

STATUS OF DVCS ANALYSIS FROM E1-6 DATA

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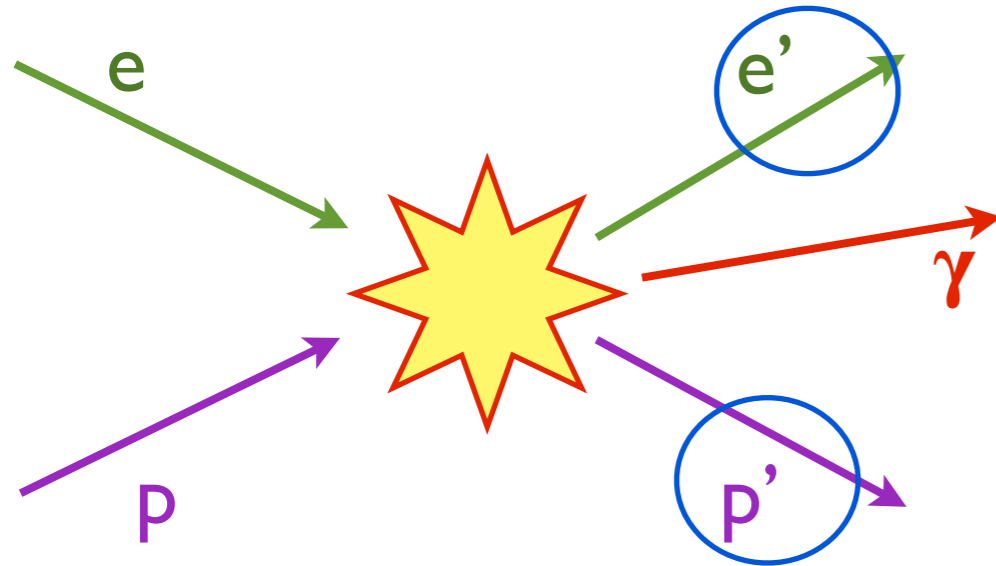
INFN-Ferrara



Collaboration meeting

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Introduction



Measurement of DVCS Cross Section, via detection of final state proton p' and lepton e' .

Large statistics & broad kinematic coverage \Rightarrow large coverage of Φ acceptance.

Exclusivity achieved via missing mass technique

E1-6 experiment:

Data collected in 2001-2002.

Beam energy 5.754 GeV

5cm long liquid hydrogen target

Average beam polarization 70%

Analysis Steps:

- 1.) analysis of exclusive pion $ep(2\gamma)$ sample
Main background to DVCS signal*
- 2.) analysis of $ep\gamma$ sample (photon detected)
Validate background subtraction*
- 3.) analysis of full $ep+ep\gamma$ sample*

Exclusive pions ($ep(2\gamma)$ sample)

Exclusive Pion Selection: 1 electron, 1 proton & 2 photons

Kinematic requirements:

