Photon reconstruction in sidloi3

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2/11/2010

PFA progress on polygonal detectors

- IDDecoder returns neighbors across borders.
- NN and DT clusterers work, although not perfect. (See 2/2/10 SimReco meeting)
- PFA executes on neutrals.
- Extrapolation needs to be solved before it will execute with tracks.
- Mip clustering still assumes layer==depth and is being worked on
- See where we are with photons

Photon reconstruction

- Relies on both NN and DT clusterers, HMatrix, and calibration.
- Different configuration for polygonal detectors changes calibration and probably HMatrix. However, to see where we are run with same calibration and HMatrix as sid02.

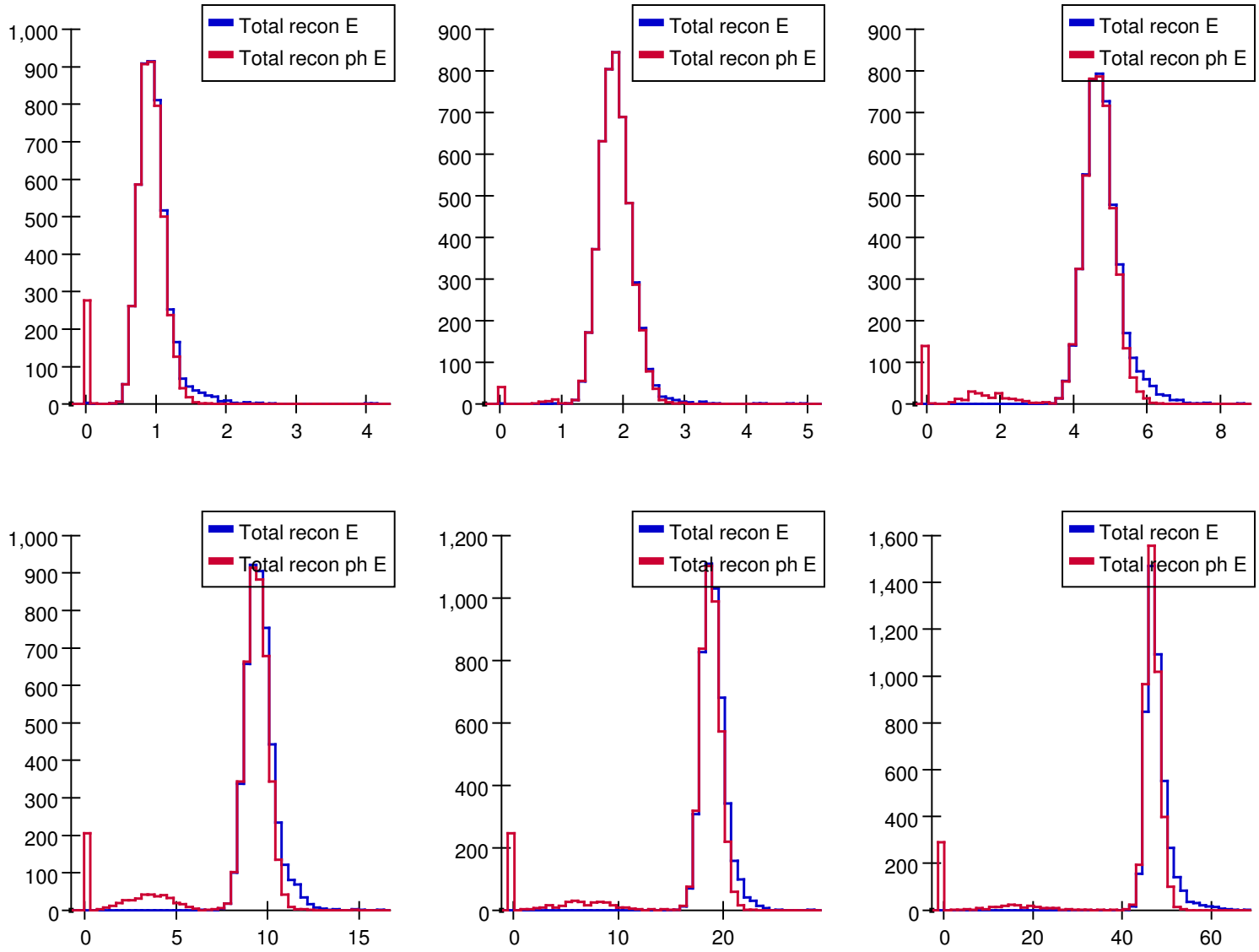
Procedure

- Run PFA on single photons in sidloi3, as well as sid02 for comparison.
- Use theta = 90 for Barrel, and theta = 160 for Endcap.
- Energies = {1,2,5,10,20,50,100} GeV
- Look at distributions to find problem areas.

