University of Glasgow

DVCS eA Status

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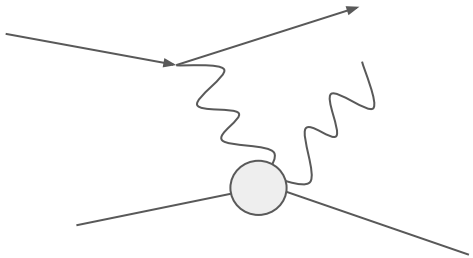
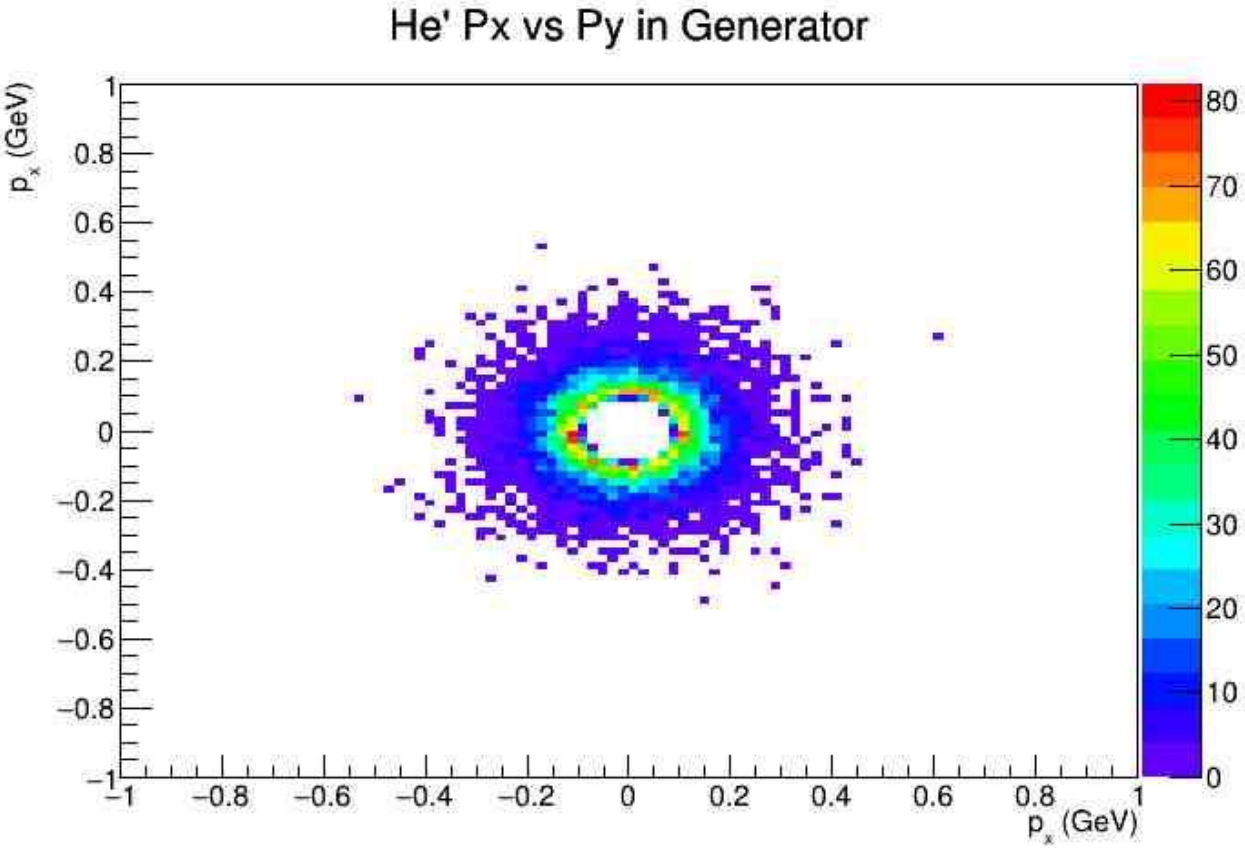
08/10/21

