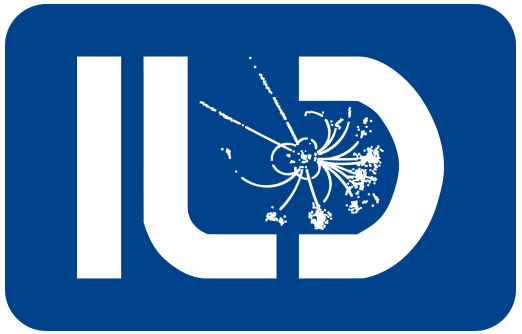
look at recent validation samples:
ilcsoft v01-19-05

single photons

2f (tau-tau)

Daniel Jeans, KEK
ILD sw/ana meeting, 20 Dec 2017



single photons

flat in cos(theta), phi

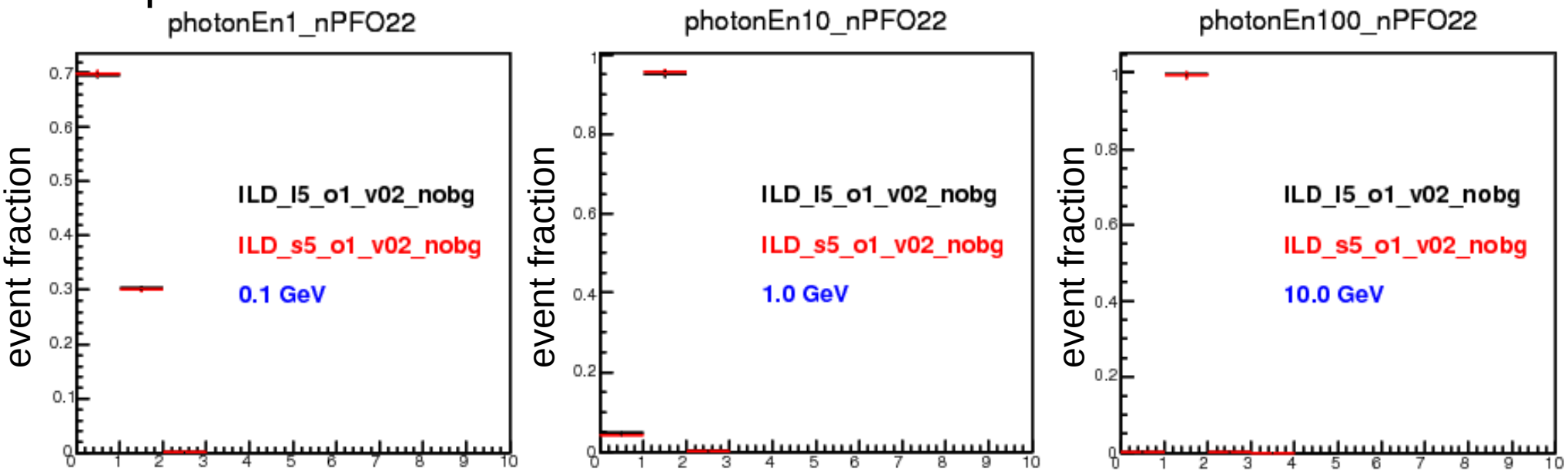
0.1, 0.2, 0.4, 0.7, 1, 2, 5, 10, 20, 50, 100 GeV

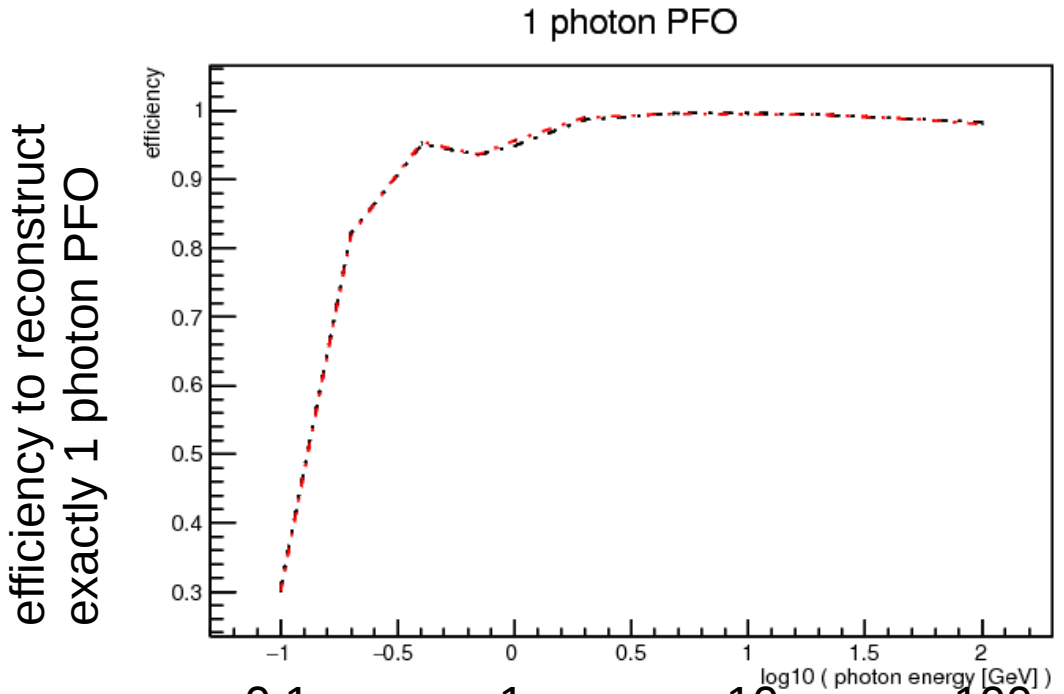
no bg overlay

veto events in which MC photon converts
|z| < 2200 mm and r < 1700 mm

compare ILD_l5_o1 and ILD_s5_o1 models
(large & small models with SiW ECAL, AHCAL)

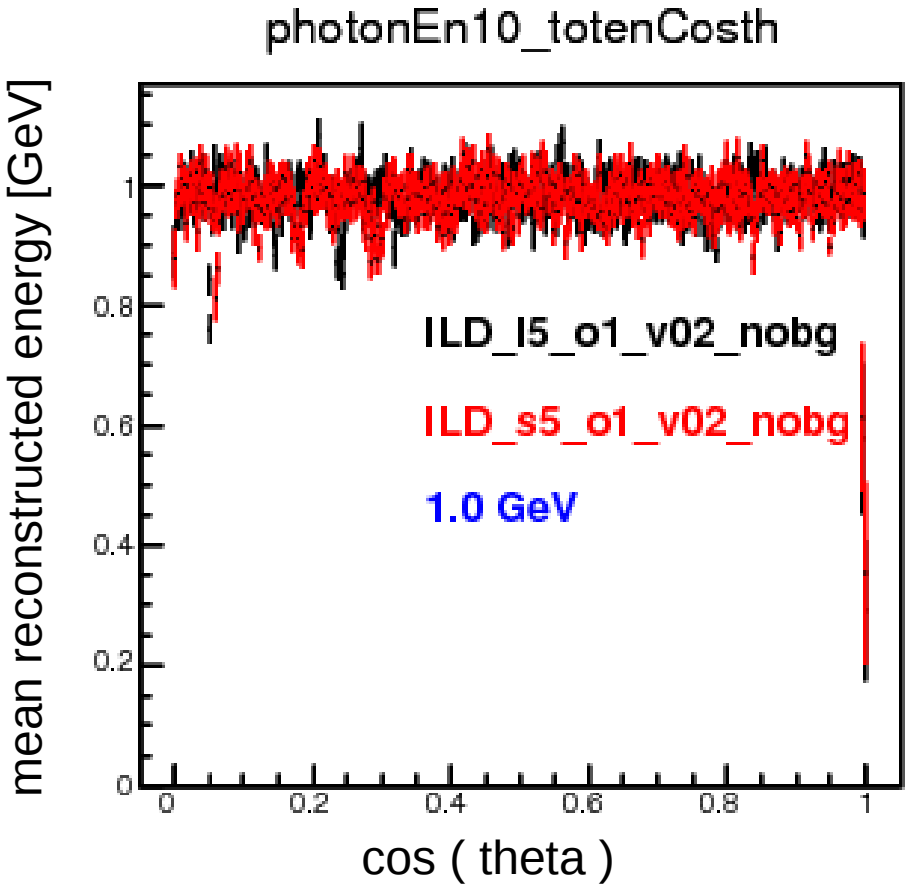
number of PFOs (type==22 → identified as photons by Pandora) per event

