

# Status on $e^+e^- \rightarrow \gamma Z$ process Jet Energy Calibration



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# Recent Progress

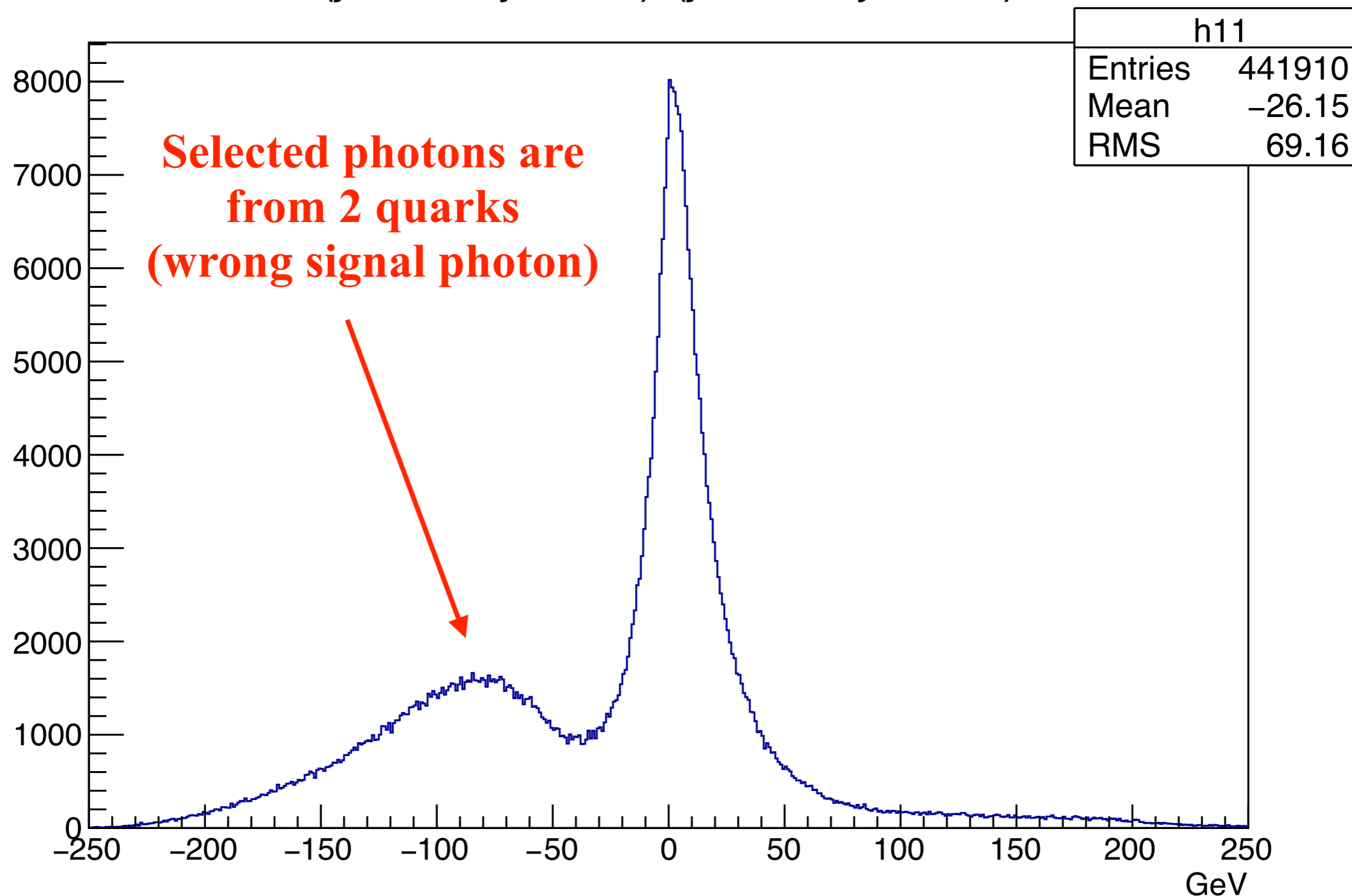
**Consideration of cut to exclude  
the wrong photon choice events**