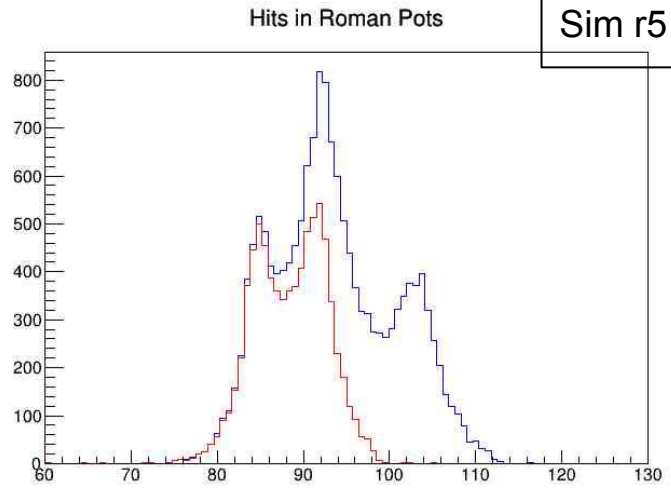
eA->e'A'γ

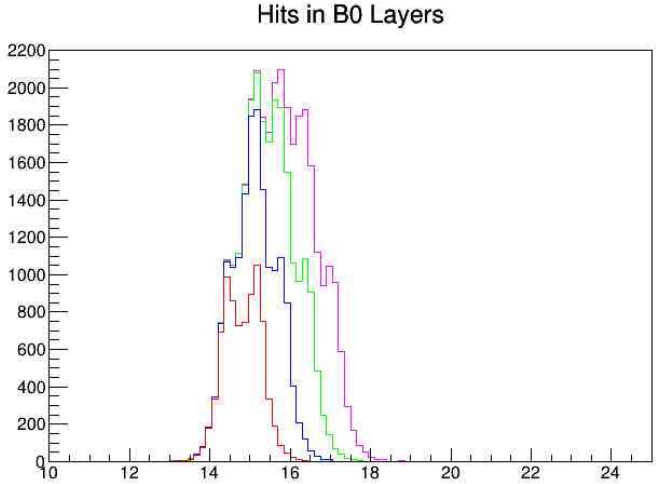


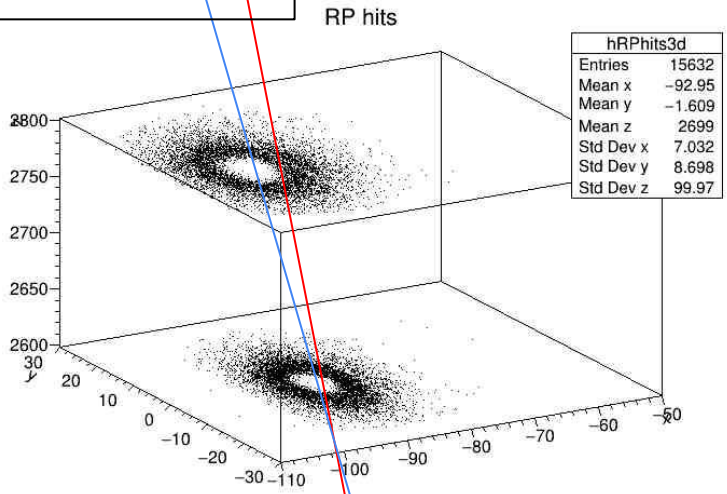


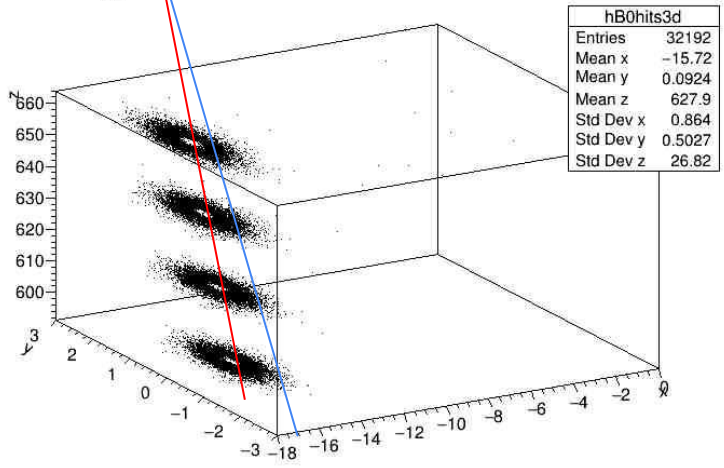
- t minimum set to 0.01 in generator - causing hole at 0 He’ momenta transfer
- Currently generating new data with tmin = 0
- Generator doesnt like wide kinematic ranges for some settings
- Need to fine tune(100GeV / u +)