$$W^2 > 4 \text{ [GeV}^2\text{]}$$

$$-t < 0.52 \text{ [GeV}^2\text{]}$$

$$-0.05 < M_X^2(epX) < 0.09 \text{ [GeV}^2\text{]}$$

$$P_{ele.} > 0.7 \text{ [GeV]}$$

$$P_{\pi^0} > 2.5 \text{ [GeV]}$$

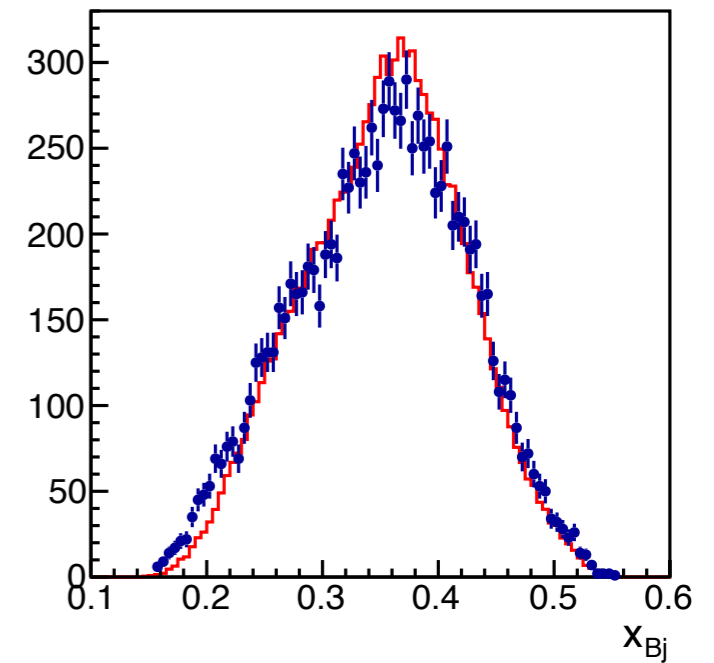
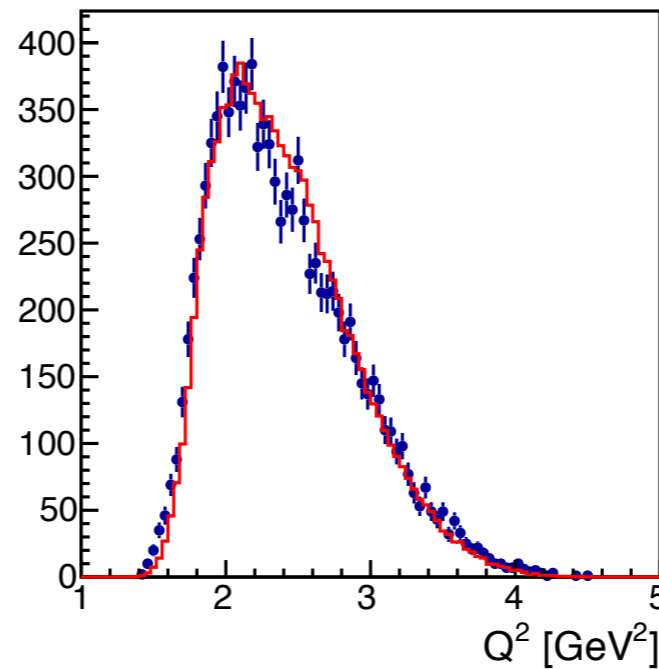
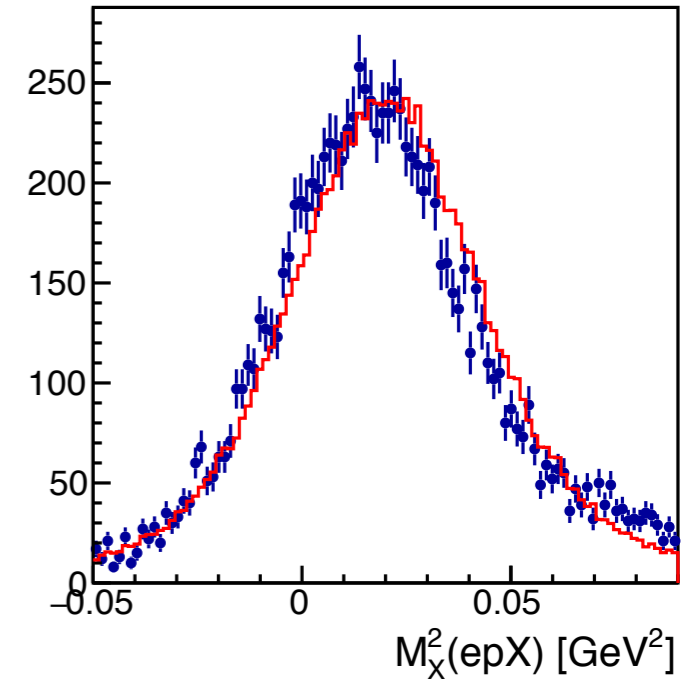
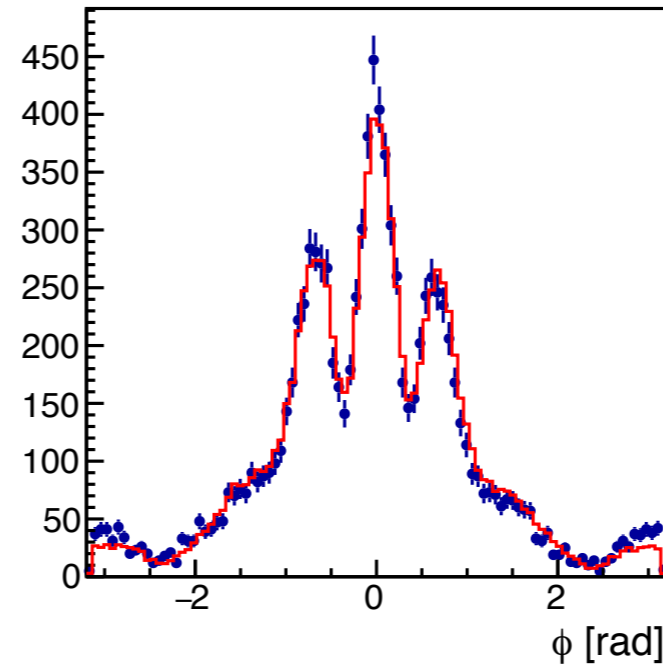
$$Sector(\gamma 1) = Sector(\gamma 2)$$

