

A new possible resonance at Belle

2017. 06. 15.
Jaeyong Lee

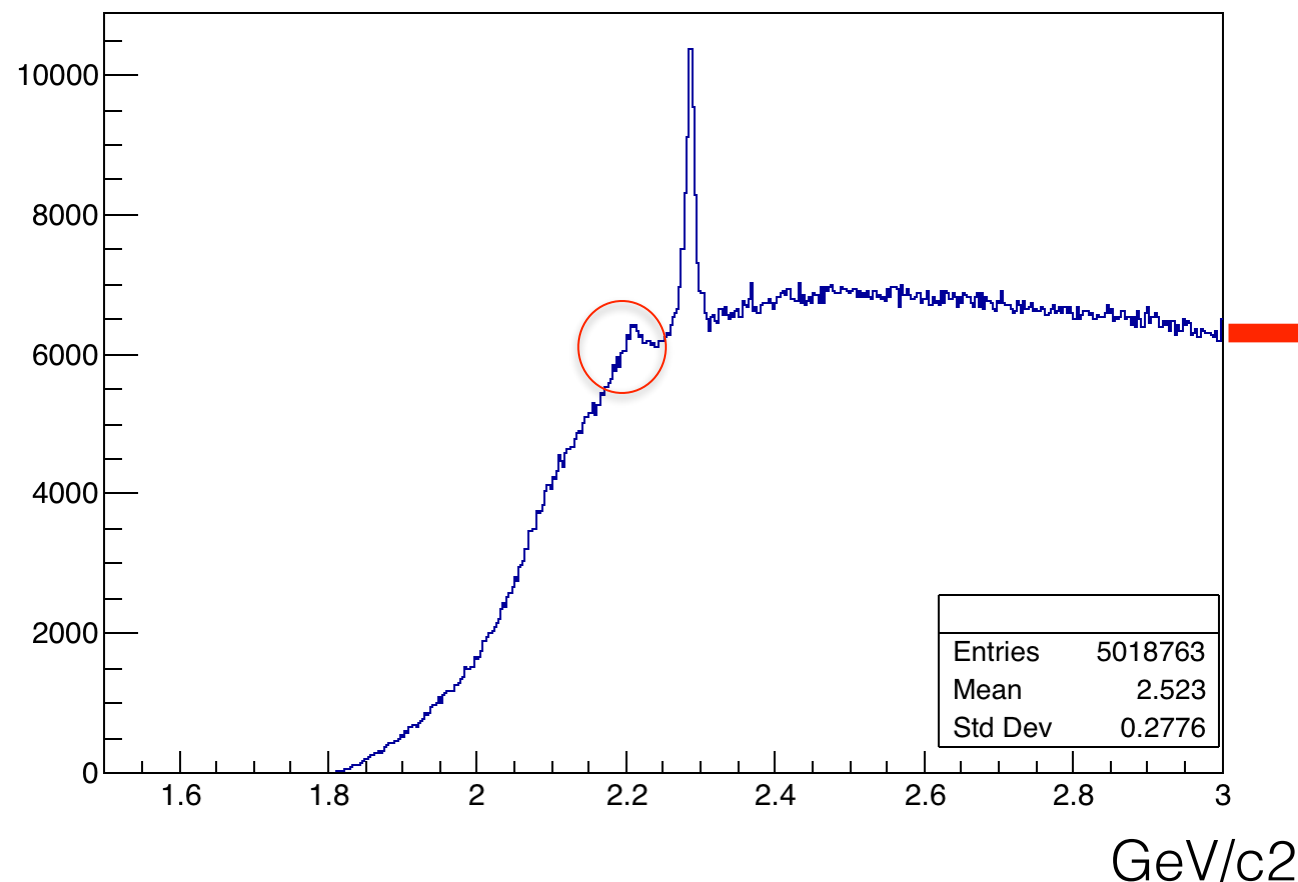
with kfitter vs without kfitter

$$\Lambda_c^+ \rightarrow \eta \Lambda \pi^+ (\eta \rightarrow \gamma\gamma)$$

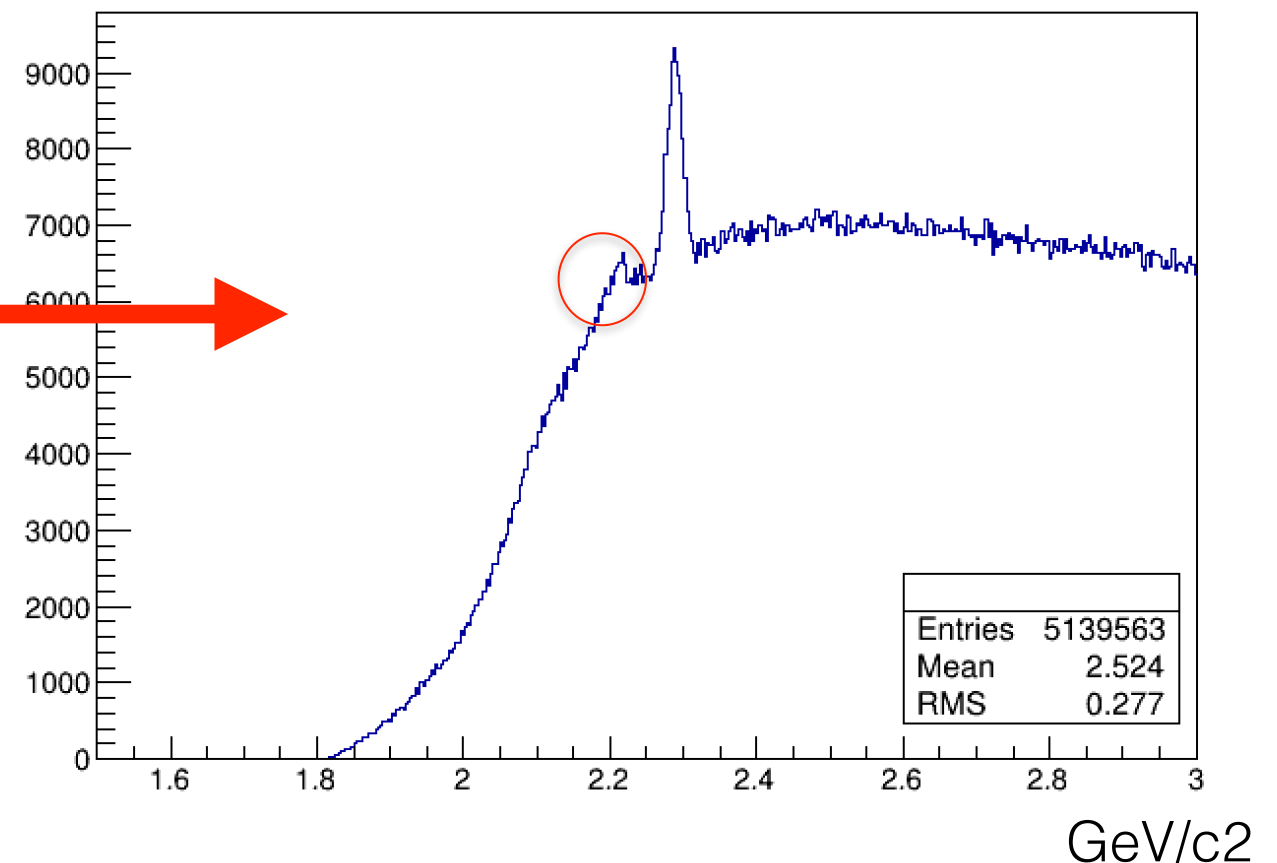
kfitter

without kfitter

lcms {xp>0.55&&ems>0.54&&ems<0.56&&lms>1.11&&lms<1.12}



lcmsno {ems>0.54&&ems<0.56&&xp>0.55&&lms>1.11&&lms<1.12}



Not from kinematical function