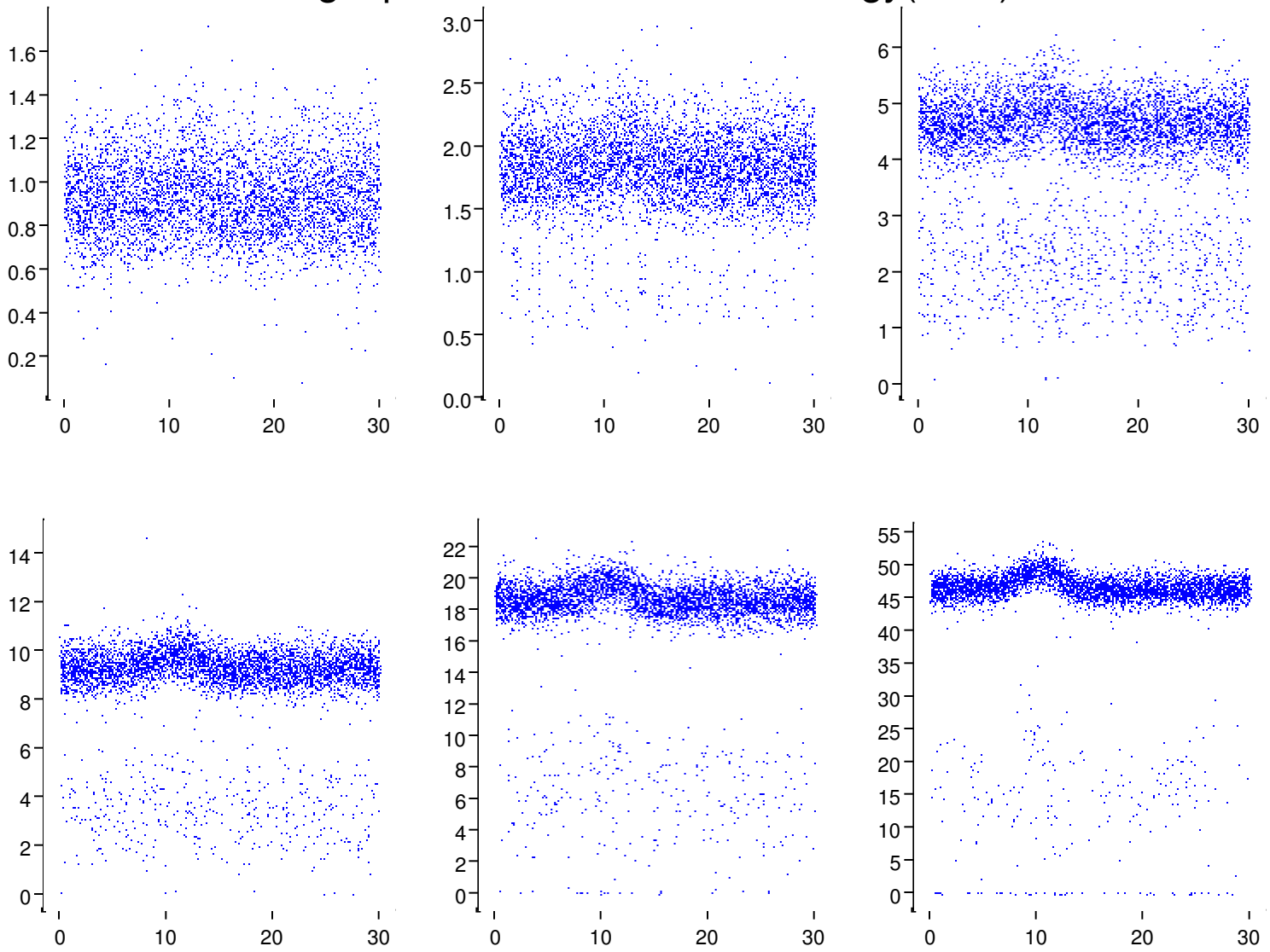
Definitions

- Phi: Folded azimuth angle. 12-fold symmetry => 0 < phi < 30 degrees. No phi dependence in sid02 so spread indicates statistical spread of distribution. Can look for dependence in sidloi3.
- Efficiency: tricky, even for single particles. Used 3 different definitions
- Eff0 == exactly 1 photon and 0 neutral hadrons reconstructed. Very restrictive
- Eff1 == (Reconstructed photon energy) > (Generated photon E – 4*sigma), sigma = .2$\sqrt{E}$. Reasonable, but presents artificial problems if calibration off.
- Eff2 == (Reconstructed photon energy) > (Generated E/2). Generous

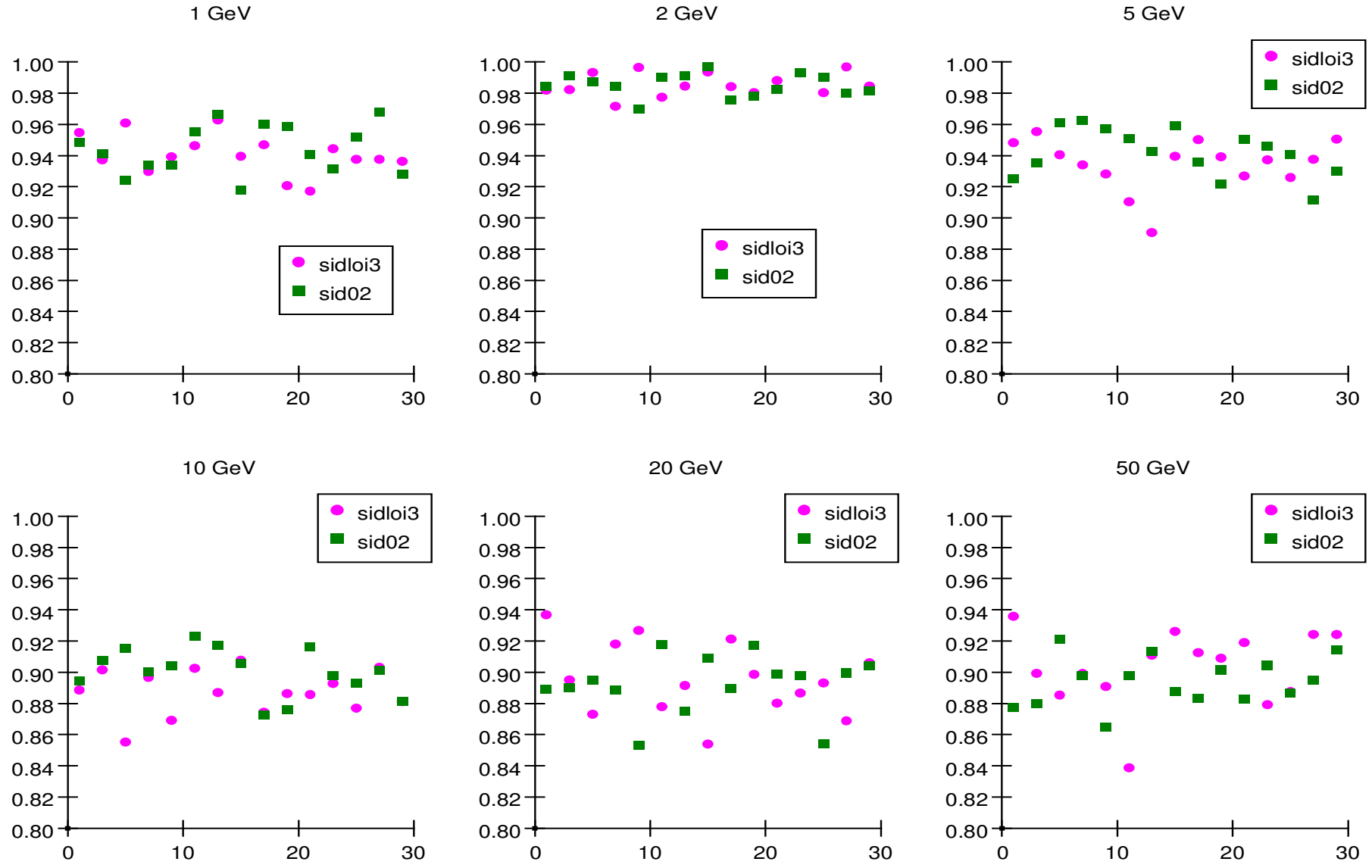
Photons: Theta = 90. x axis = Reconstructed Energy(GeV)