Sim r5 Far Forward Distributions







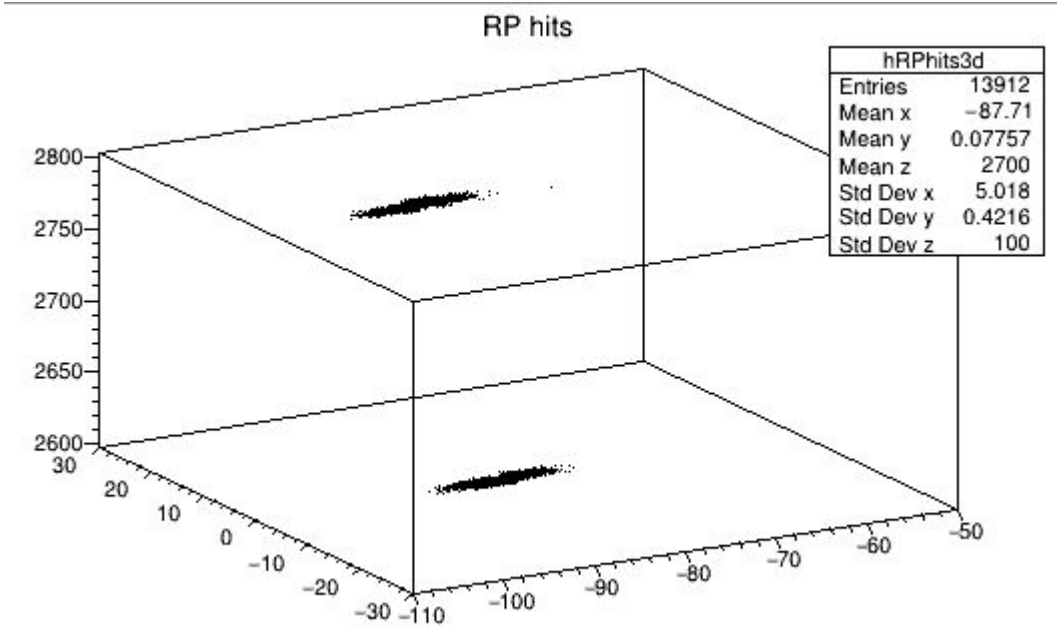


Simulation r6 Far Forward Distributions

R6 Sim

No Hits in B0 - current bug (confirmed by Bill), and being worked on!

r6 Plots use RP momenta info - pinch of salt!



1. DVCS Differential Cross Section vs t, Q^2, x_B,phi

Acceptance[i] = SimulatedBinContent[i] / GeneratedBinContent[i]
EventsExpected = xsec * lum/4
Scale = EventsExpected/EventsGenerated
histo->SetBinContent(Bin[i],Acceptance[i])
histo->Sumw2();
histo->Scale(scale);
histo->Scale(omega);
histo0>Draw("he");

- Differential cross section calculation (without unfolding):

$$\frac{d^4\sigma}{dQ^2 dx_B dt d\phi} = \frac{1}{L \cdot Acc_{bin} \cdot \Delta\Omega}(N \pm \sqrt{N})$$

  - N is the number of counts in the bin
  - L is the integrated luminosity
  - Acc_{bin} is the acceptance of the bin calculated before, and equal to the number of events reconstructed in the bin divided by the total number of generated events in the bin.
  - $\Delta\Omega$ is the multi-dimensional bin size:

$$\Delta\Omega = \Delta Q^2 \Delta x_B \Delta t \Delta\phi$$

Acceptance[i] = SimulatedBinContent[i] / GeneratedBinContent[i]
histo->SetBinContent(Bin[i], N / (L * Acceptance[i] * omega)
histo->Sumw2();
histo->Draw("he");