MC to Data normalization

$$\frac{N_{\pi^0}^{Data}}{N_{\pi^0}^{MC}}$$

MC to Data normalization for
ep & ep γ samples

$$N_{0,1\gamma}^{Data \pi^0}(x, Q^2, -t, \phi) = \frac{N_{\pi^0}^{Data}}{N_{\pi^0}^{MC}} N_{0,1\gamma}^{MC}(x, Q^2, -t, \phi)$$



Exclusive photons ($ep\gamma$ sample)

Data - MC comparison **exclusive photons**:

$$W^2 > 4 \text{ [GeV}^2\text{]}$$

$$0.07 < -t < 0.52 \text{ [GeV}^2\text{]}$$

$$|M_X^2(epX)| < 0.08 \text{ [GeV}^2\text{]}$$

$$P_{ele.} > 0.7 \text{ [GeV]}$$

$$t < t_{min}$$

$$\theta_{\gamma calc.} > 2^\circ$$

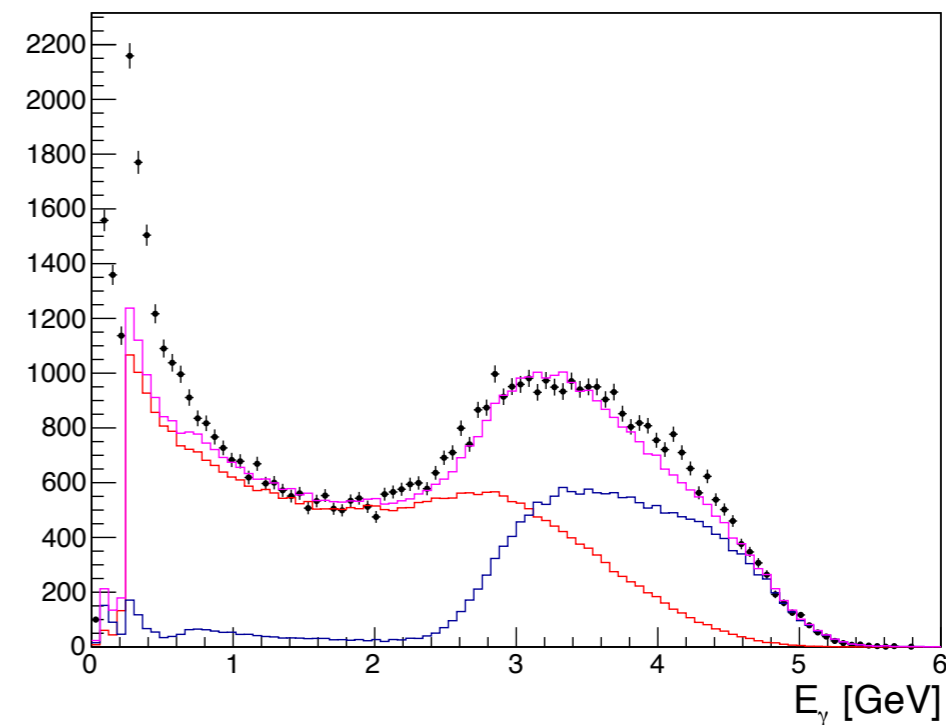
Low energy photon tail is not reproduced in simulation

In case of $ep\gamma$ sample can be removed by additional exclusivity cuts.