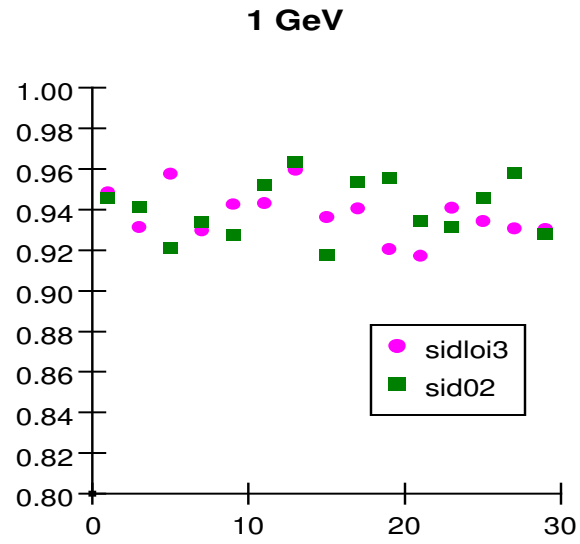
Photons: Theta = 90: x axis = phi, y axis = single photon reconstructed energy(GeV)

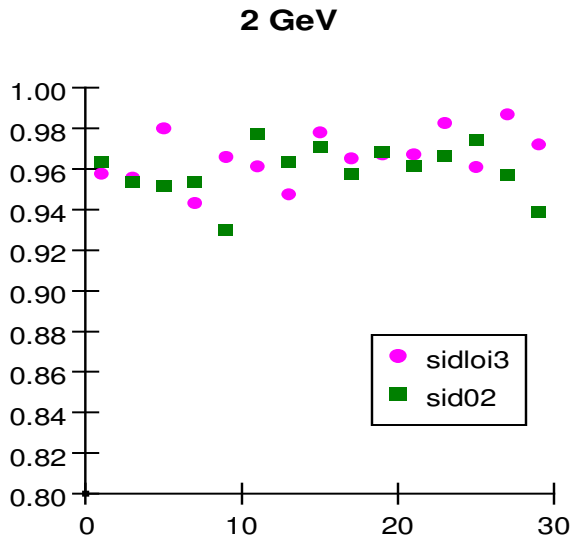


