Status Report on W mass measurement with CEPC in WW->lvqq final state

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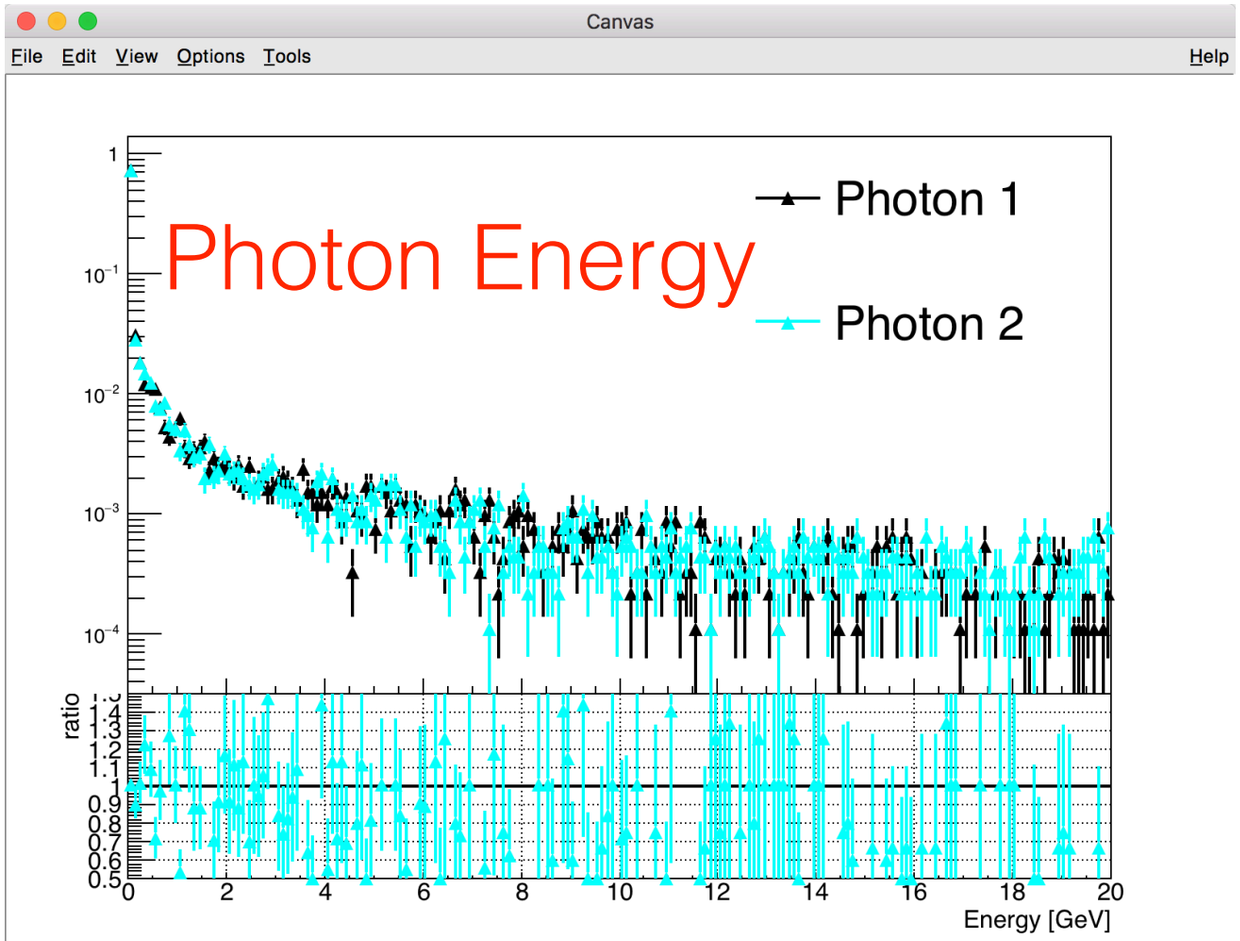
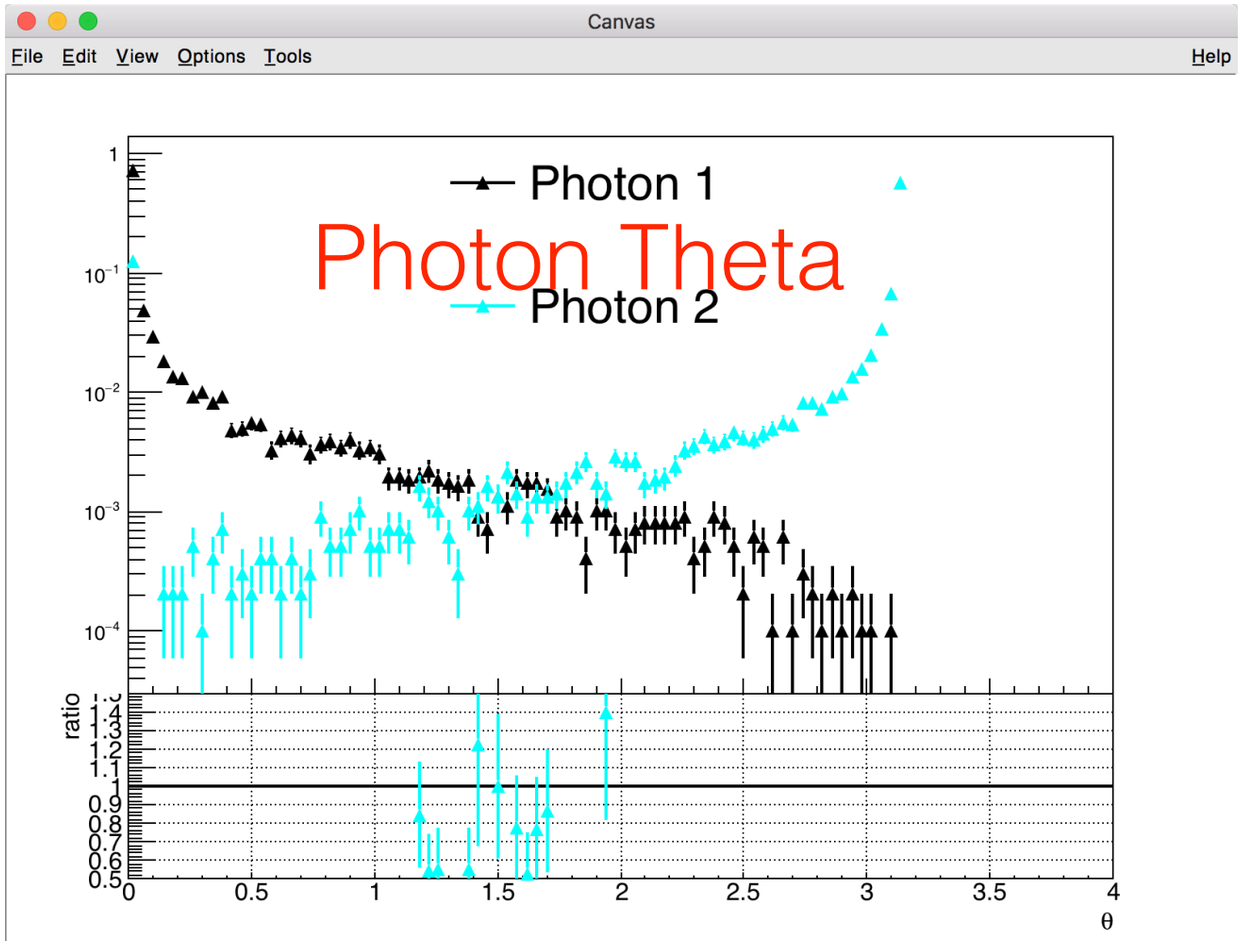
Introduction