**Full simulation to reconstruct the jet energies  
-> Comparison between reconstructed and  
MCTruth information for the jets is checked.  
-> It turned out that signal photon selection is  
failed in 41% of events.**

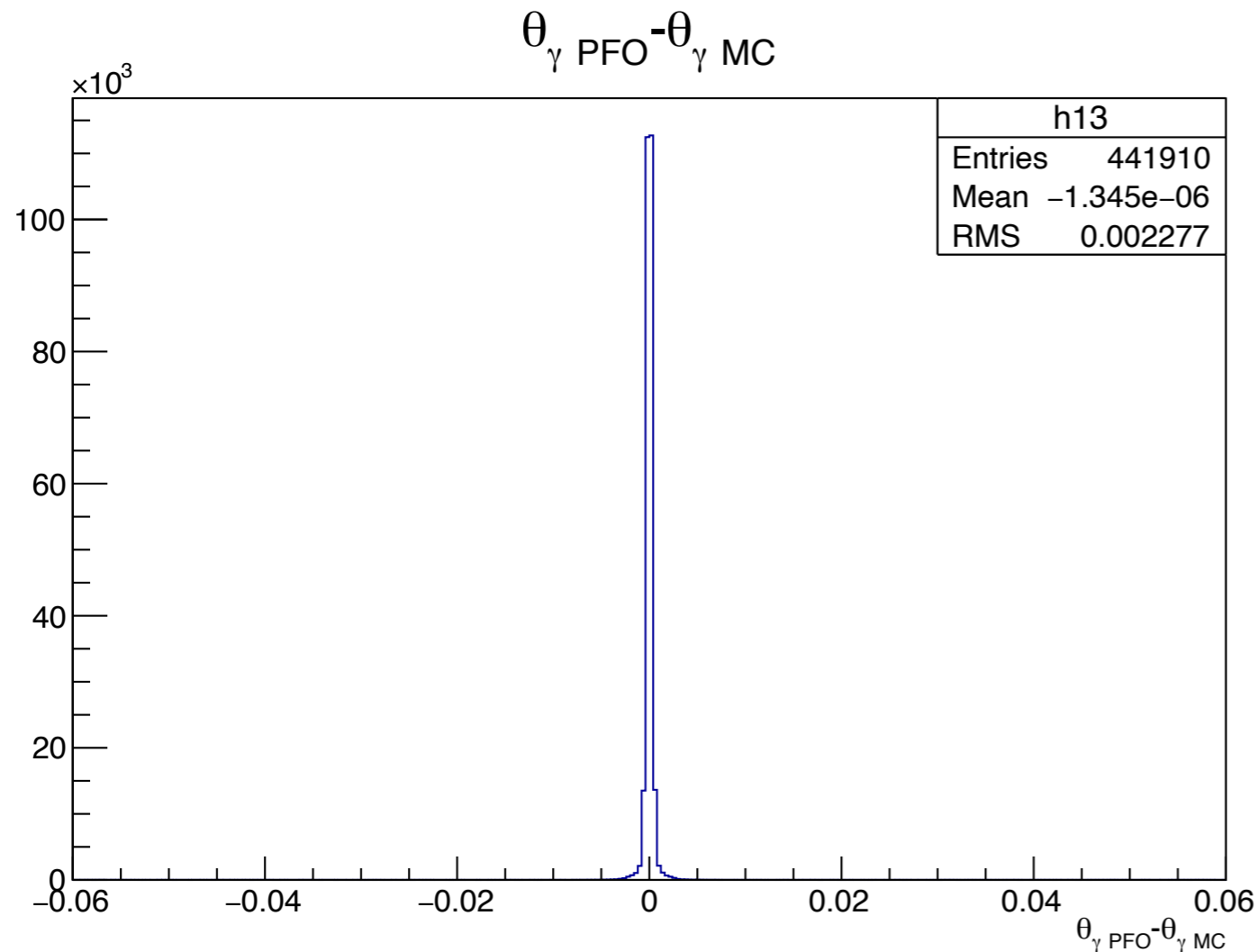
**We need to consider the cut to exclude  
the wrong photon choice events  
Not only “MCcut” **but also “Realistic cut”****

