DVCS status

On behalf of the DVCS analysis group:

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CLAS collaboration meeting

2018, March, 6-9th

Guillaume Christiaens

(University of Glasgow / CEA Saclay)

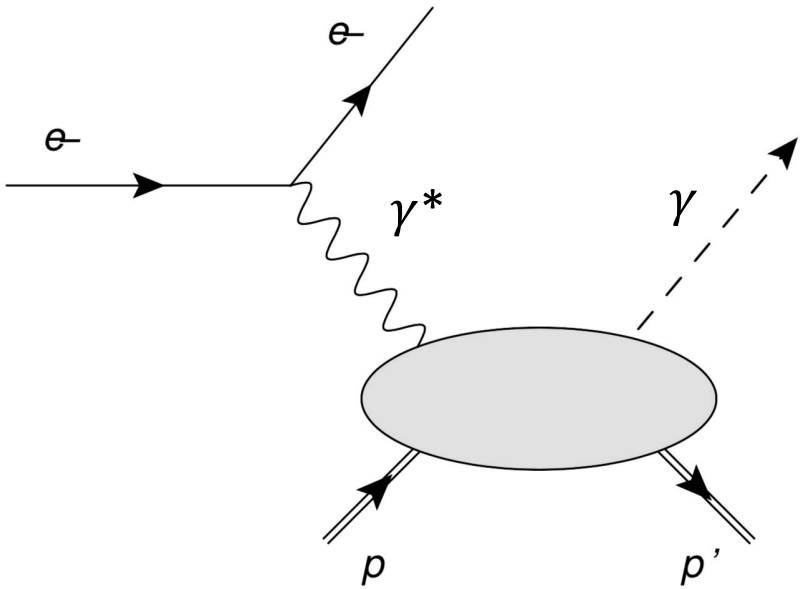
Introduction - DVCS

- **Deep Virtual Compton Scattering (DVCS)**

$$ep \rightarrow ep\gamma$$

  - Golden channel for GPD measurement

  - Electron and photon going in the forward detector
  - Proton going in forward or central

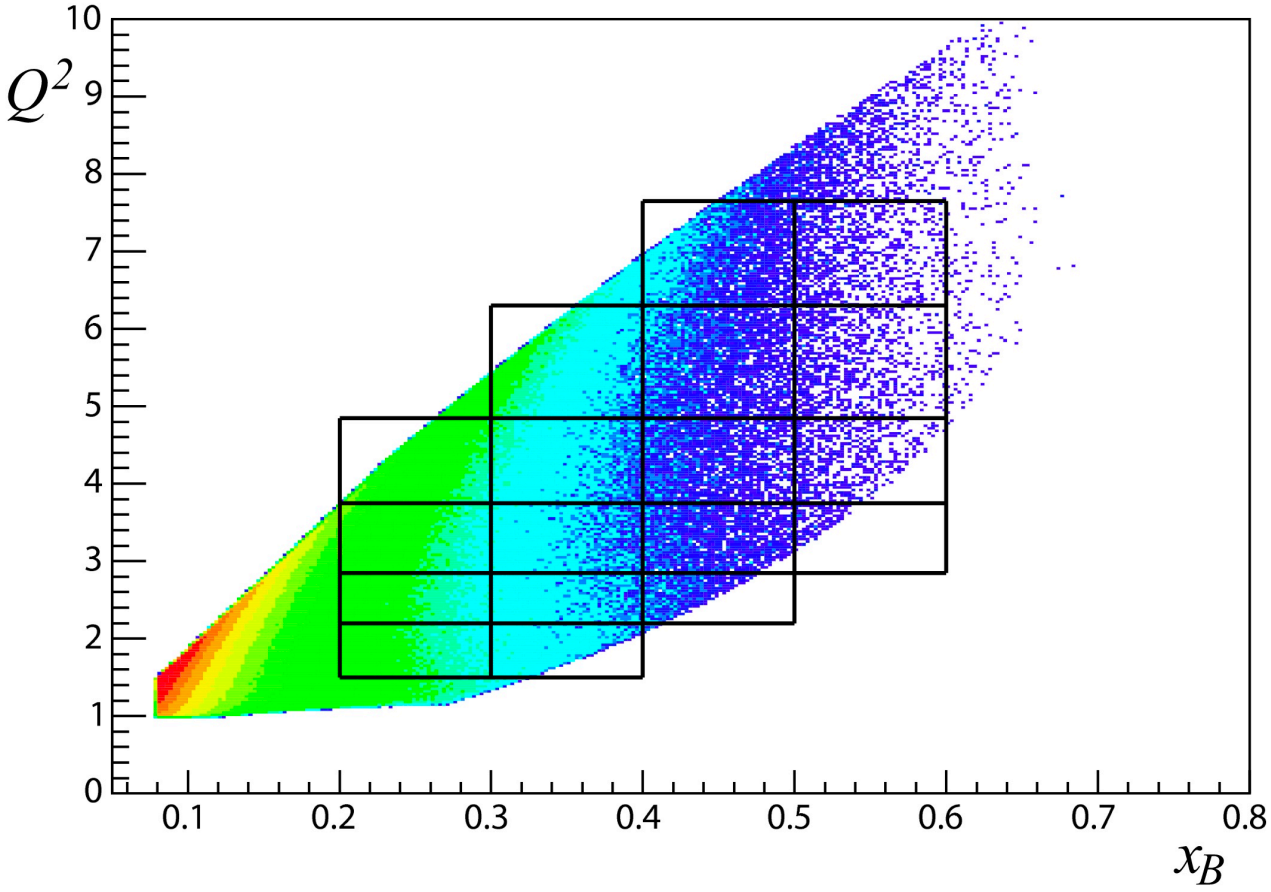


- π^0 electroproduction is considered as background

$$ep \rightarrow ep\pi^0 \rightarrow ep\gamma\gamma$$

Proposal

- Run group A
- Target : unpolarized protons
- Measure:
  - Beam-spin asymetries
  - Cross sections
- 11 GeV electron beam