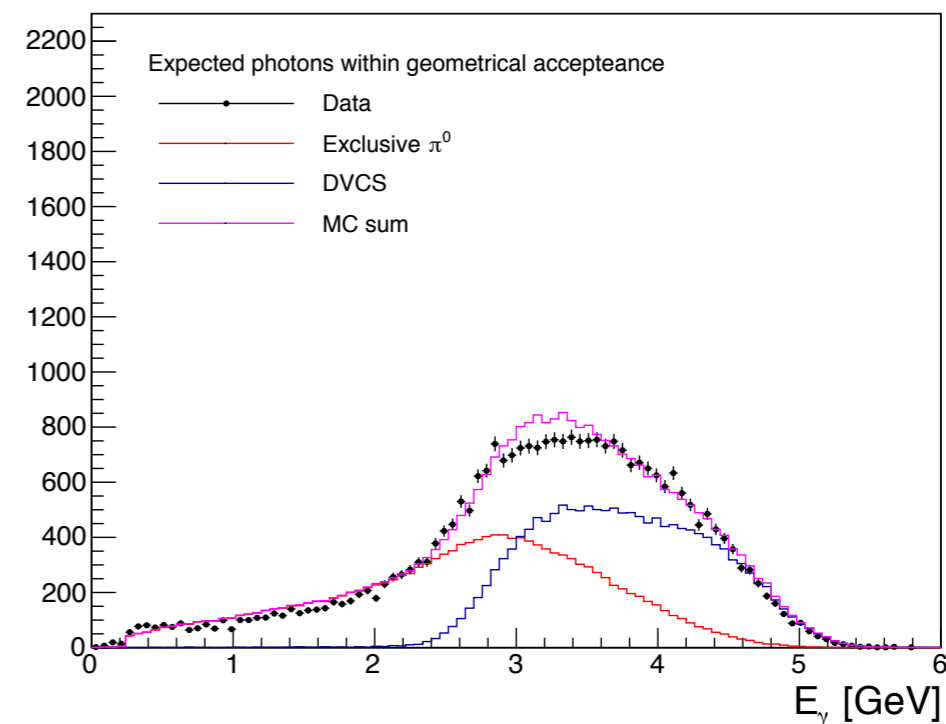
The origin should be understood to avoid problems in ep sample

Possible candidate could be radiative hard photons (currently missing in the MC)

Data - MC



Data - MC



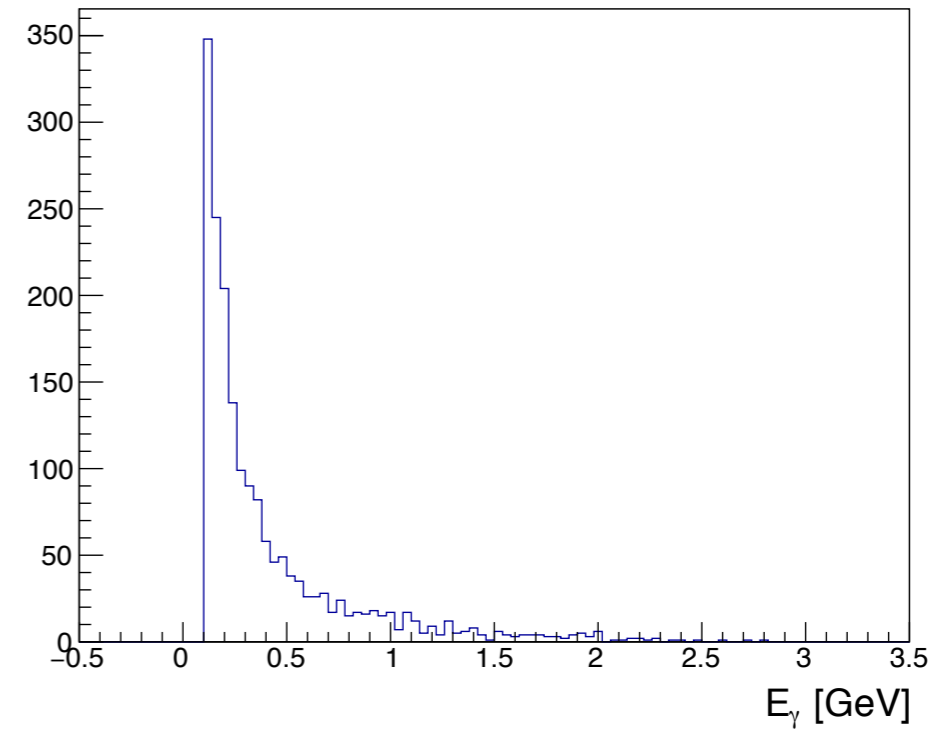
RADGEN 2.0 package is used with DVCS generator

Originally designed for inclusive DIS.

