Tagger acceptance and resolution

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Acceptance in Q^2

- The acceptance is given as a fraction of events reaching one of the taggers to all generated events
- Compared for two event generators
- Quasi-real photoproduction: Comput.Phys.Commun. 272 (2022) 108251

Figure: Tagger 1

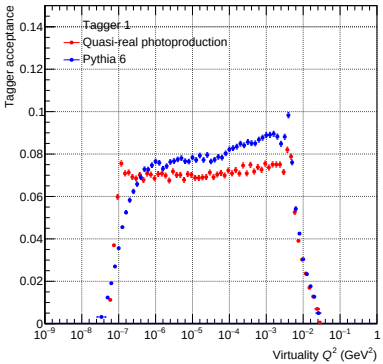
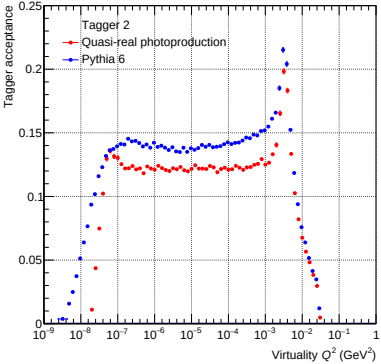


Figure: Tagger 2



Acceptance in electron energy

Figure: Tagger 1

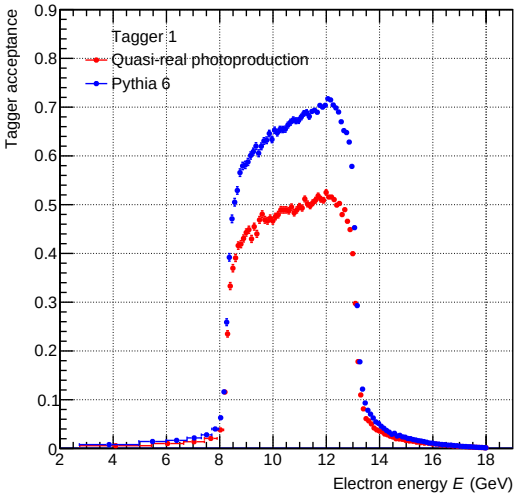
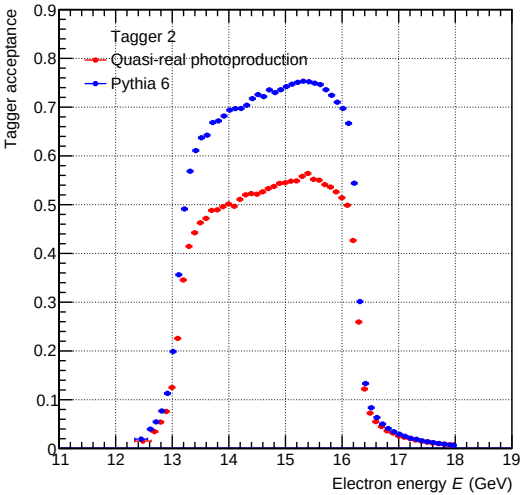


Figure: Tagger 2



Acceptance in Q^2 and electron energy

Figure: Tagger 1

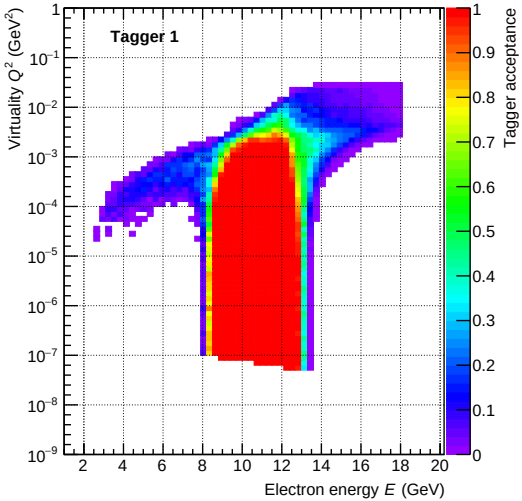
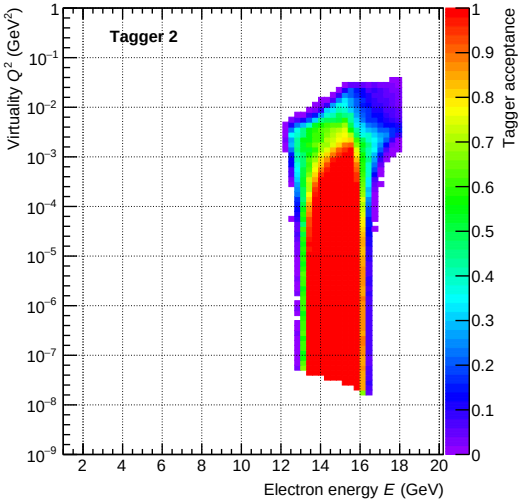