1. Measure mW in WW->lvqq channel in 250 GeV run
   - Recoil method to reconstruct mJJ for Wboson.
   - Potential problem on ISR photons.
2. Run over full data set (corresponding to 5 iab)
3. Derive Preliminary signal fit results on Mjj distribution
4. Next step:
   - More study on systematic effects
   - More study on photon recovery

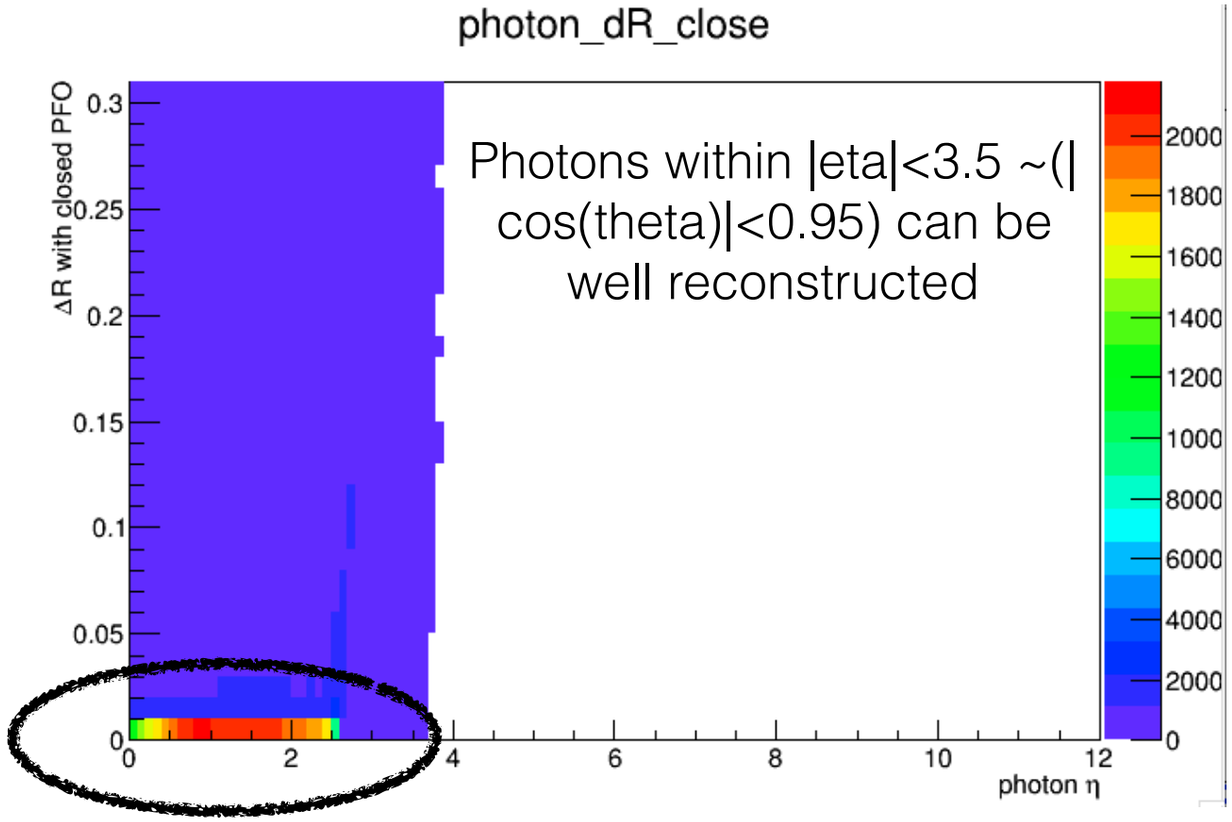
Photon information





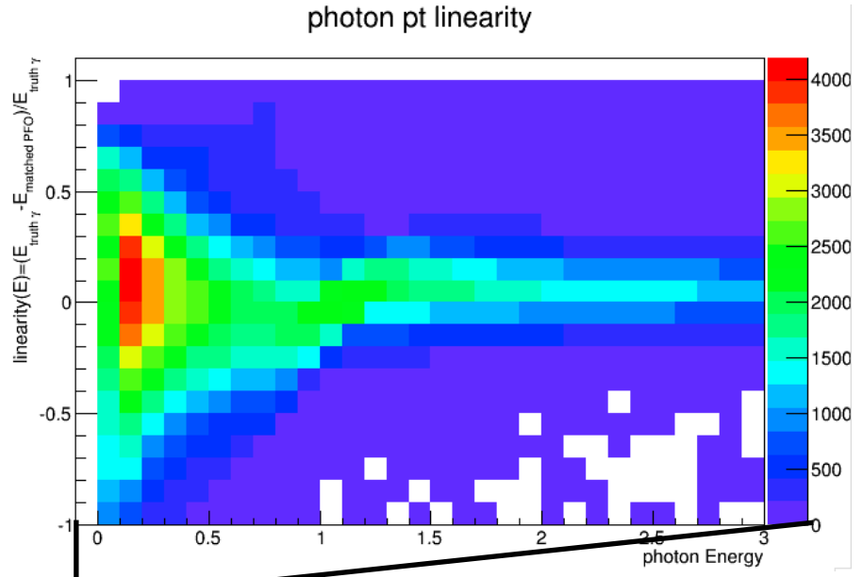
Most of ISR photons are in forward region with small energy
Can these photon be reconstructed?