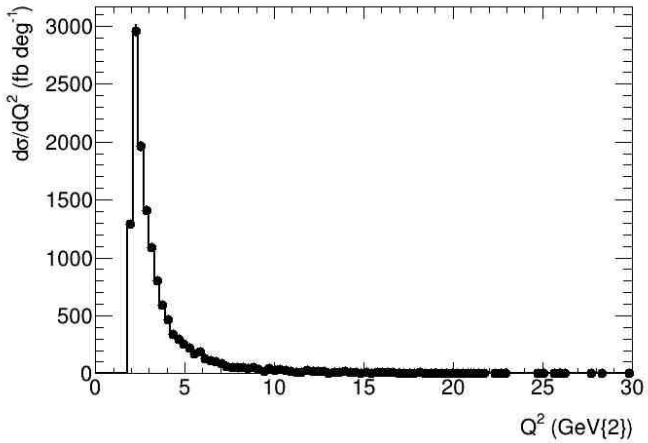
1.7828933 ×10¹⁰ Femtobarn [fb]
5x41 Positive helicity

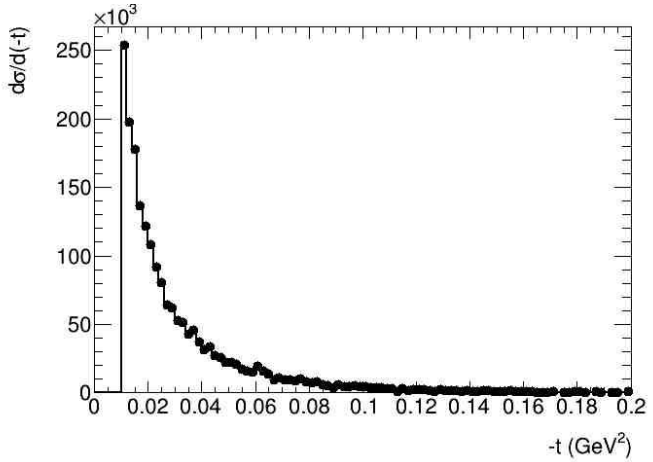
```
Cross section : 17828.933 nb
Precision : 44.246745 nb
Events produced correspond to 0.56088608 nb^-1
```

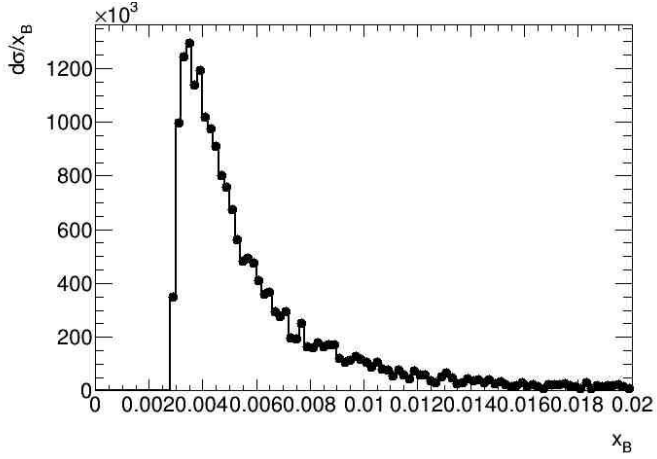
1.79304×10¹⁰ Femtobarn [fb]
5x41 Negative helicity

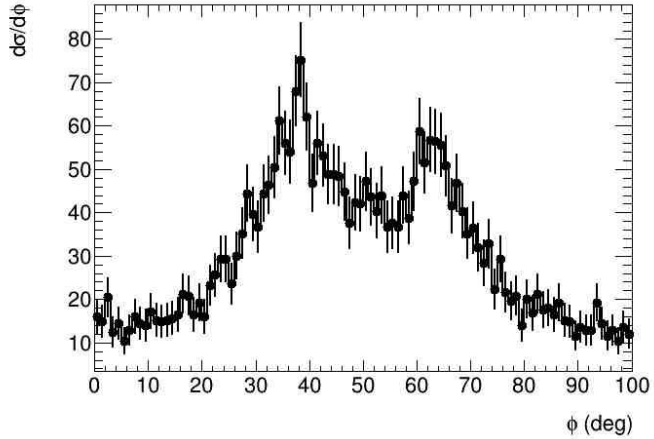
```
Cross section : 17930.4 nb
Precision : 44.086337 nb
Events produced correspond to 0.55771206 nb^-1
```