Figure: Tagger 2



Acceptance in electron polar angle

Figure: Tagger 1

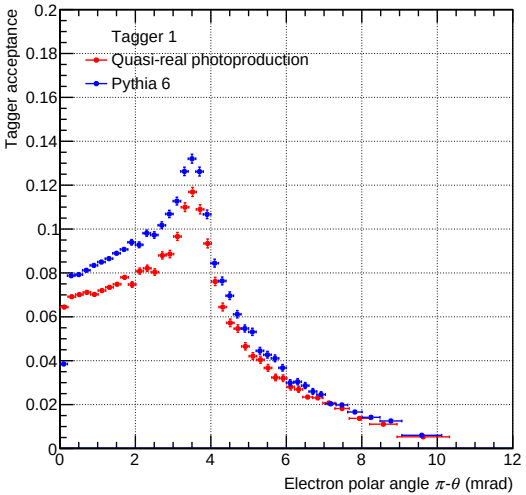
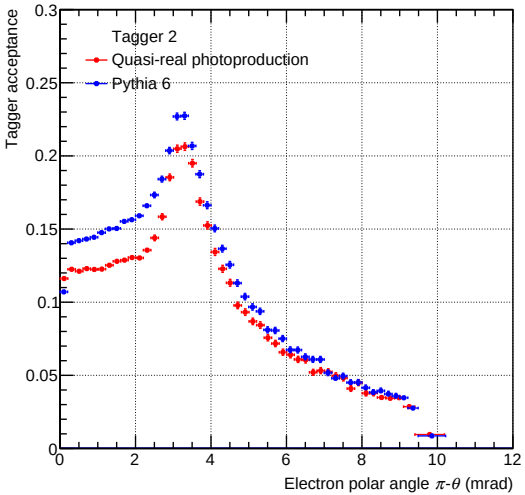


Figure: Tagger 2



Acceptance in Q^2 and electron polar angle

Figure: Tagger 1

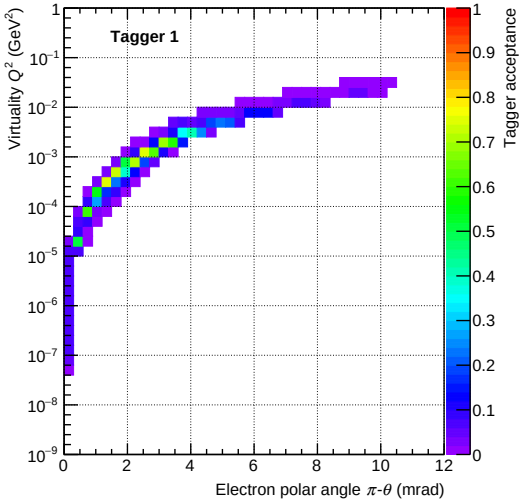
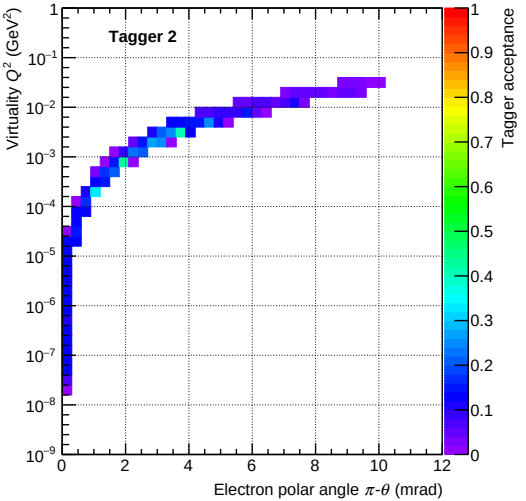