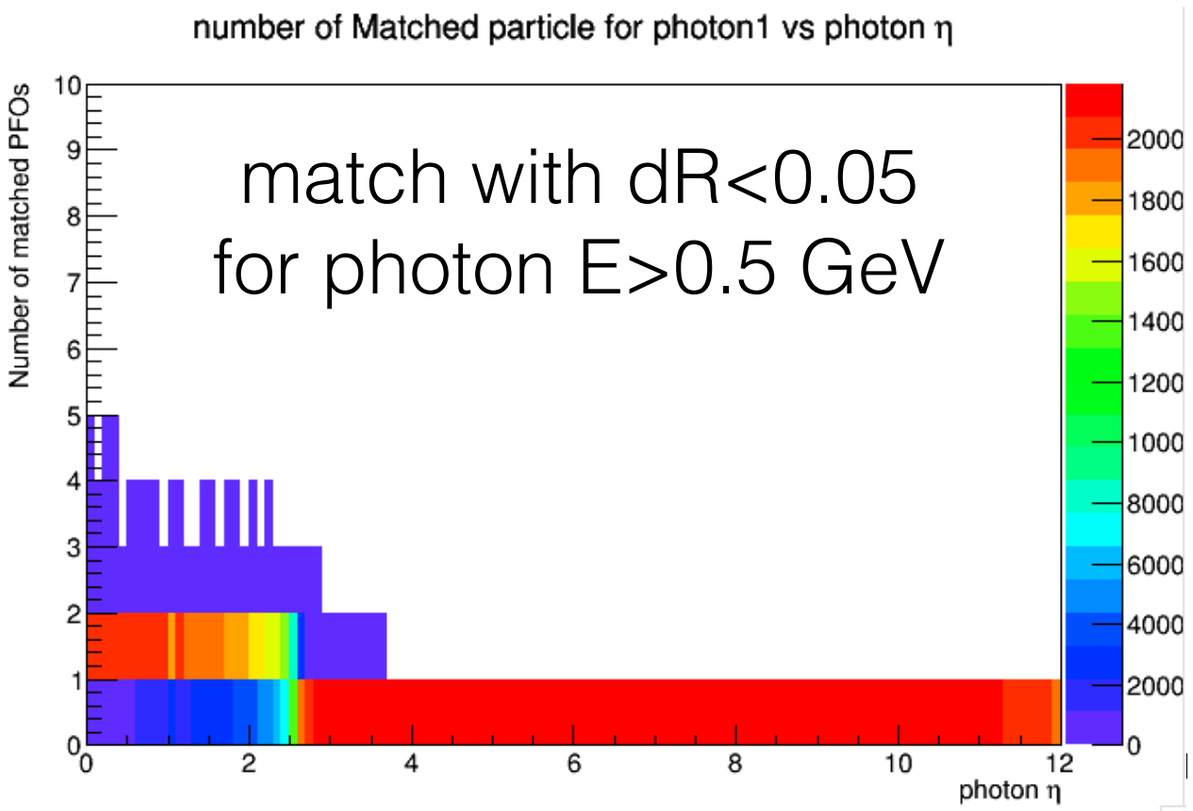
Photon truth matching

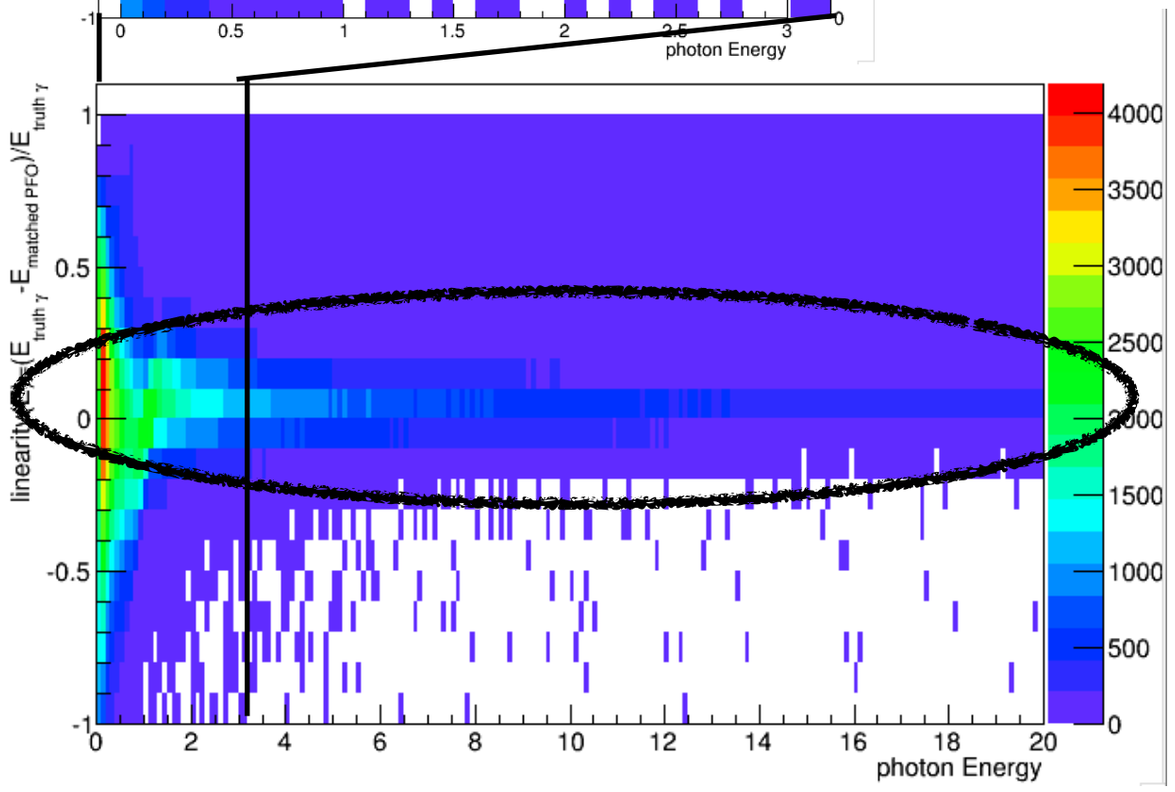


$$\Delta R = \sqrt{(\Delta\eta)^2 + (\Delta\phi)^2}.$$

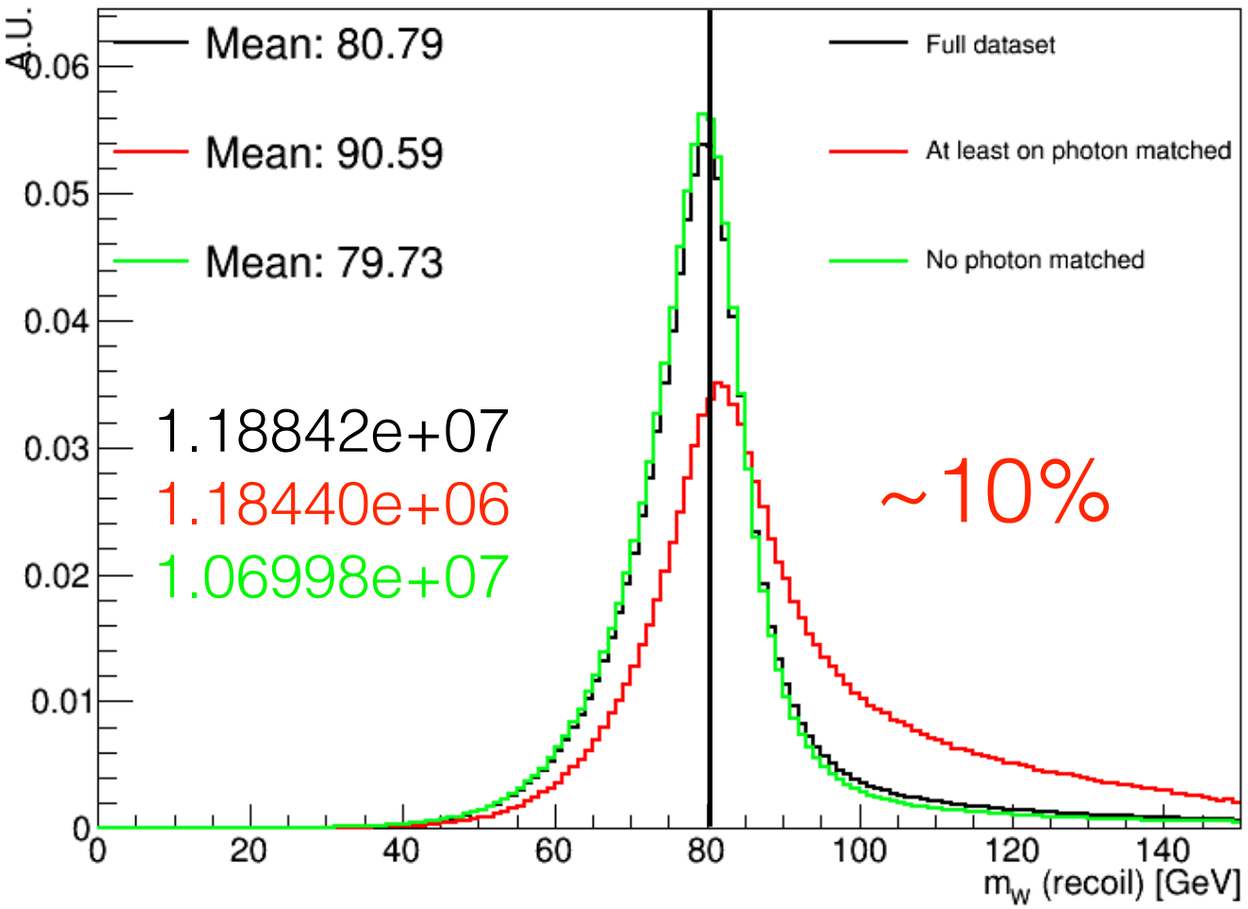