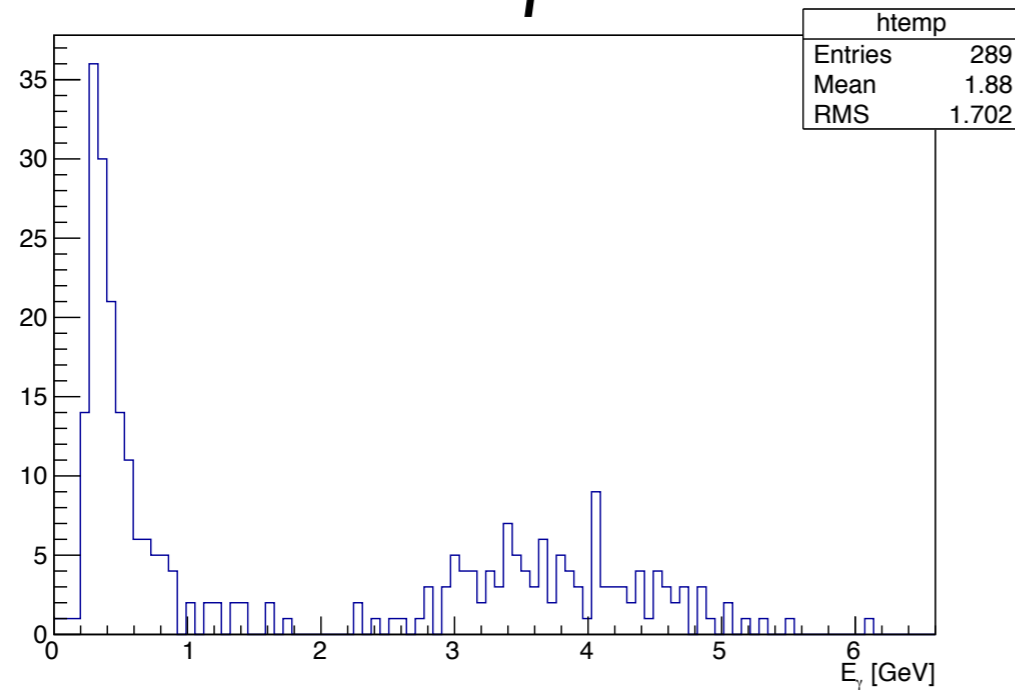
Can be used to study the shape of photon energy spectra.