1. DVCS Differential Cross Section vs t, Q^2, x_B,phi



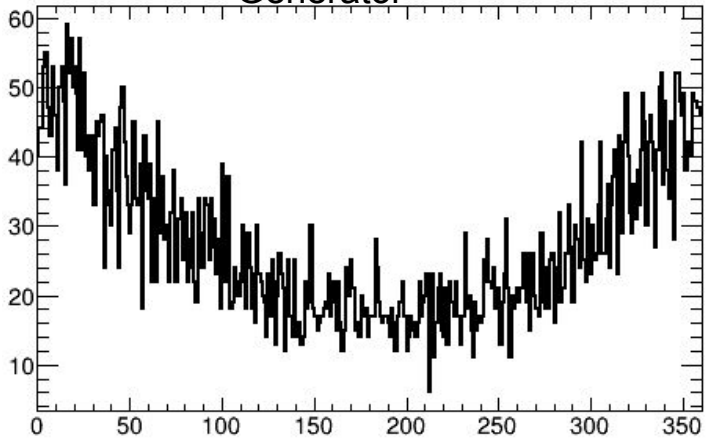




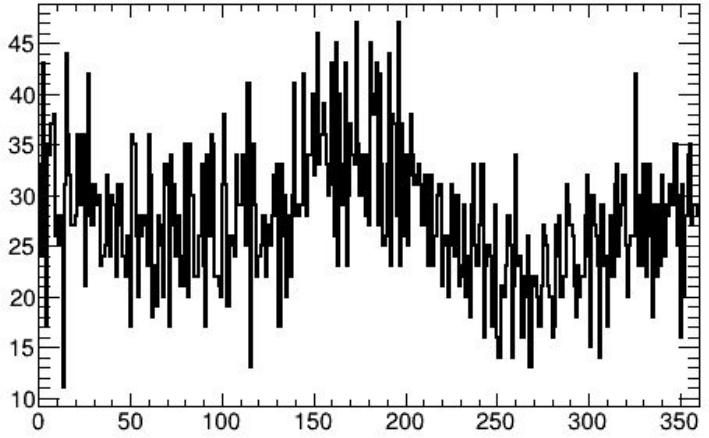


Phi (360bins)