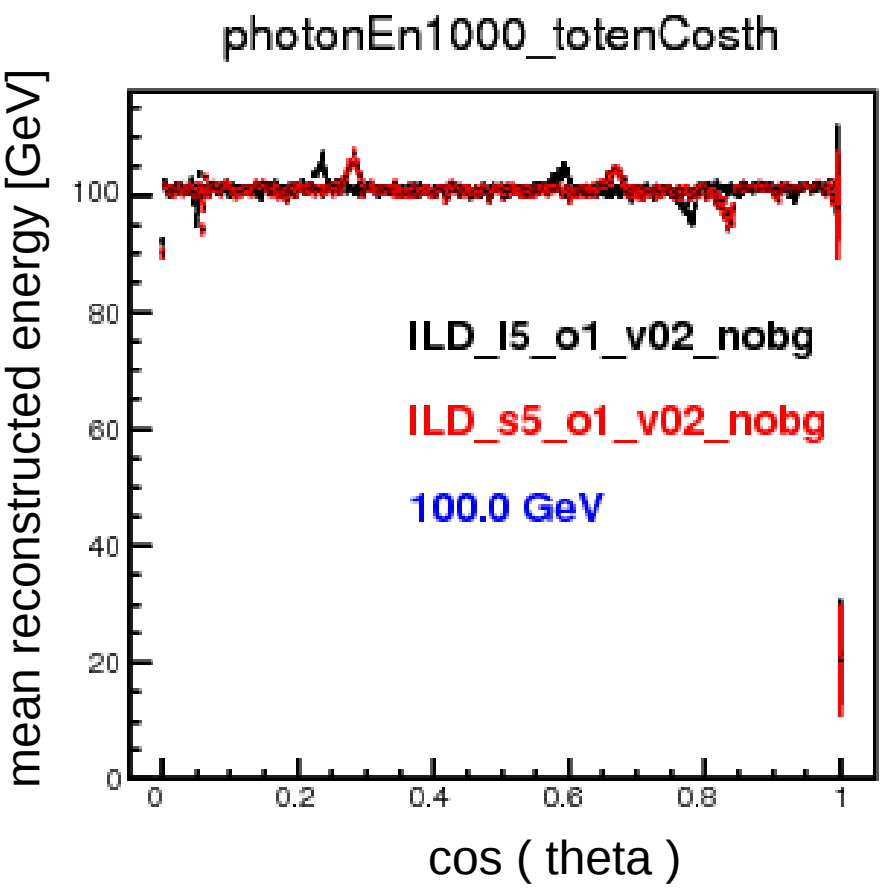




0.1 1 10 100 GeV

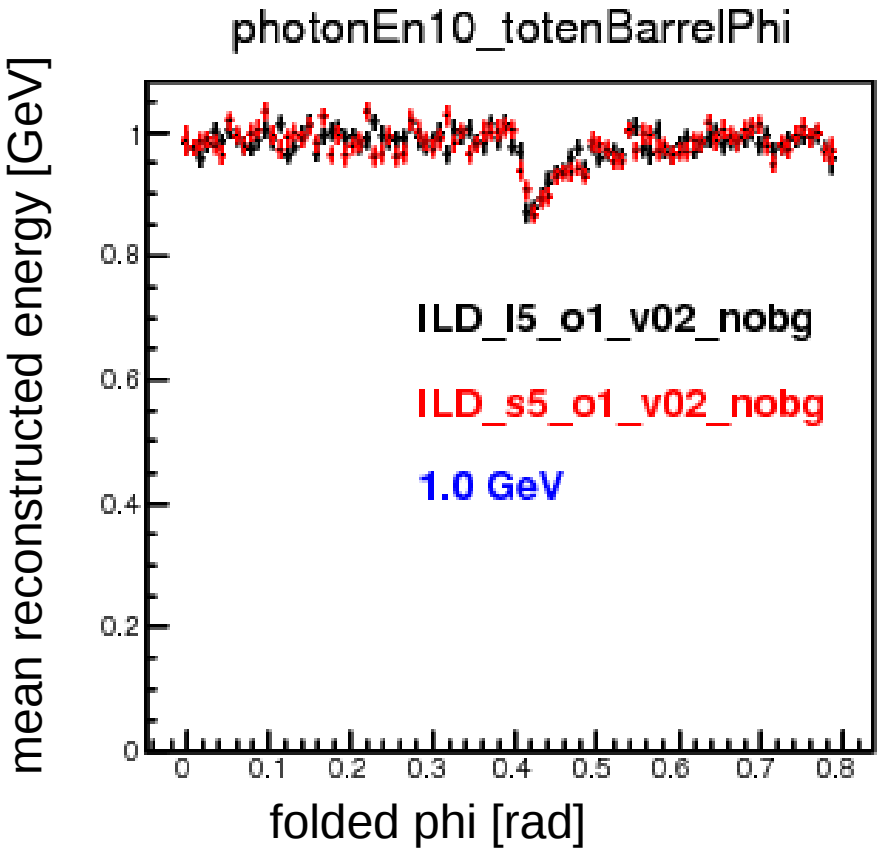
sum of PFO energies in an event vs. cos(theta)

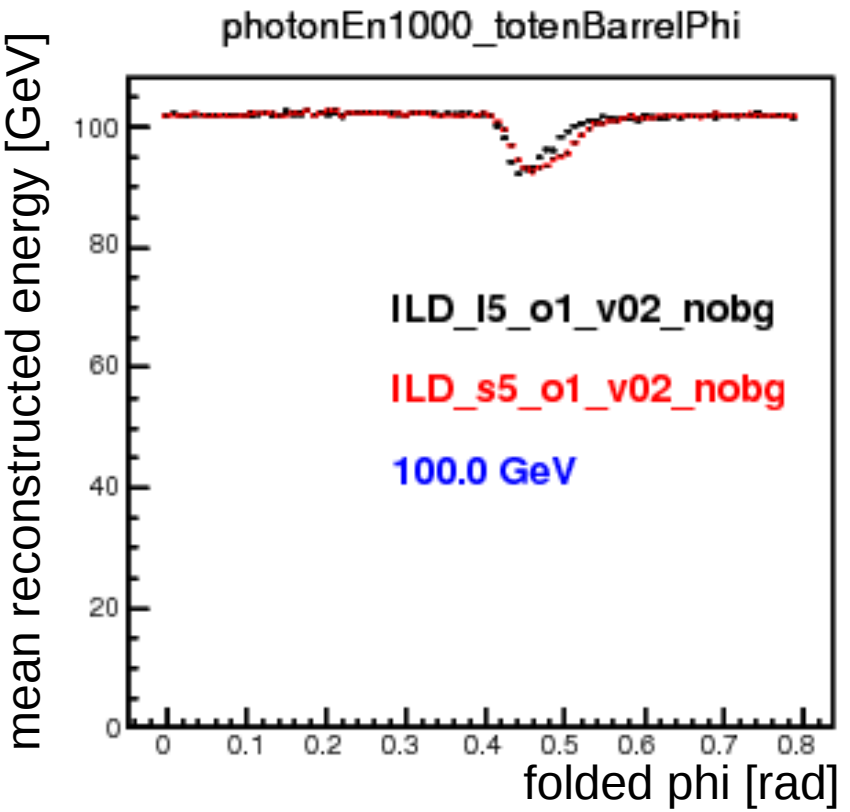




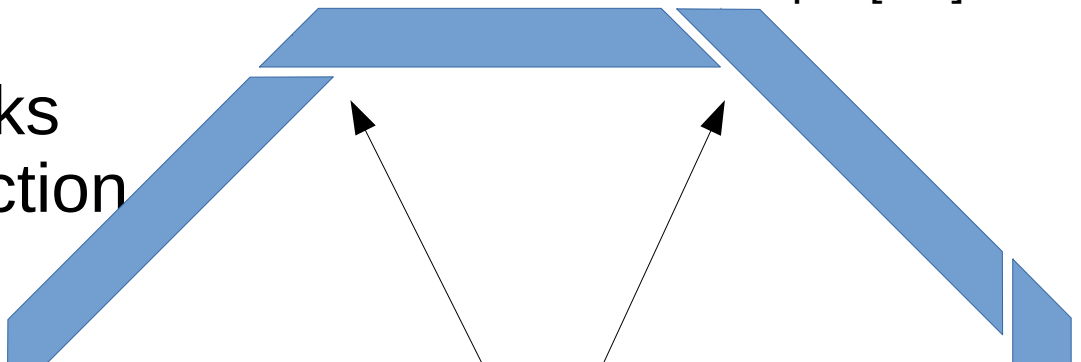
can see effect of ECAL cracks
and their imperfect correction
(as expected)

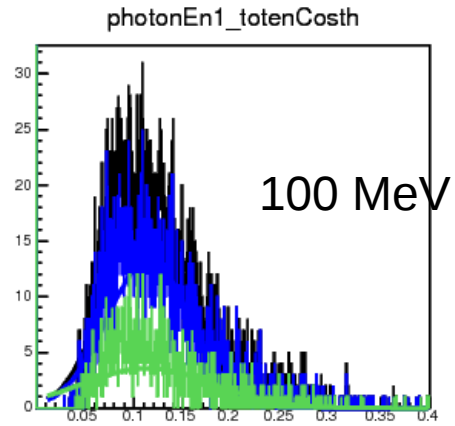
sum of PFO energies in an event vs. phi (in barrel, folded into 8-fold symmetry)

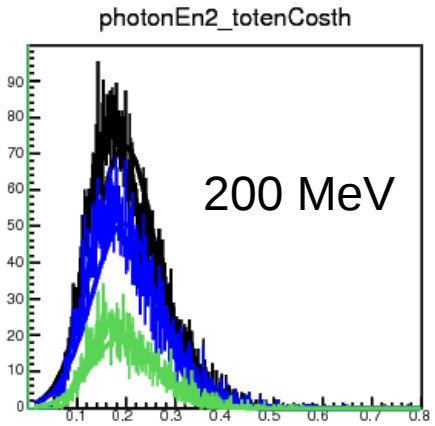


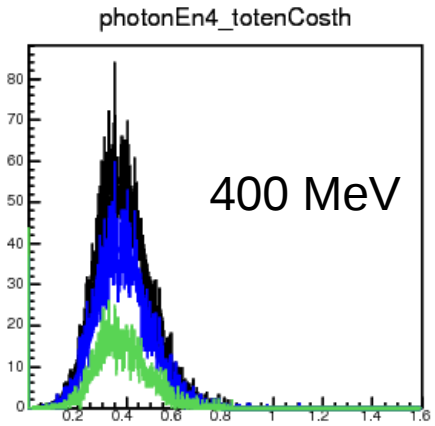


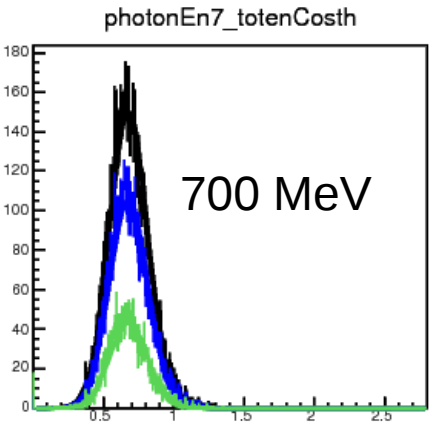
can see effect of ECAL cracks and their imperfect correction (as expected)