# 1. Difference of the jet energy sum

$$(j1E_{AnI}+j2E_{AnI})-(j1E_{EMC}+j2E_{EMC})$$



# 1. Difference of the jet energy sum



**MCcut**

**“ $|\theta_{\gamma \text{ PFO}} - \theta_{\gamma \text{ MC}}| < 0.01$ ”  
is applied for now.**

**“ $|\theta_{\gamma \text{ PFO}} - \theta_{\gamma \text{ MC}}| < 0.01$ ” events: 262705 (59%)**

**“ $|\theta_{\gamma \text{ PFO}} - \theta_{\gamma \text{ MC}}| > 0.01$ ” events: 179205 (41%)**

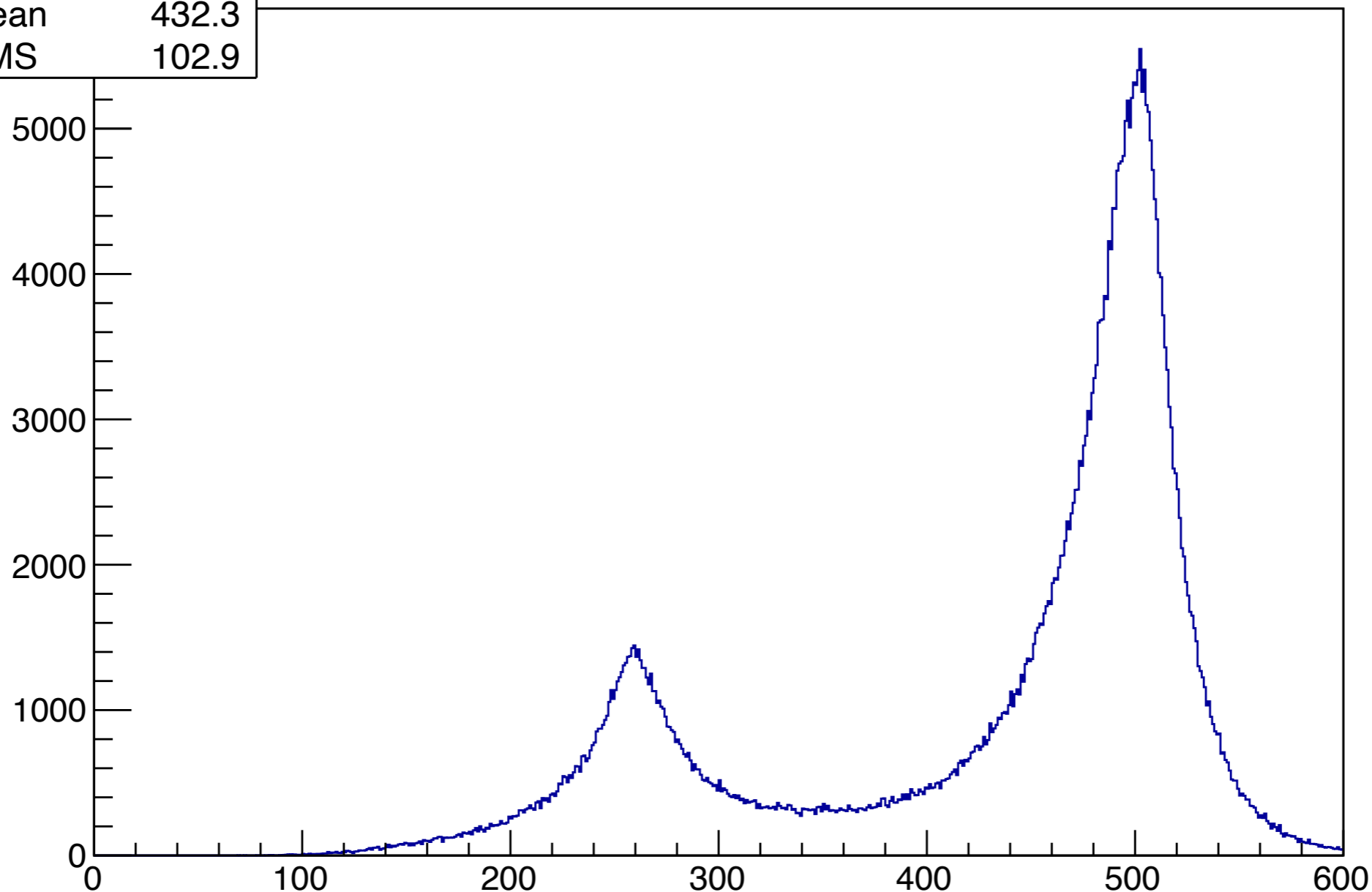