Indication of strong x_B dependence

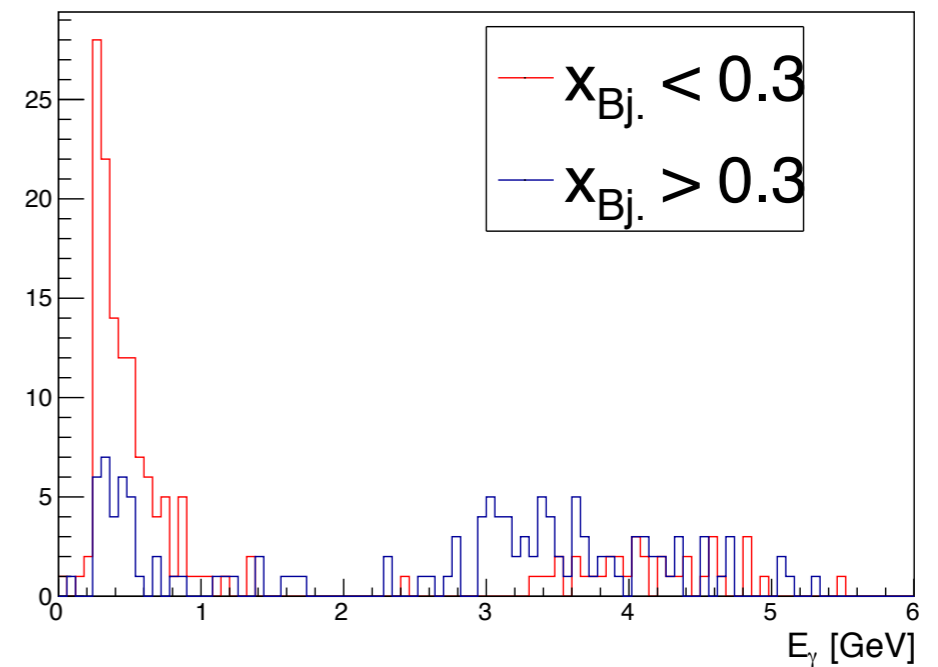
Generated photons from RADGEN



Reconstructed photons

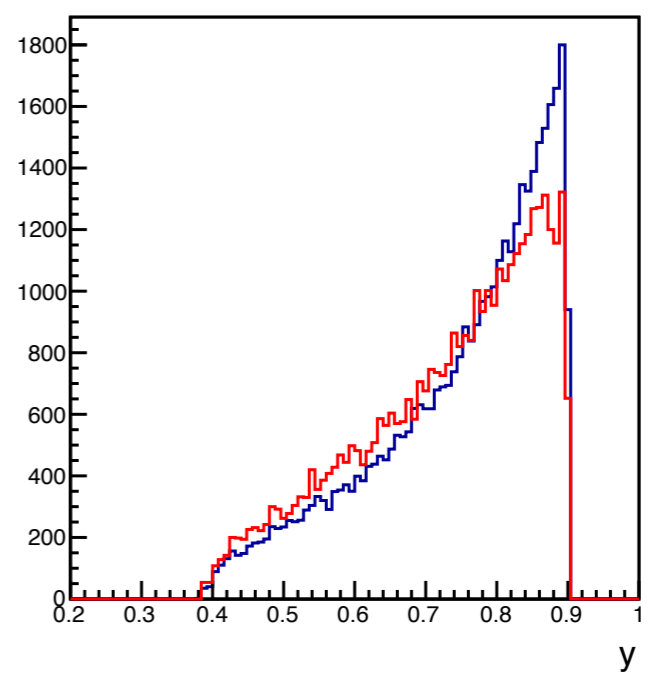