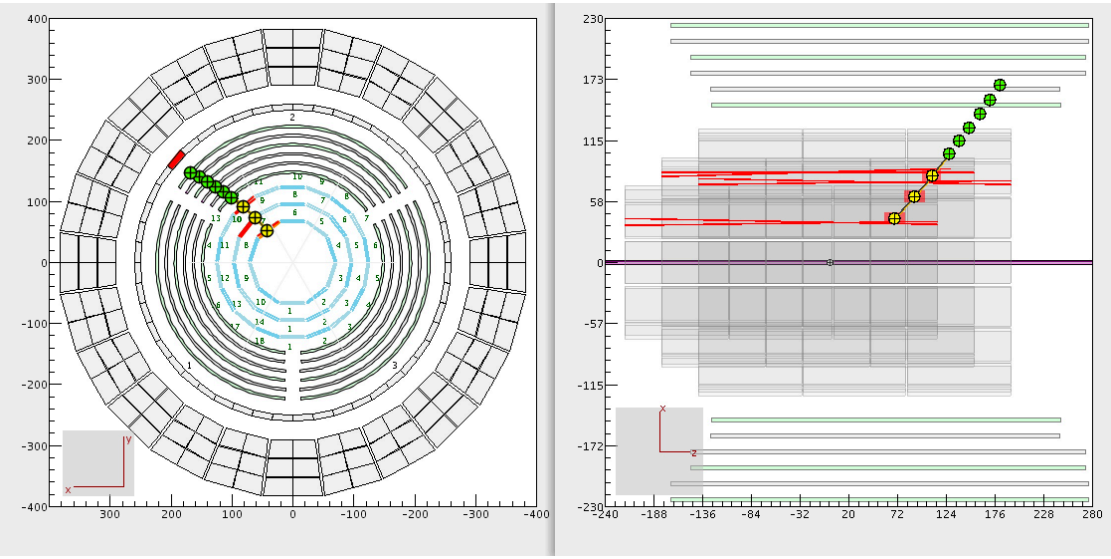


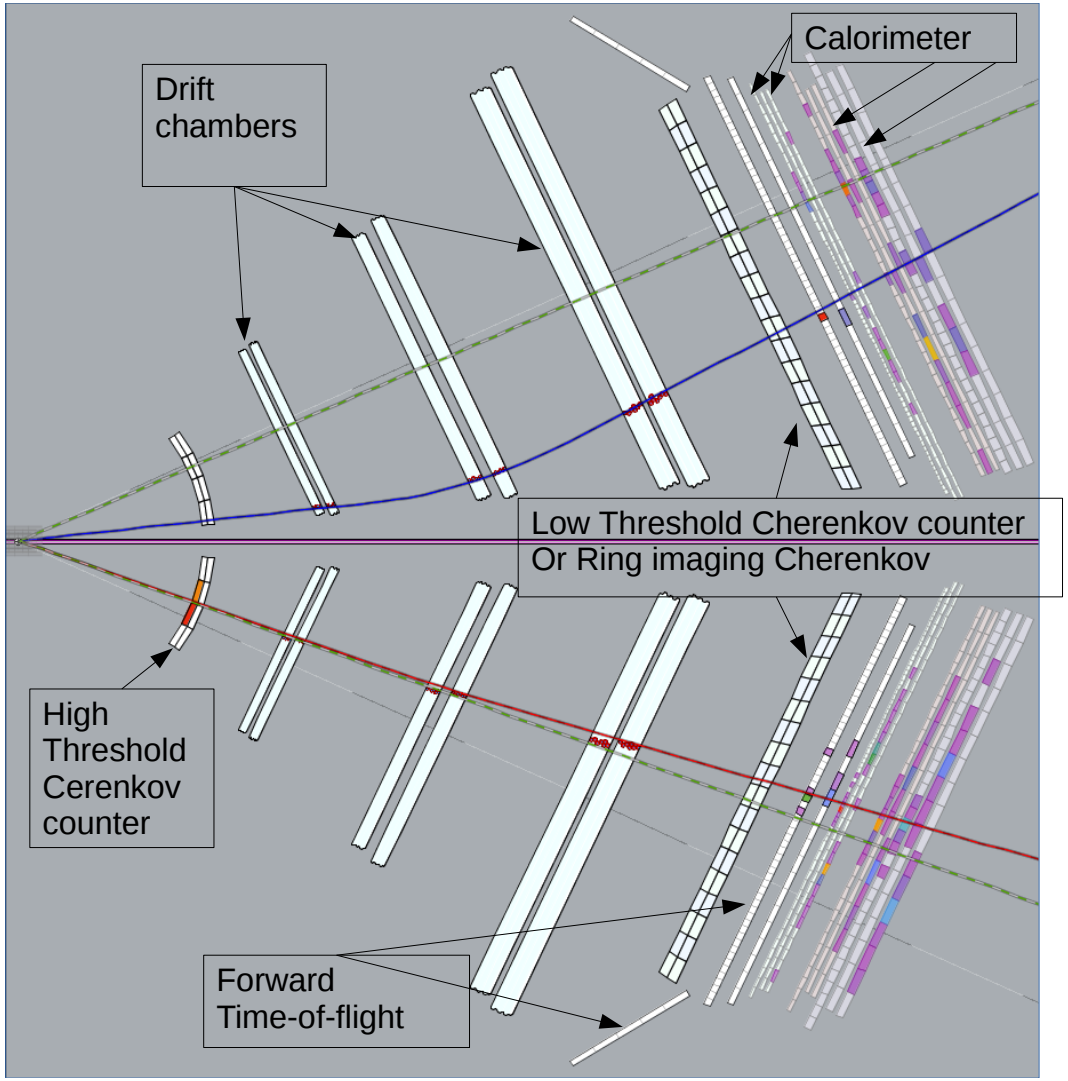
Simulation - CED

Electron

Proton

Photon



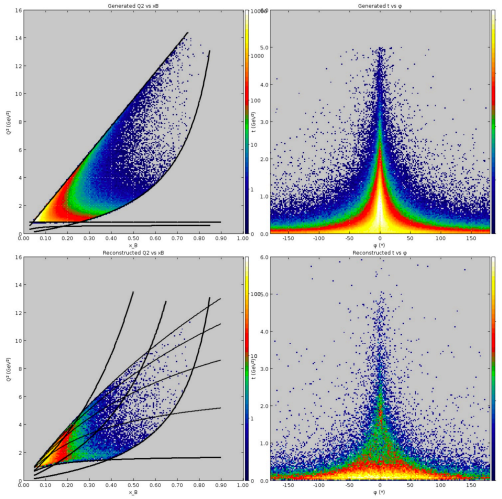


Simulations – Resolution studies

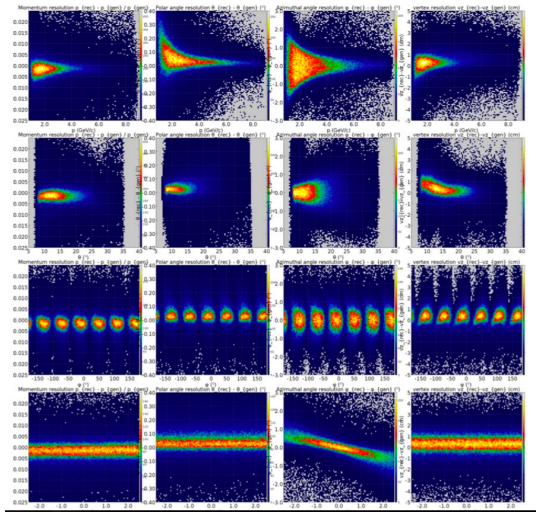