Figure: Tagger 2



Acceptance in electron energy and polar angle

Figure: Tagger 1

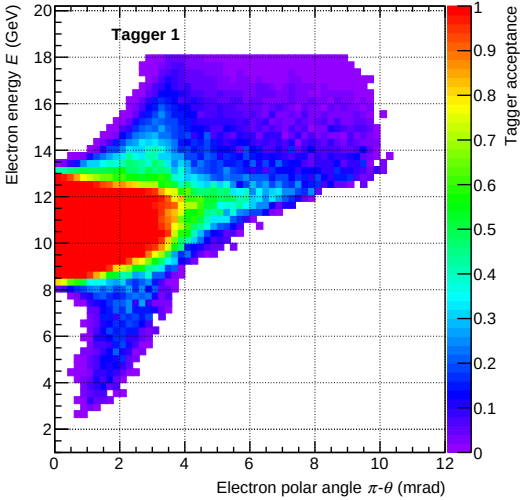
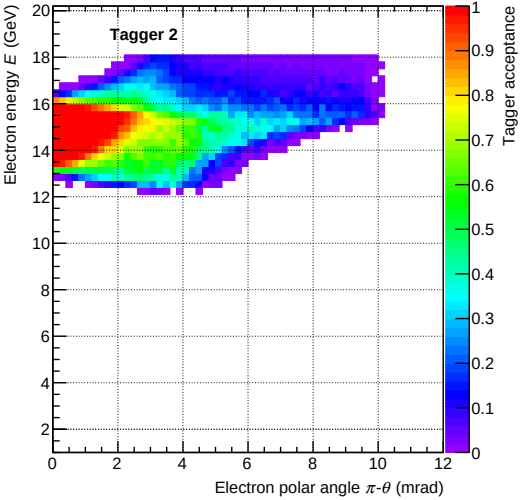


Figure: Tagger 2



Acceptance in electron pseudorapidity

Figure: Tagger 1

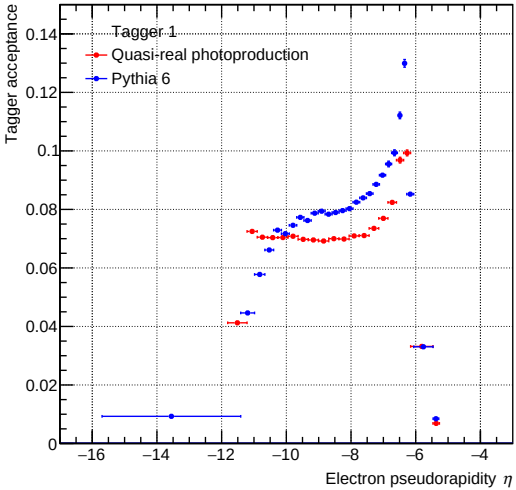
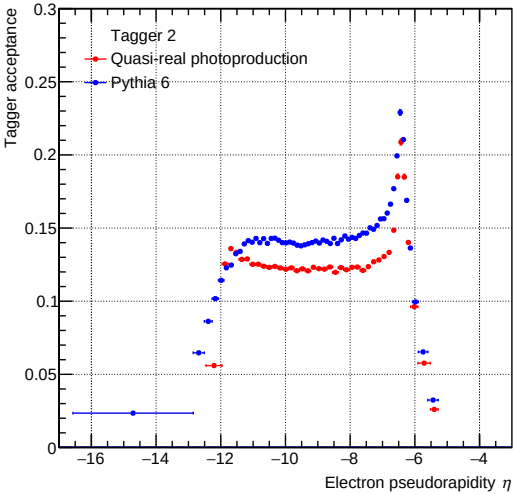


Figure: Tagger 2



Mechanism for Q^2 reconstruction in tagger

- Electron polar angle is found from its position and energy on the tagger; the angle and energy gives the Q^2
- Similar procedure is suggested in ZEUS-STATUS-REPT-1993, page 1054
- Reconstruction matrix holds mean polar angle for each position on the tagger and for a set of intervals in electron energy
- During reconstruction the polar angle is obtained from the matrix for a given energy and position on the tagger
- The matrix was trained with simulation of 200M events with uniform energy and angle distribution within taggers acceptance
- Reconstruction was applied to quasi-real and Pythia 6 data