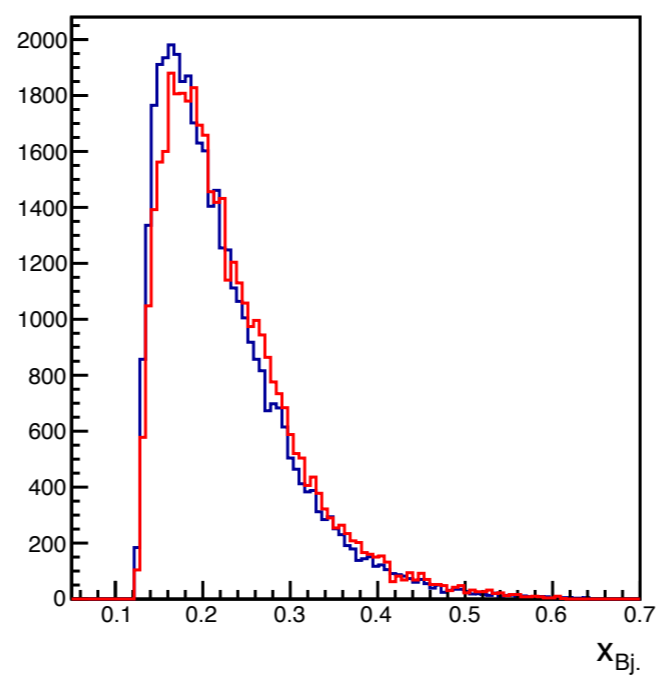
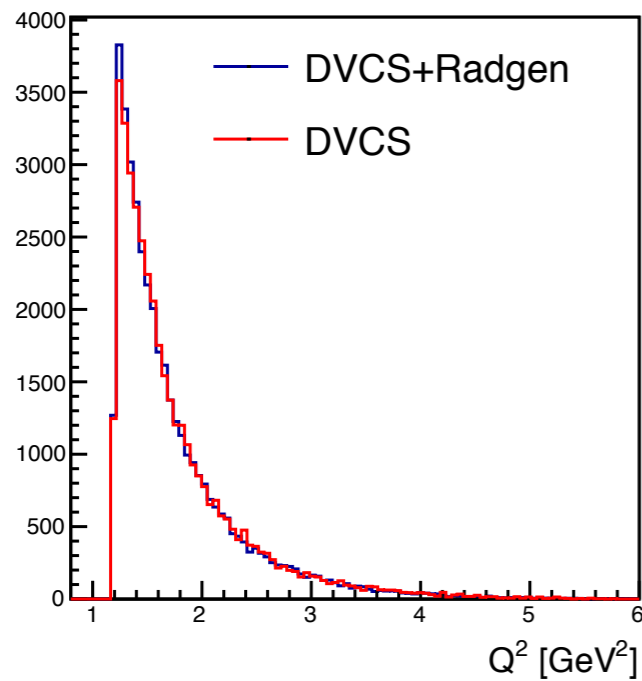
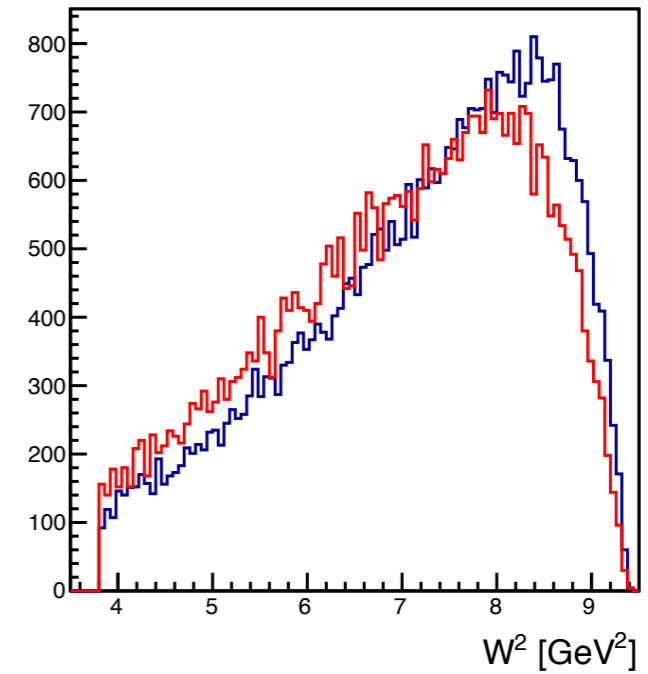
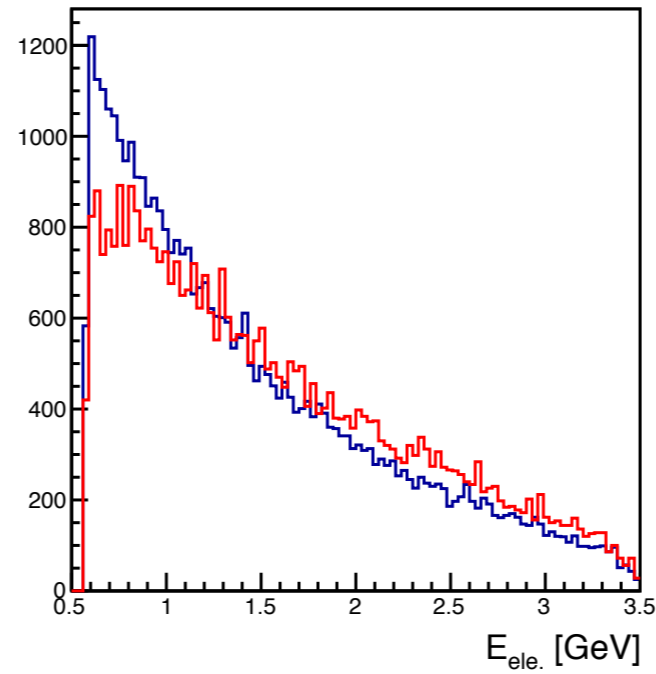
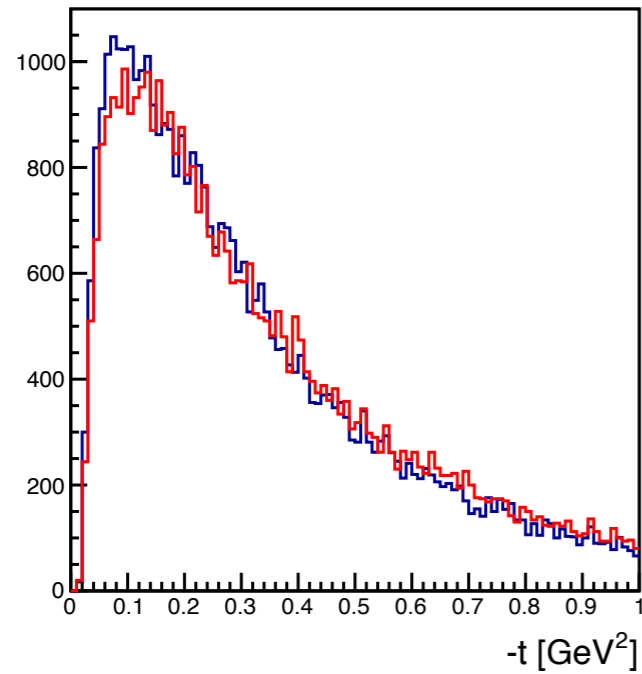