Energy is well measured



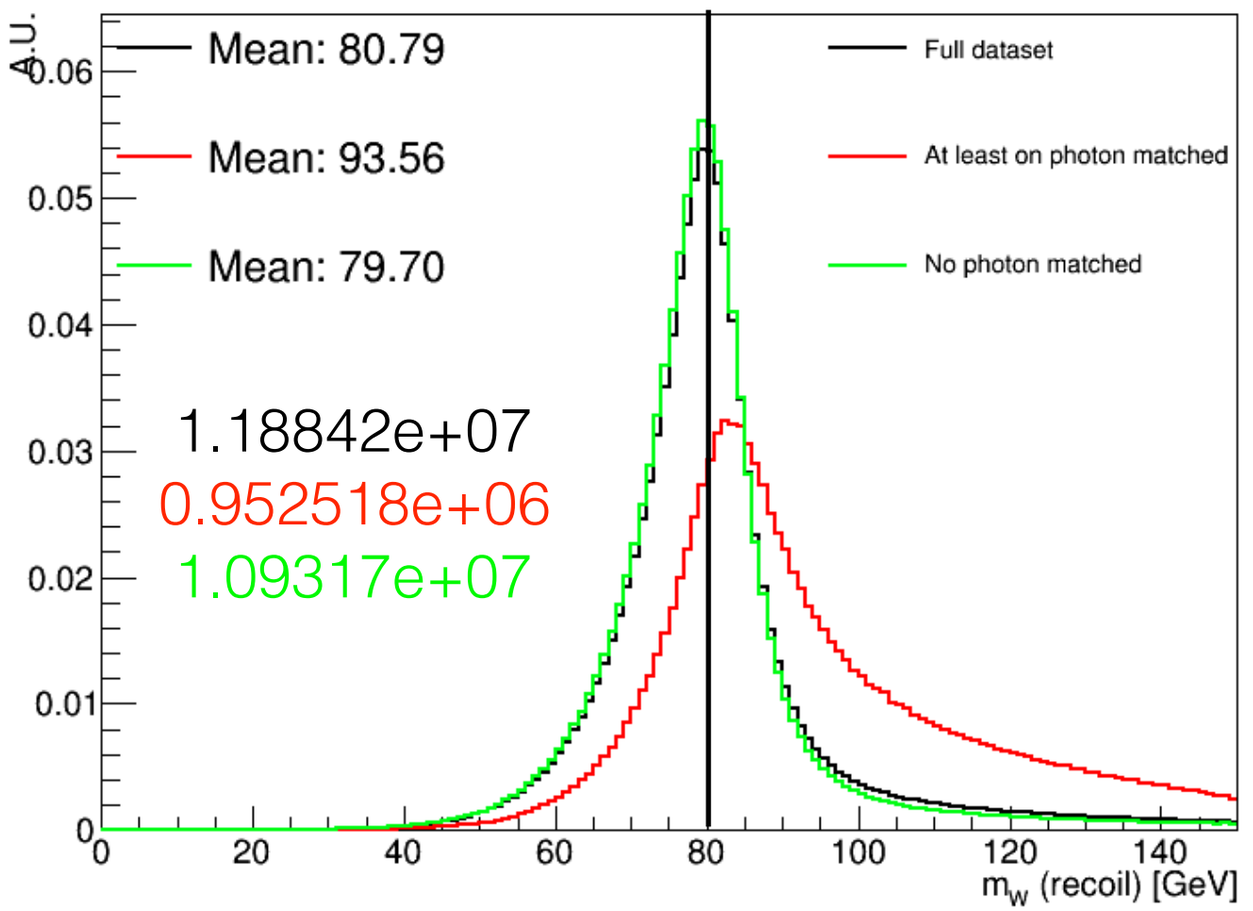




Photon effect on Mjj



At one matched photon

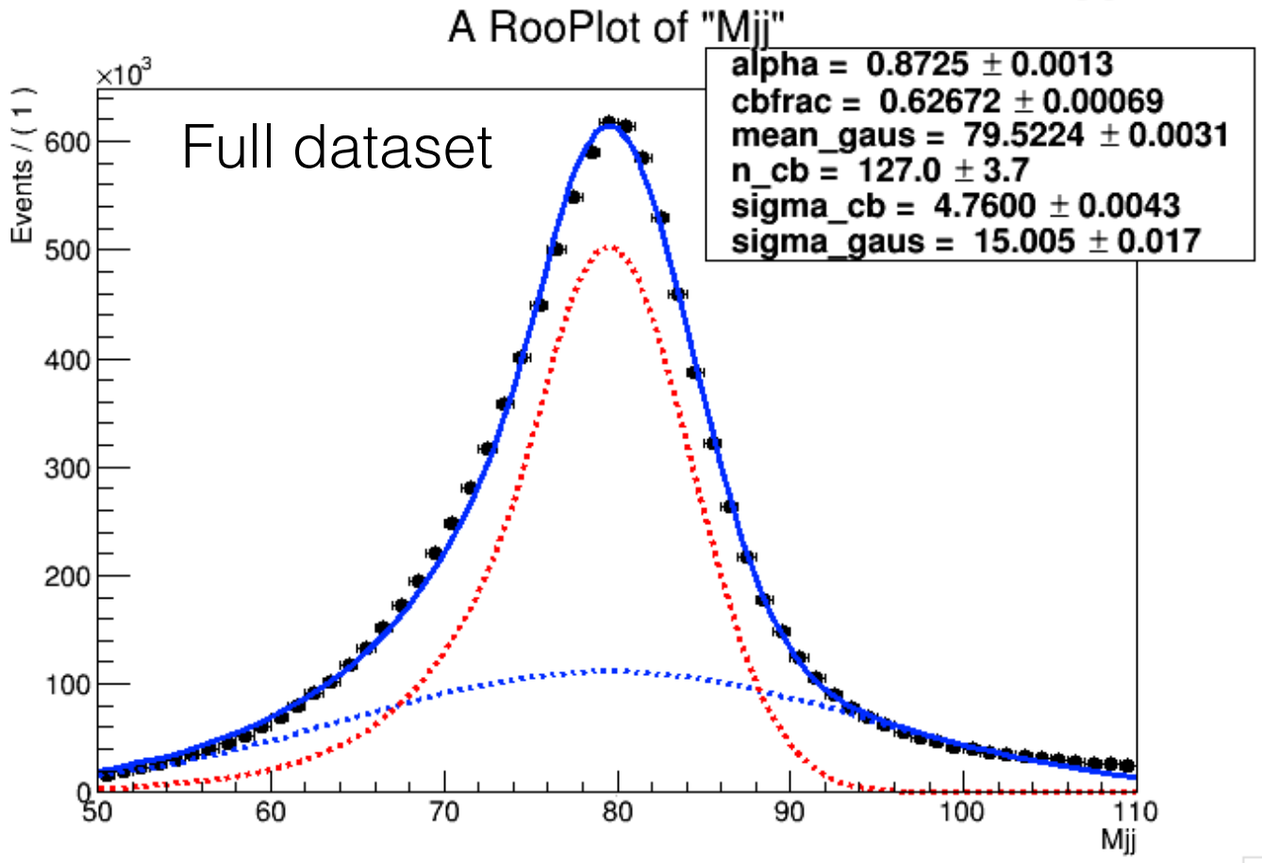


