Status of large angle analysis-$\pi\pi\gamma$

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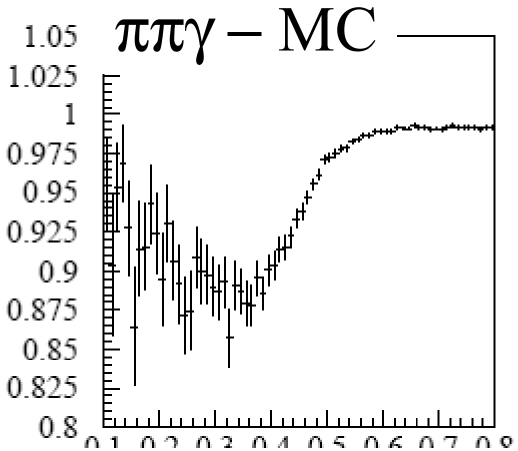
03/02/05

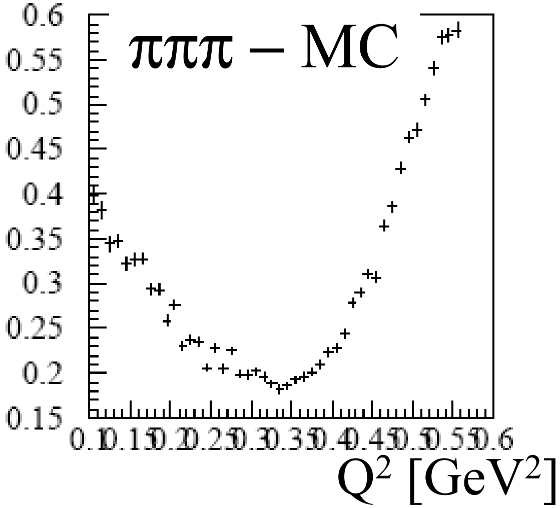
$50^o < \theta_{\pi+} < 130^o$

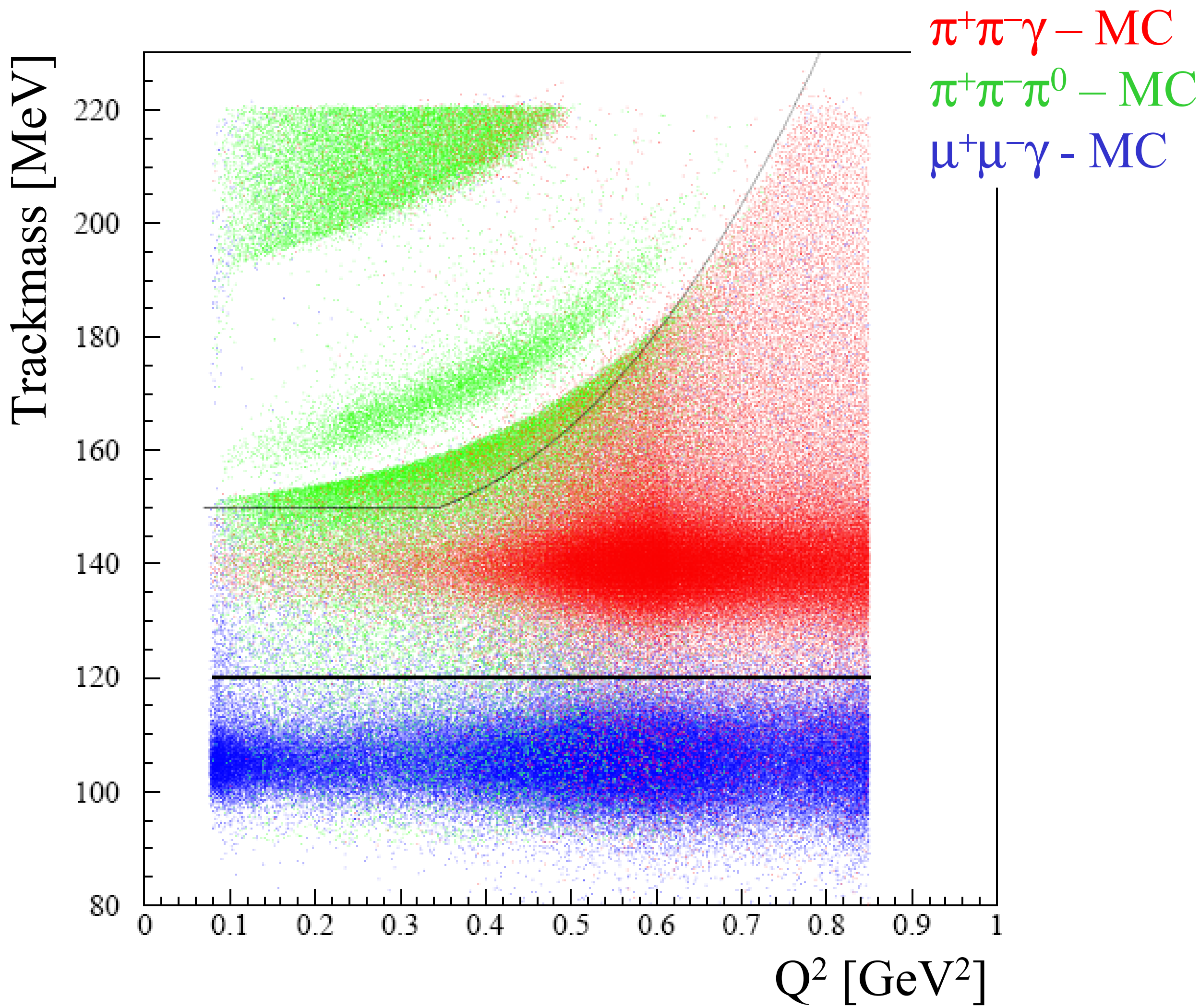
$50^o < \theta_{\pi-} < 130^o$

$45^0 < \theta_{miss} < 135^o$

$Q^2 < 0.85 GeV^2$





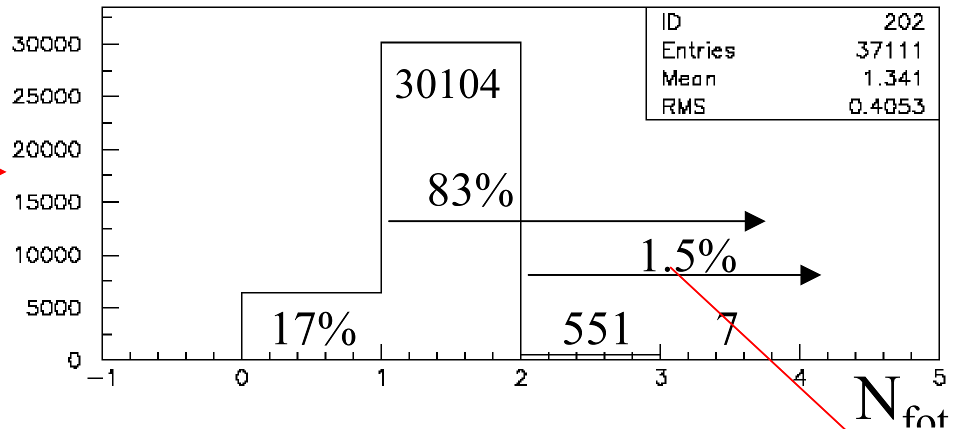


Different from the one used in s.a. analysis to reject more $\pi^+\pi^-\pi^0$ at low Q^2

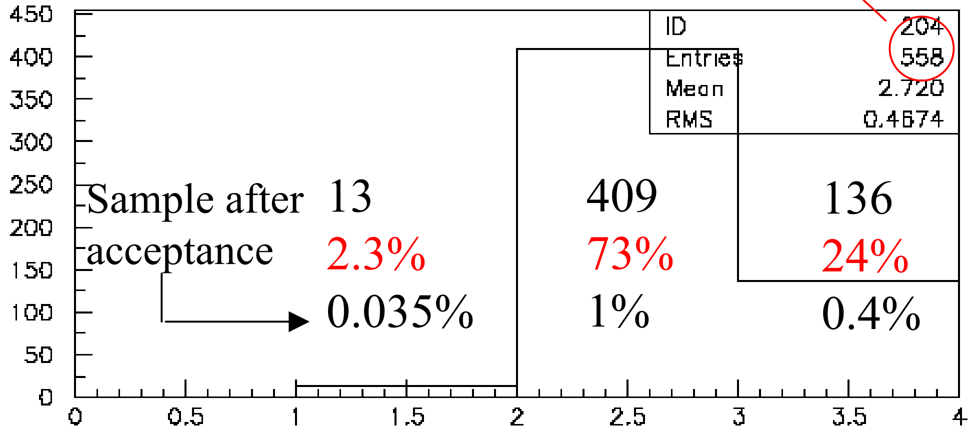
Candidate photon:
$E_\gamma > 50$ MeV
$50^o < \theta_{\pi+} < 130^o$