It is likely from

$e+e^- \rightarrow \Lambda_c^+ \rightarrow \eta \Sigma \pi^+ (\eta \rightarrow \gamma\gamma, \Sigma \rightarrow \Lambda \gamma)$ 100%, one γ missing

Current Jobs

1. Optimization of Lambdac peak using Generic MC
2. Dalitz Plot & peaks from 1-d Histogram identification (Lambdac +eta channel)
3. Study of Breit-Wigner function near mass threshold

Backup

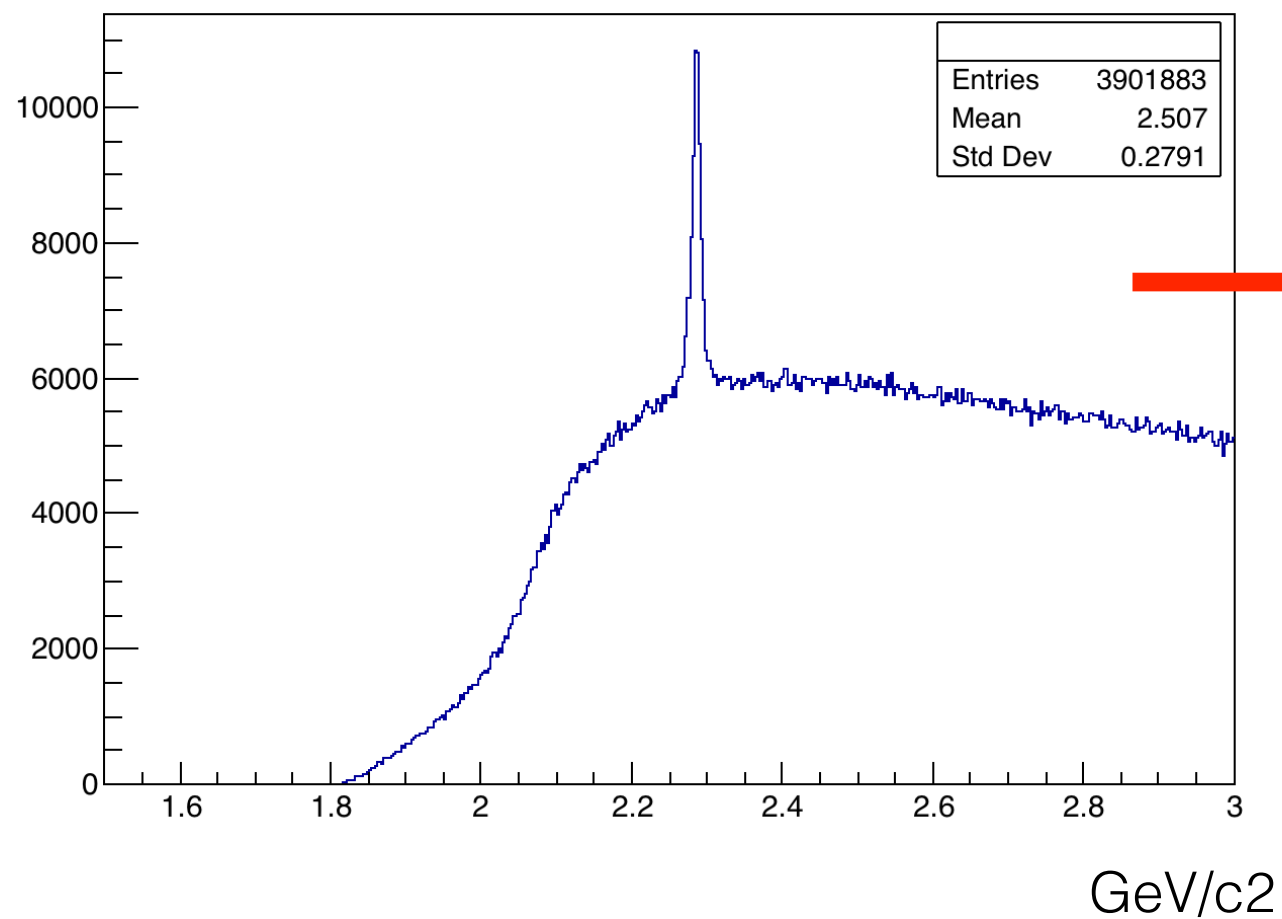
MC (ALL) vs Real Data (ALL)