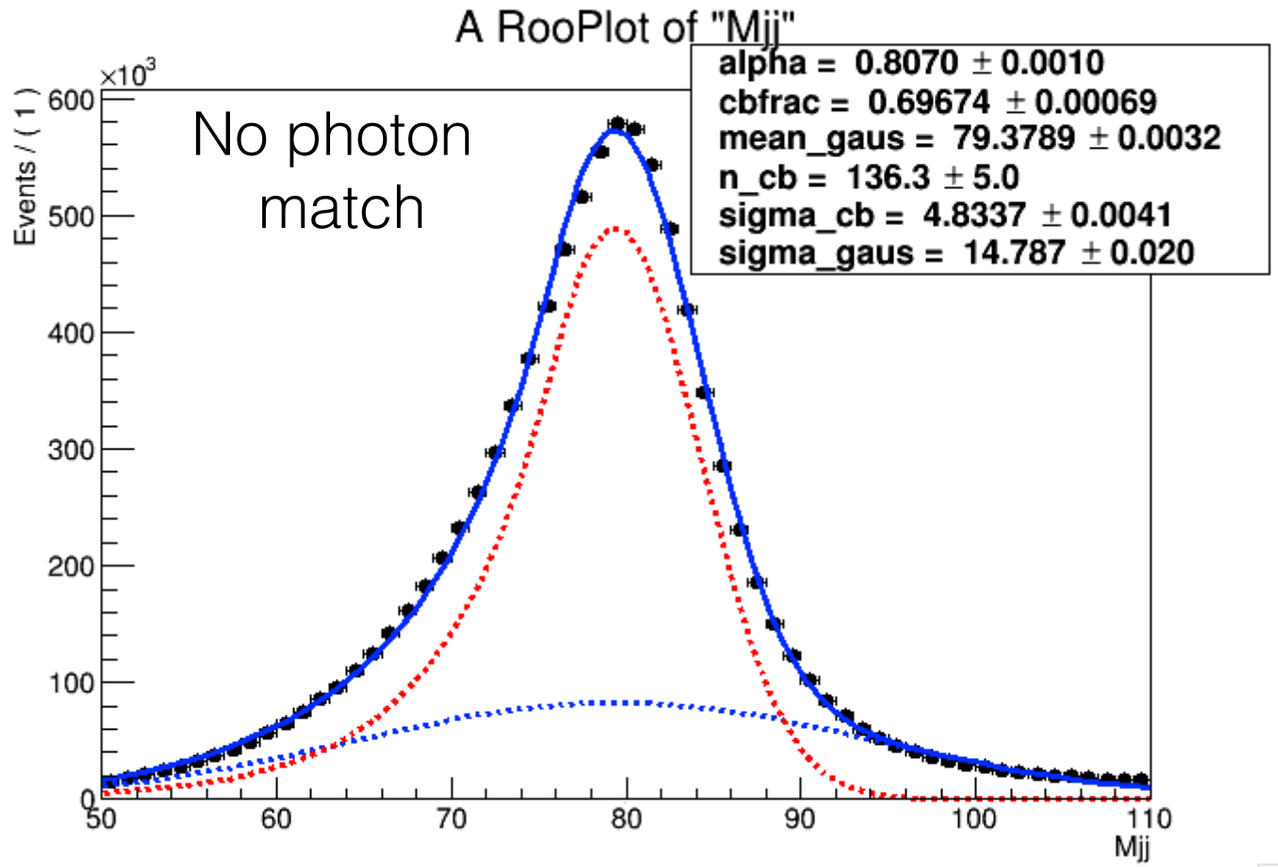
At one matched photon with E>0.5 GeV

use dR<0.05 and dE/E<0.5 to do match

To develop method to deal with photons in Mjj

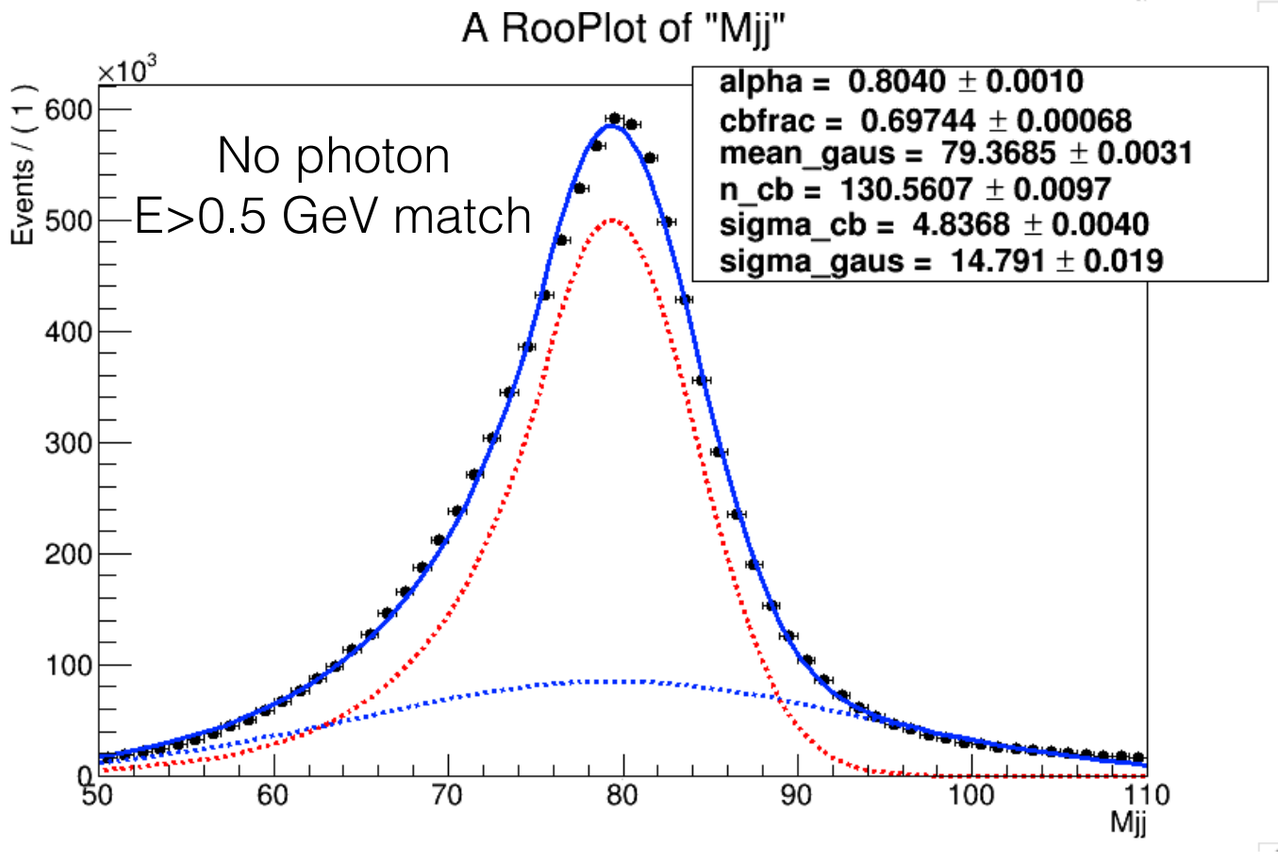