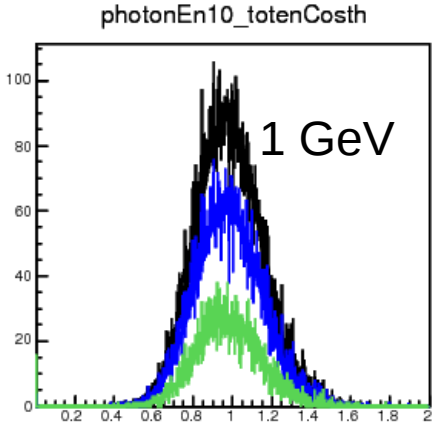


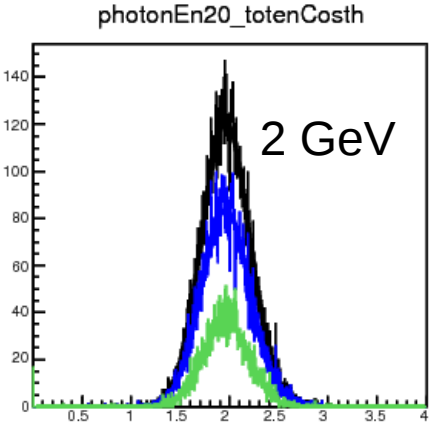


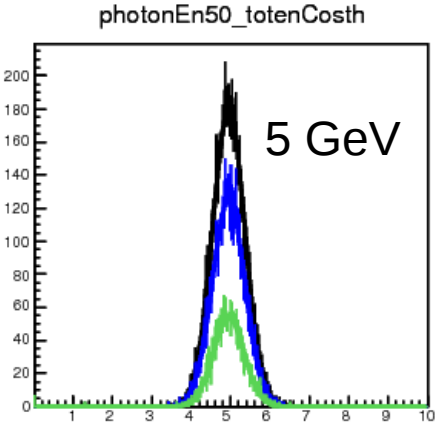


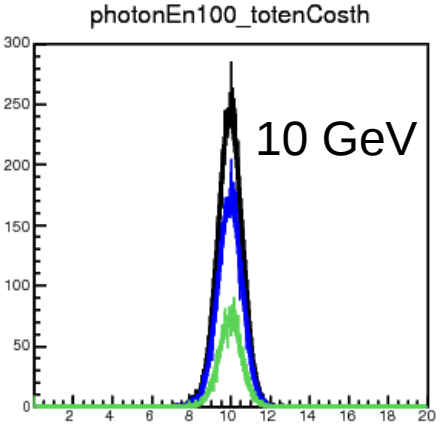


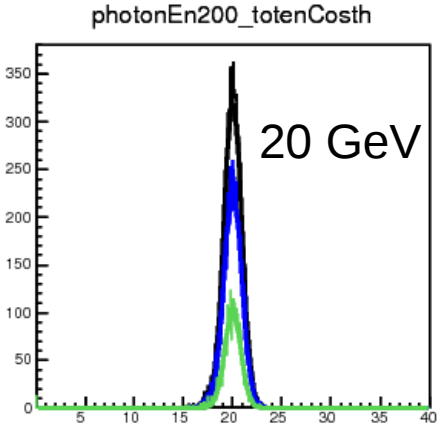


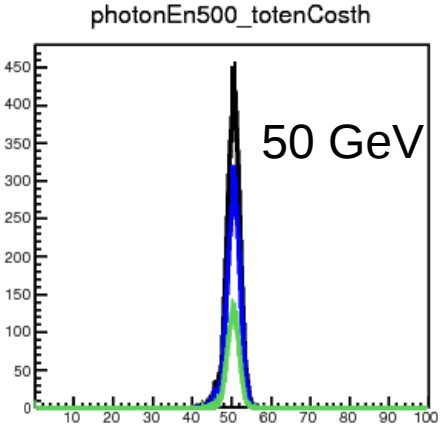


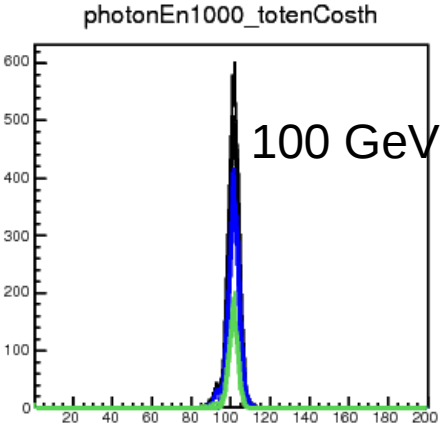












all

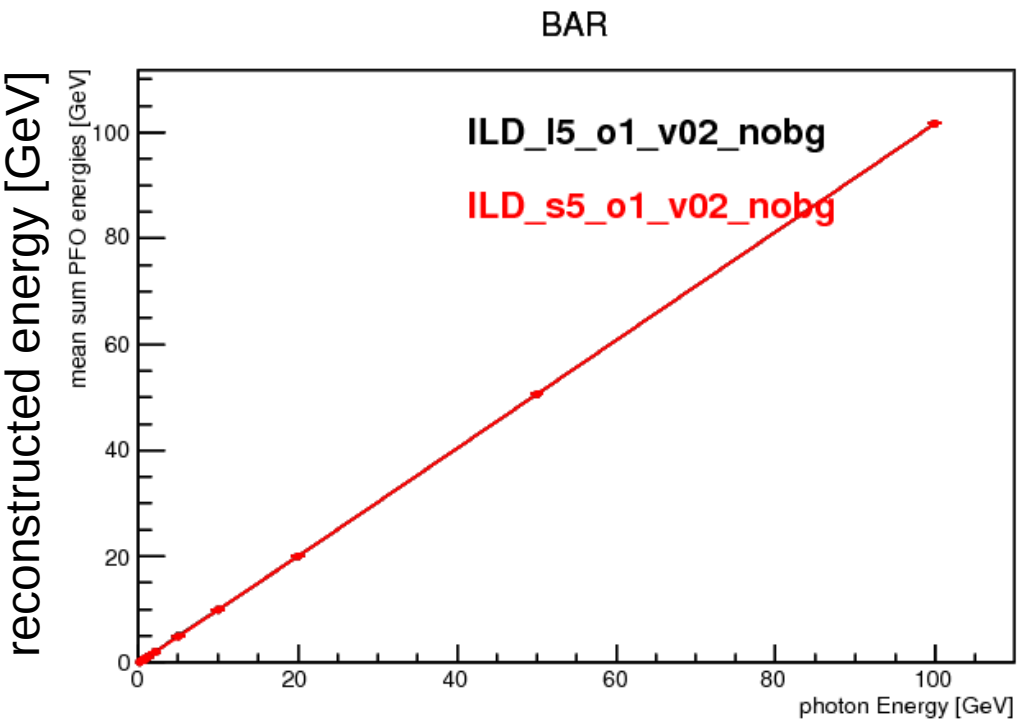
barrel

forward

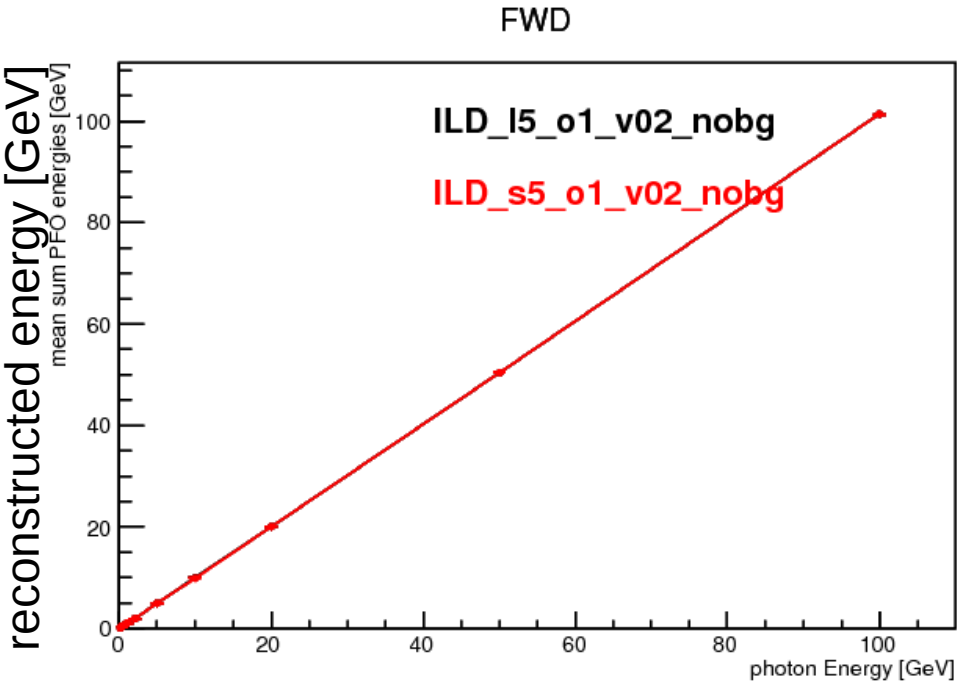
total reconstructed energy

mean reconstructed total PFO energy
(from Gaussian fit)