$$\Lambda_c^+ \rightarrow \eta \Lambda \pi^+ (\eta \rightarrow \gamma\gamma)$$

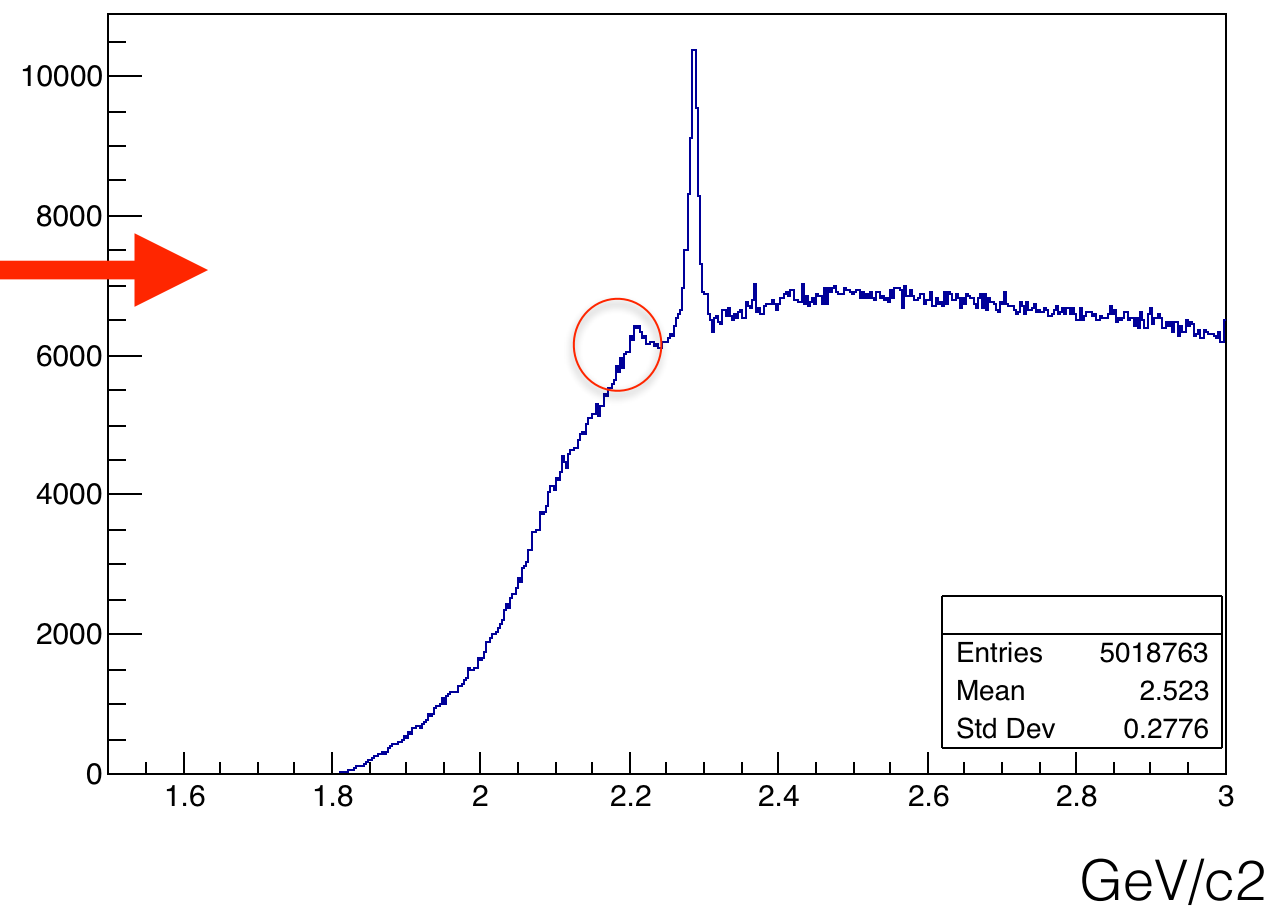
MC (All)

