



Quick Look at Some Photon Pulls

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Recall

- Pulls should be gaussian distributed with a mean of 0 and RMS of 1
 - If mean \neq 0: tends to shift measurements up/down on average
 - If RMS \neq 1: variance-covariance might be off
- Has variance-covariance matrix been determined again for geant4?
 - I know it was updated in 2016, not sure if it has been re-examined since

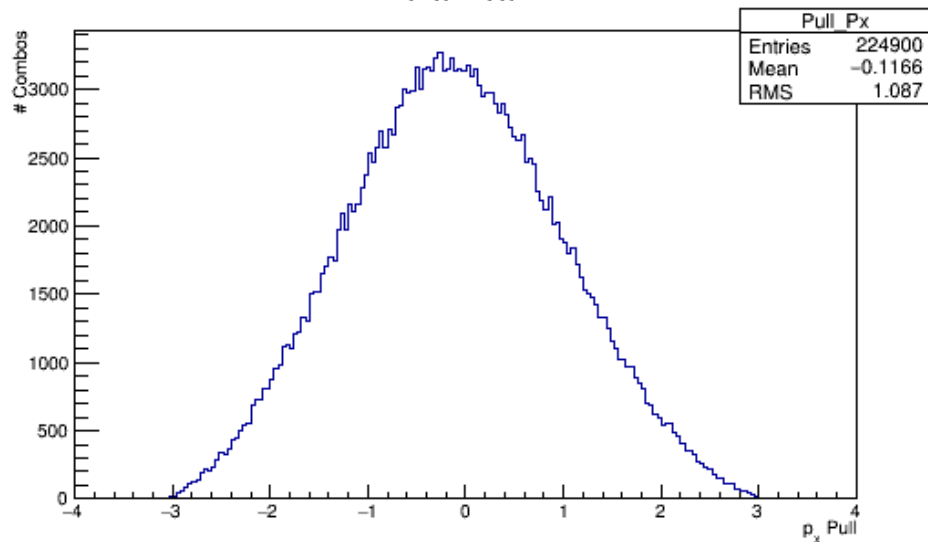


$$\gamma p \rightarrow \gamma \gamma p$$

- Pull of p_x

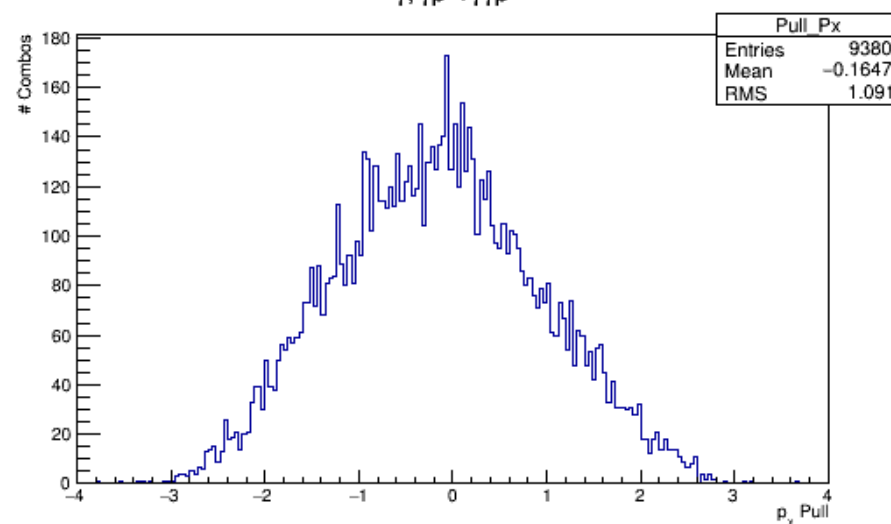
2017

$\gamma, \gamma p \rightarrow \gamma \gamma p$



G4 bggen

$\gamma, \gamma p \rightarrow \gamma \gamma p$

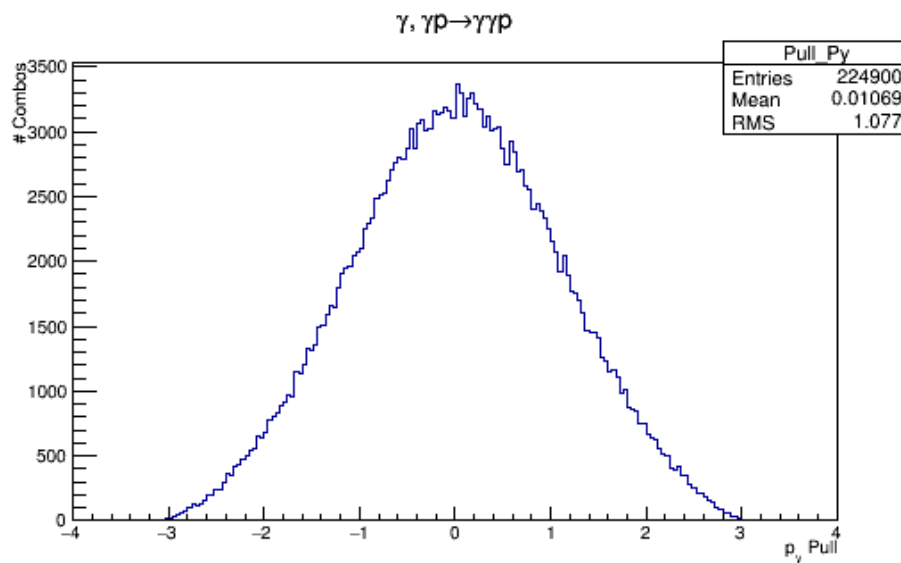




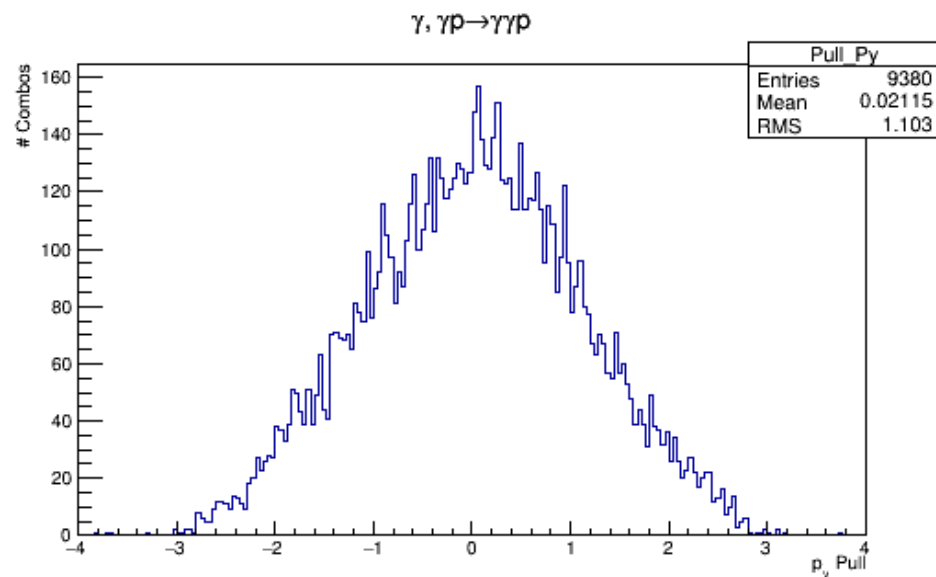
2017 $\gamma p \rightarrow \gamma \gamma p$