**What about the “Realistic cut”?**

# 1. Realistic cut

Distribution of “Visible Energy ( $=E_{j1}+E_{j2}+E_{\gamma}$ )”

h2	
Entries	441910
Mean	432.3
RMS	102.9

$j1 E_{Anl} + j2 E_{Anl} + \text{photon} E_{Anl}$



**Wrong photon events = Peak below  $E < 350$ ?**

# 1. Realistic cut

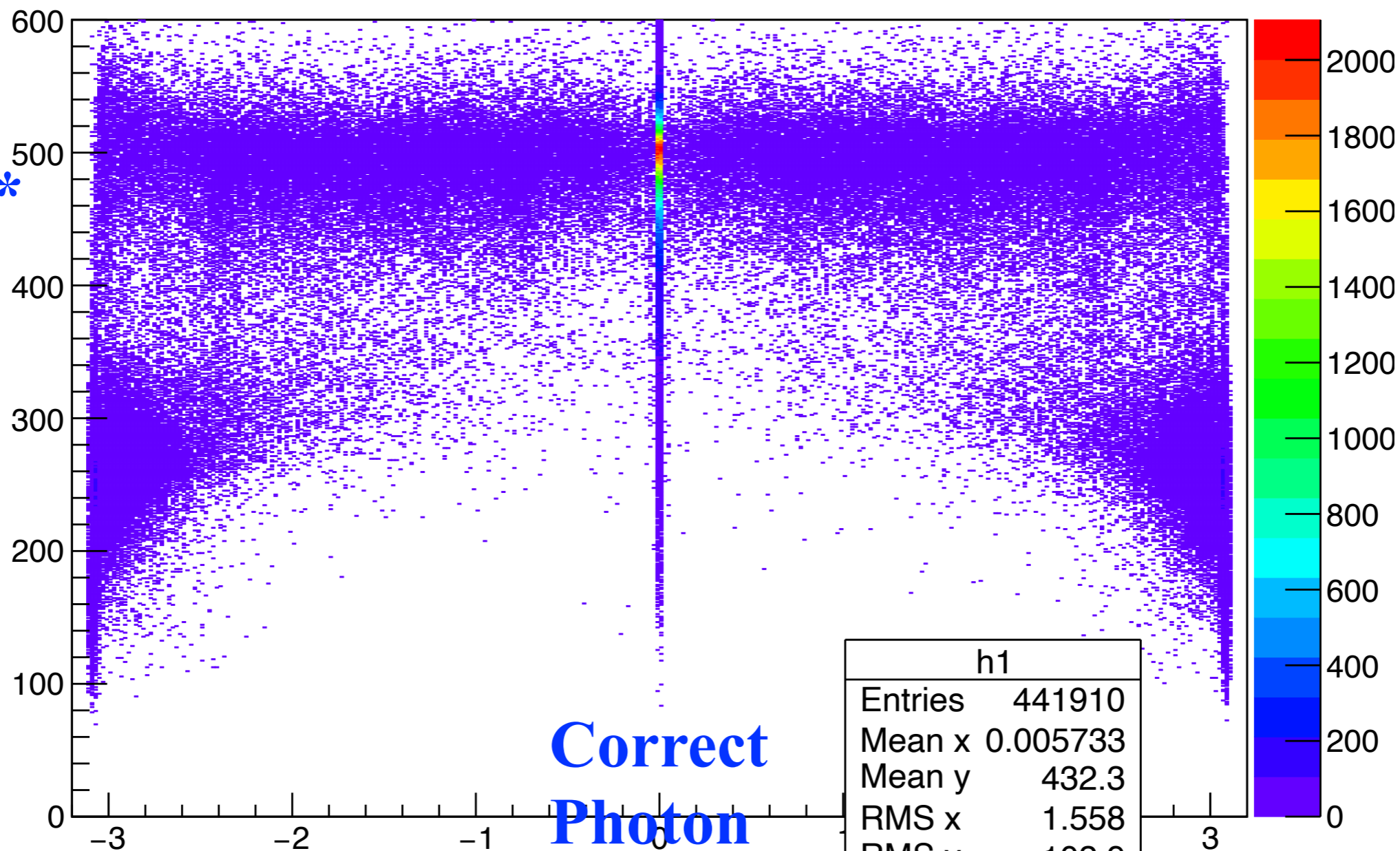
Visible Energy ( $=E_{j1}+E_{j2}+E_{\gamma}$ ) vs.  $\theta$  difference