GemC 4a.2.1
Coatjava 4a.8.1

Weighted generator

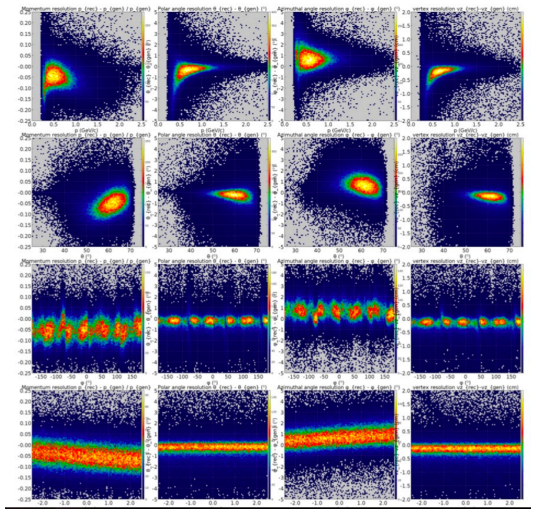
Kinematical variables



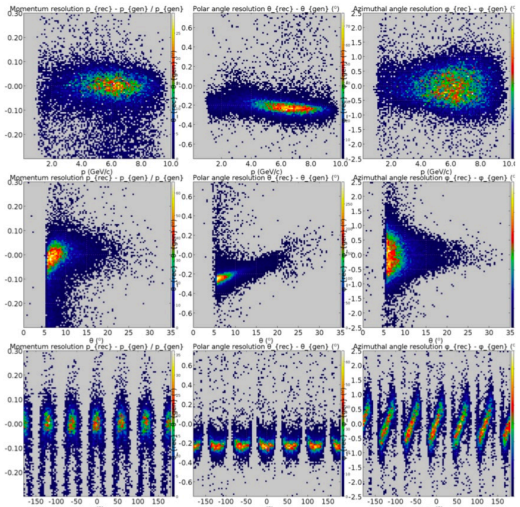
Electron Resolutions



Proton Resolutions



Photon Resolutions



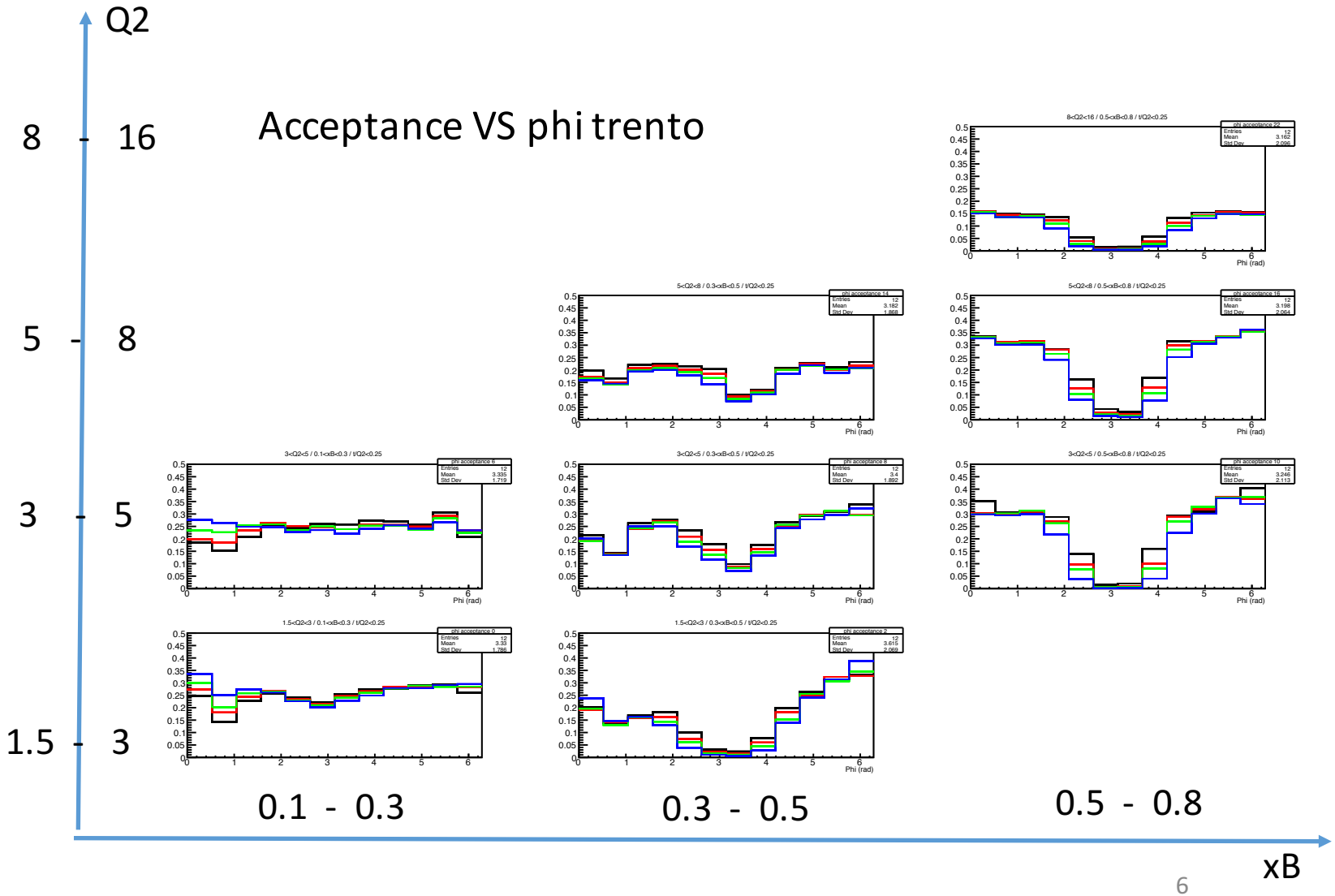