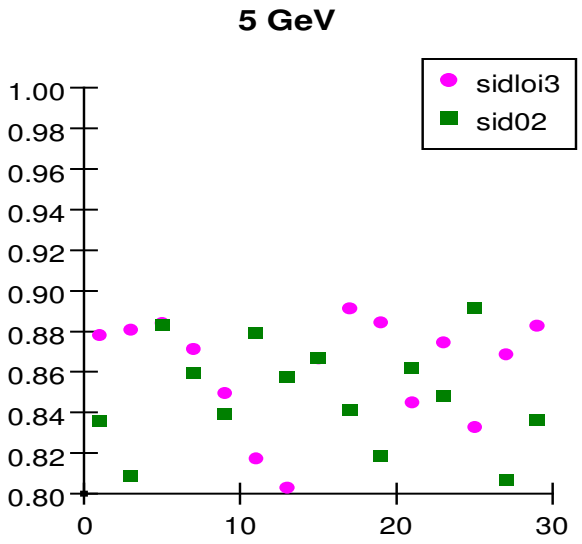
Photons: Theta = 90: eff2 vs phi

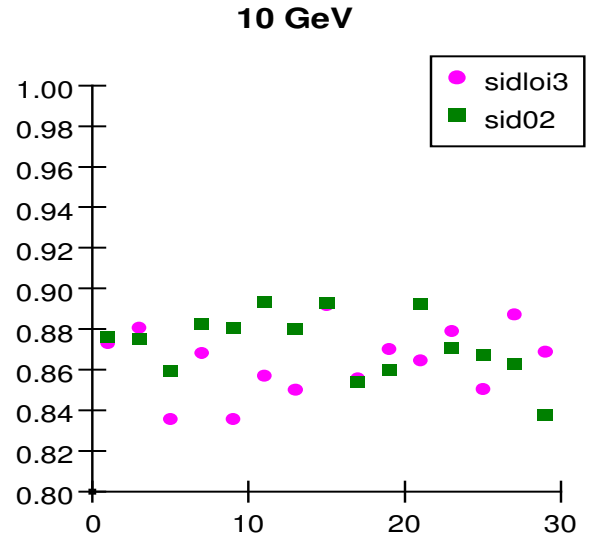


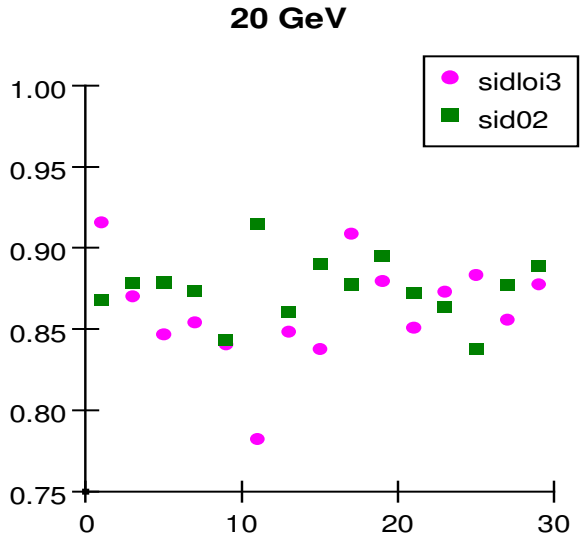
Photons: Theta = 90: eff0 vs phi