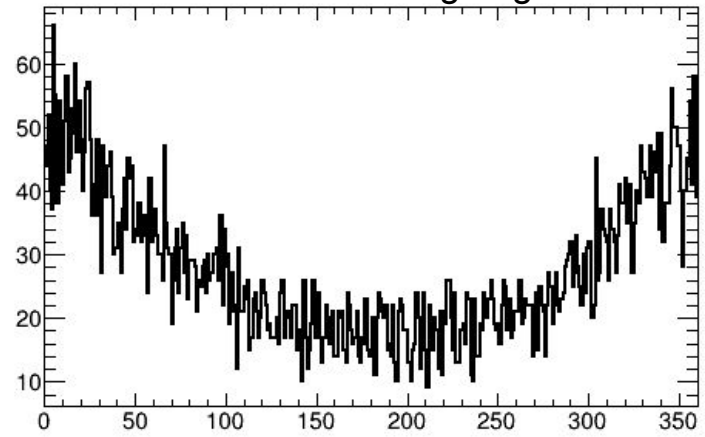
Generator



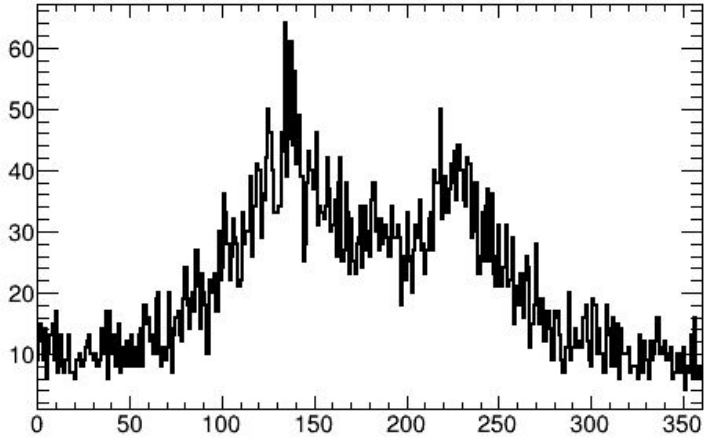
Simulation Truth



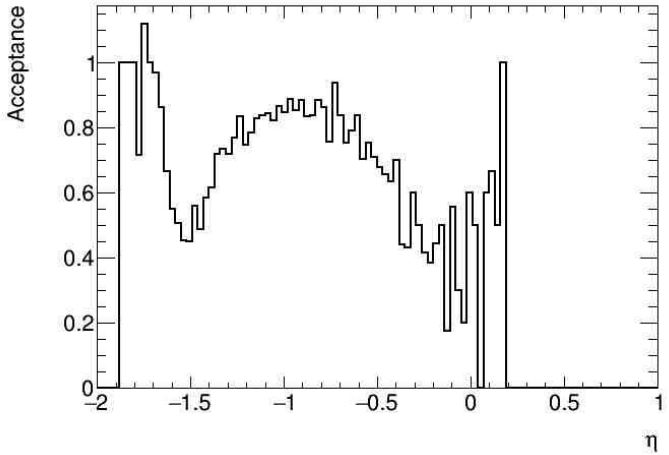
Simulation after crossing angle rotation