We use Ω in order to
- choose the right photon (in case of more photons)
- reject πππ events

$50^o < \theta_\pi < 130^o$
$45^o < \theta_\Sigma < 135^o$
$Q^2 > 0.85$ GeV^2



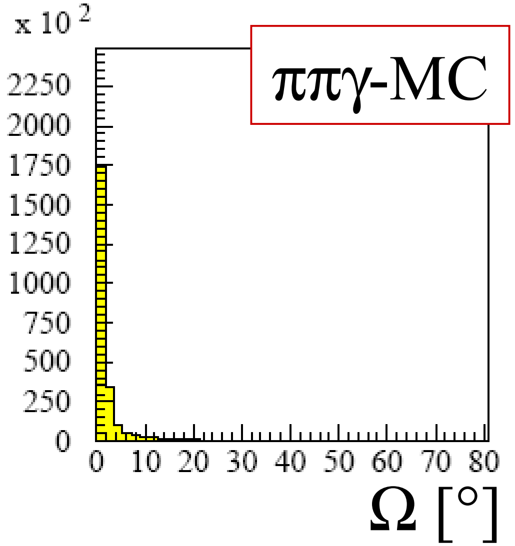
$$\Omega = a\cos\left(\frac{\vec{p}_\gamma \cdot \vec{p}_{miss}}{|\vec{p}_\gamma||\vec{p}_{miss}|}\right)$$

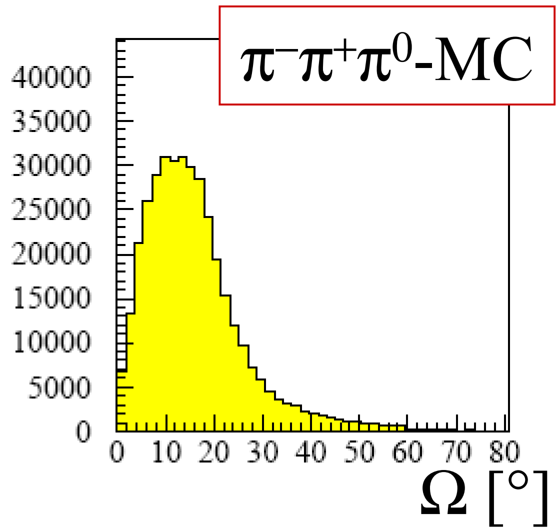


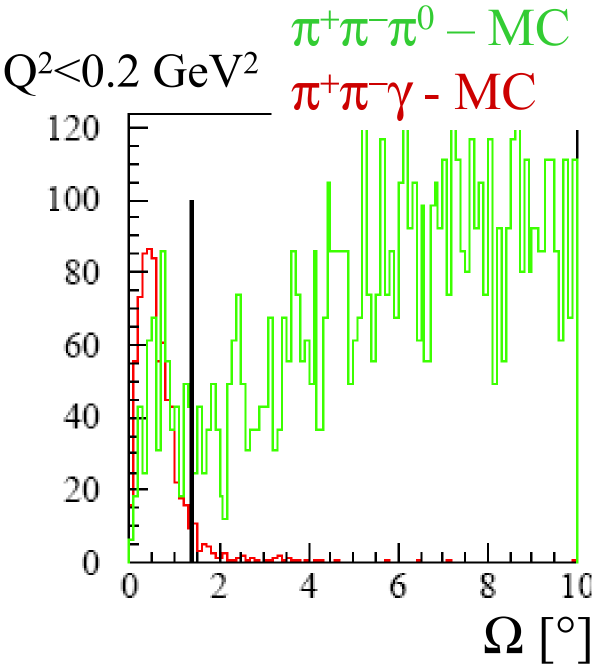
=1 means $\Omega(\gamma_1)<10^o$ and $\Omega(\gamma_2)<10^o$
=2 means $\Omega(\gamma_1)<10^o$ and $\Omega(\gamma_2)>10^o$
=1 means $\Omega(\gamma_1)>10^o$ and $\Omega(\gamma_2)>10^o$