- Pull of p_y

2017



G4 bggen



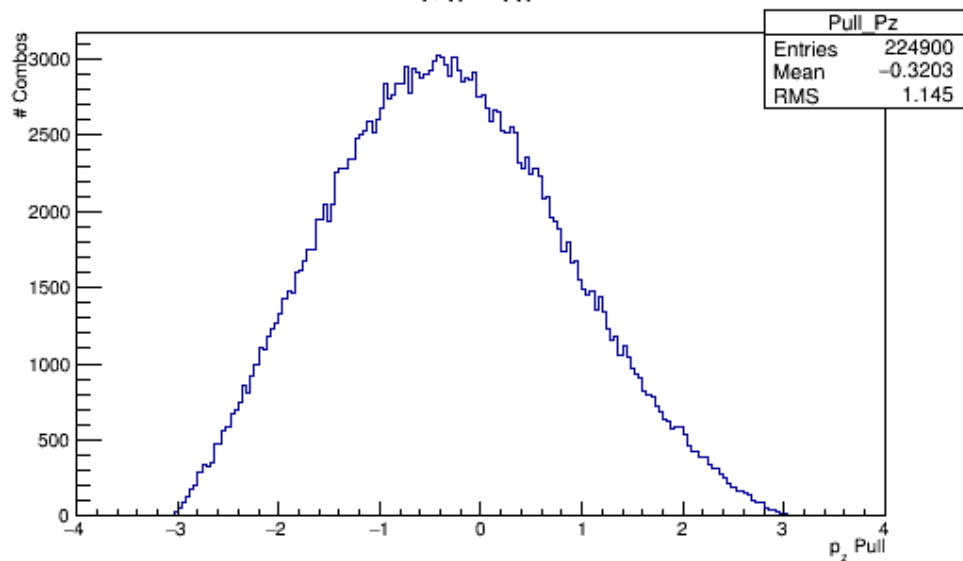


2017 $\gamma p \rightarrow \gamma \gamma p$

- Pull of p_z

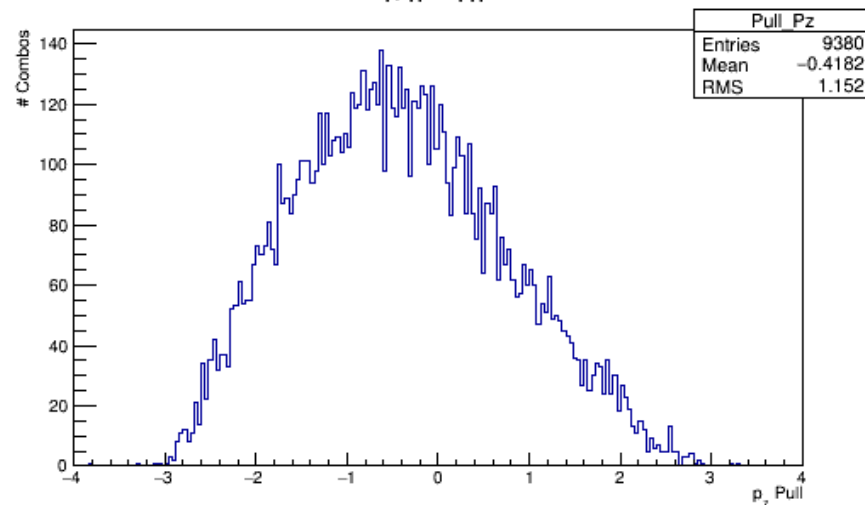
2017

$\gamma, \gamma p \rightarrow \gamma \gamma p$



G4 bggen

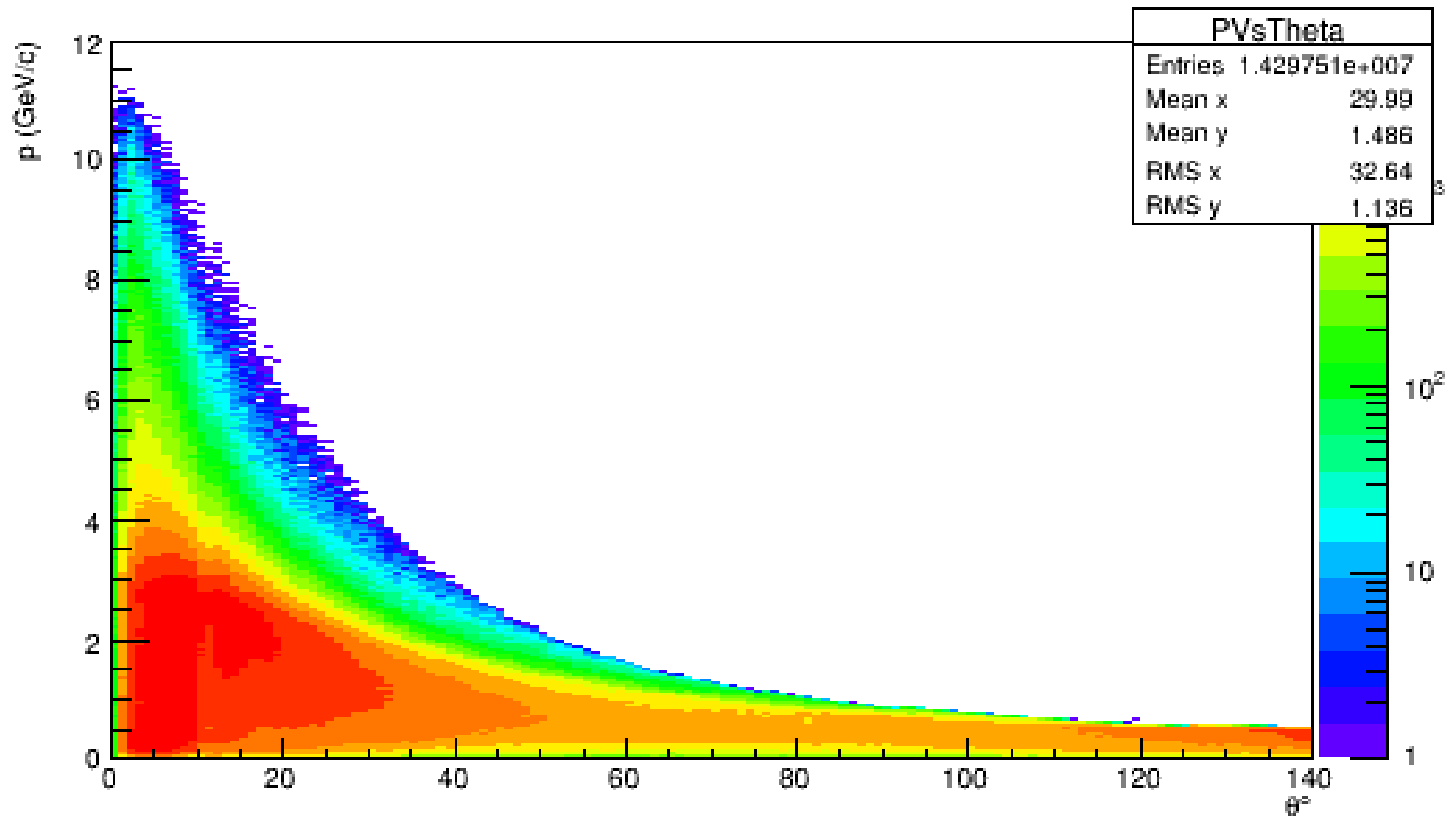
$\gamma, \gamma p \rightarrow \gamma \gamma p$





$$\gamma p \rightarrow \gamma \gamma p$$

$\gamma, \gamma p \rightarrow \gamma \gamma p$





A few more topologies I looked at

- $\pi^+ \pi^- \pi^0, \gamma \pi^0, \pi^0 \eta, \pi^0 \eta', \pi^+ \pi^- \eta, \pi^0 \pi^0 \eta, \pi^+ \pi^- \pi^0 \pi^0, \gamma K^+ \Lambda$
- All have similar general trends:
 - RMS generally high (1.1-1.3)
 - P_x pull negative
 - P_y pull close to 0
 - P_z pull more negative than P_x
- $\gamma \pi^+ \pi^-$ stands out