Real (All)

lcms {xp>0.55&&ems>0.54&&ems<0.56&&lms>1.11&&lms<1.12}



lcms {xp>0.55&&ems>0.54&&ems<0.56&&lms>1.11&&lms<1.12}

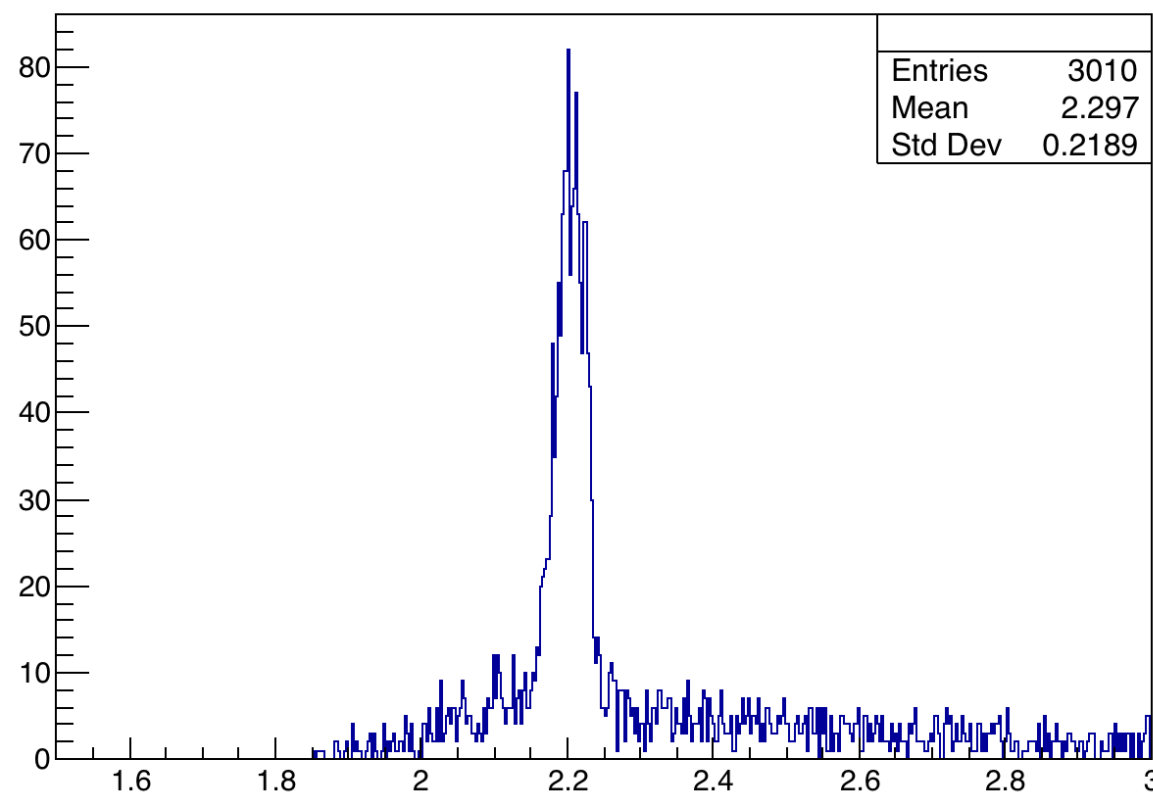


Signal MC 50000 Λ_c^+ event generated

$e+e-\rightarrow\Lambda_c^+\rightarrow\eta\Sigma\pi^+$ ($\eta\rightarrow\gamma\gamma,\Sigma\rightarrow\Lambda\gamma$) 100%, one γ missing

Signal MC (50000 Λ_c^+)

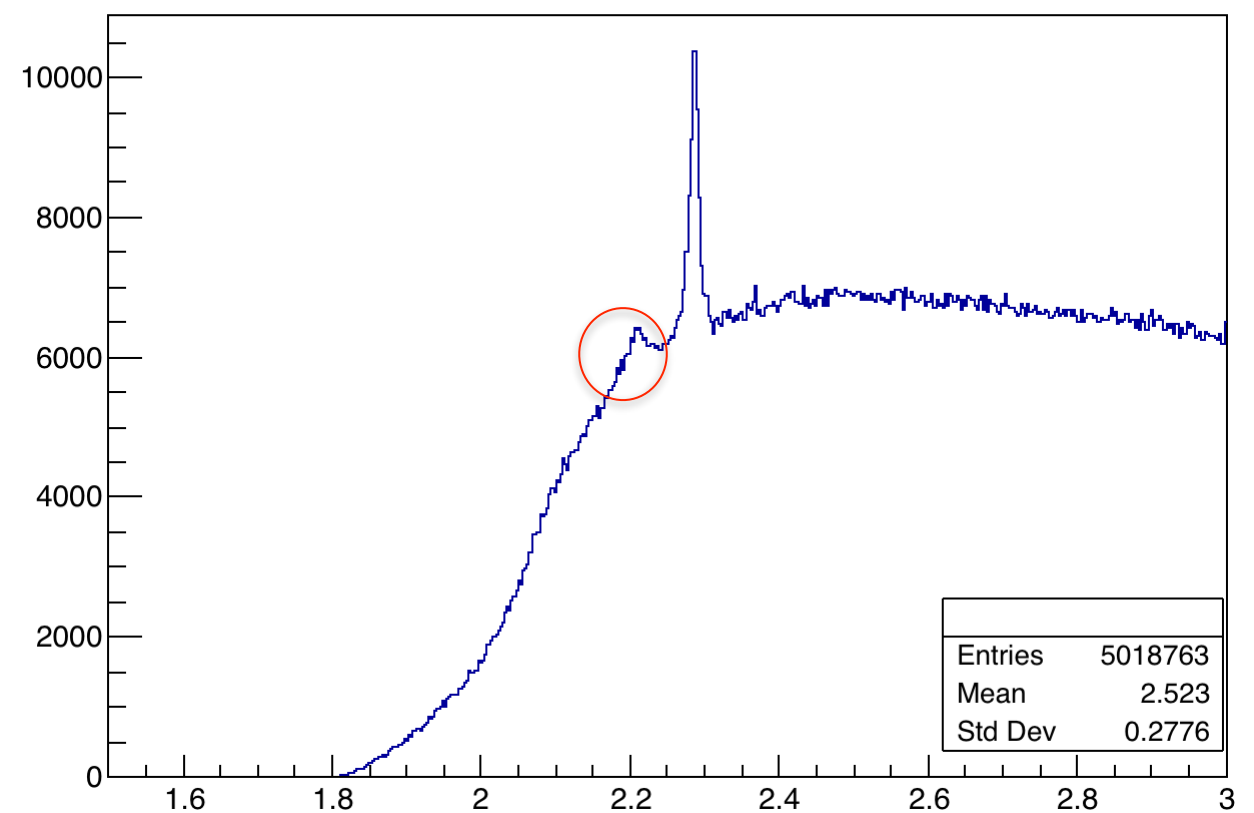
lcms {xp>0.55&&ems>0.54&&ems<0.56&&lms>1.11&&lms<1.12}