François-Xavier Girod

Simulations – Acceptance study

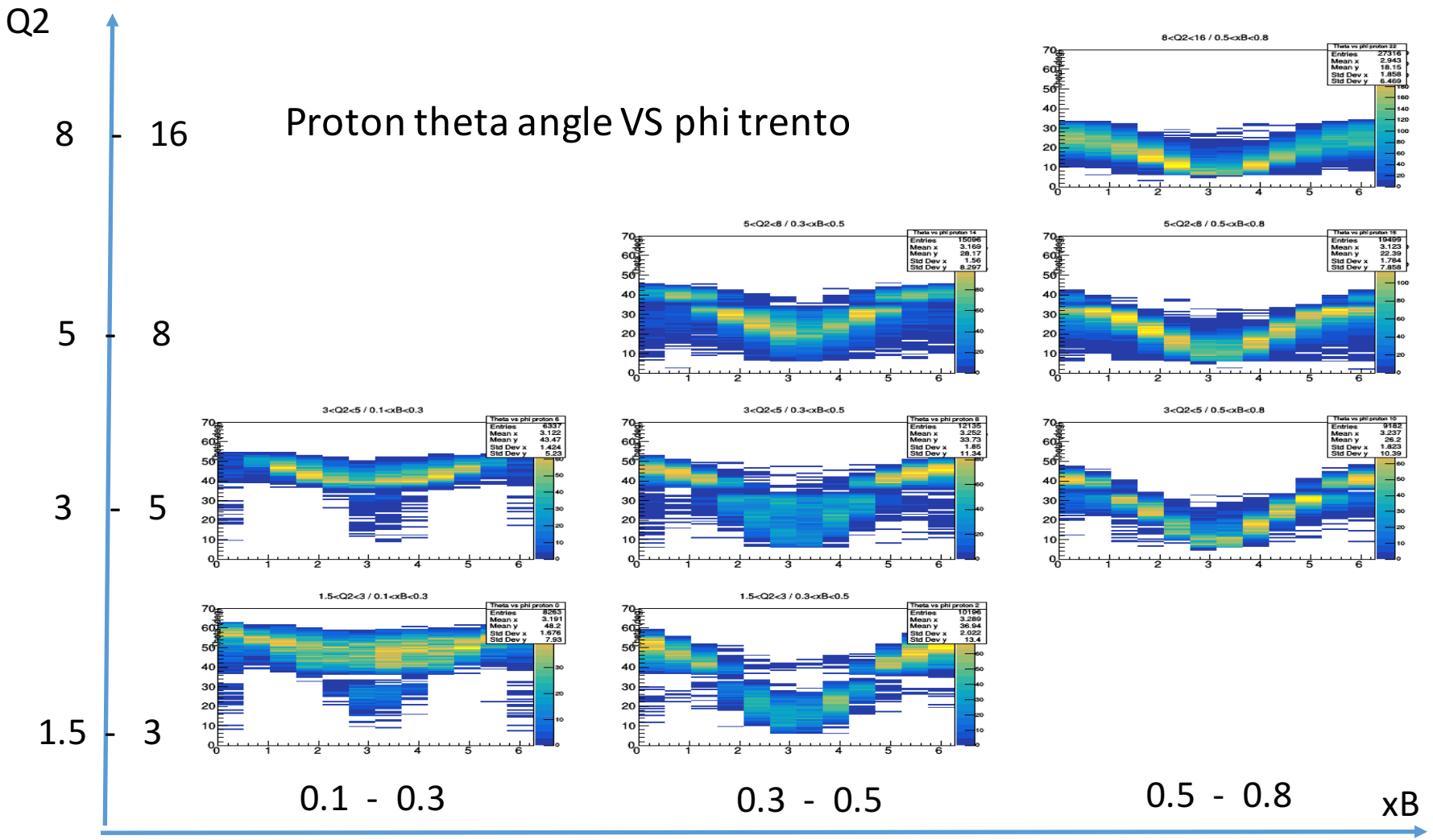
Uniform DVCS generator

Solenoid : 80%
negative outbending

GEMC 4a2.1
COATJAVA 4a8.1

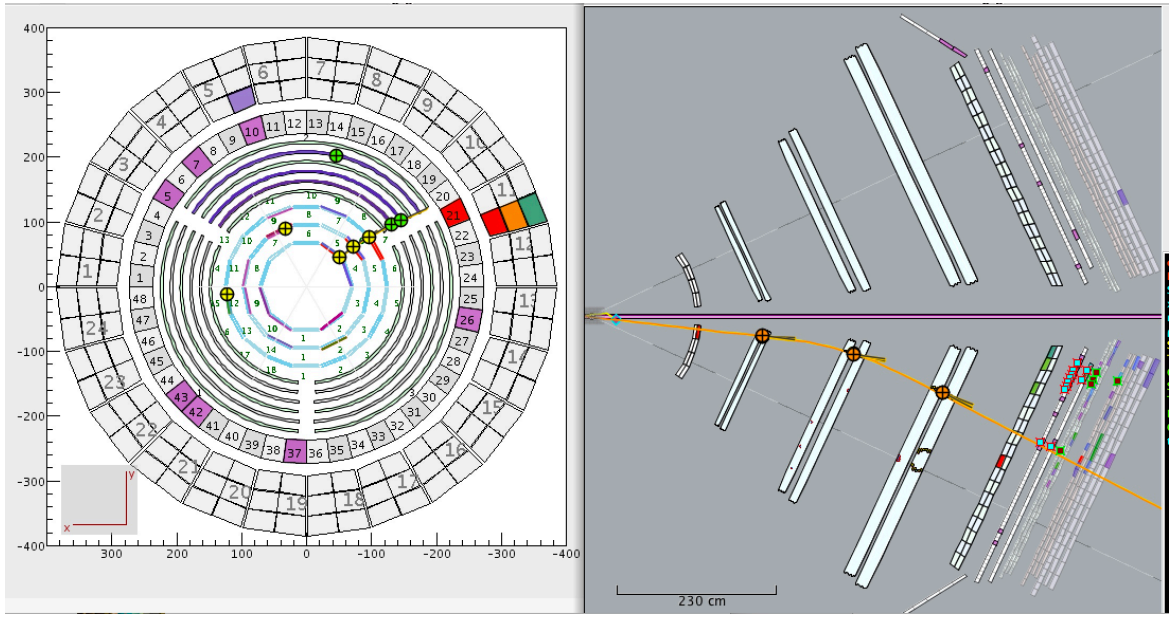


Simulations – Acceptance study