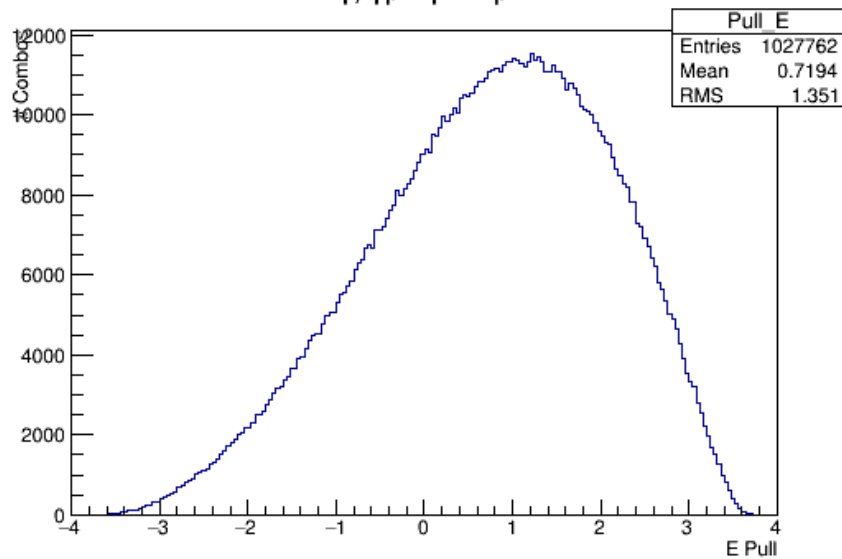


$$\gamma p \rightarrow \gamma \pi^+ \pi^- p$$

- Pull of E

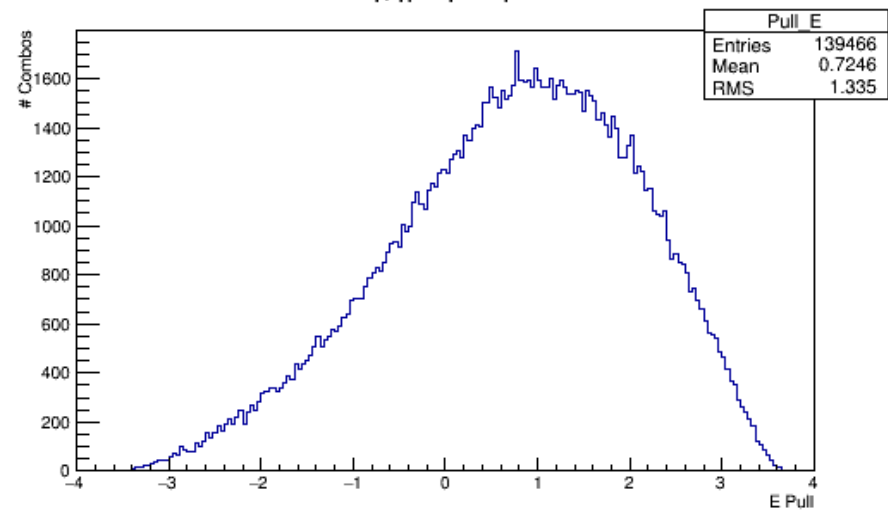
2017

$\gamma, \gamma p \rightarrow \gamma \pi^+ \pi^- p$



G4 bggen

$\gamma, \gamma p \rightarrow \gamma \pi^+ \pi^- p$

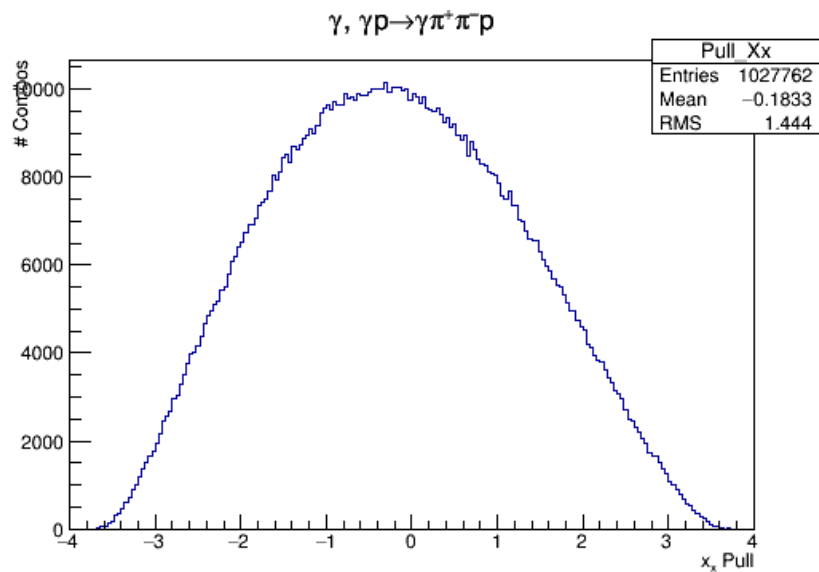




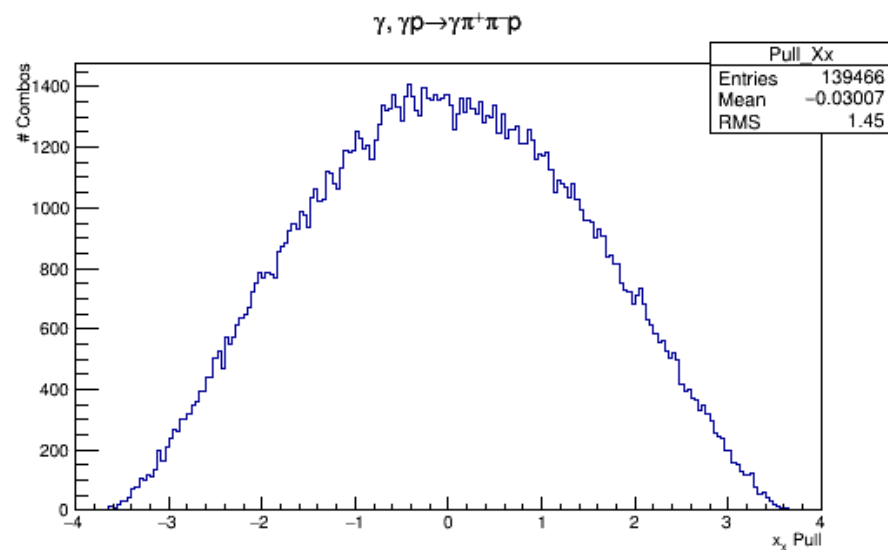
$$\gamma p \rightarrow \gamma \pi^+ \pi^- p$$