barrel region

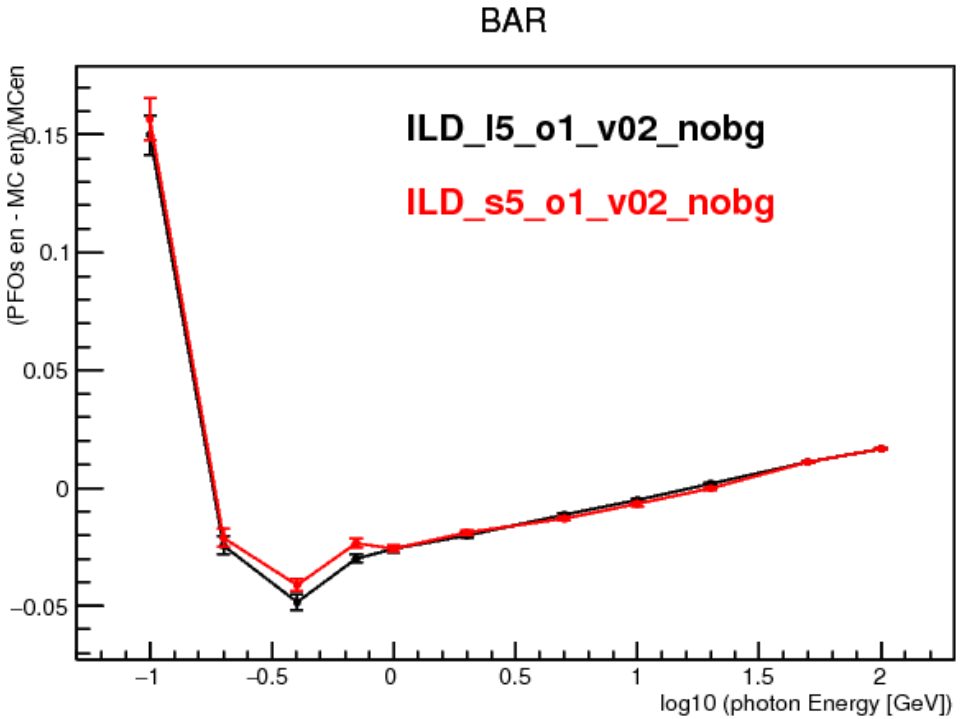


forward region



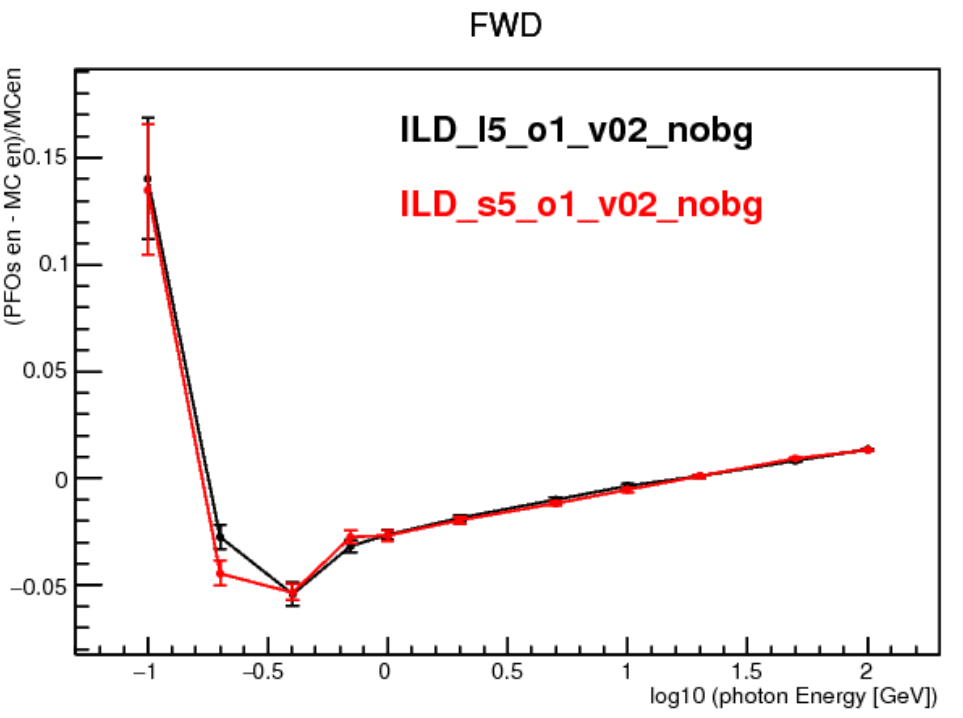
mean reconstructed total PFO energy

relative deviation: (Ereco – Etrue)/Etrue



0.1 1 10 100 GeV

input energy [GeV]

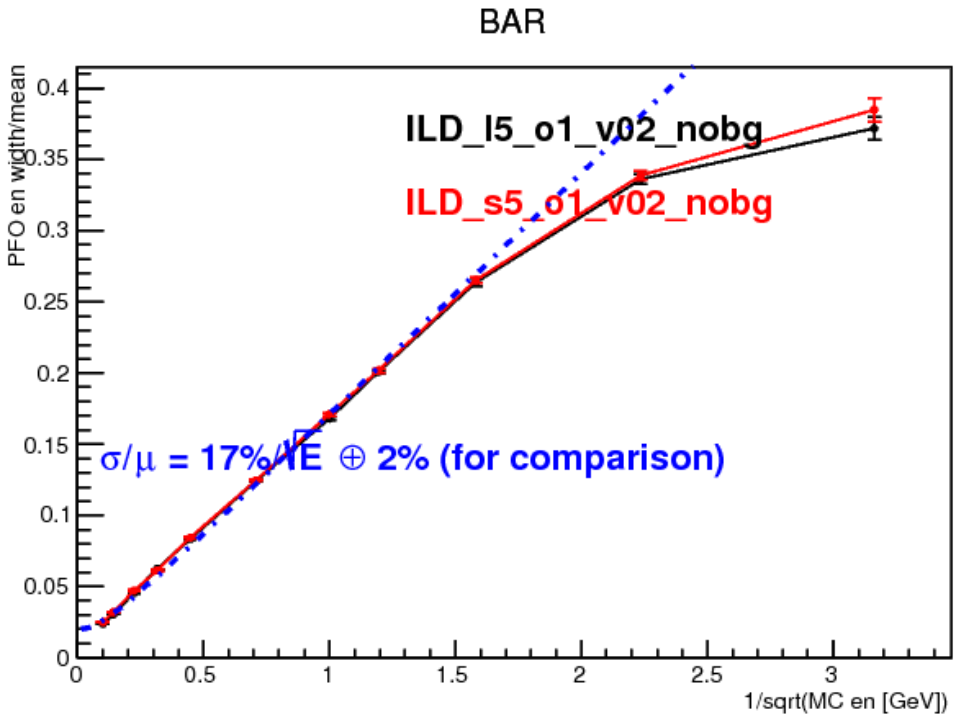


0.1 1 10 100 GeV

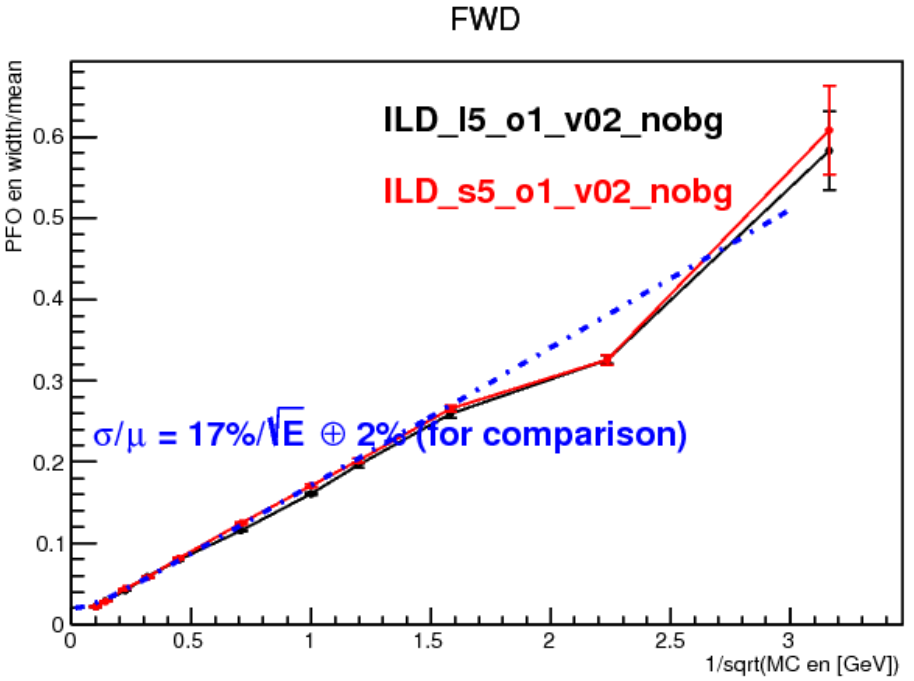
input energy [GeV]

width of energy distribution

(from Gaussian fit)



1 / sqrt (photon energy [GeV])



1 / sqrt (photon energy [GeV])

consistent with expectations

single photon samples look OK
    l5 and s5 models look consistent

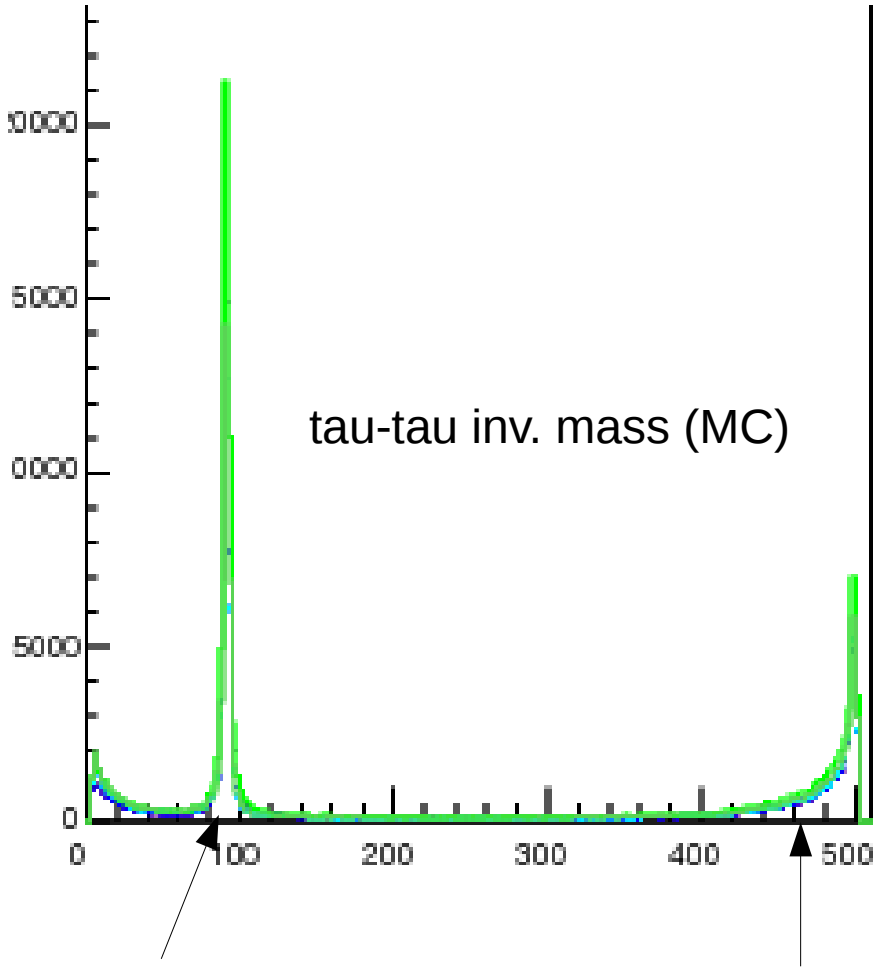
PFO efficiency drops significantly
    for photon energies < 0.4 GeV
        (potential for improvement?)