Reconstructed photons



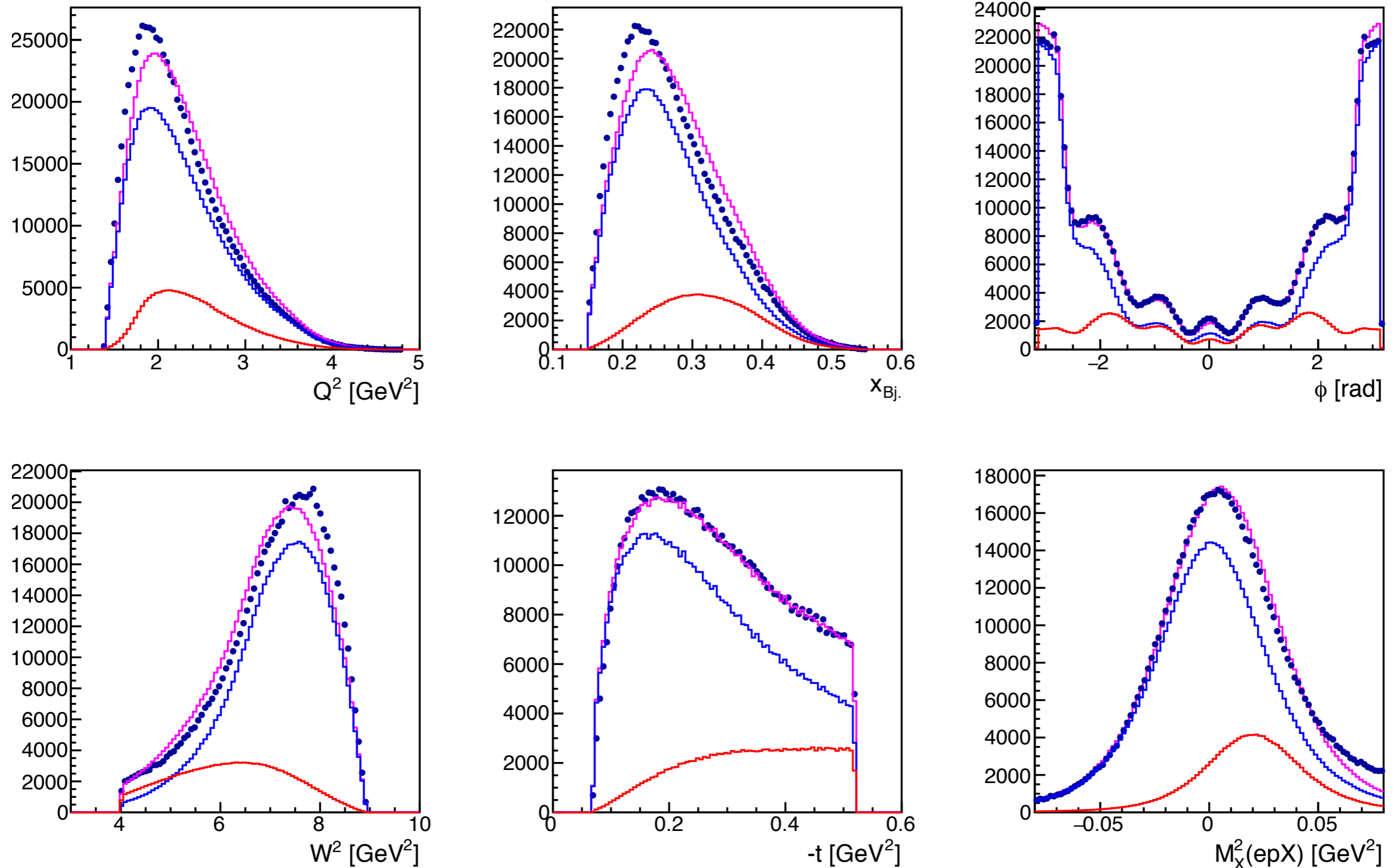
DVCS+RADGEN

Non negligible event migration in generated event sample



DVCS ($ep + ep\gamma$ sample)

Data - MC comparison (exclusive π^0 , DVCS, MC sum):



Conclusion & Outlook

- a. Preliminary studies indicate non negligible contribution from radiative correction.
- b. Photon energy spectra of $e\gamma$ sample might be described by MC simulations with radiative corrections.
- c. Radiative corrections might be responsible for the mismatch between Data and MC.

Thank you!