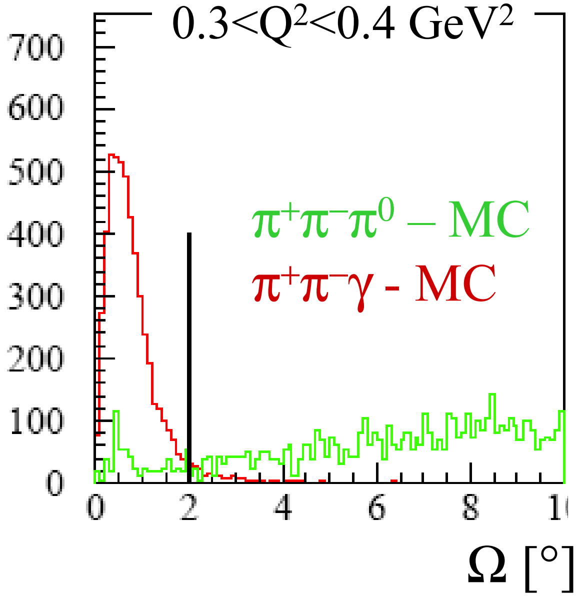
73% of the “doubt” cases is easy to classify
For the rest we take the smallest value of Ω (it is <0.5 % of the initial sample)

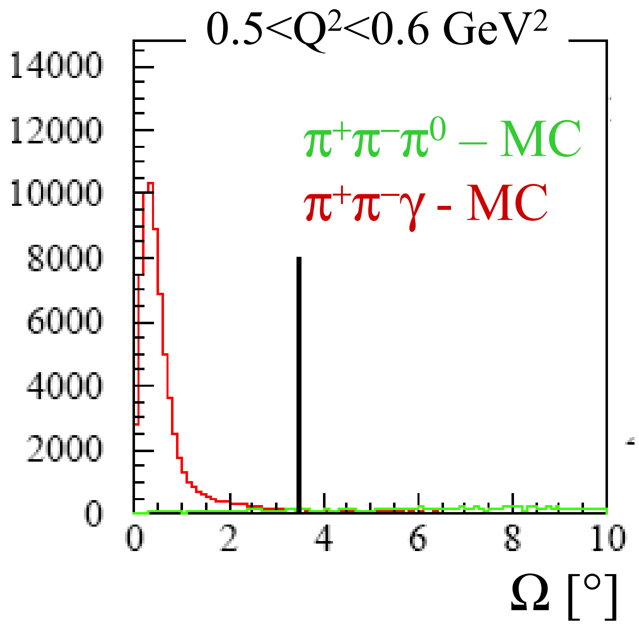
Up to now we have used $\Delta E = E_\gamma - E_{miss}$ and $\Delta\theta = \theta_\gamma - \theta_{miss}$ to distinguish $\pi\pi\gamma$ and $\pi^+\pi^-\pi^0$ events.



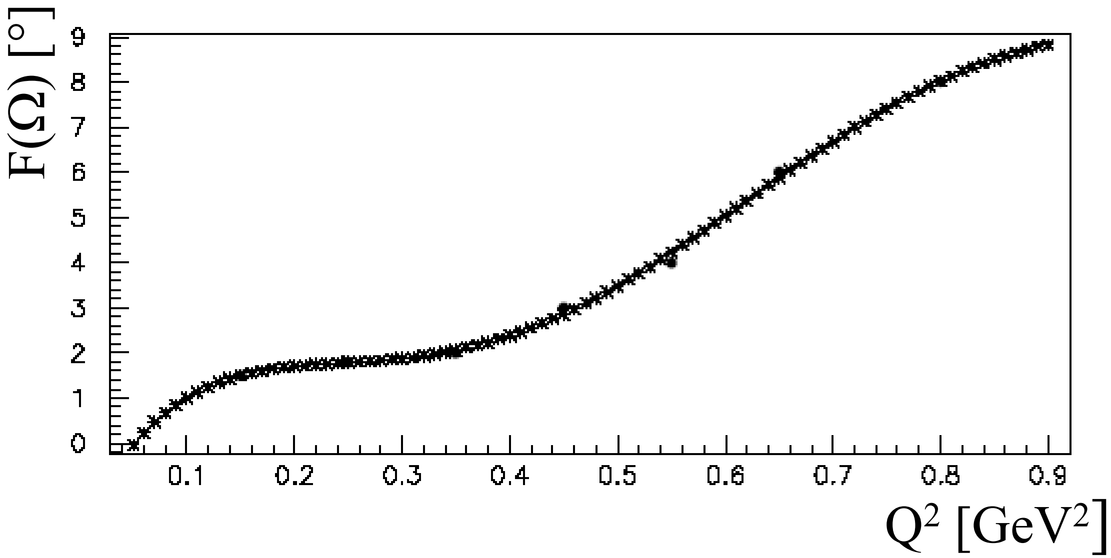


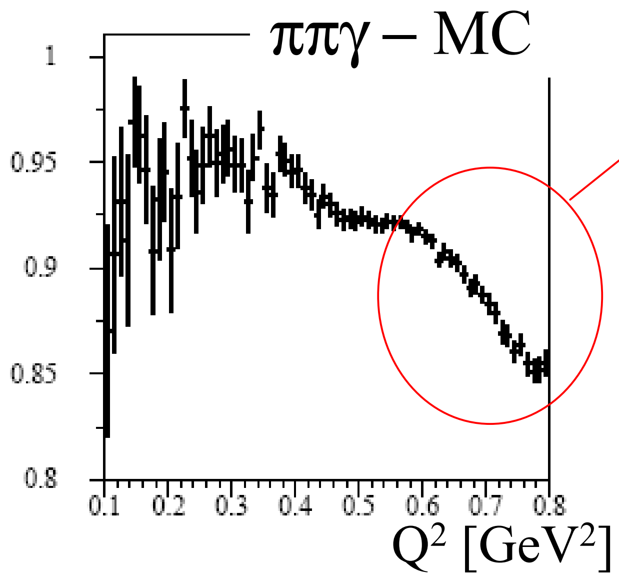




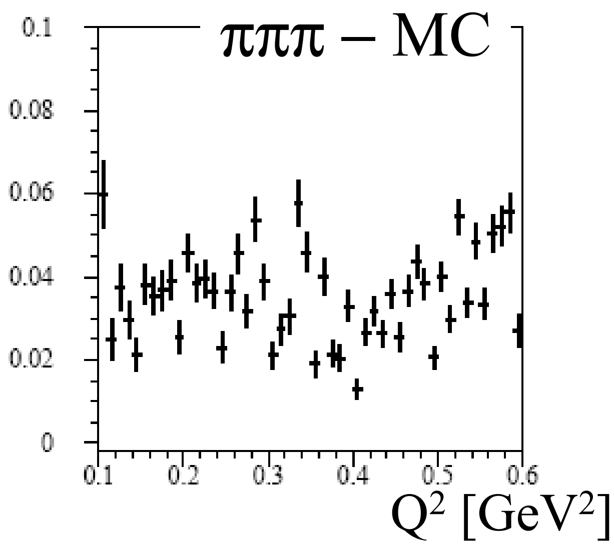


Giving a smooth shape to the cut bin by bin:





Too rigid cut in this region. No reason to cut so strictly here



$50^o < \theta_{\pi+} < 130^o$

$50^o < \theta_{\pi-} < 130^o$

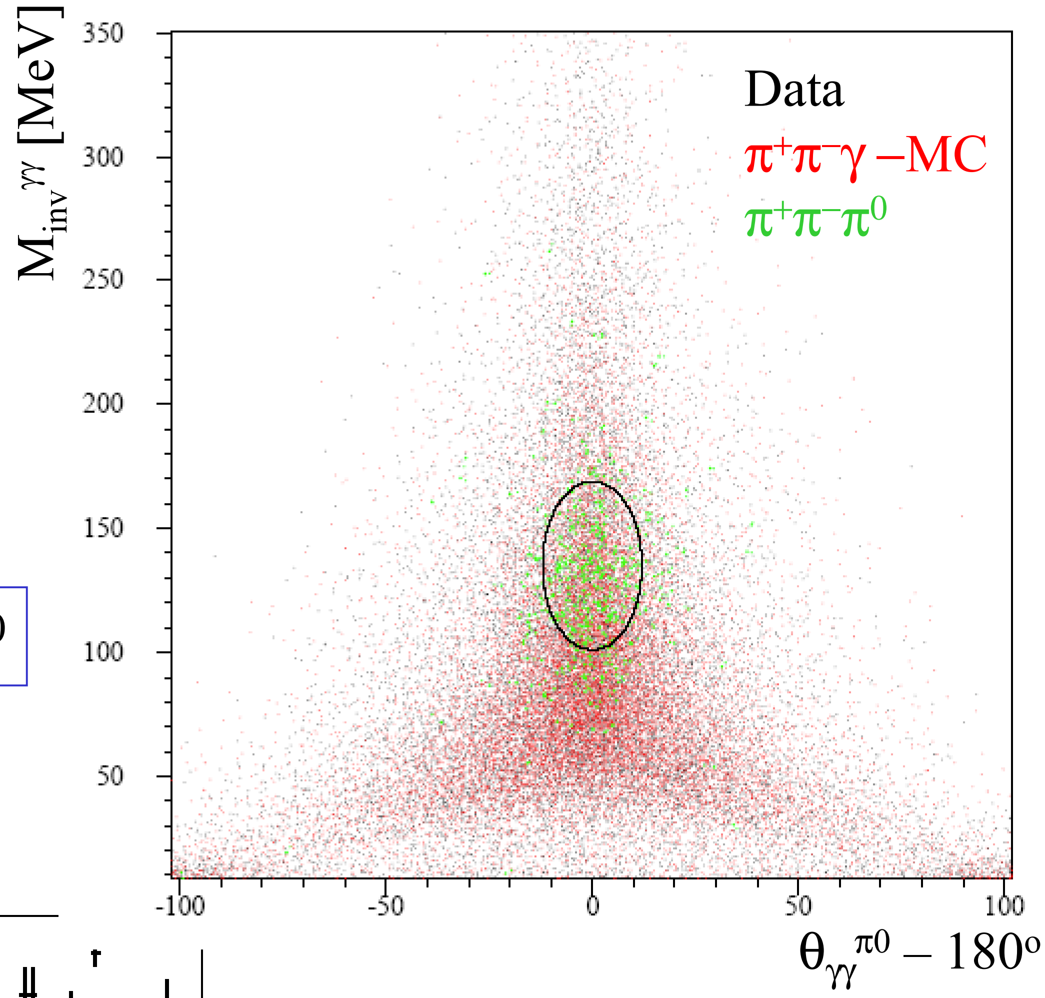
$45^0 < \theta_{miss} < 135^o$

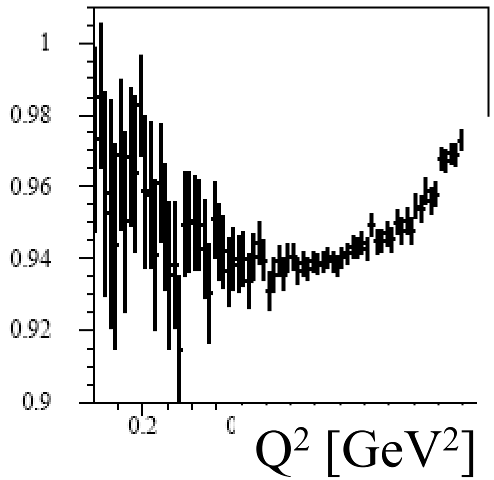
$Q^2 < 0.85 GeV^2$

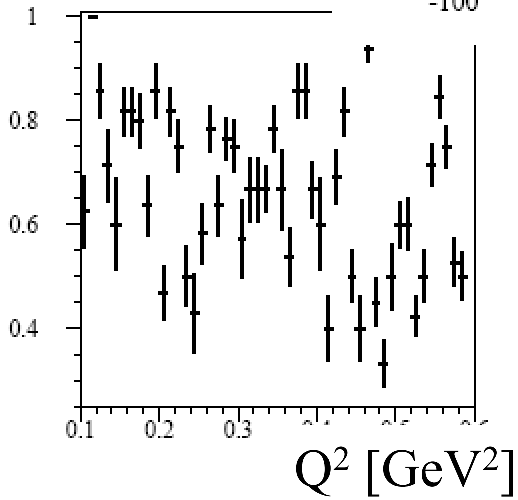