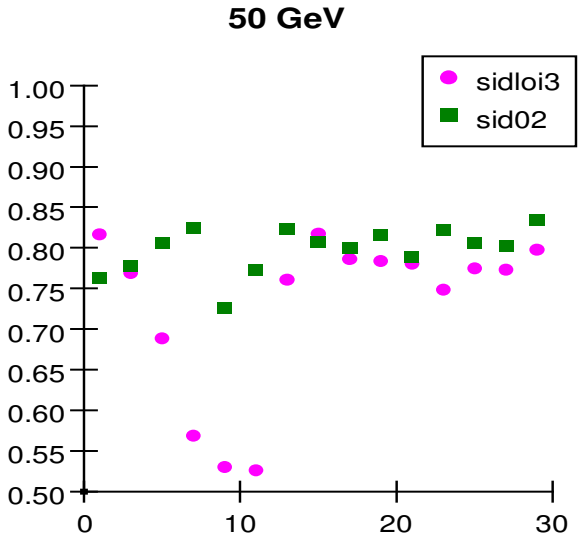




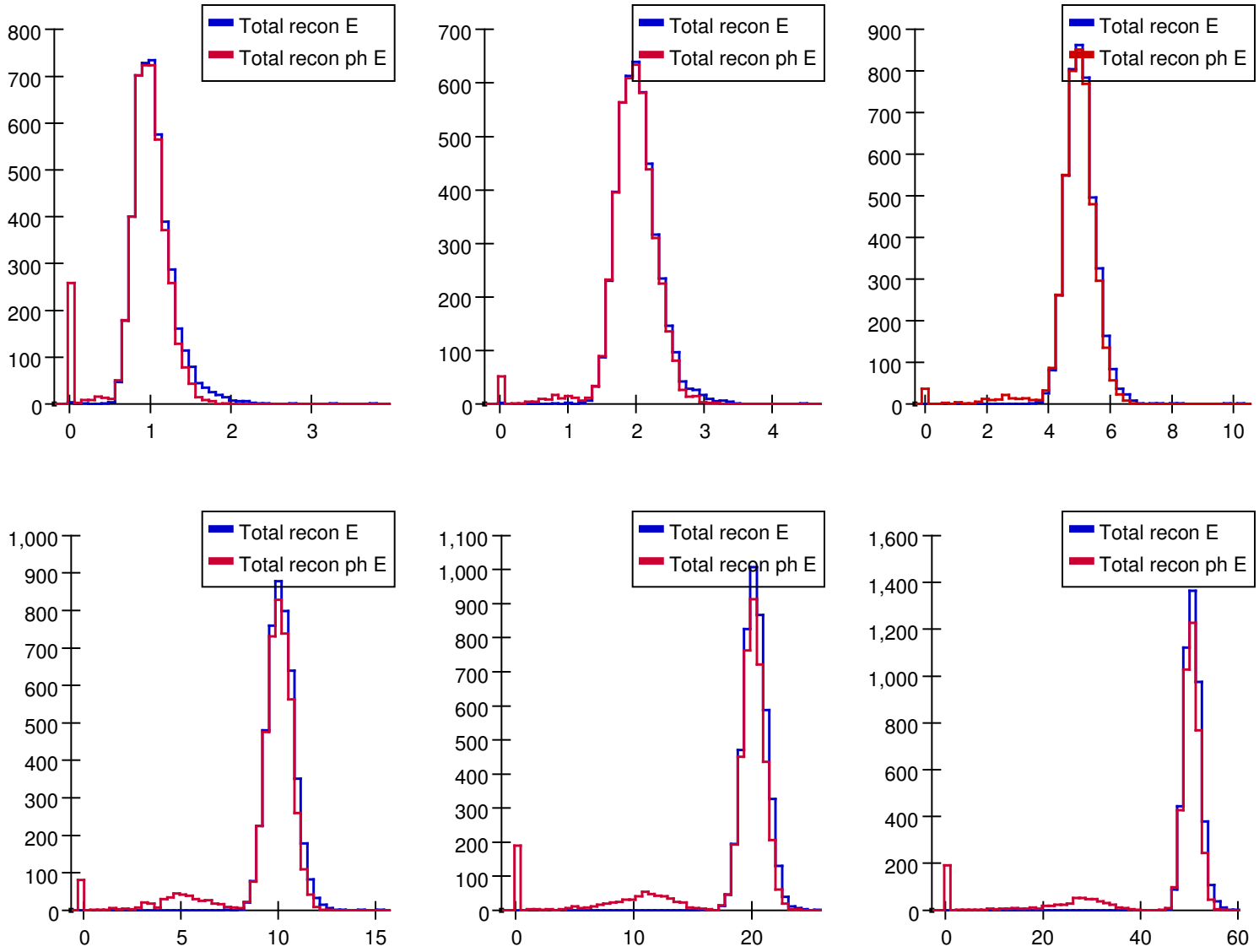




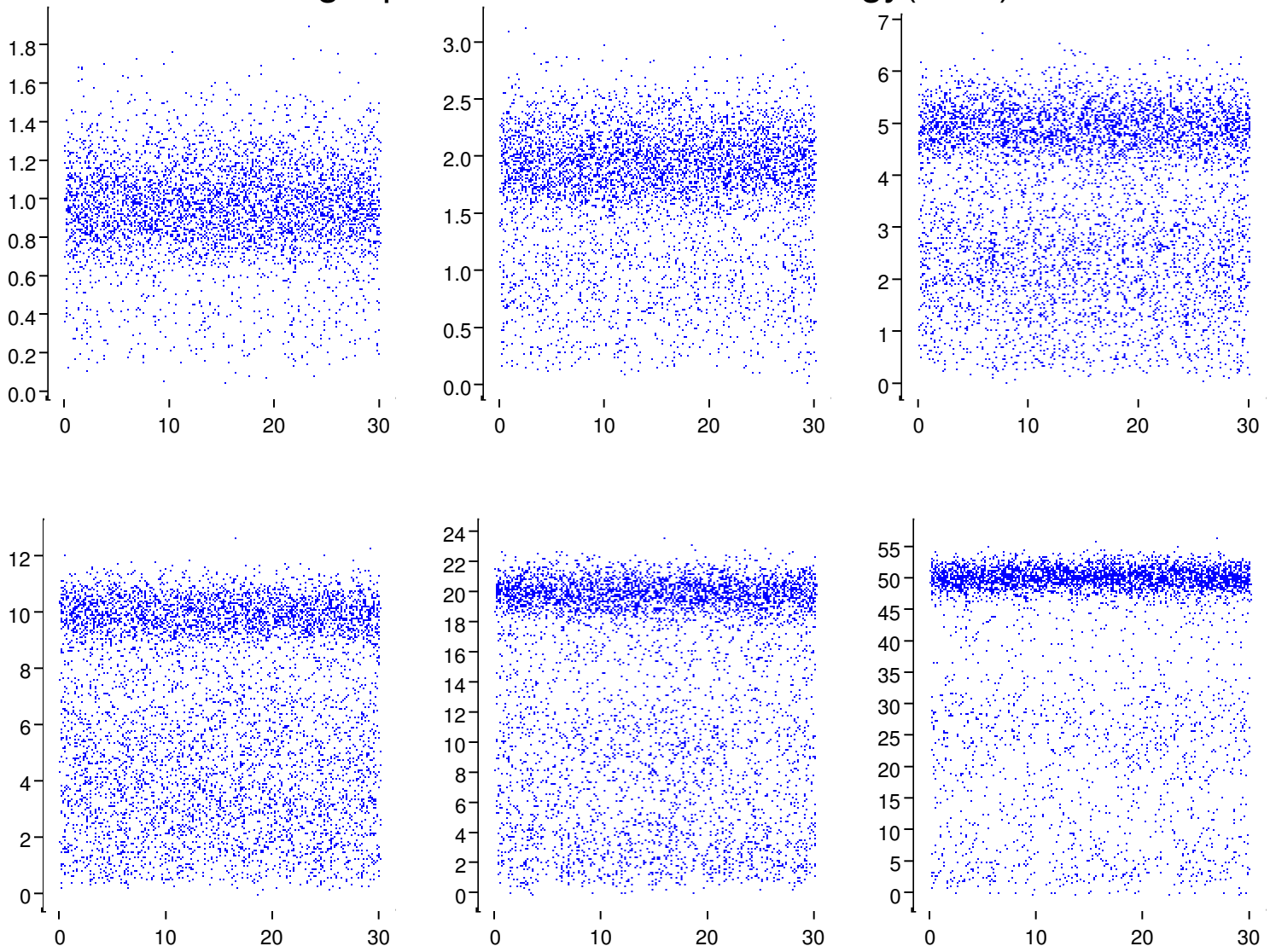




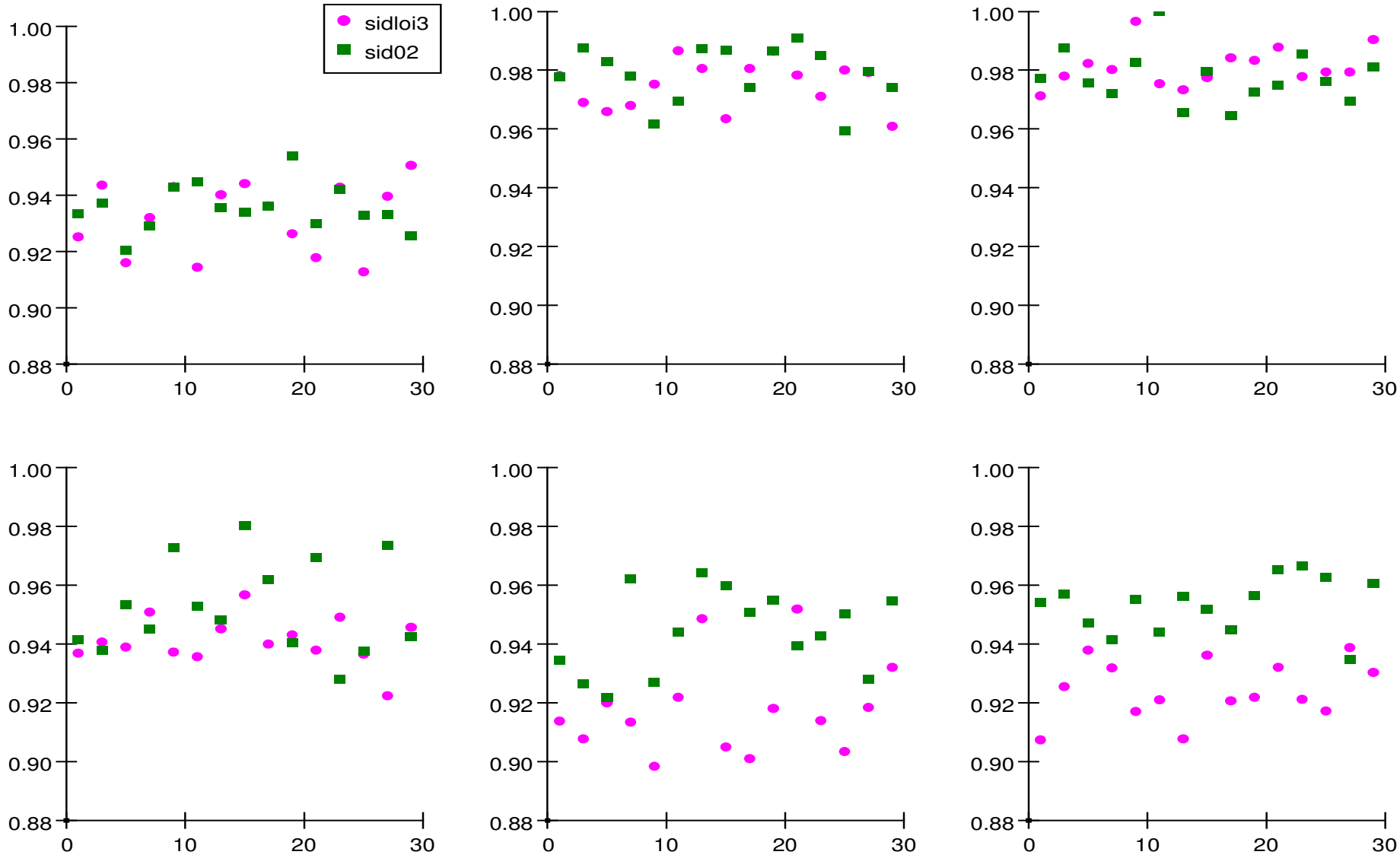