GeV/c²

Real (All)

lcms {xp>0.55&&ems>0.54&&ems<0.56&&lms>1.11&&lms<1.12}



GeV/c²

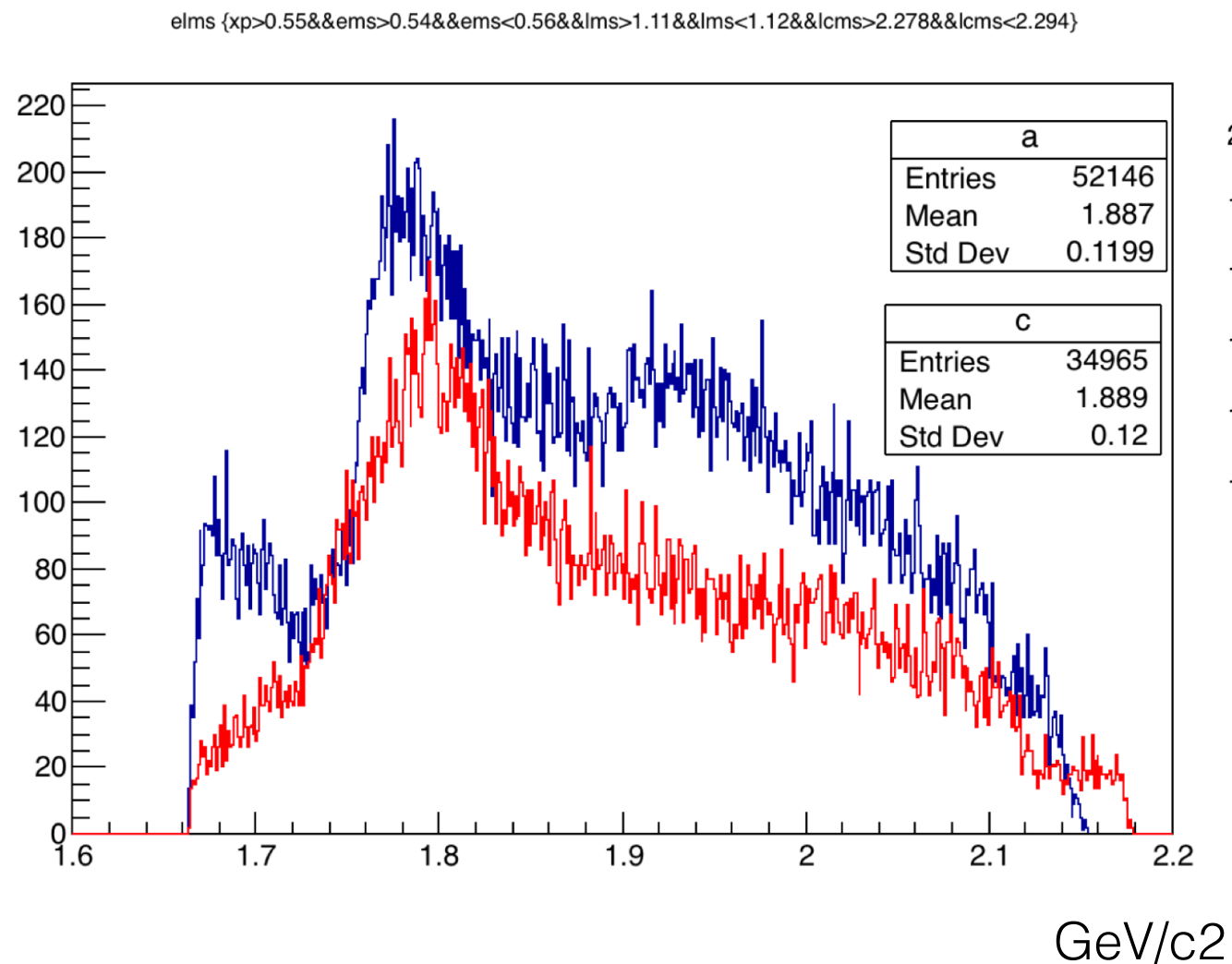
Invariant mass spectrum without kinematical fitting