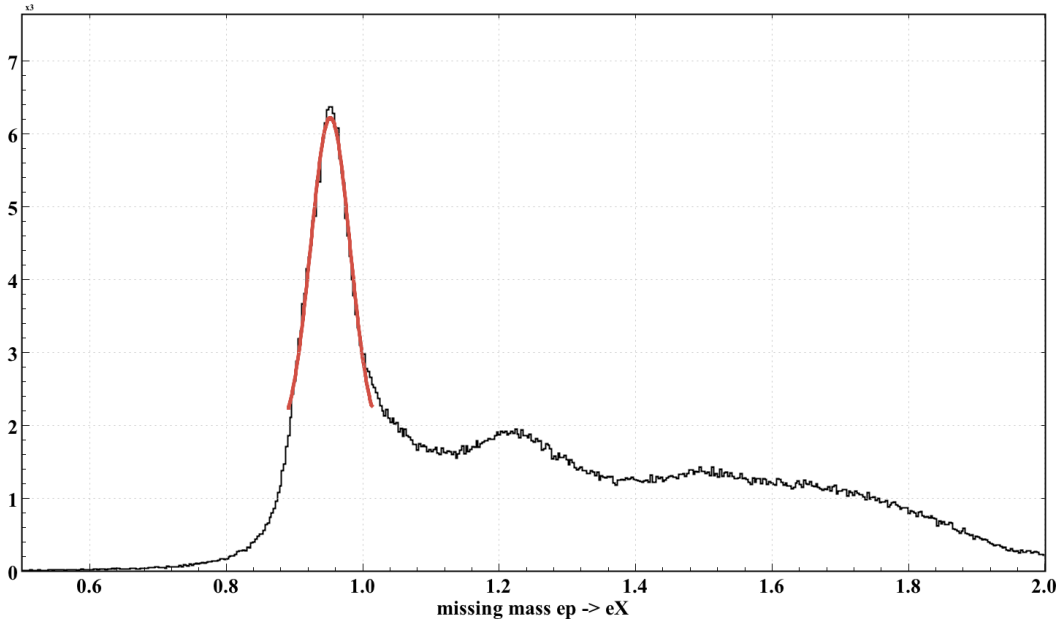


Data taking conditions

- Liquid hydrogen target
- 100% torus and 100% solenoid field
- 75% negative inbending 25% negative outbending
- 2 Gev (engineering run), 6 Gev and 11 Gev data (run group A)