reminder that PFO-level energy corrections
        as function of theta, phi [in barrel ; x,y in endcap]
    have potential to improve energy resolution
        (especially the constant term
            → most relevant for high energy photons)

this processor is (nearly?) in ILDPerformance

e+ e- → tau+ tau- samples @ 500GeV

(skimmed from the 2f_leptonic samples)

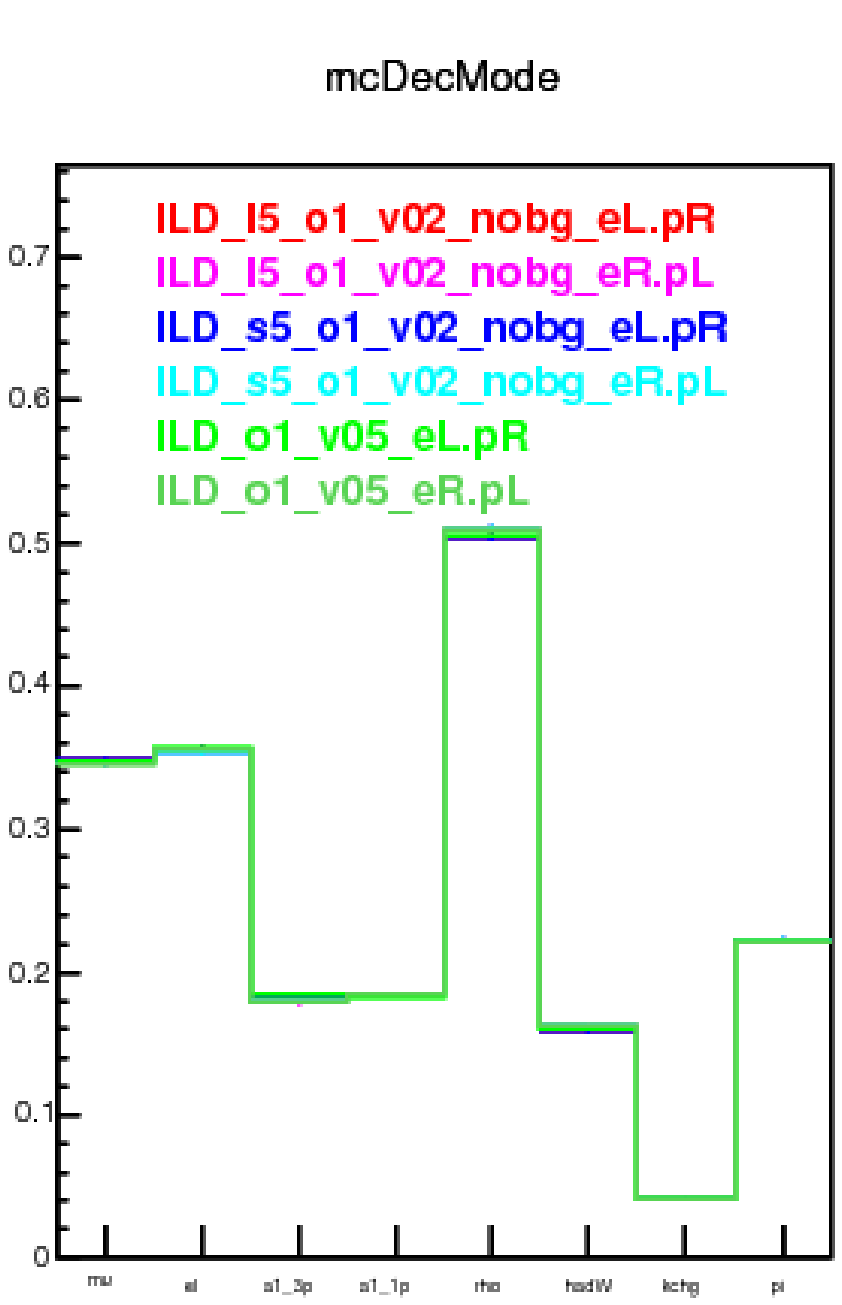


compare

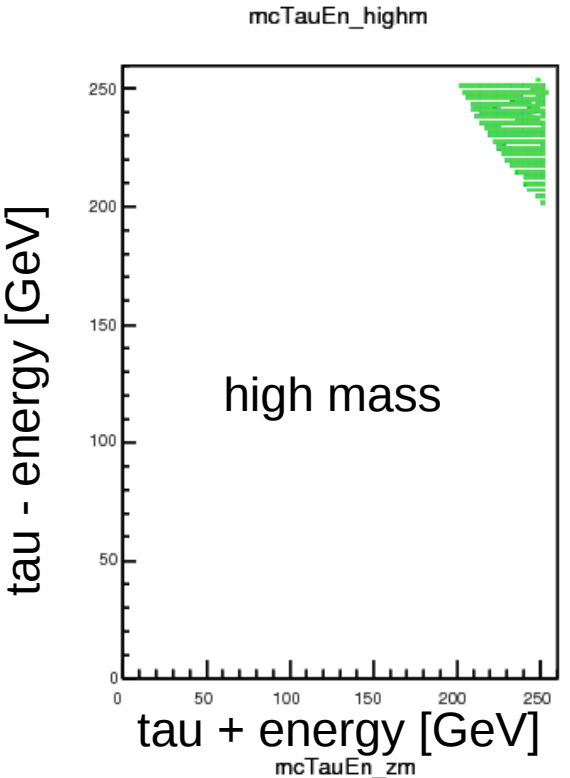
pol: eLpR, eRpL

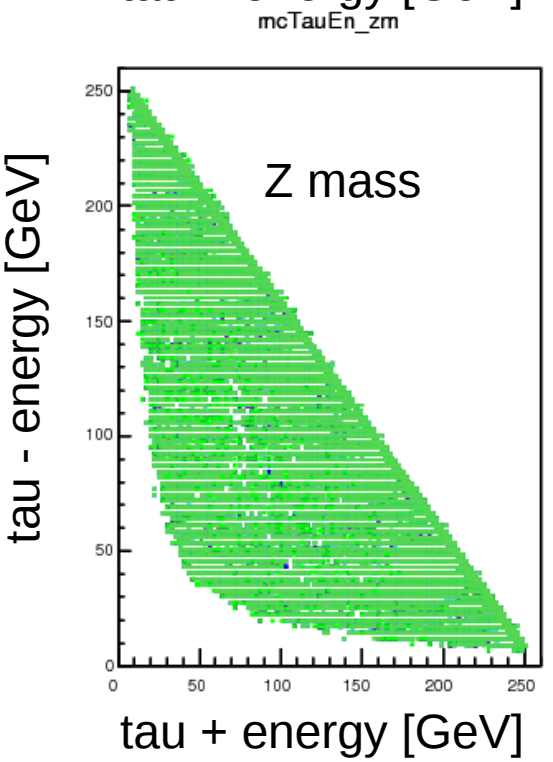
det: l5, s5, DBD

looked at 2 subsamples: around mZ (81-101 GeV) high mass > 450 GeV