Visible Energy  $j1E_{Anl}+j2E_{Anl}+photonE_{Anl}:photontheta_{Anl}-photontheta_{MC}$

(GeV)

Photon  
from  $Z^*$

Photon  
from  $Z$



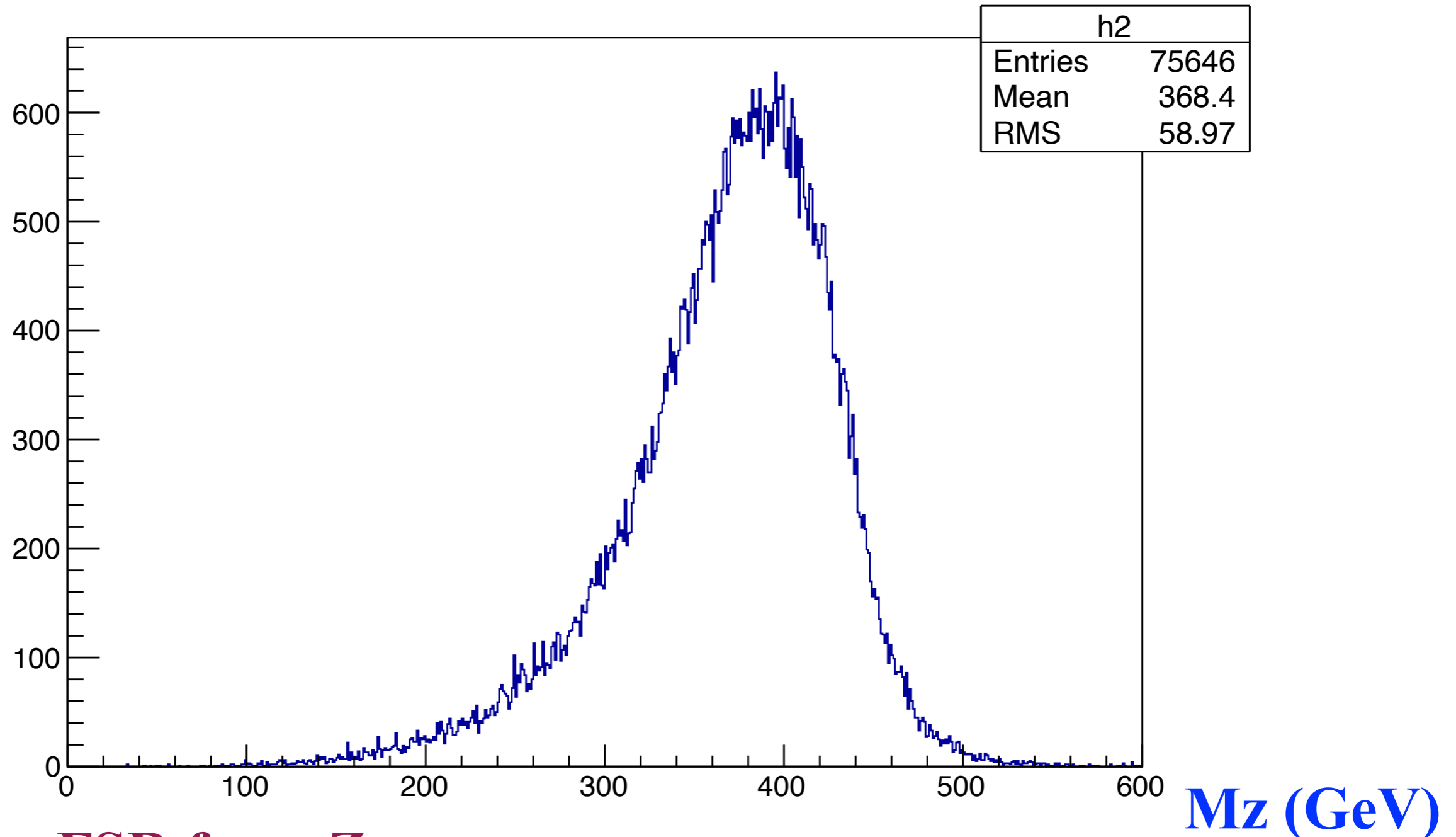
Correct  
Photon

$\theta$  difference (rad)

# 1. Realistic cut

“Visible Energy > 440 && wrong photon”