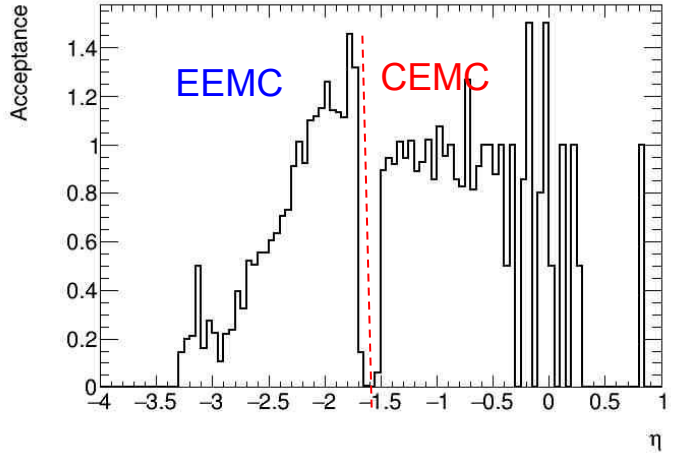


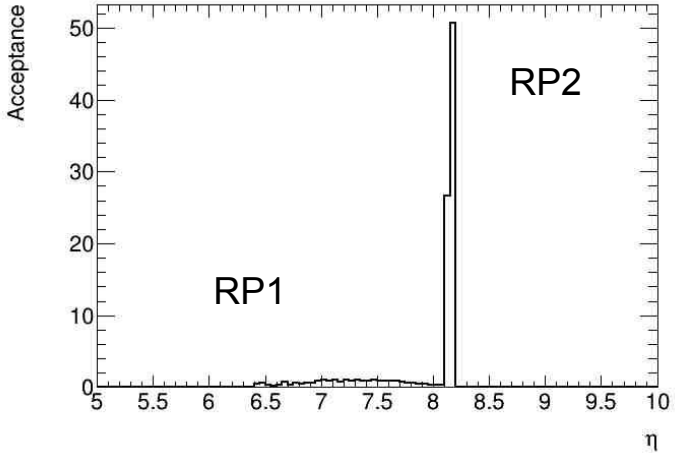
Reconstructed after cuts

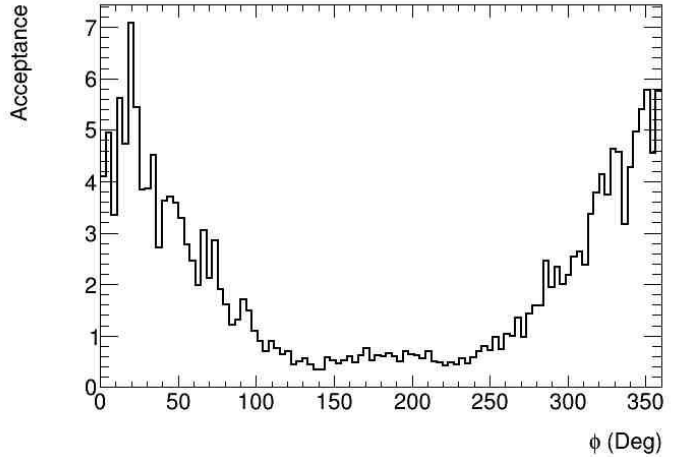


2. Detector Acceptance as a function of Eta, Q2, t, xb, phi, pt









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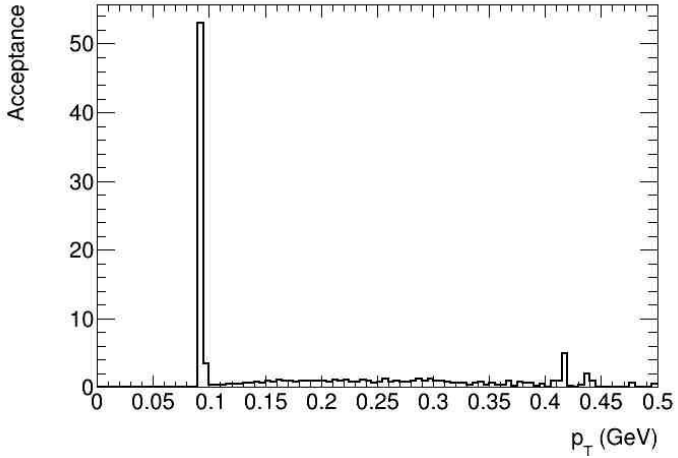

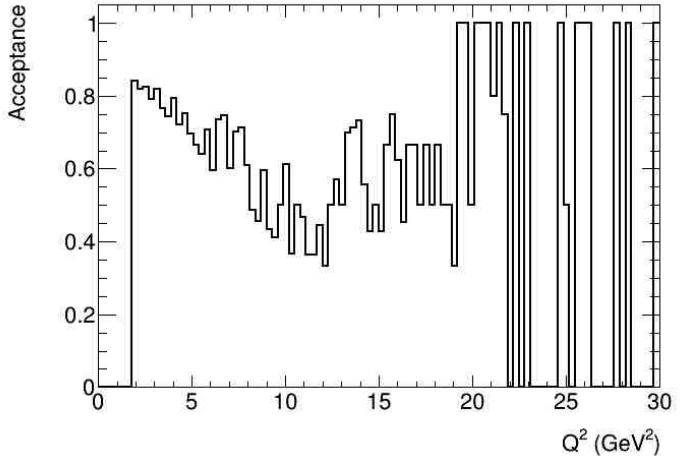

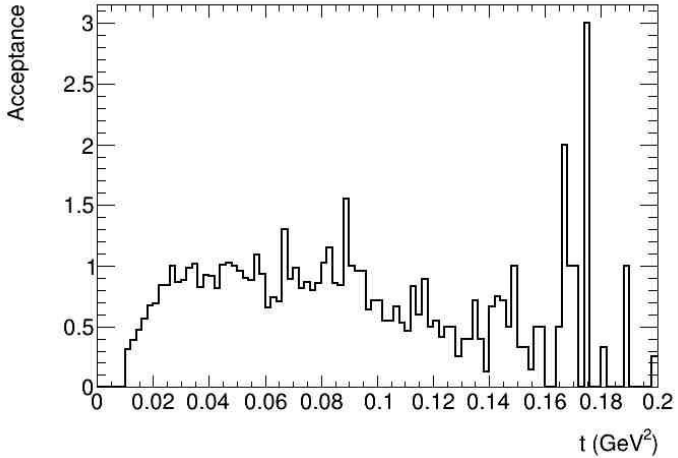

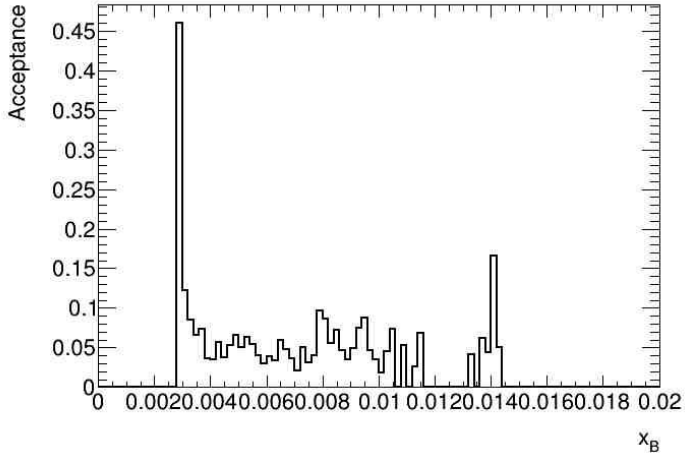

3. Q2, xb, t 2D phase space plots (get rid of stat boxes but keep colz scale)

$$Q^2 = -q^2 = (k - k')^2$$

$$t = (p - p')^2$$

$$x_B = \frac{Q^2}{2M\nu}$$