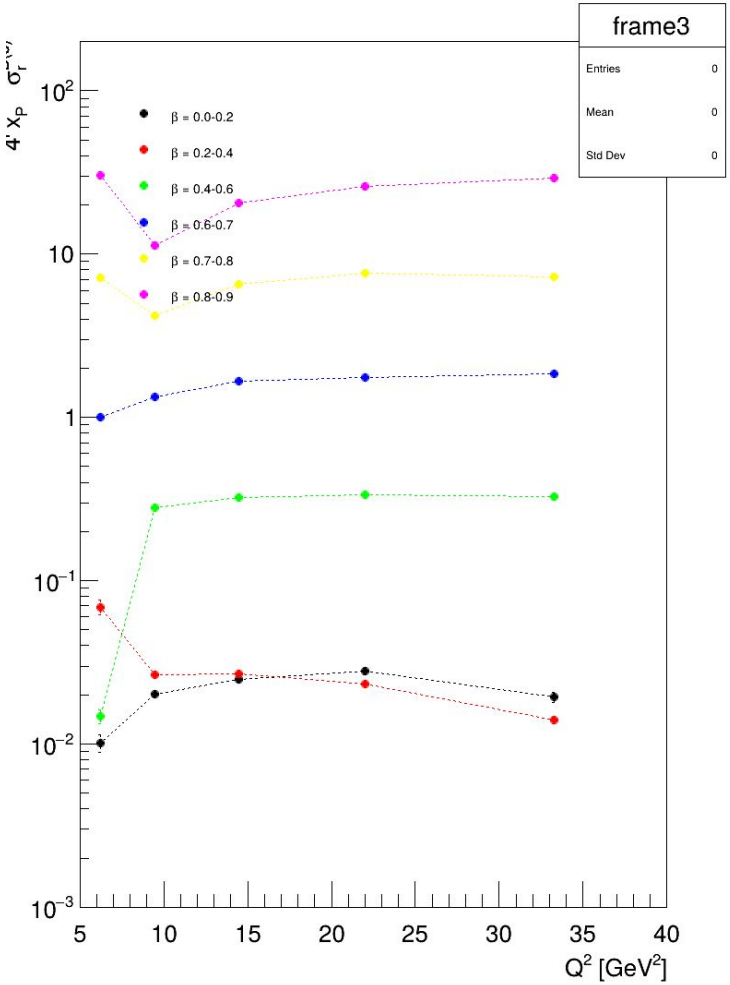

x_P = 0.0010
frame0
Entries 0
Mean 0
Std Dev 0
β = 0.0-0.2
β = 0.2-0.4
β = 0.4-0.6
β = 0.6-0.7
β = 0.7-0.8
β = 0.8-0.9
$4' x_P \tilde{\sigma}_r^{(3)}$
Q^2 [GeV^2]


x_P = 0.0045
frame1
Entries 0
Mean 0
Std Dev 0
β = 0.0-0.2
β = 0.2-0.4
β = 0.4-0.6
β = 0.6-0.7
β = 0.7-0.8
β = 0.8-0.9
$4' x_P \tilde{\sigma}_r^{(3)}$
Q^2 [GeV^2]

$x_P = 0.0200$



$x_P = 0.0899$



Next, checking the values(?)

Bin-wise d^3σ/dQ² dβ dx_Pom [pb/GeV²]:

Bin (Q²: 6.2, β: 0.100, x_Pom: 0.0122): xPom*σ_red = 0.0013 ± 0.0001

Bin (Q²: 6.2, β: 0.100, x_Pom: 0.0550): xPom*σ_red = 0.0066 ± 0.0001

Bin (Q²: 6.2, β: 0.100, x_Pom: 0.1450): xPom*σ_red = 0.0066 ± 0.0001

Bin (Q²: 6.2, β: 0.300, x_Pom: 0.0027): xPom*σ_red = 0.0000 ± 0.0000

Bin (Q²: 6.2, β: 0.300, x_Pom: 0.0122): xPom*σ_red = 0.0188 ± 0.0003

Bin (Q²: 6.2, β: 0.300, x_Pom: 0.0550): xPom*σ_red = 0.0176 ± 0.0002

Bin (Q²: 6.2, β: 0.300, x_Pom: 0.1450): xPom*σ_red = 0.0030 ± 0.0001

Bin (Q²: 6.2, β: 0.500, x_Pom: 0.0027): xPom*σ_red = 0.0060 ± 0.0003

Bin (Q²: 6.2, β: 0.500, x_Pom: 0.0122): xPom*σ_red = 0.0357 ± 0.0005

Bin (Q²: 6.2, β: 0.500, x_Pom: 0.0550): xPom*σ_red = 0.0208 ± 0.0003

Bin (Q²: 6.2, β: 0.650, x_Pom: 0.0027): xPom*σ_red = 0.0179 ± 0.0007

Bin (Q²: 6.2, β: 0.650, x_Pom: 0.0122): xPom*σ_red = 0.0391 ± 0.0008

Bin (Q²: 6.2, β: 0.650, x_Pom: 0.0550): xPom*σ_red = 0.0164 ± 0.0005