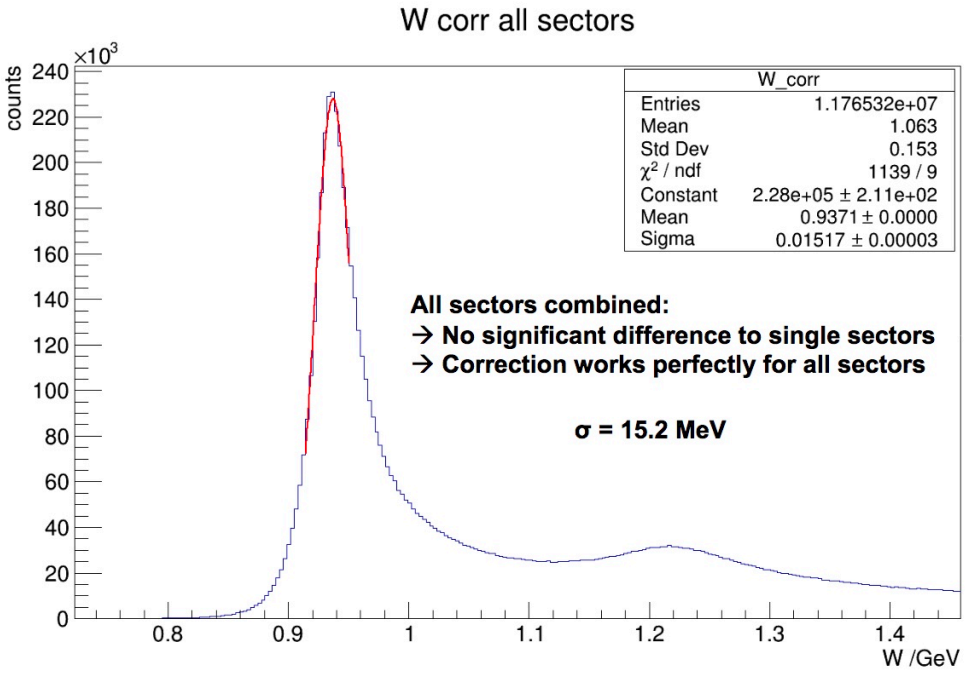
Data – Elastic 2.2 GeV



All sectors together without cuts and without correction

Mean : 953 MeV

Sigma : 28 MeV

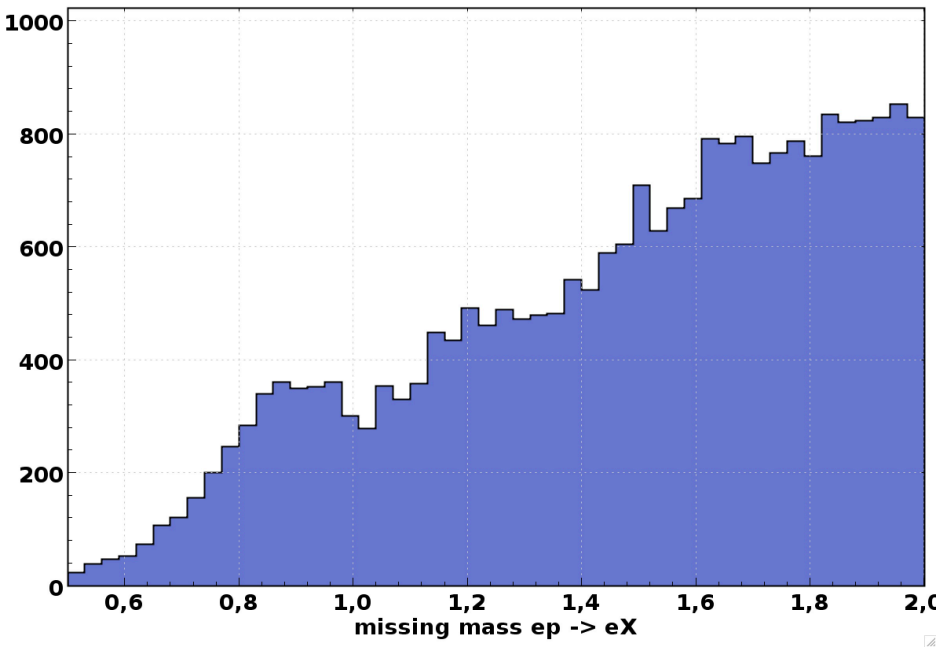


All sectors together

With cuts and with kinematical corrections

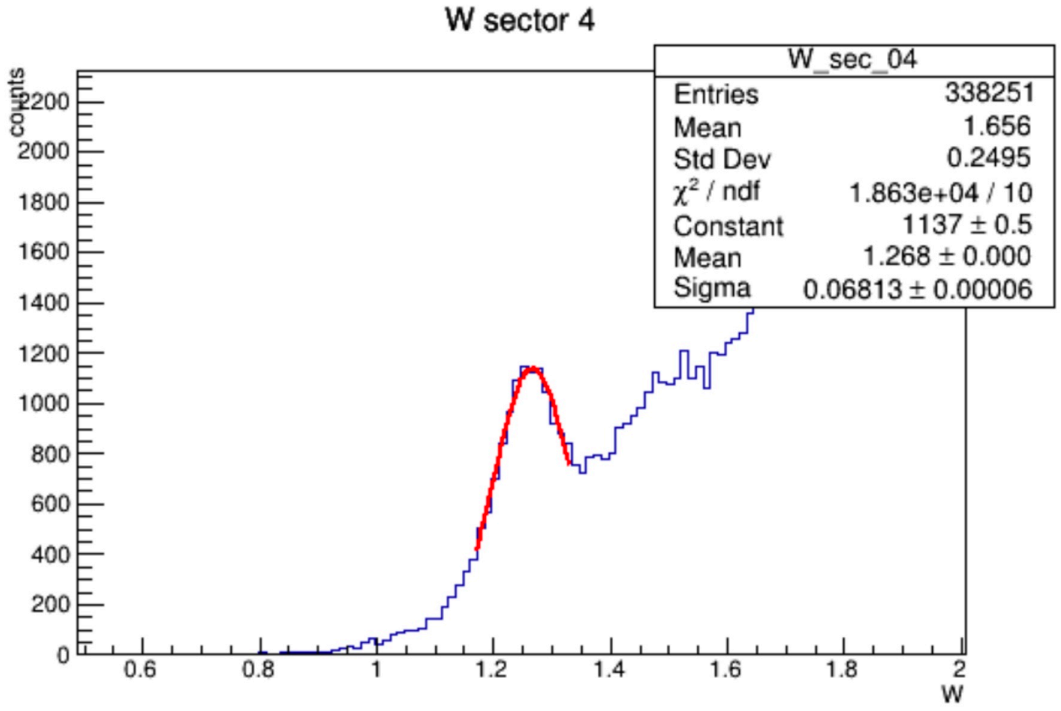