Fit mjj distribution



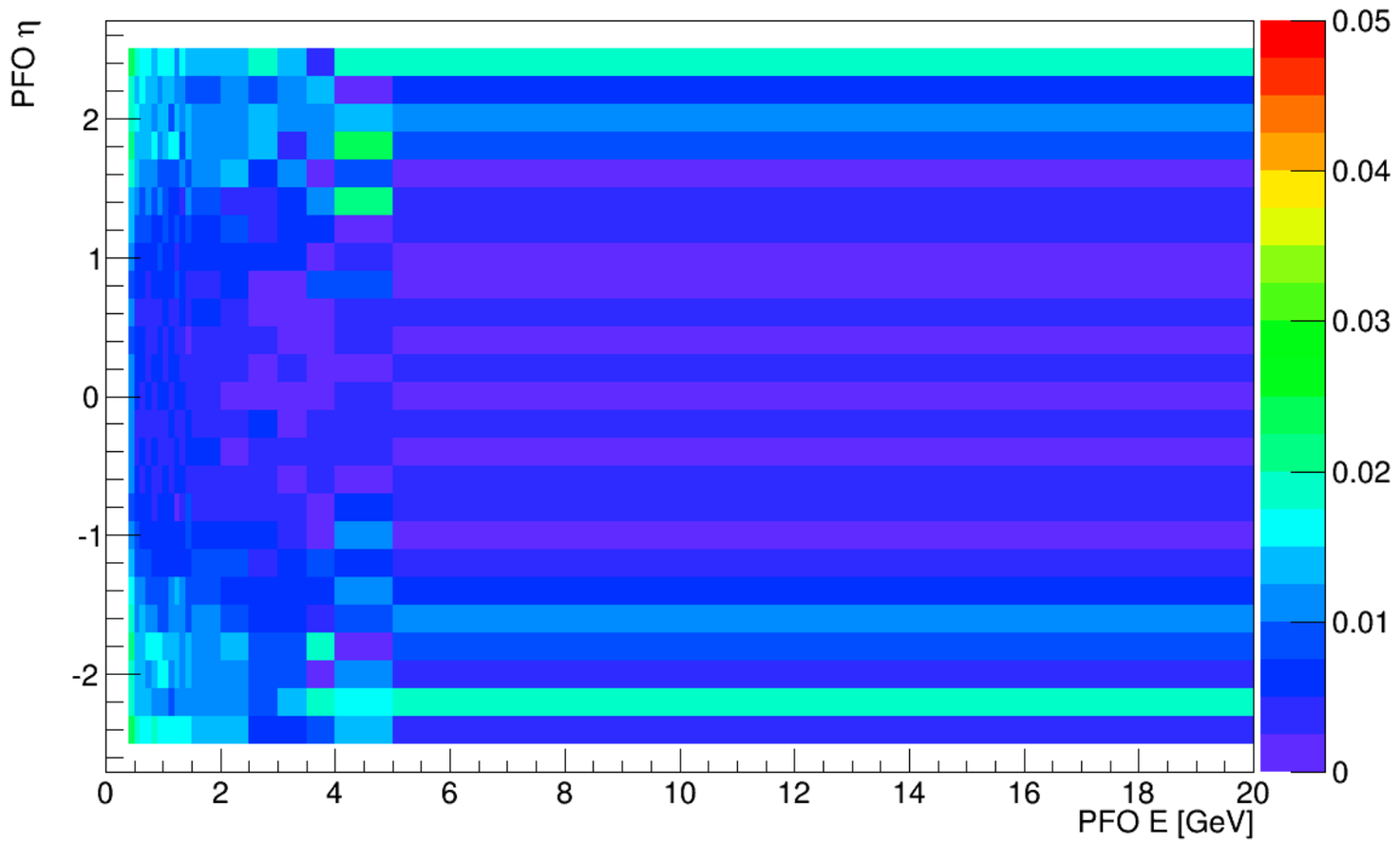


No big different for three cases,
Fit still to be tuned

PDF: cbfrac*RooCBShape(“cb”, “cb”, Mjj, mean, sigma_cb, alpha, n