→ Analysis program is running

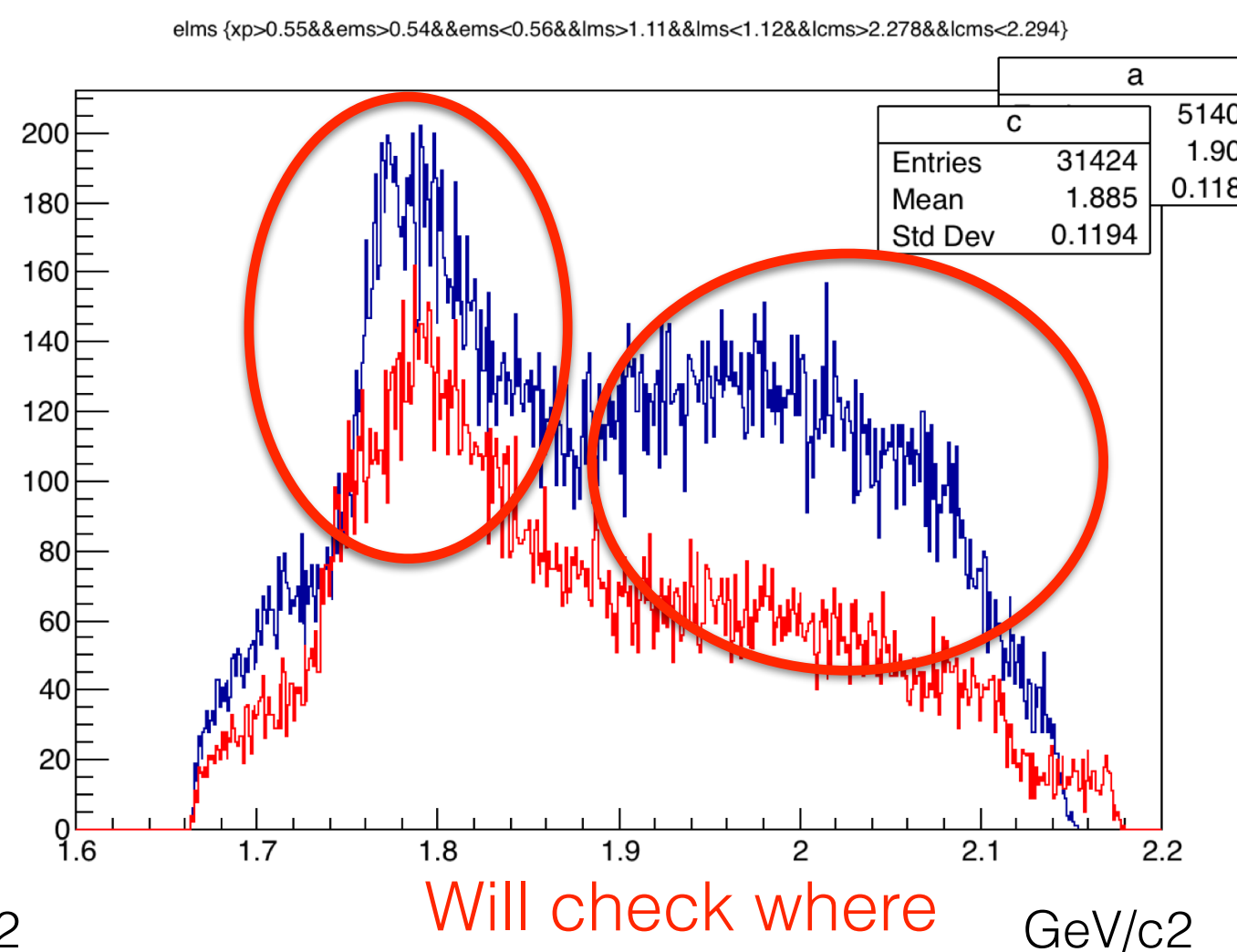
Eta lambda invariant mass

all data, $\Lambda_c^+ \rightarrow \eta \Lambda \pi^+ (\eta \rightarrow \gamma\gamma)$

Data (all)



MC (all)