Run 2475, solenoid +0.6%, torus +0,6%, 2nA

Data – Elastic 6.4 GeV



Sector 4 without cuts and without corrections

Run 3105, solenoid -100%, torus +0,75%, 10nA



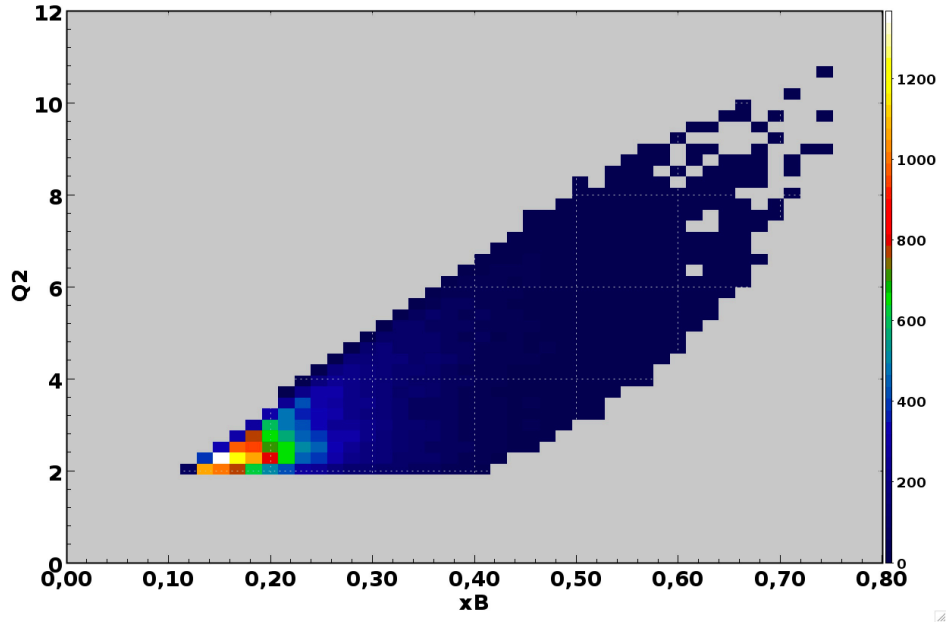
Sector 4 with additionnal cuts (old software version)

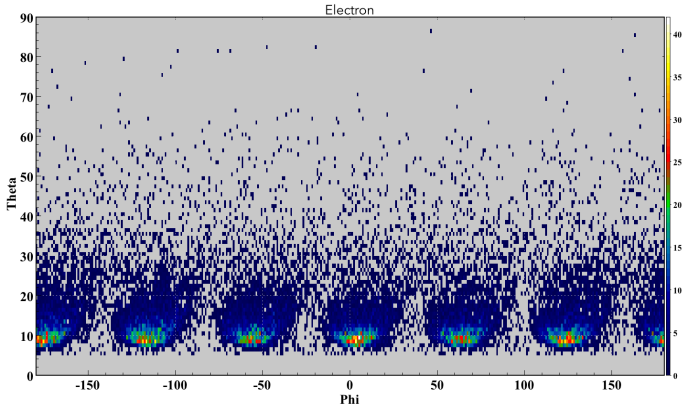
Run 3105, solenoid -100%, torus +0,75%, 10nA