`mz {j1EAnl+j2EAnl+photonEAnl>440 && abs(photonthetaAnl-photonthetaMC)>0.1}`



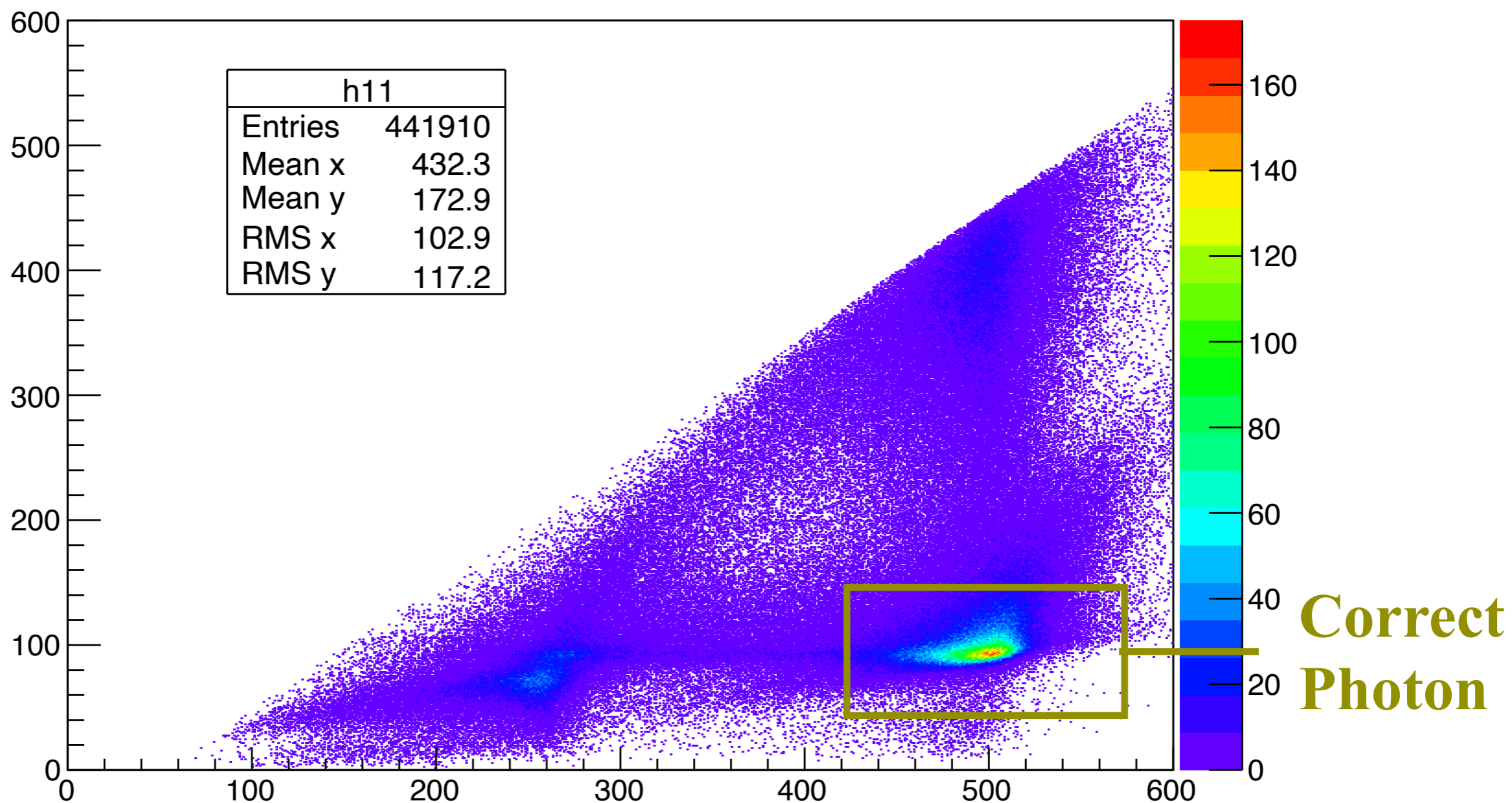
**FSR from Z**  
**ISR added to Z**

# 1. Realistic cut

**Mz vs. Visible Energy (=Ej1+Ej2+E $\gamma$ )**

mz:j1EAnl+j2EAnl+photonEAnl

**Mz**



**Visible Energy  
(GeV)**



# 1. Realistic cut

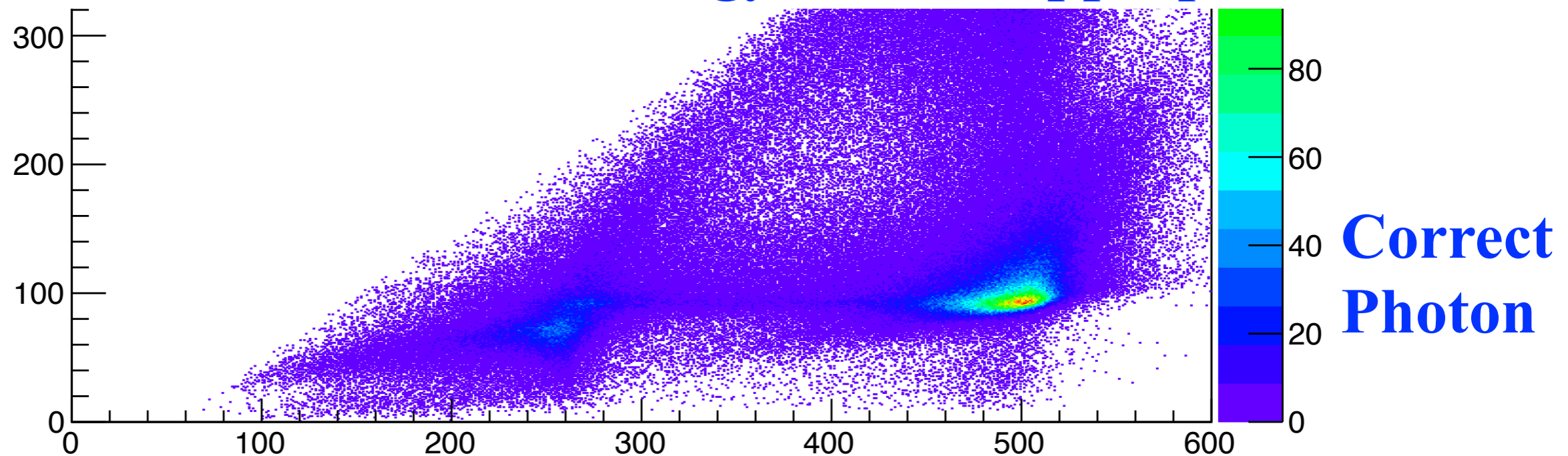
**Mz vs. Visible Energy (=Ej1+Ej2+E $\gamma$ )**