Photons: Theta = 160. x axis = Reconstructed Energy(GeV)



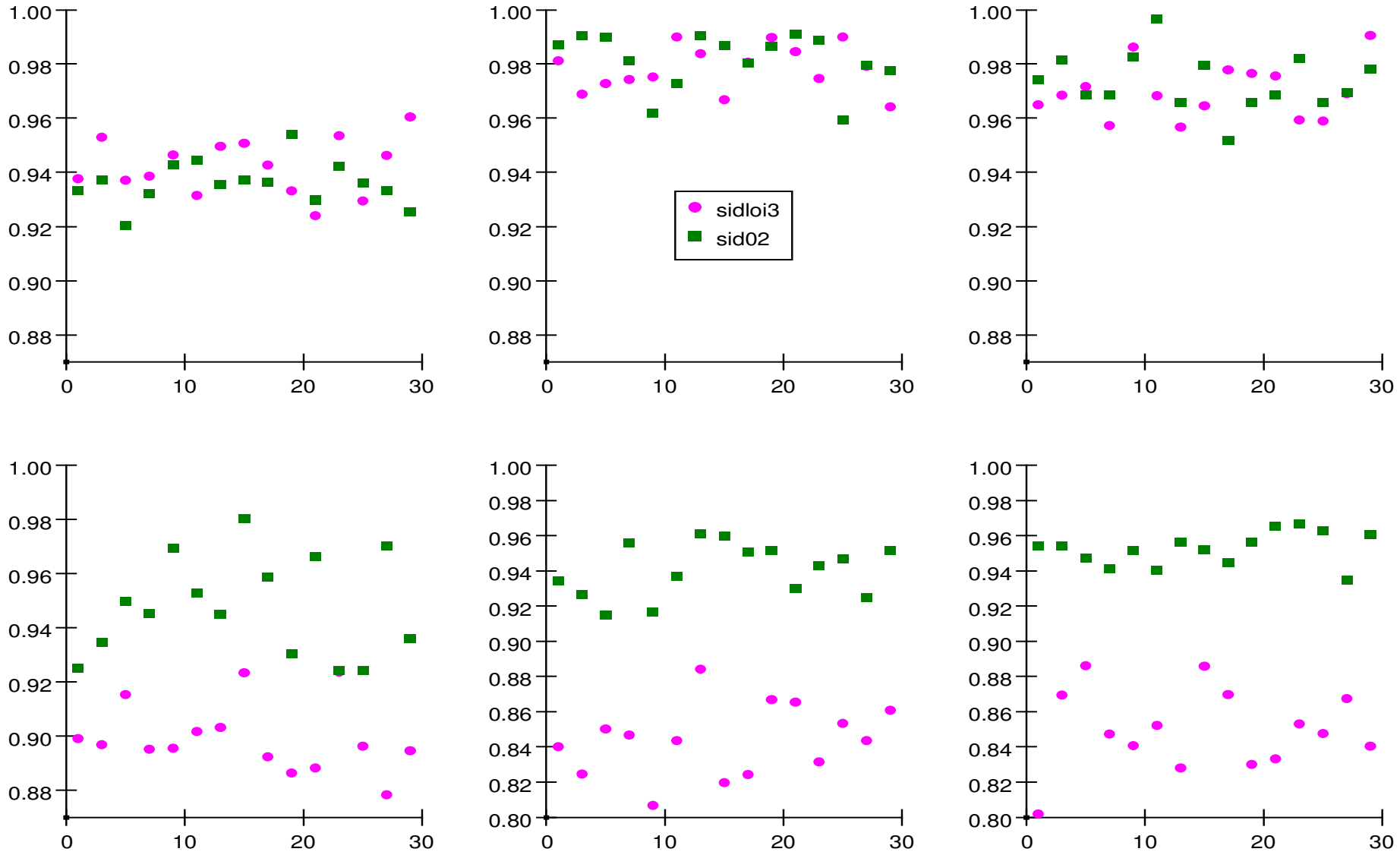
Photons: Theta = 160: x axis = phi, y axis = single photon reconstructed energy(GeV)