Reconstruction matrix, angle and energy θ_e, E_e and position x, y

Figure: Tagger 1

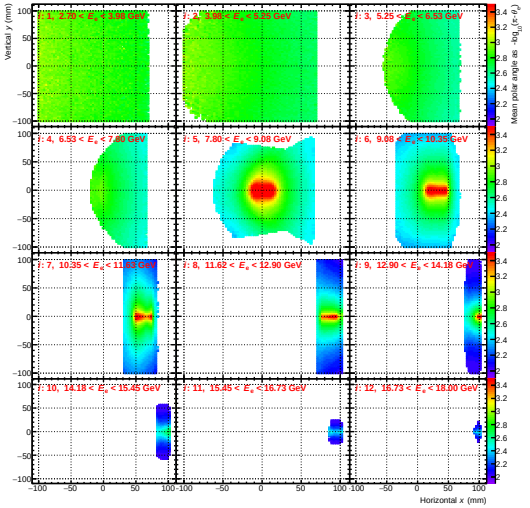
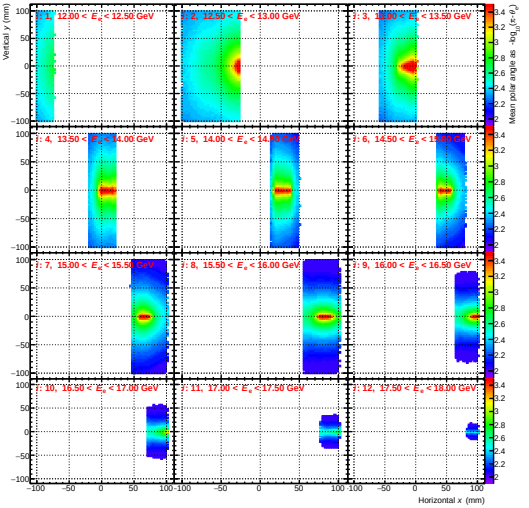


Figure: Tagger 2



Q^2 reconstruction in taggers for quasi-real photoproduction

Figure: Tagger 1, quasi-real

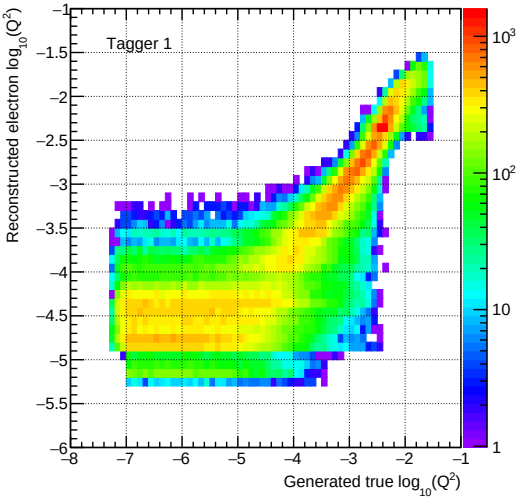
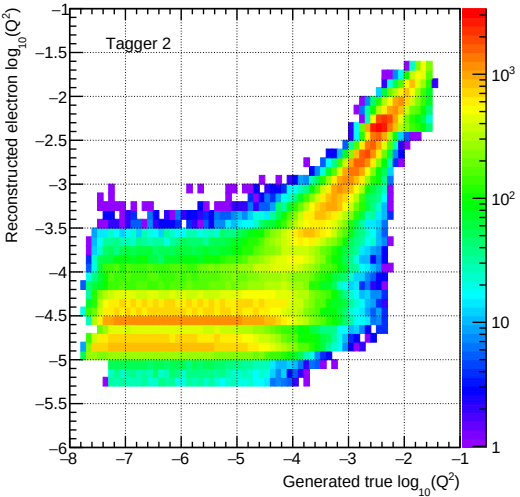