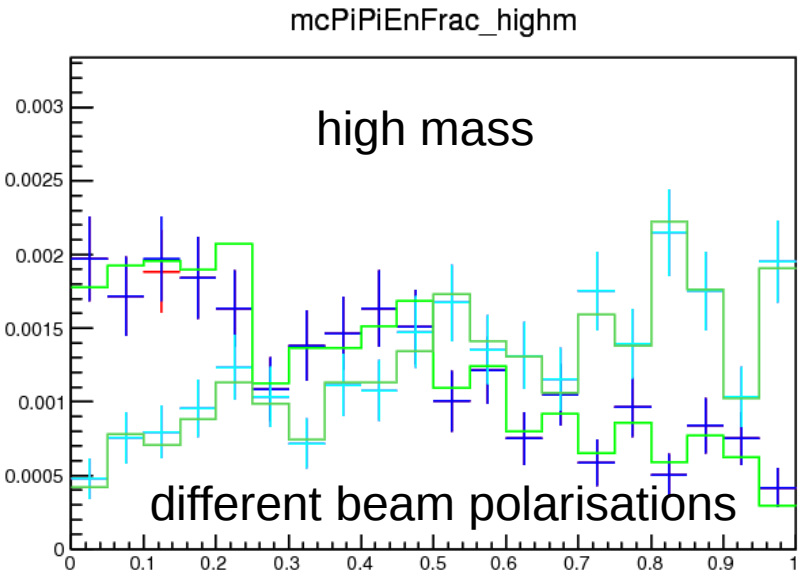


MC tau decay mode

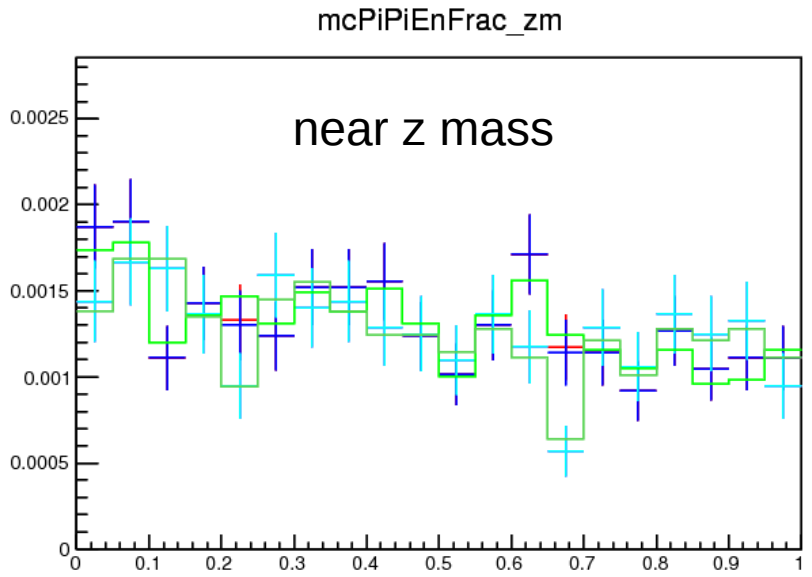




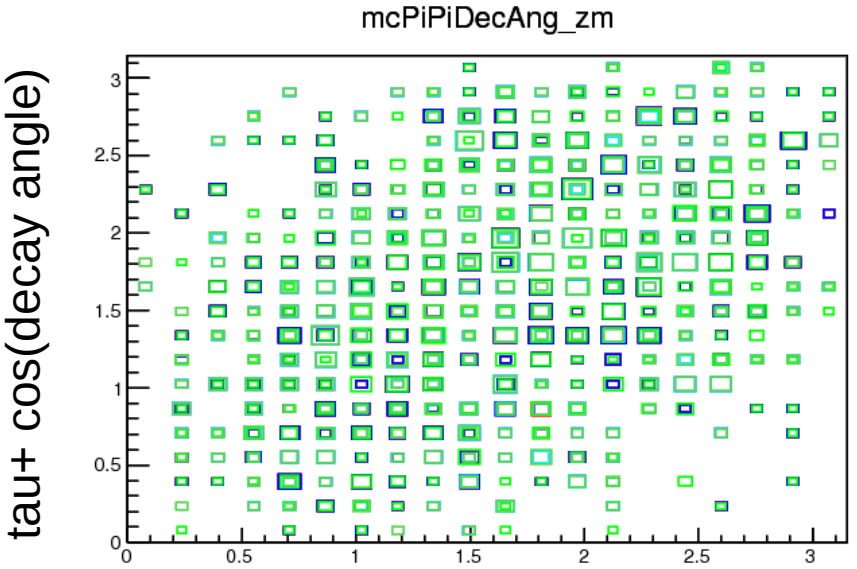
tau → pi nu decays: check tau polarisation, correlations



E pi / E tau



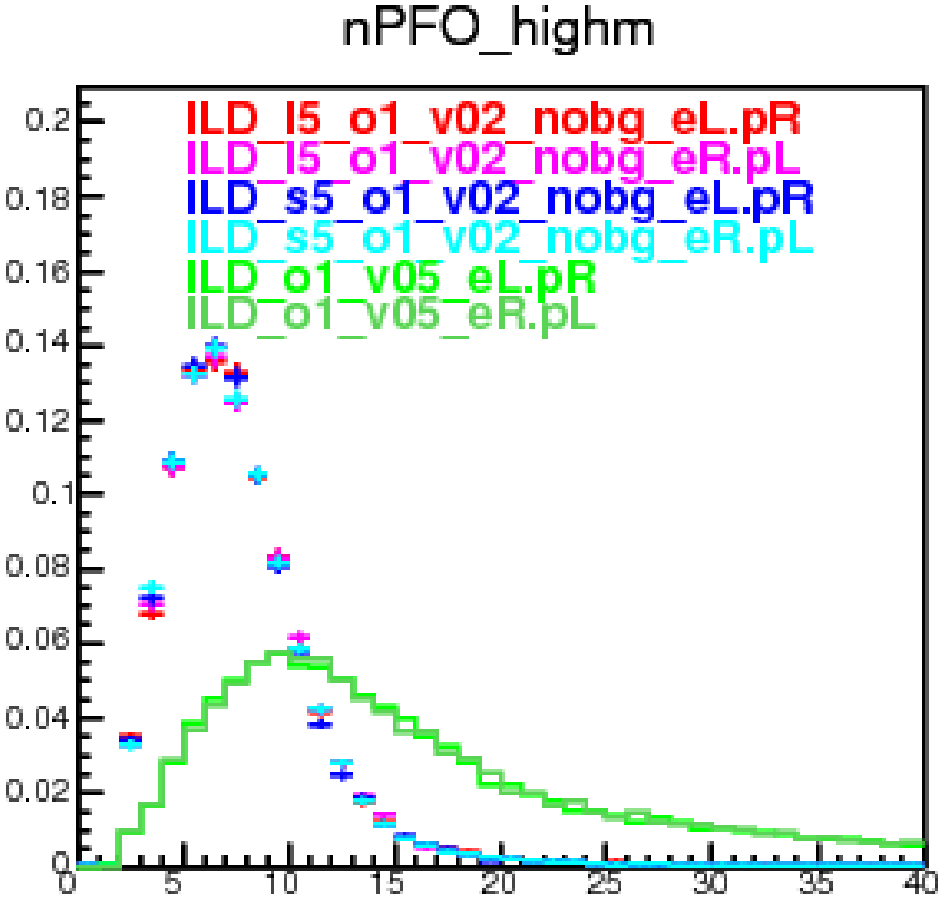
E pi / E tau

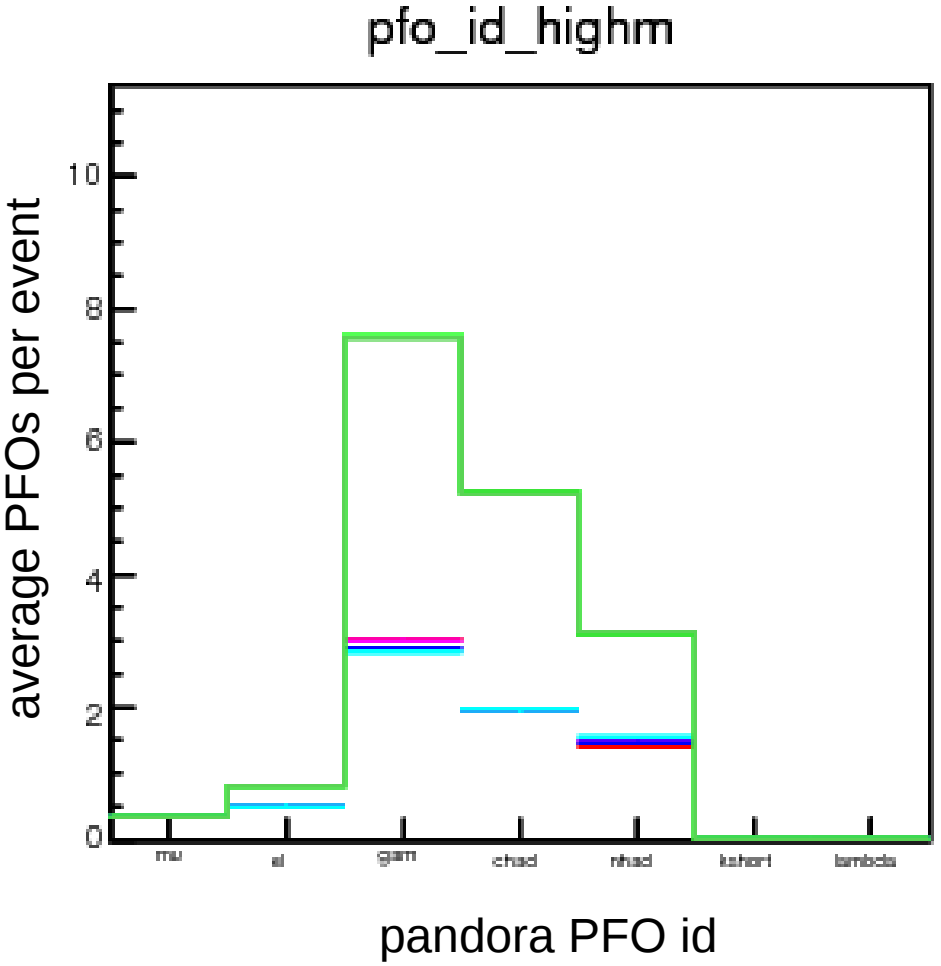


tau– cos(decay angle)

ILD_l5_o1_v02_nobg_eL.pR
ILD_l5_o1_v02_nobg_eR.pL
ILD_s5_o1_v02_nobg_eL.pR
ILD_s5_o1_v02_nobg_eR.pL
ILD_o1_v05_eL.pR
ILD_o1_v05_eR.pL

number of PFOs per event





see effect of background in DBD samples (ILD_o1_v05)

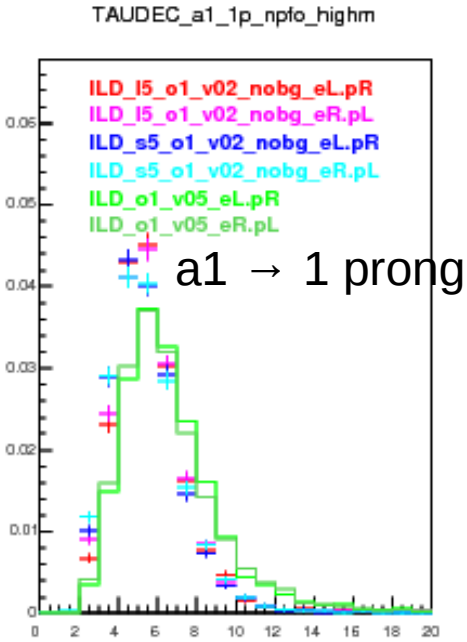
assign PFOs to parent tau:

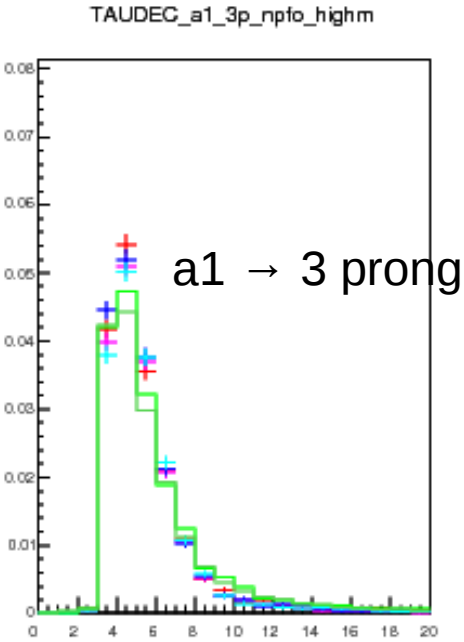
assign to closest MC tau, if angle < 0.5 rad

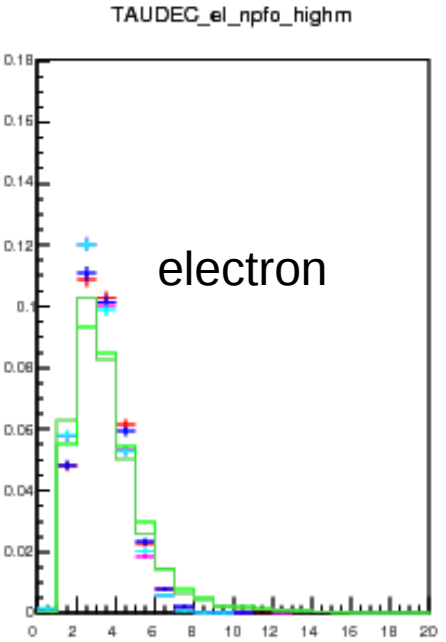
look at per-tau distributions,

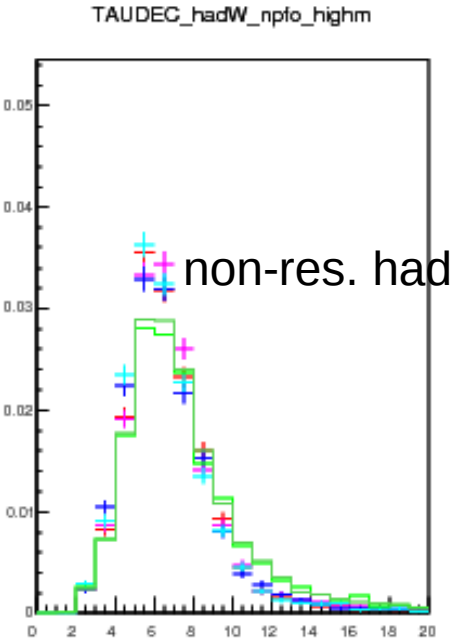
as function of MC tau decay channel

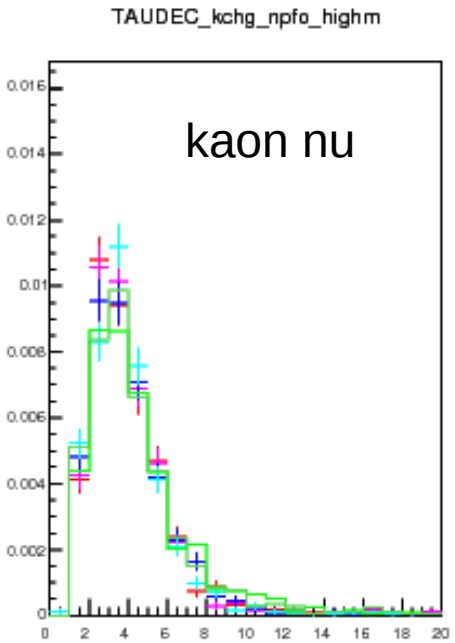
nPFOs per tau: high mass sample

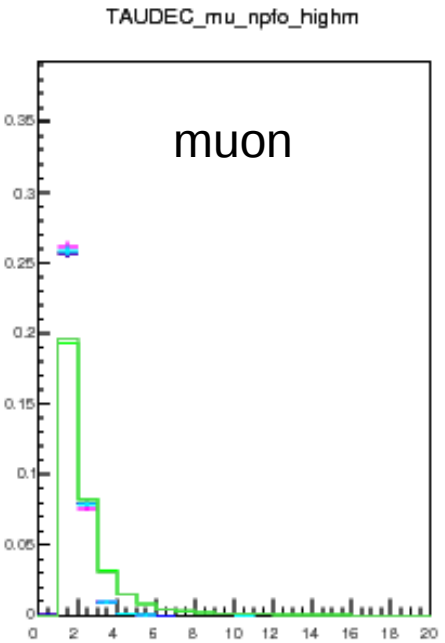


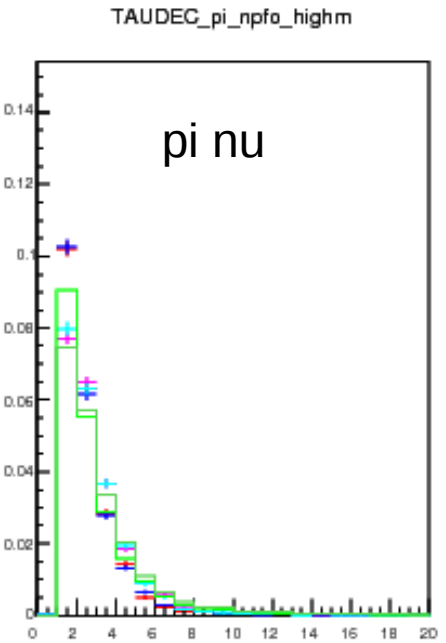


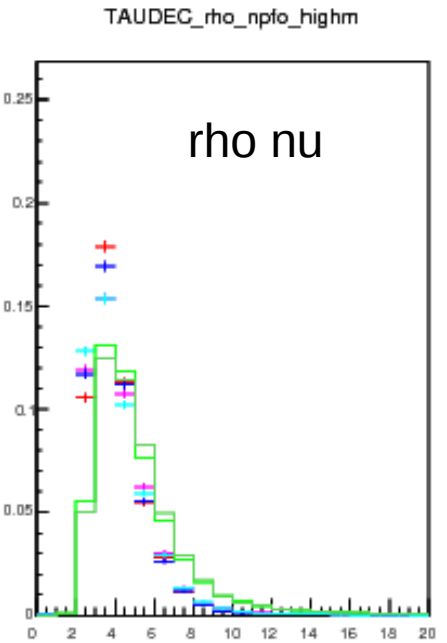






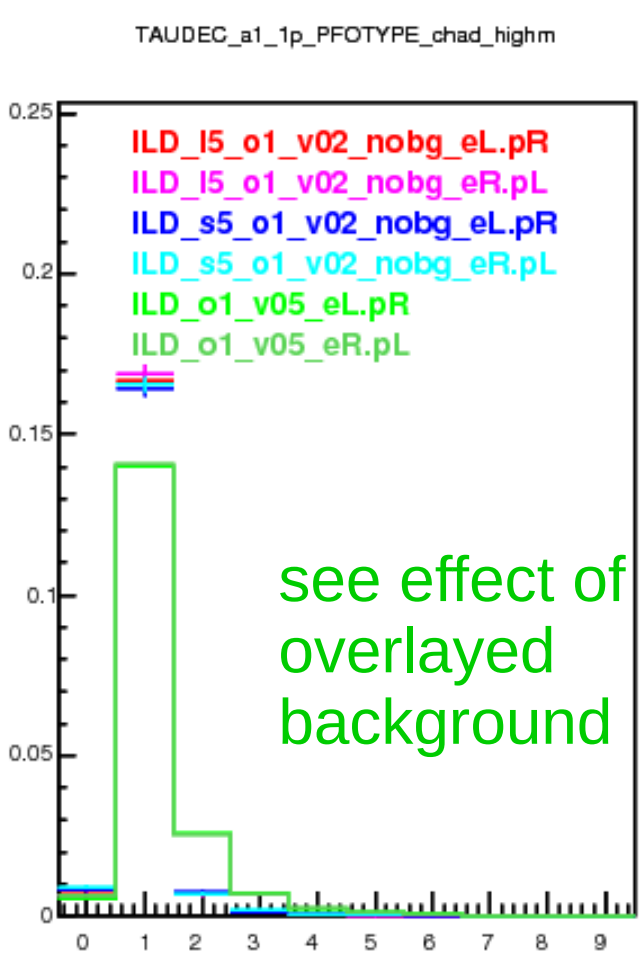




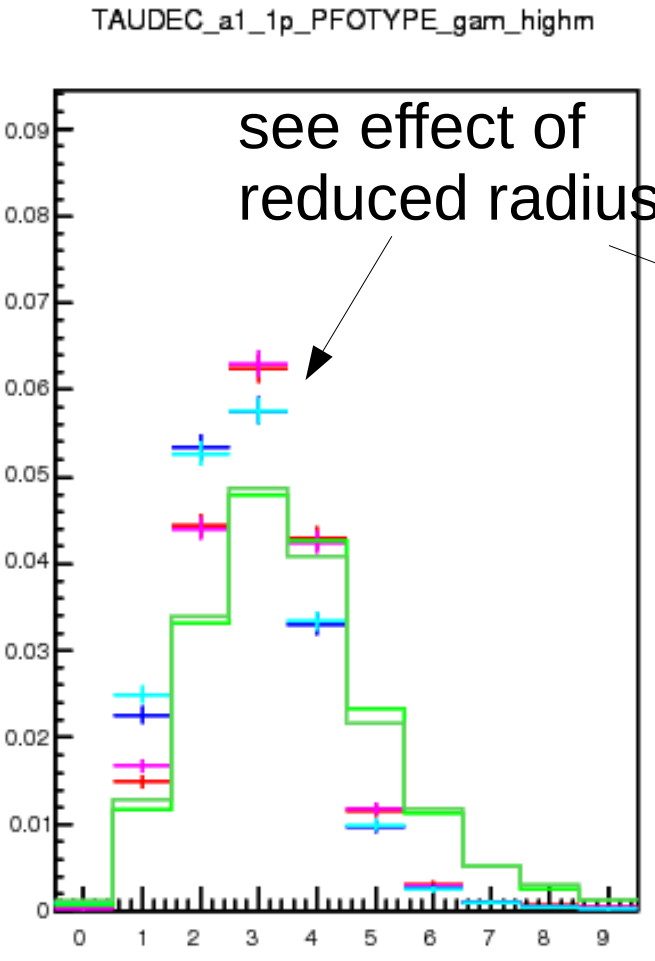


e.g. tau+ → a1+ nu, a1+ → pi+ pi0 pi0