mz:j1EAnl+j2EAnl+photonEAnl

**Mz**



**“Mz<150 && Visible Energy>440” is appropriate.**



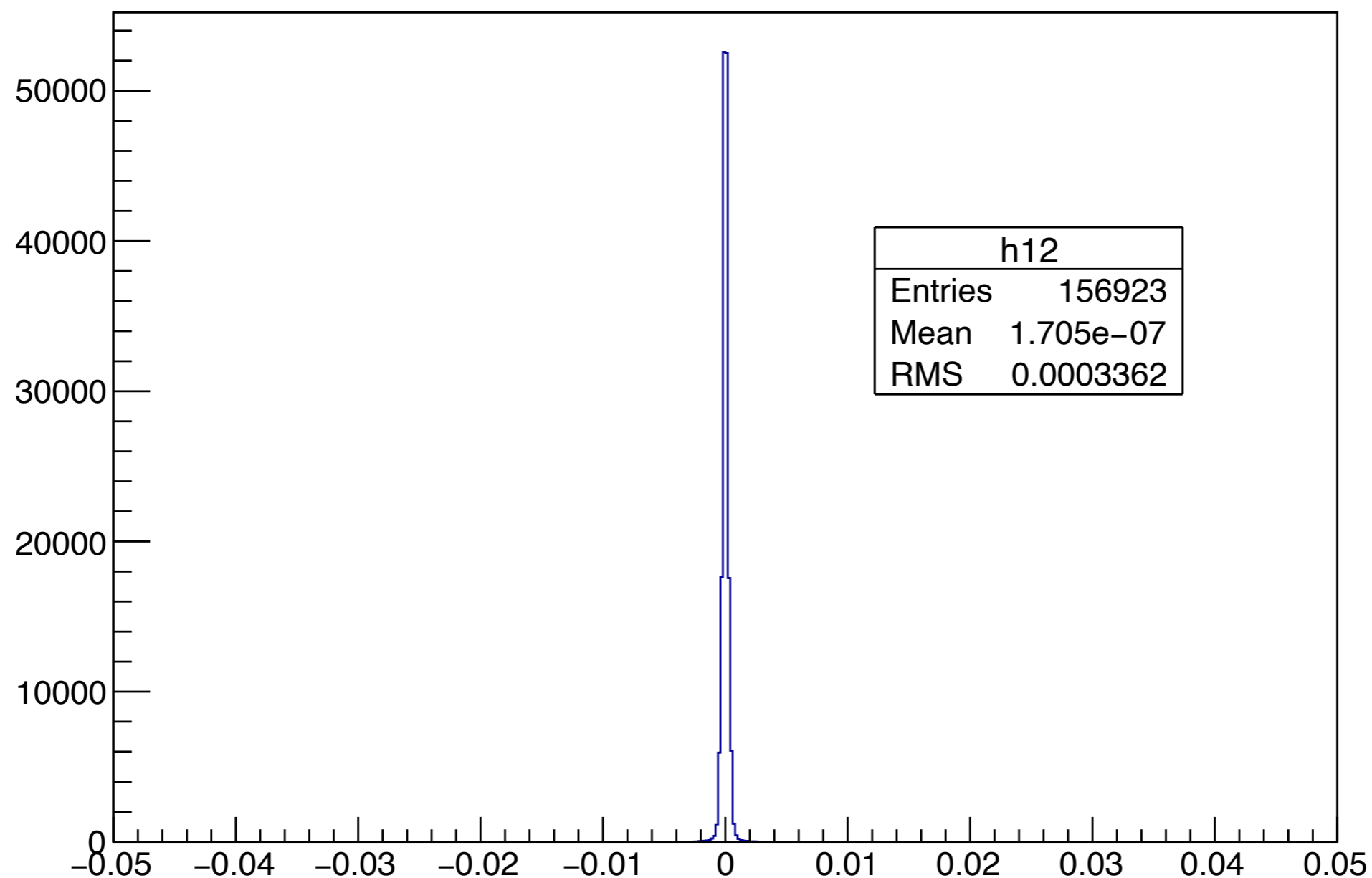
**Visible Energy  
(GeV)**

# 1. Realistic cut

“ $Mz < 150$  && Visible Energy  $> 440$ ” is appropriate.

$\theta$  difference (rad)

photonthetaAnl-photonthetaMC {mz<150 && j1EAnl+j2EAnl+photonEAnl>440}





**Thank you for your attention!**