Figure: Tagger 2, quasi-real



Q^2 reconstruction in taggers for Pythia 6

Figure: Tagger 1, Pythia 6

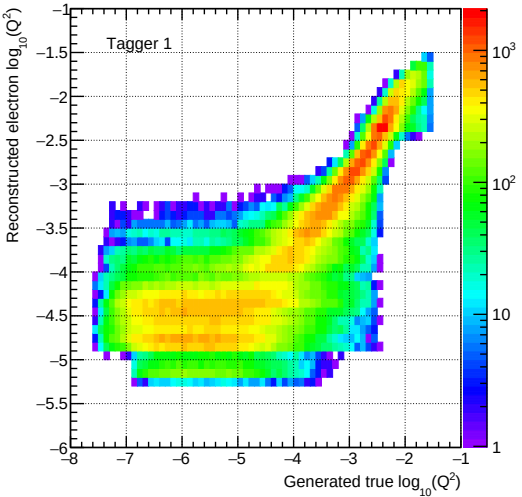
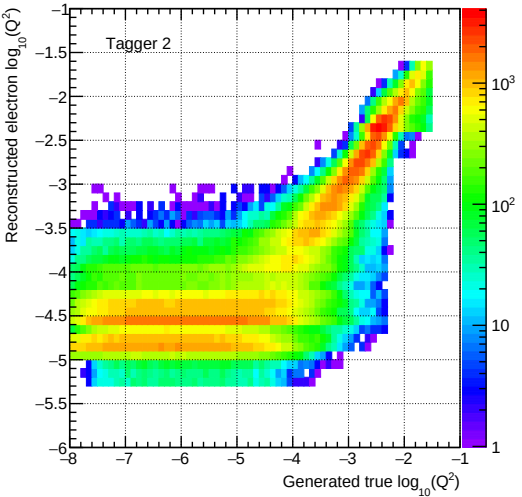


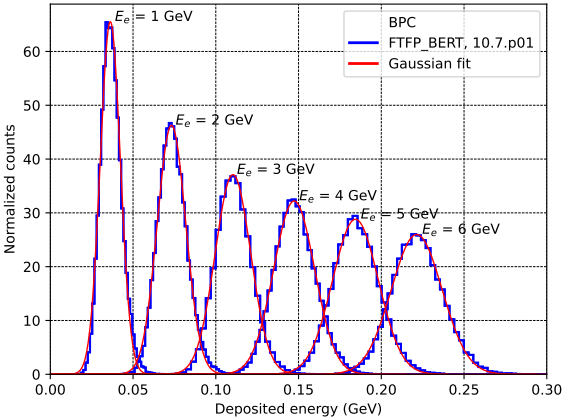
Figure: Tagger 2, Pythia 6



BPC calorimeter in Geant4

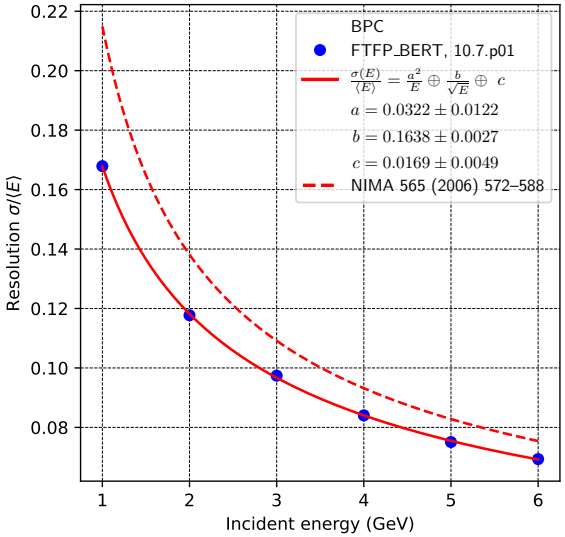
- Geant4 layout follows Nucl.Instrum.Meth.A 565 (2006) 572-588
- The aim was to test codes for energy resolution

Figure: Deposited energy in scintillator layers for a set of incident electron energies E_e



Energy resolution for BPC calorimeter

- Energy resolution is compared to Nucl.Instrum.Meth.A 565 (2006) 572-588
- $\oplus$ denotes the sum in quadratures
- Fit parameters in the reference are $a = 0.13$, $b = 0.17$, $c = 0.02$



Energy resolution for W/ScFi

- Same procedure is used for tungsten-fiber calorimeter
- The layout follows from Supplemental Material on hadronic calorimeters (EM part is used here)