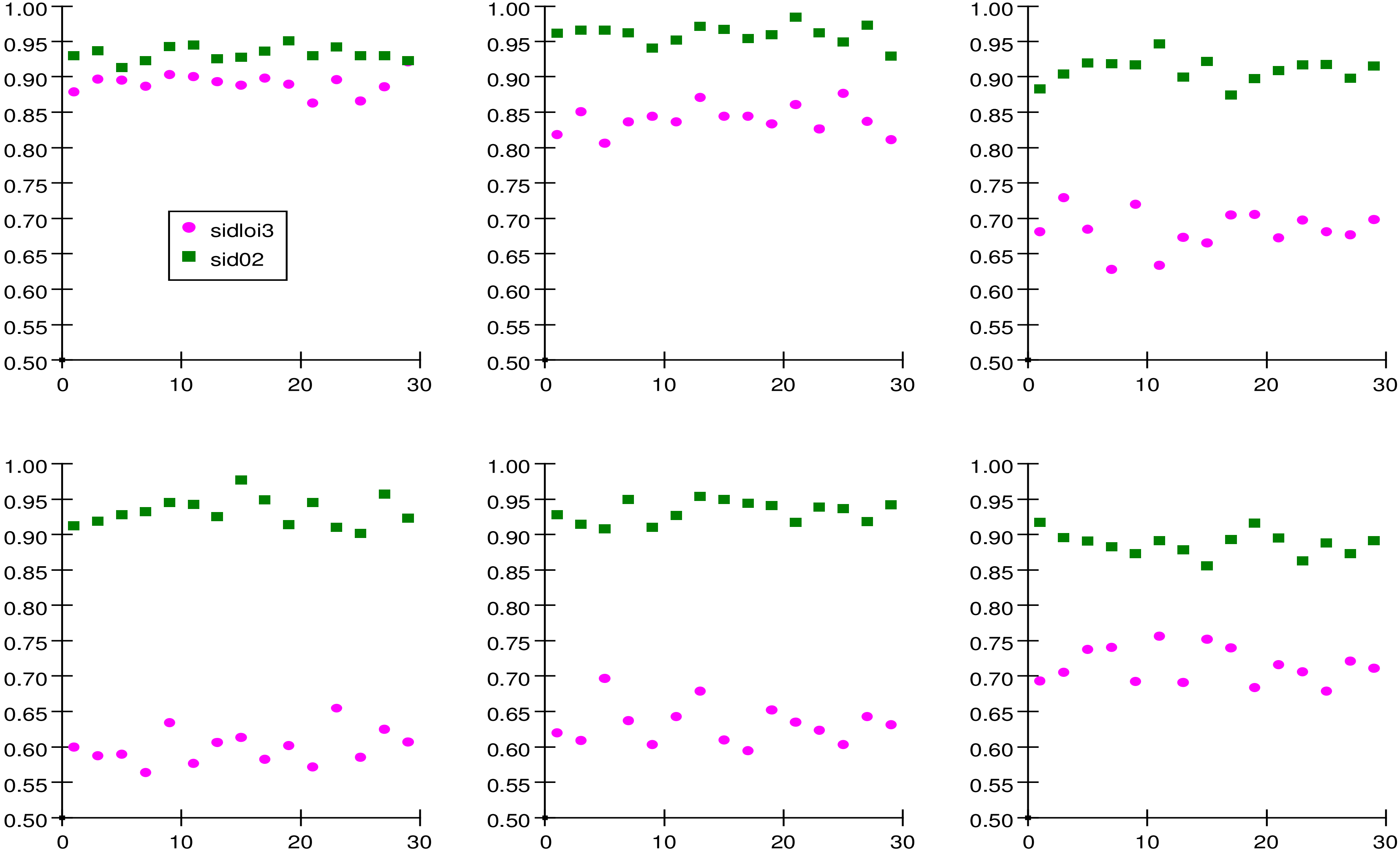
Photons: Theta = 160: eff2 vs phi



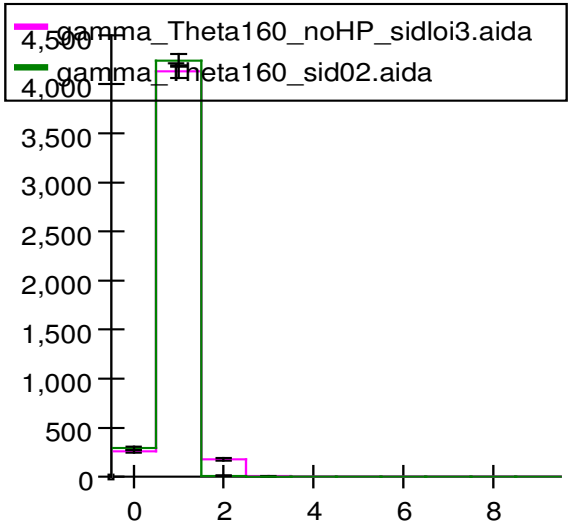
Photons: Theta = 160: eff1 vs phi



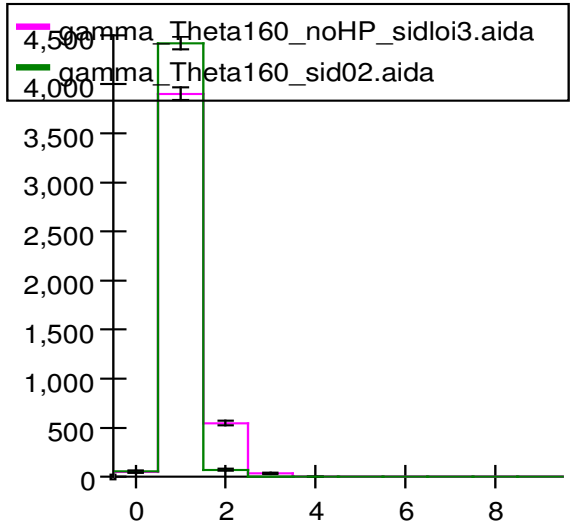
Photons: Theta = 160: eff0 vs phi



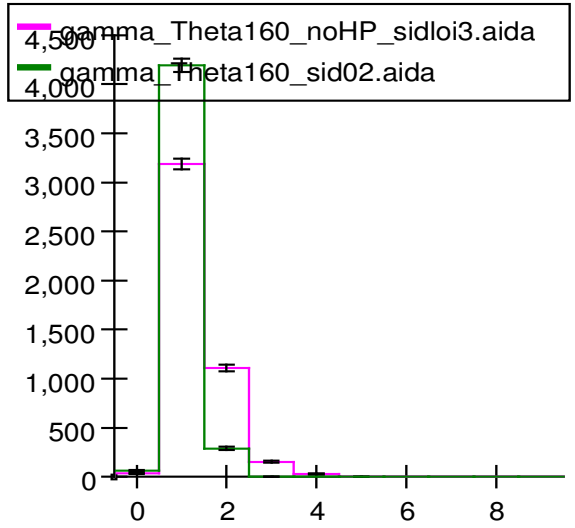
PDG22 - E=1 - ct=.94 - Total # recon phot...



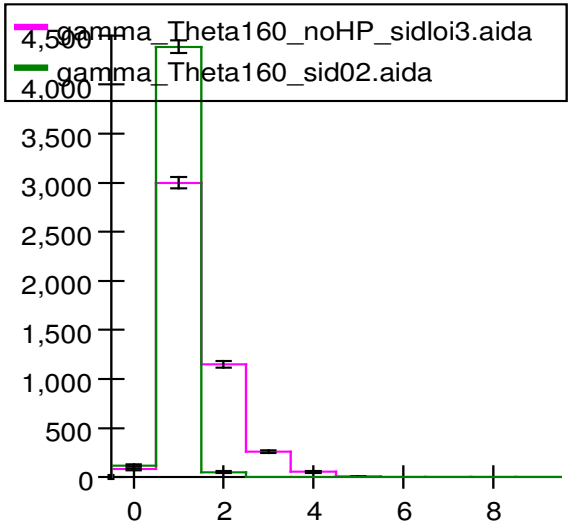