_cb) +(1-cbfrac)*RooGaussian(“gaus”, “gaus”, Mjj, mean, sigma_gaus)



Systematics propagation



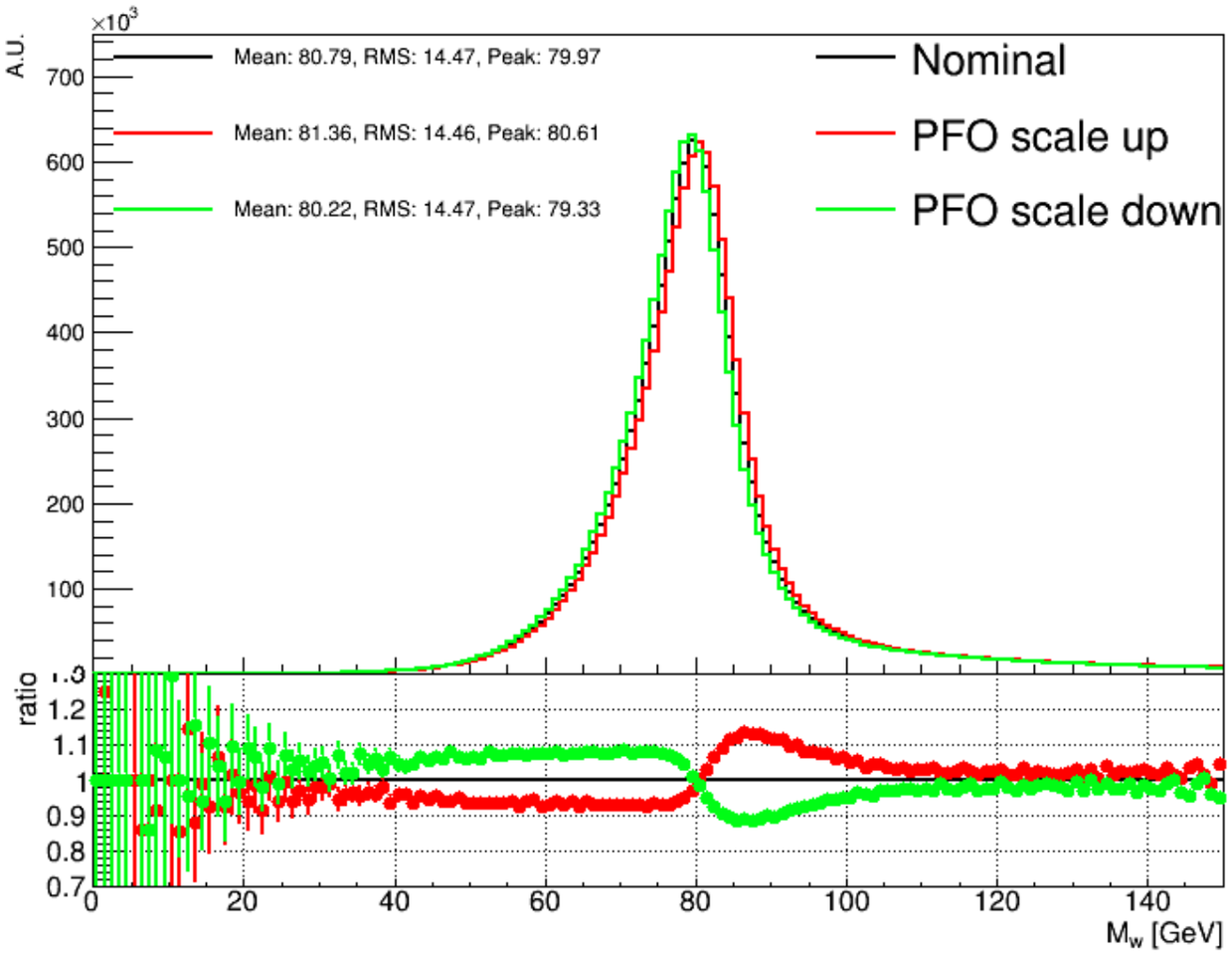
Assume a uncertainty map for PFO scale/resolution