$E_\gamma > 50$ MeV

$50^o < \theta_{\pi+} < 130^o$

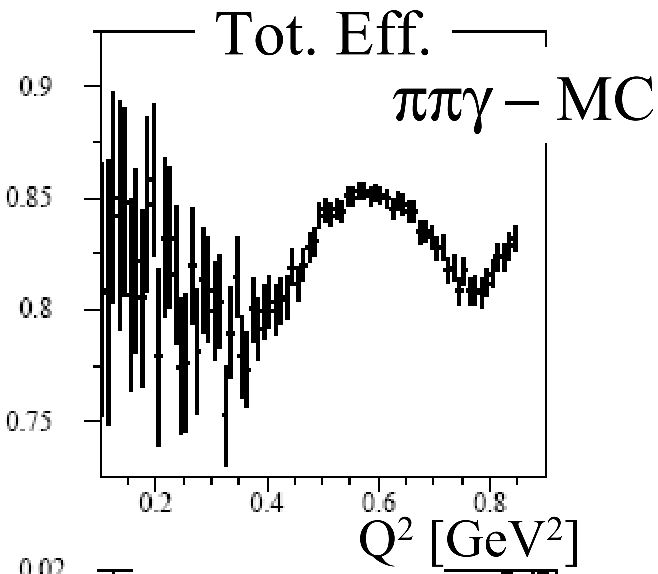
Ω cut → $M_{inv}^{\gamma\gamma}$ vs $\theta_{\gamma\gamma}^{\pi 0}$

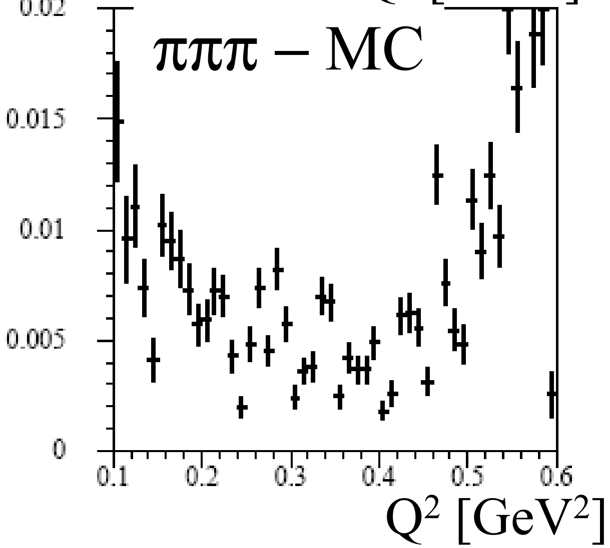


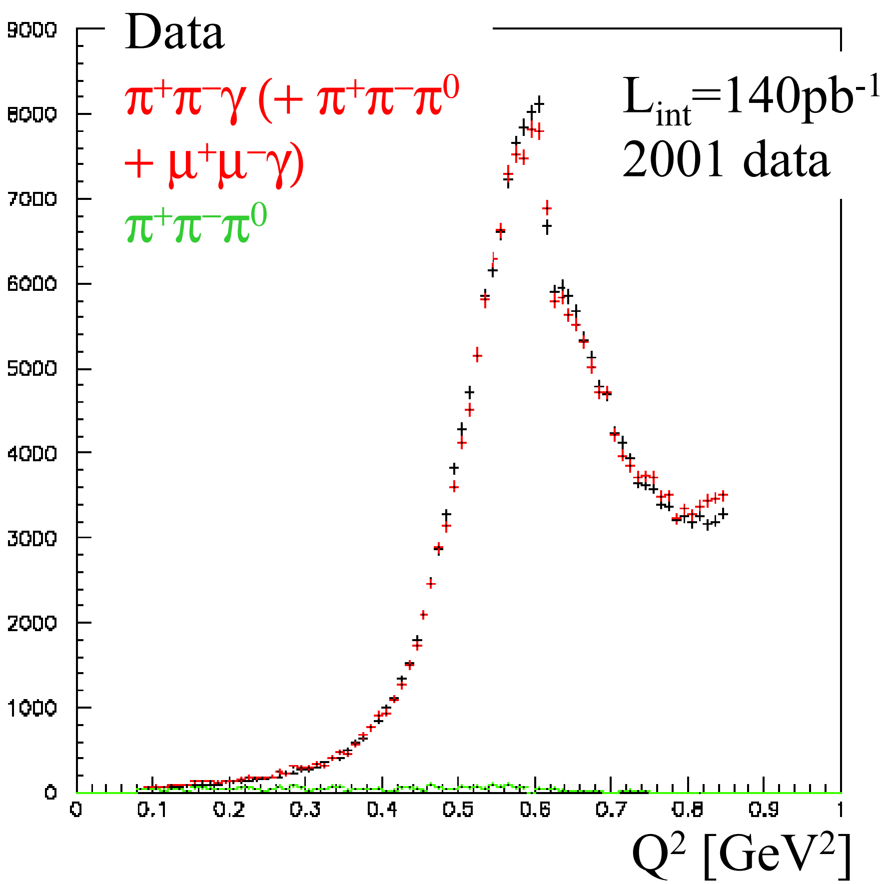


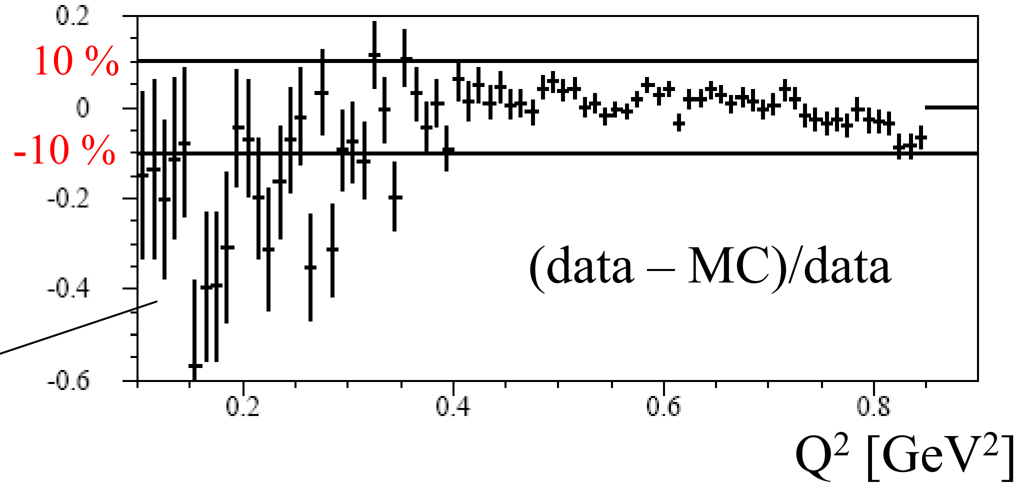


At the end of the selection:



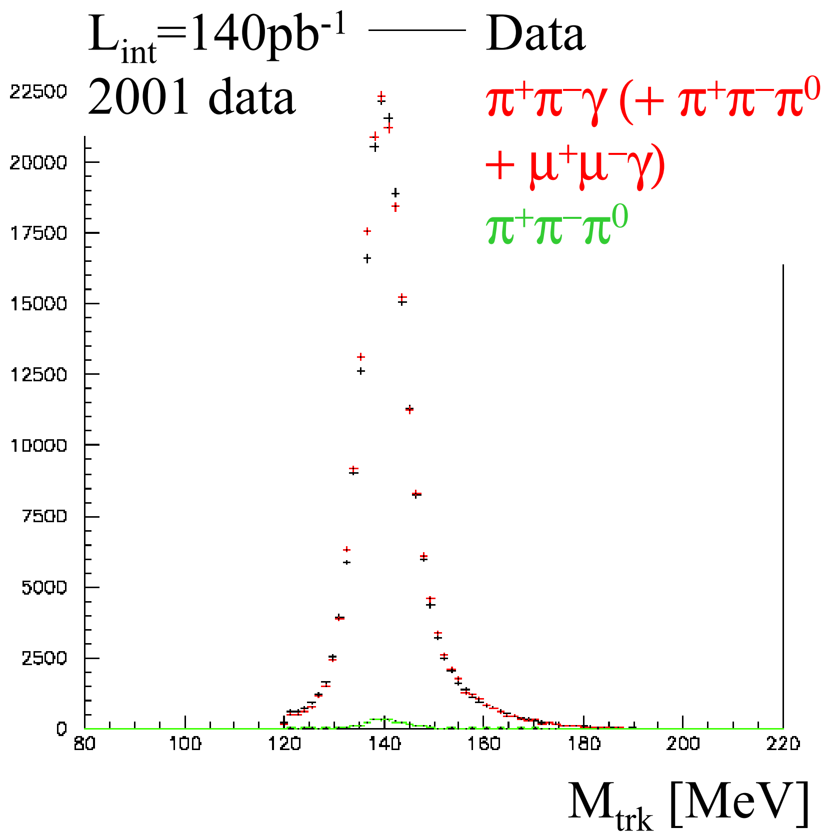


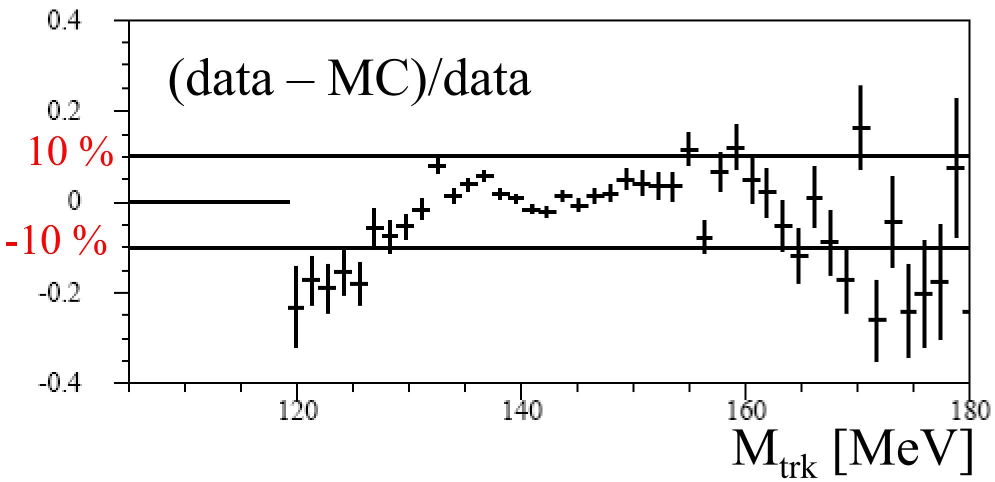




2 possible contribtions

- 3π background
- is trustable our MC here?





To remove the residual
3π background:
kinematic fit (just started)