- Pull of X_x

2017



G4 bggen



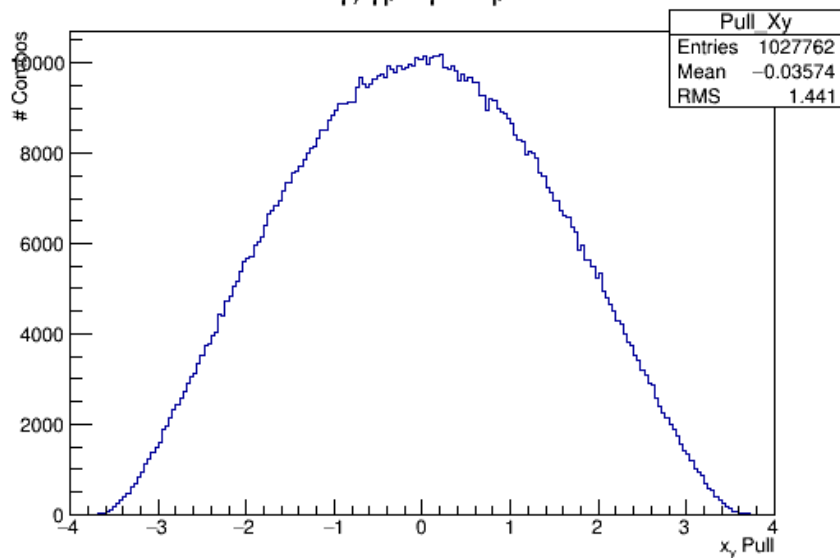


$$\gamma p \rightarrow \gamma \pi^+ \pi^- p$$

- Pull of X_y

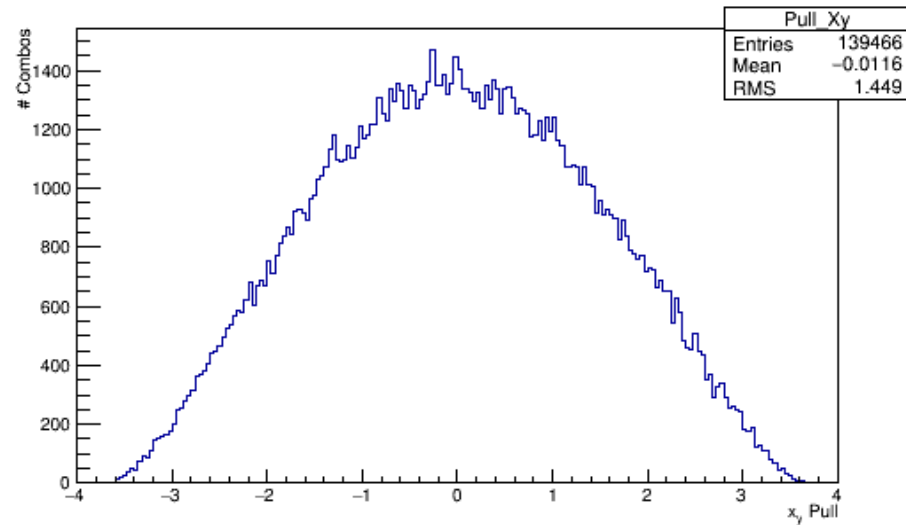
2017

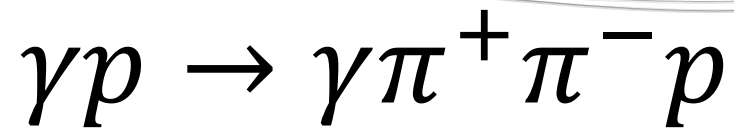
$\gamma, \gamma p \rightarrow \gamma \pi^+ \pi^- p$