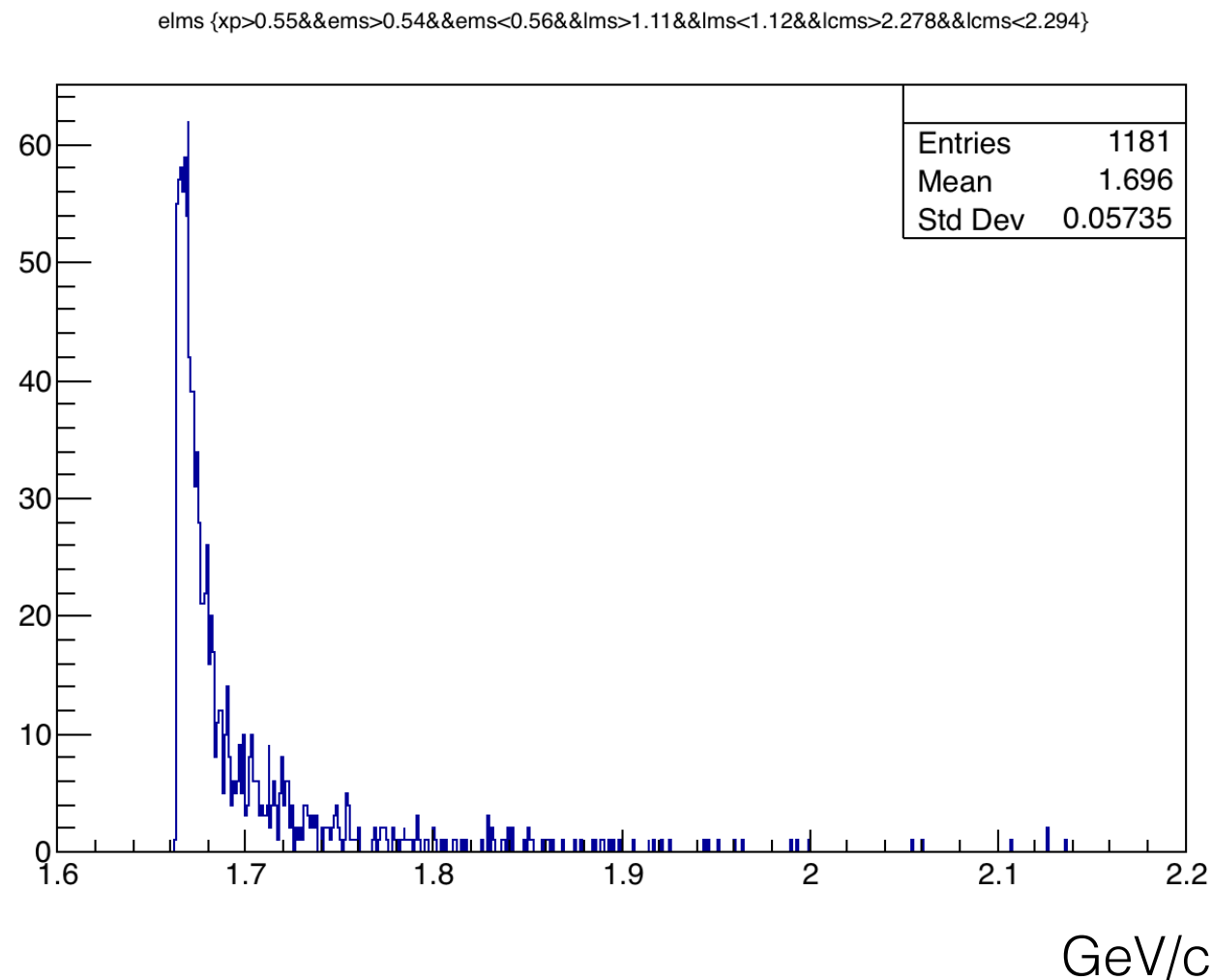
Will check where
the enhancements come from