Acceptance

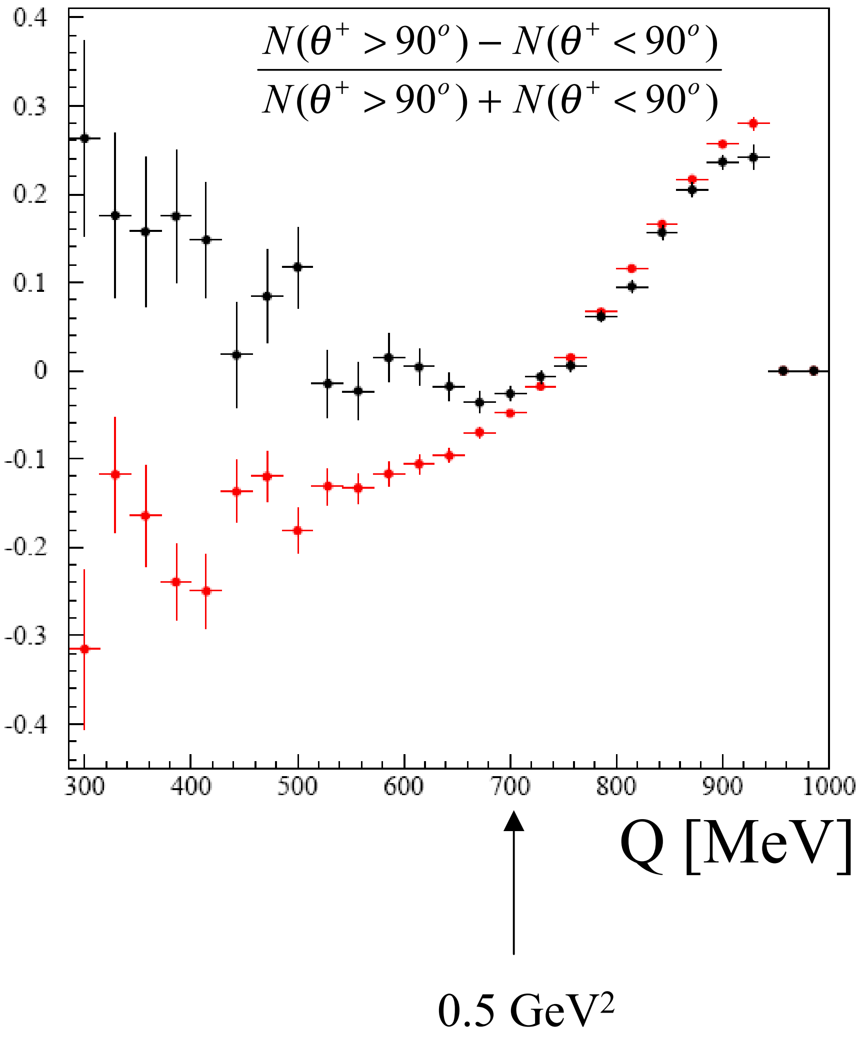
Trackmass cut

Ω cut

$M_{inv}^{\gamma\gamma}$ vs $\theta_{\gamma\gamma}^{\pi 0}$ cut

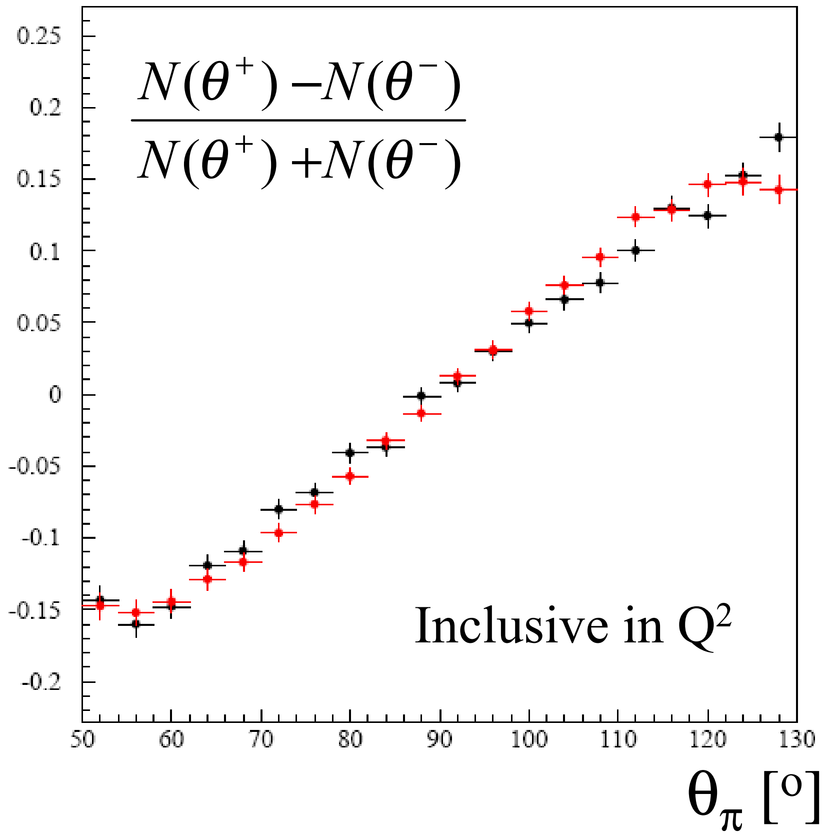
Fit in $\pi^+\pi^-\pi^0$ hypothesis

Charge asymmetry

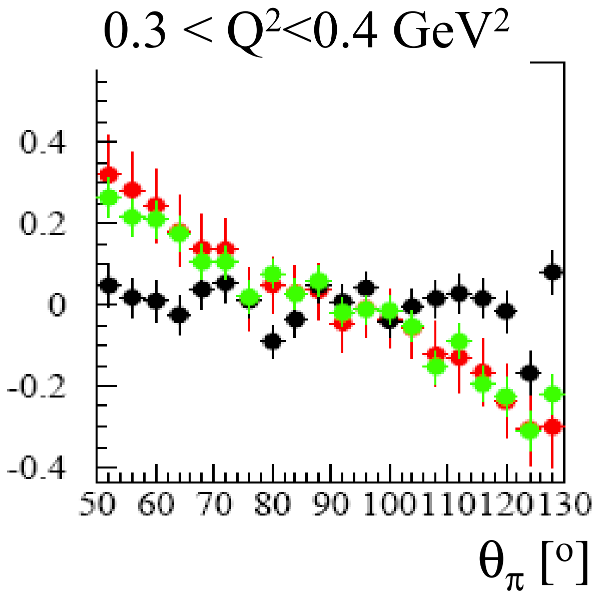


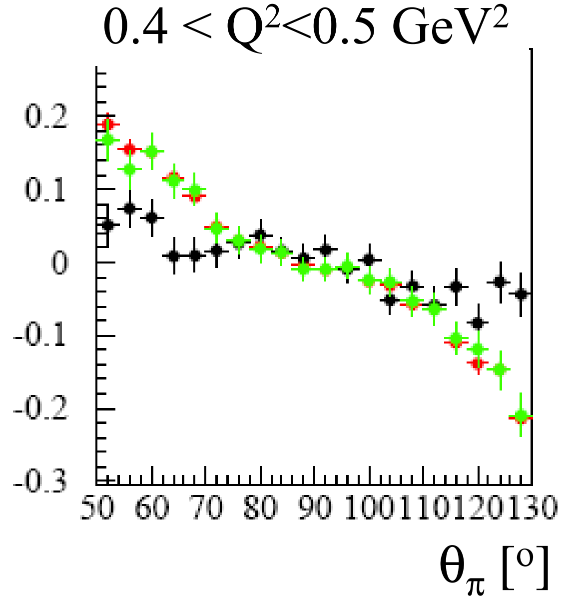
Data

ππγ - MC

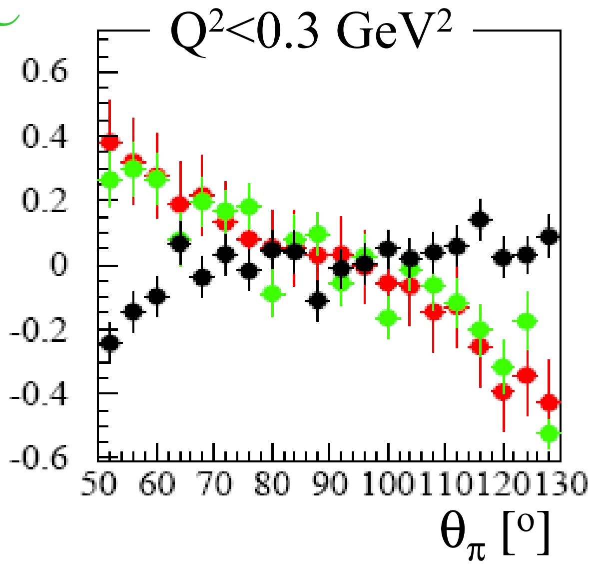


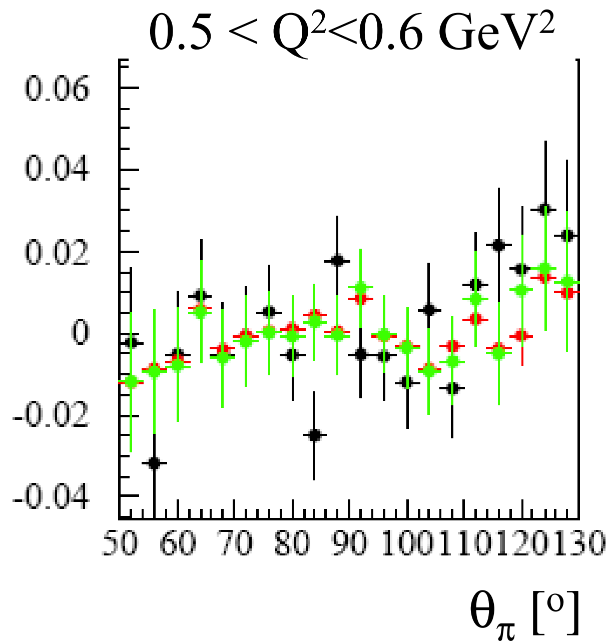
For $Q^2<0.5$ GeV^2