G4 bggen

$\gamma, \gamma p \rightarrow \gamma \pi^+ \pi^- p$

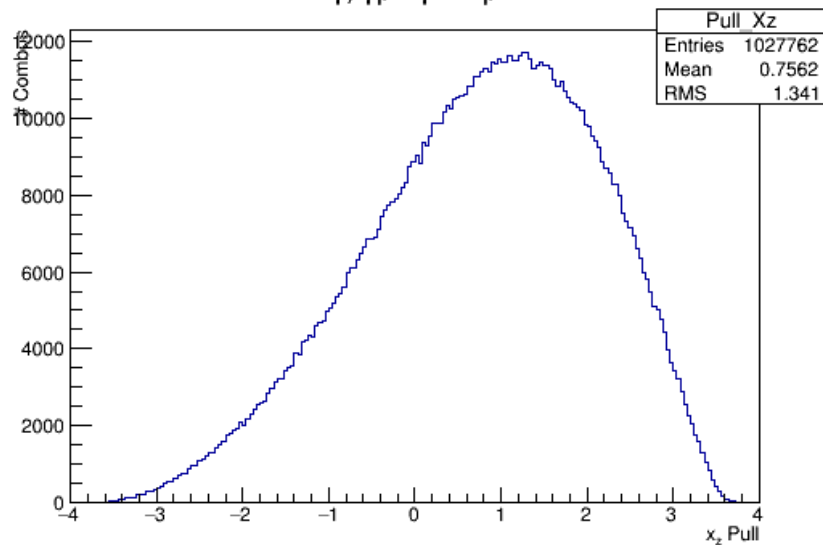




- Pull of X_z

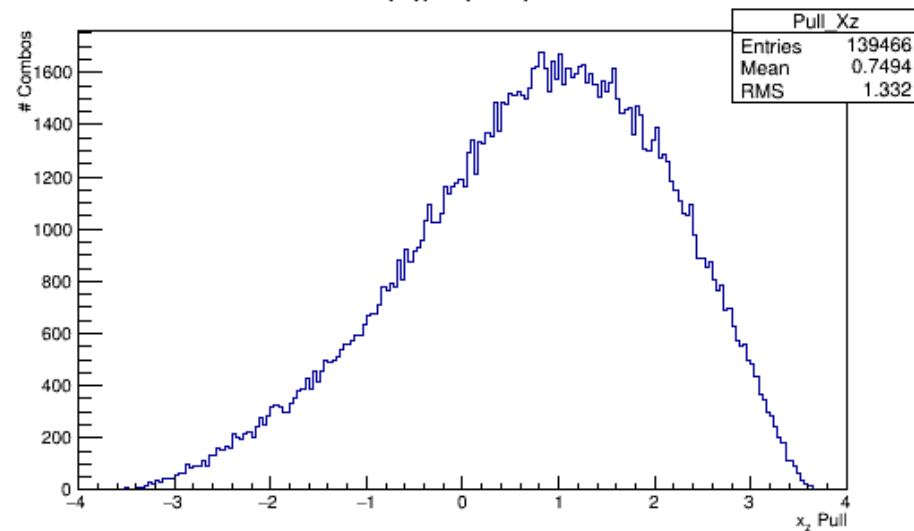
2017

$\gamma, \gamma p \rightarrow \gamma \pi^+ \pi^- p$



G4 bggen

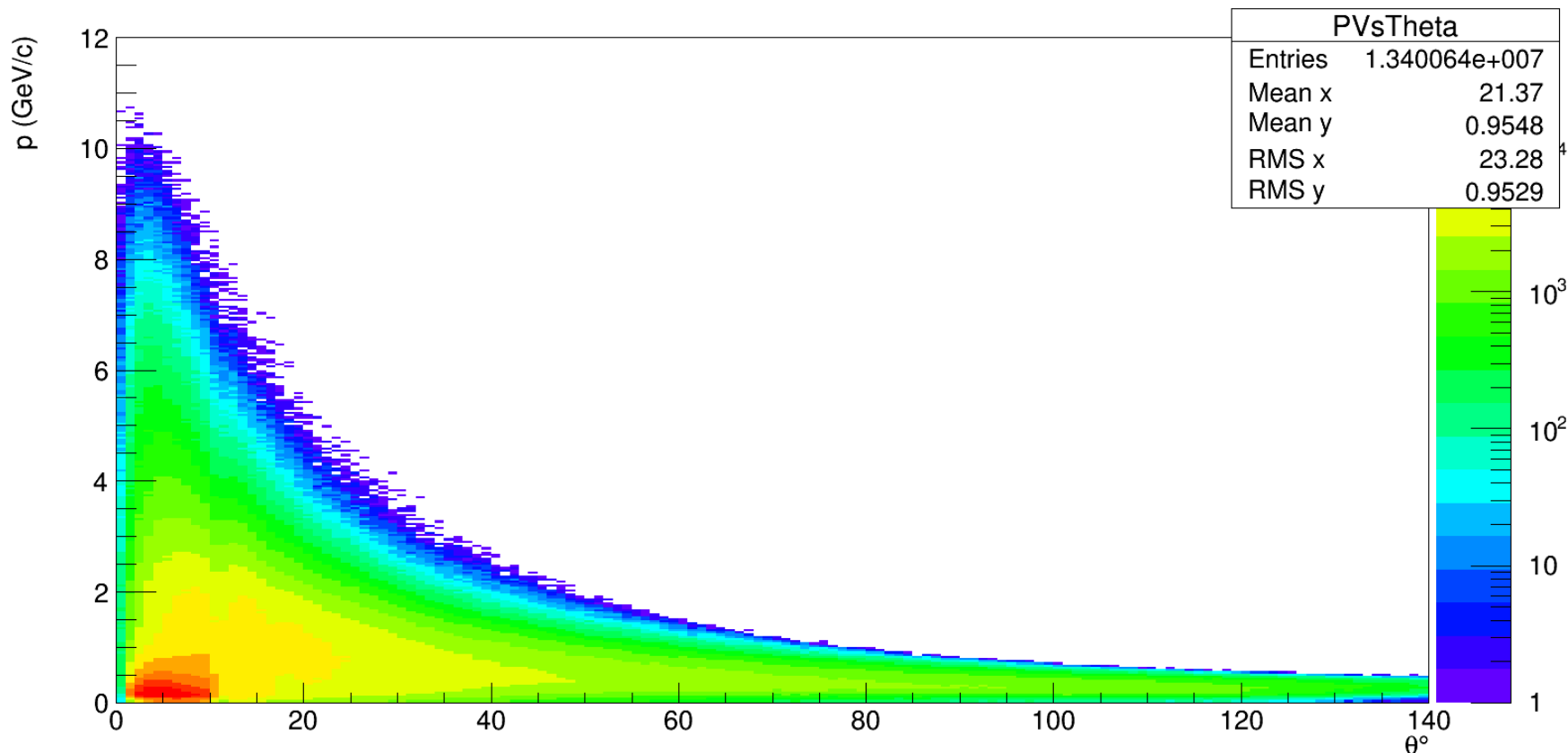
$\gamma, \gamma p \rightarrow \gamma \pi^+ \pi^- p$





$$\gamma p \rightarrow \gamma \pi^+ \pi^- p$$

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Maybe a lot of ρ + misID hadronic shower contaminates,
in spite of $CL > 0.05$ cut