usually 1 charged pion + 4 photons

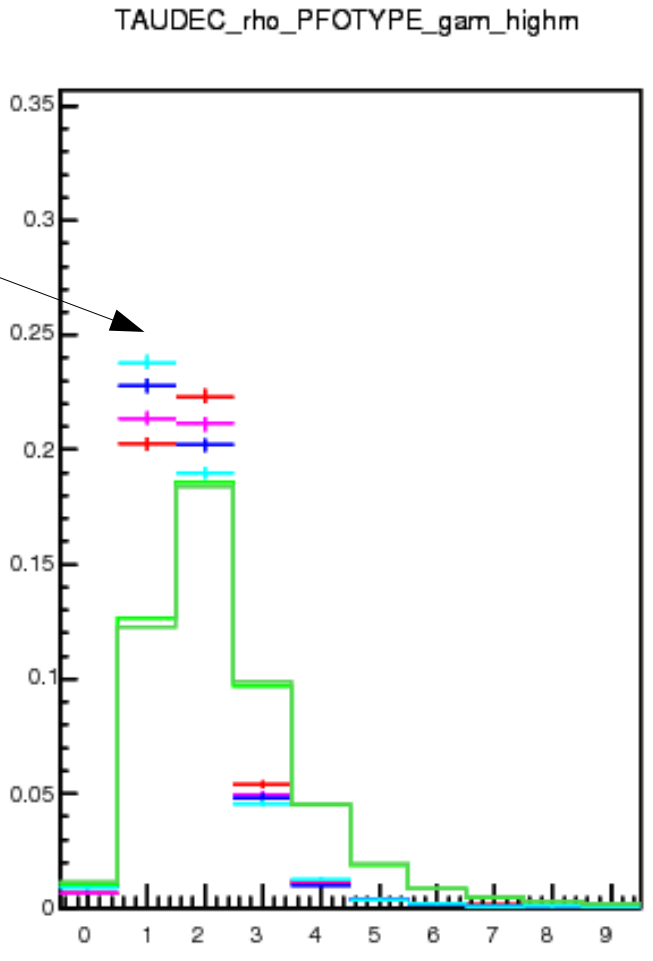
tau+ → rho+ nu
rho+ → pi+ pi0
1 chg pi + 2 photons



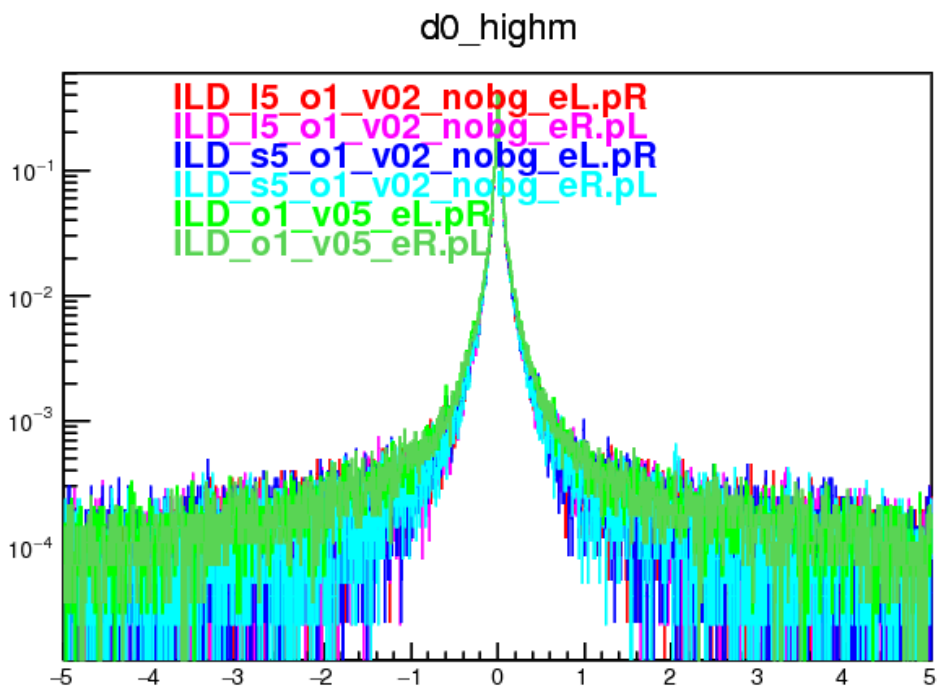
chg hadron PFOs / tau

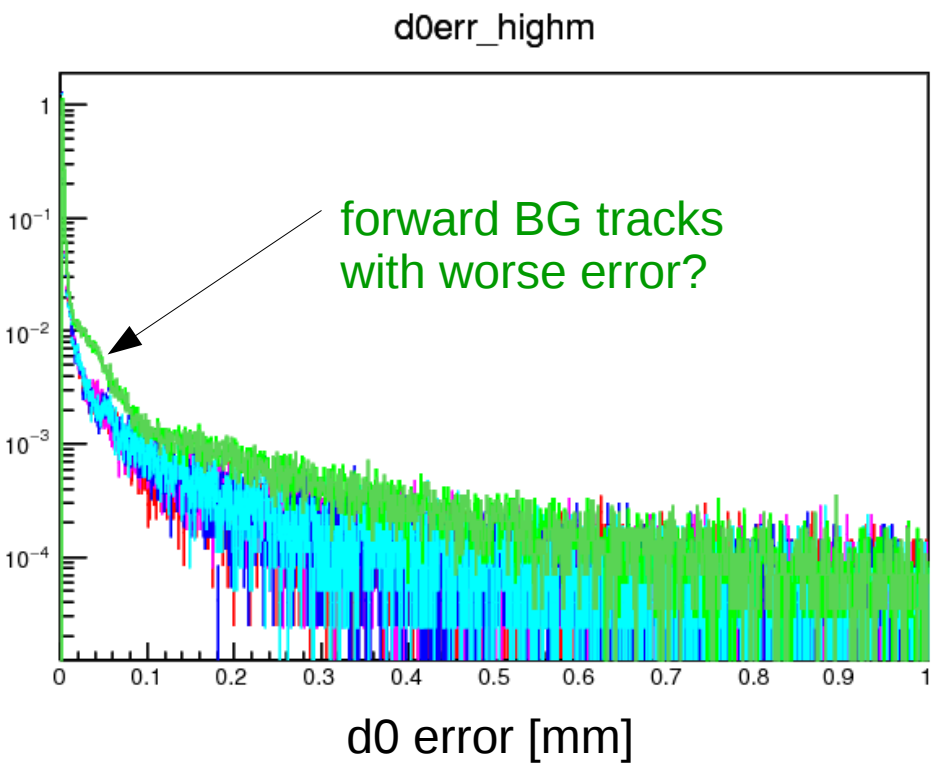


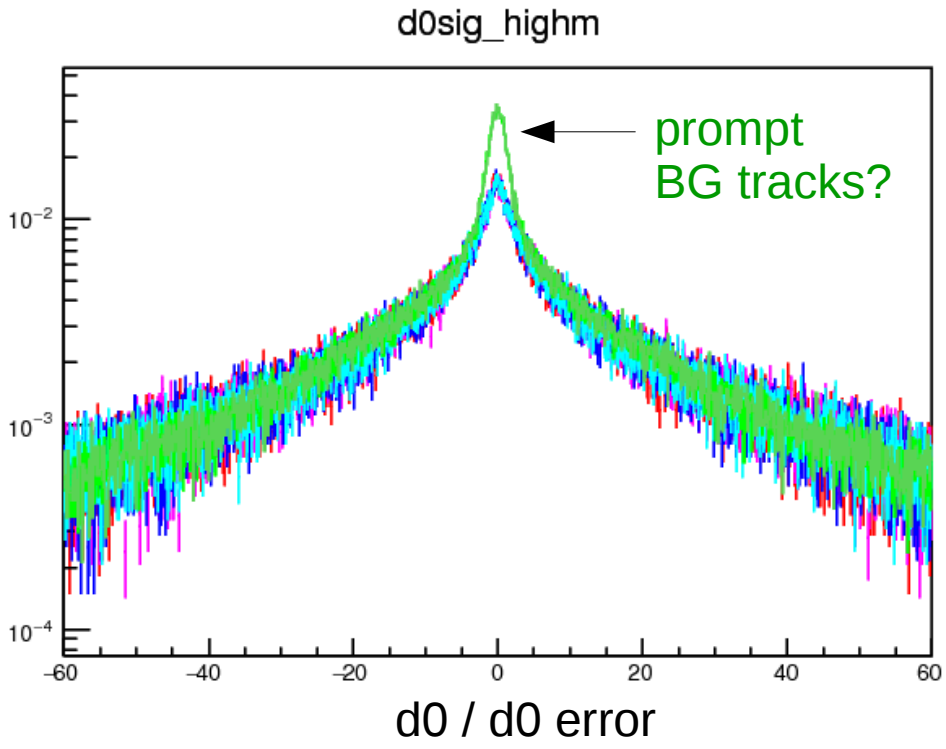
photon PFOs / tau



photon PFOs / tau







impact parameter of reconstructed tracks

di-tau events at 500 GeV look reasonable

BG-free DBD sample would be helpful
for comparisons

differences between large and small models
in PandoraPFA performance when
counting photons
in tau jets