($Q<700$ MeV)

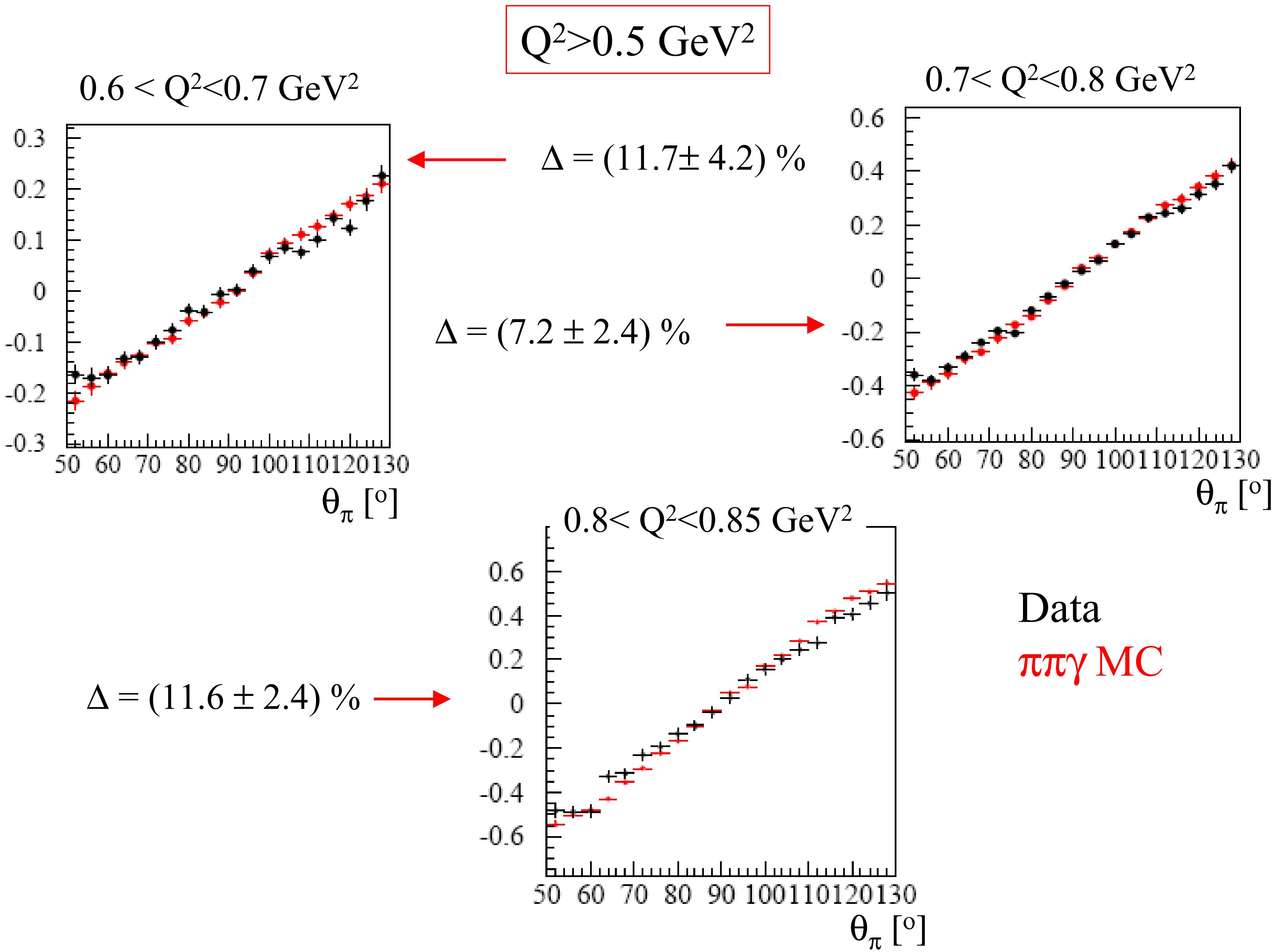




Data
ππγ MC
ππγ+3π–MC







Q²>0.5 GeV²
0.6 < Q²<0.7 GeV²
Δ = (11.7± 4.2) %
0.7< Q²<0.8 GeV²
Δ = (7.2 ± 2.4) %
0.8< Q²<0.85 GeV²
Δ = (11.6 ± 2.4) %
θπ [°]
Data
ππγ MC

Conclusion

- the acceptance cuts are almost fixed: Ω cut has to be finished
- we have started a kinematic fit under the hypothesis of $\pi\pi\pi$
- we are trying to understand the behavior of charge asymmetry