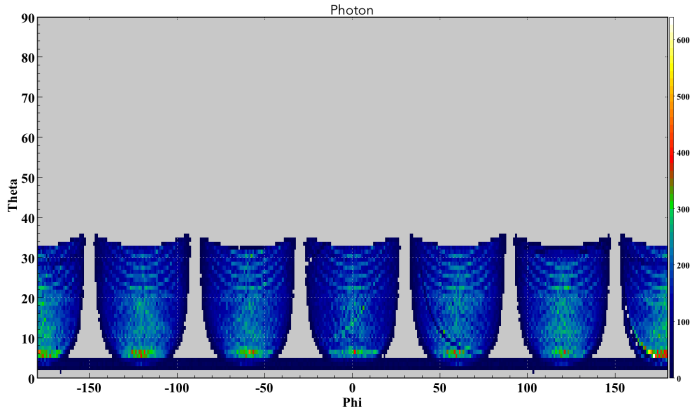
Data – 11 GeV Kinematic

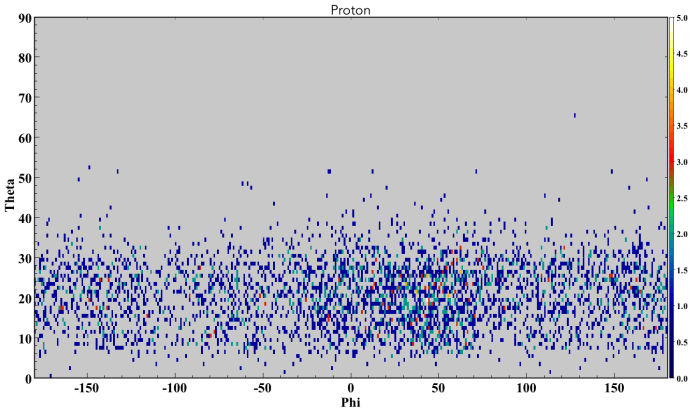
- Kinematical variables
- Single particle kinematics

- Run 3432
- -100% Solenoid / -100% Torus, 50 nA







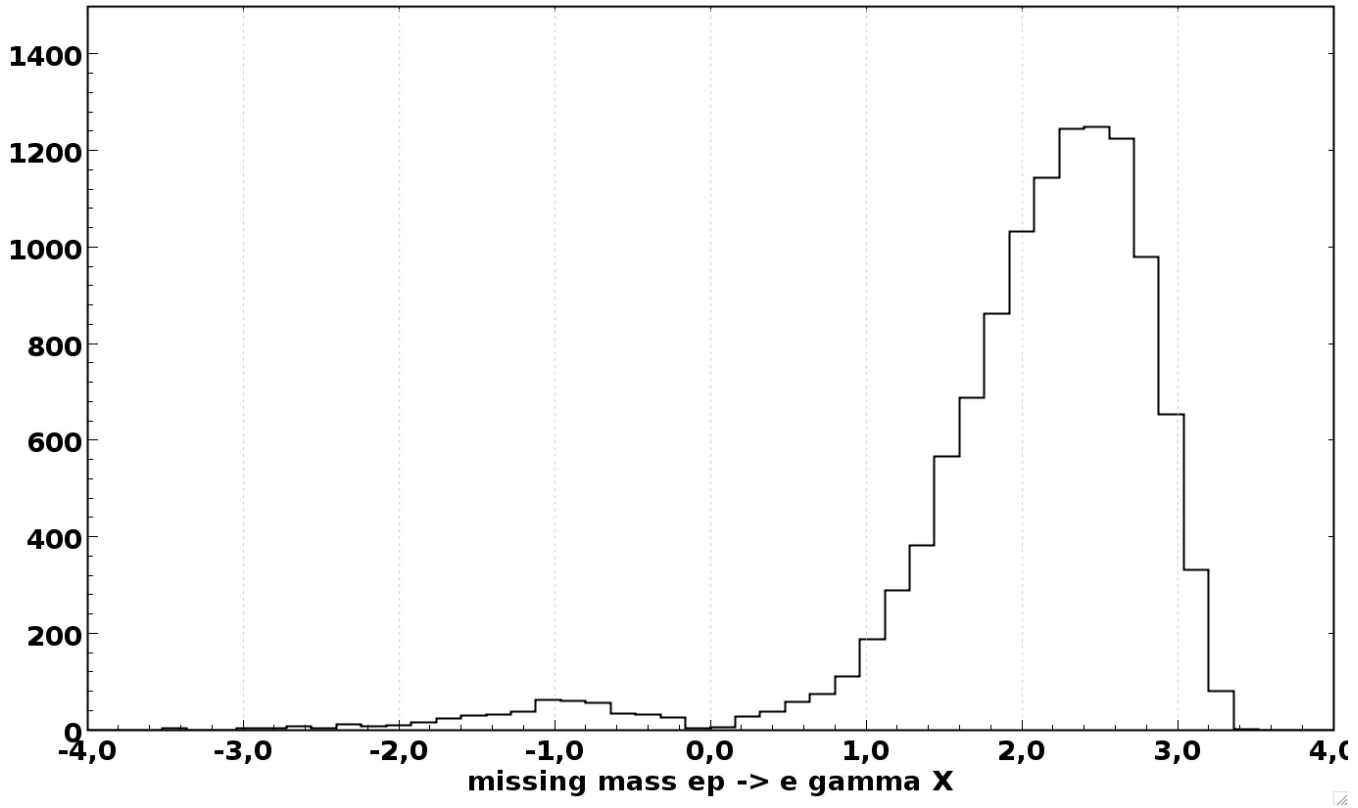


Data – 11 GeV DVCS

- Q2 > 2
- W2 > 4
- Photon energy > 2
- Vertex cuts
- ToF timing cuts

- Peak not strong enough, too wide or at the wrong location

- Run 3432
- -100% Solenoid / -100% Torus, 50 nA



Conclusion

- Just the beginning of a work in progress …
- Work on tracking and alignment is critical
- Work on magnetic field map will help a lot
- …