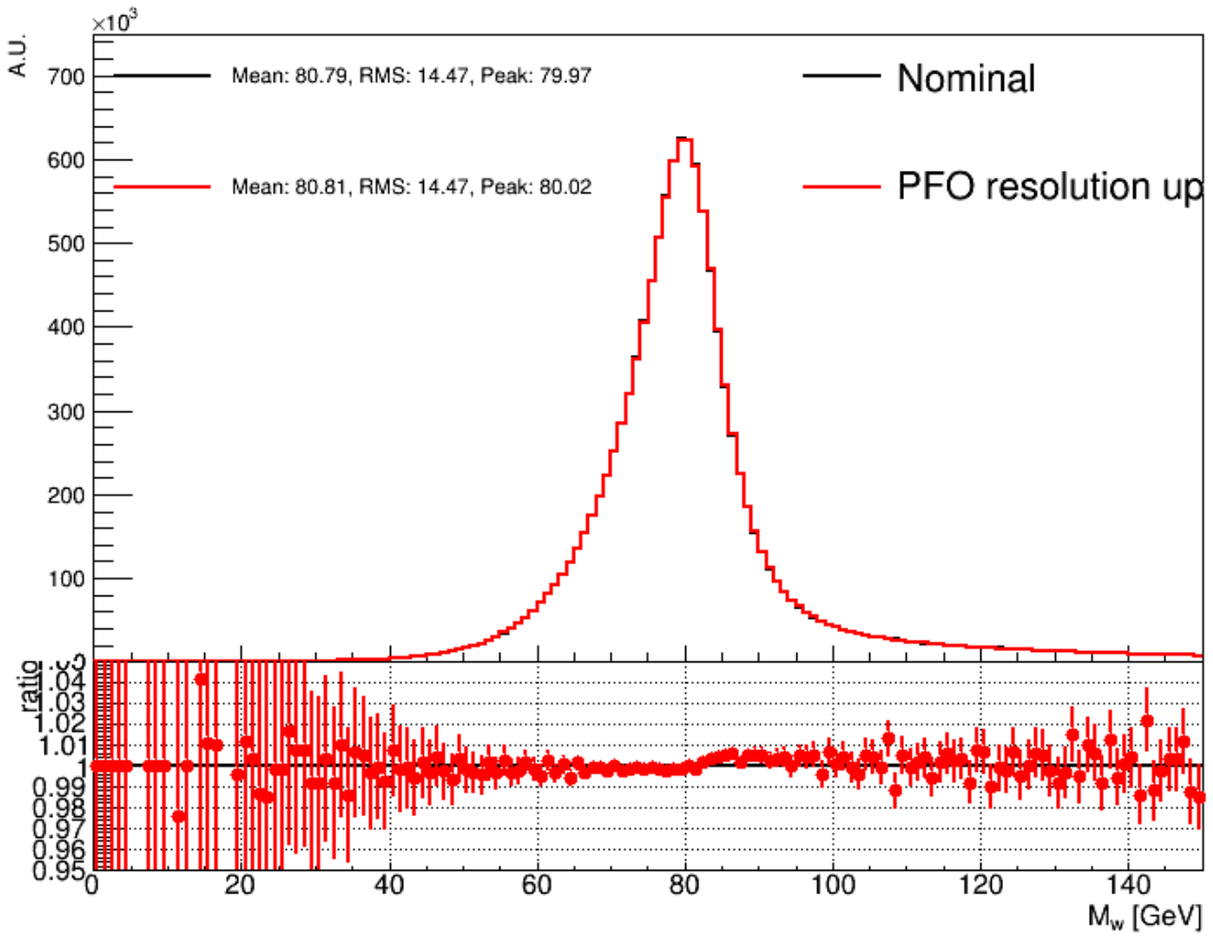
Scale 4-momentum by 1+/- uncertainty

Smear: Scale 4-momentum by 1+Random(Gaussian(0, 1))*uncertainty

Caveat: “fake” uncertainty map. Just for test

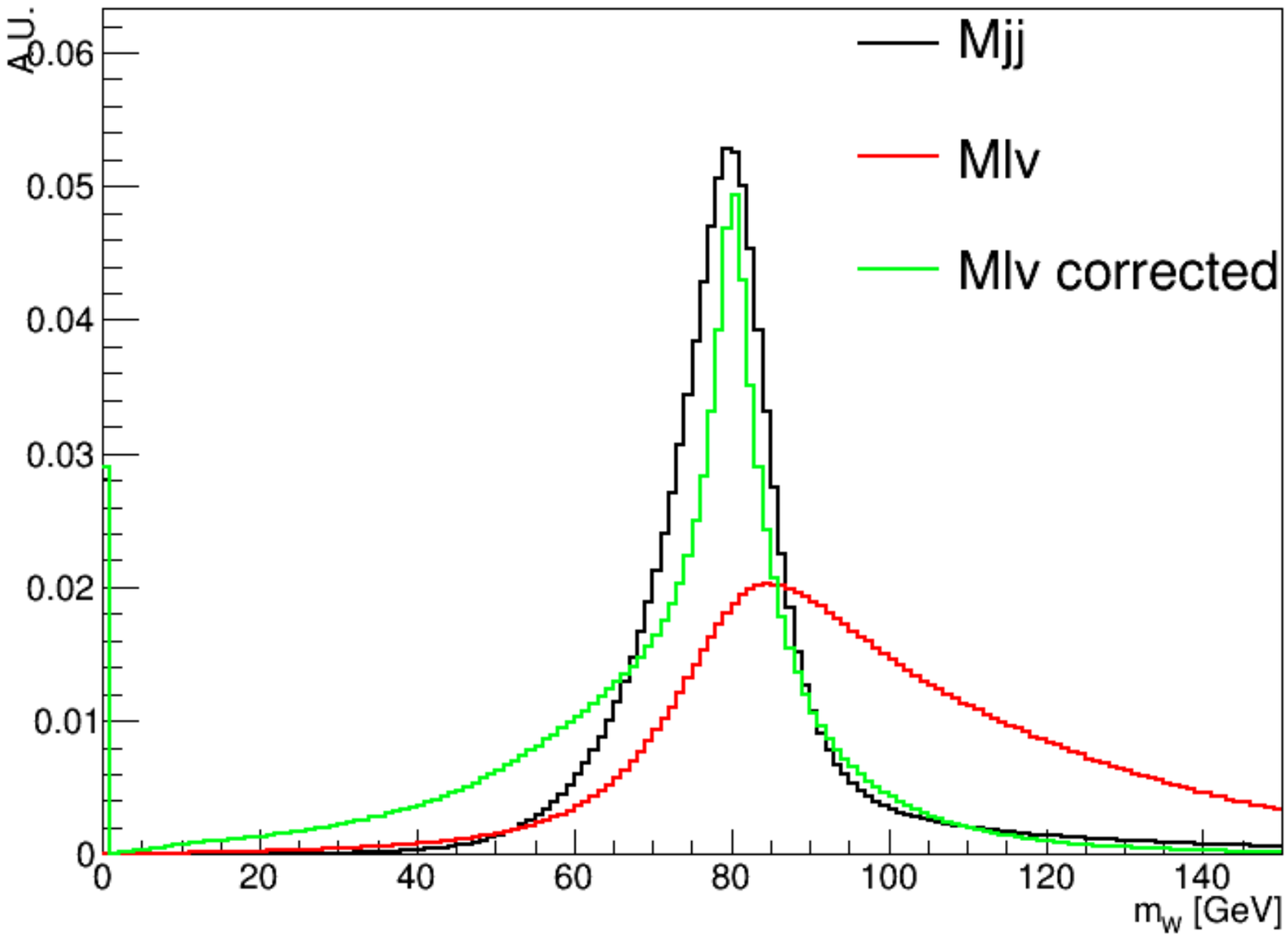
Systematics propagation





Caveat: Use same map for scale and resolution for now. Just for machinery test.

mW with lv



Not reconstructed photon harms Mlv (probably can be used to constrain mW) distribution.

Green curve is the method developed by Manqi by assuming one extra photon with Pt=0 (along Z axis)