PDG22 - E=2 - ct=.94 - Total # recon phot...



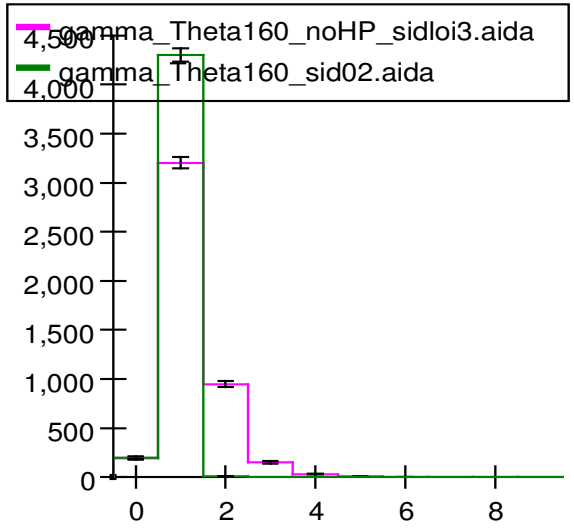
PDG22 - E=5 - ct=.94 - Total # recon phot...



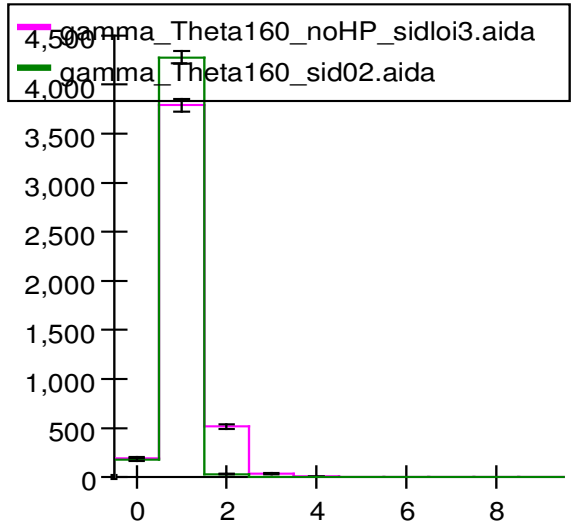
PDG22 - E=10 - ct=.94 - Total # recon ph...



PDG22 - E=20 - ct=.94 - Total # recon ph...



PDG22 - E=50 - ct=.94 - Total # recon ph...



Conclusions

- Lots of work to do