Red: Side band, Blue: Λ_c^+ Signal

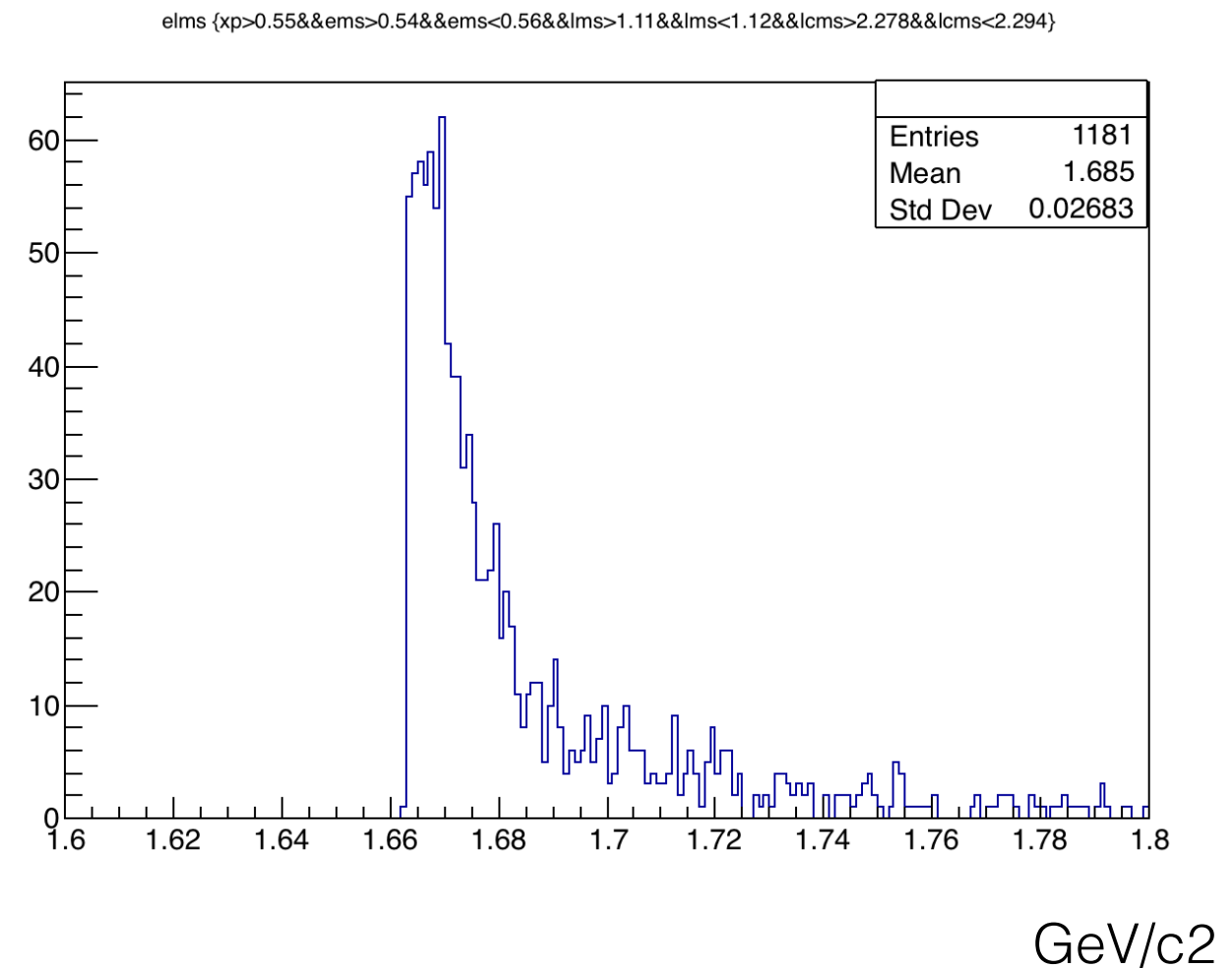
Signal MC 50000 Λ_c^+ events

$$e+e^- \rightarrow \Lambda_c^+ \rightarrow \Lambda(1670)\pi^+ \rightarrow \eta\Lambda\pi^+(\eta \rightarrow \gamma\gamma) \text{ 100\%}$$

Signal MC (50000 Λ_c^+)



Signal MC (50000 Λ_c^+)



Will do signal MC with new particle (1663)

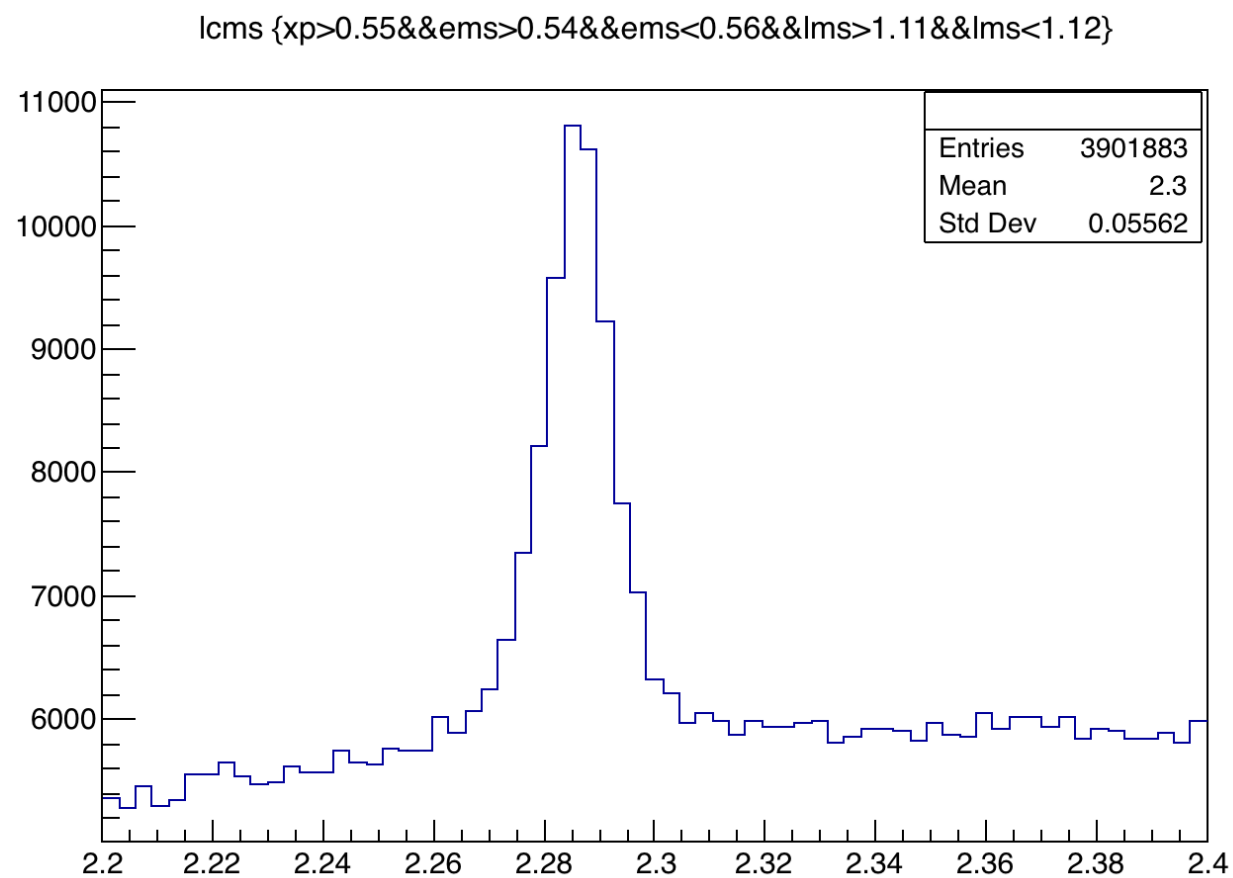
Backup

Signal MC 50000 Λ_c^+ events

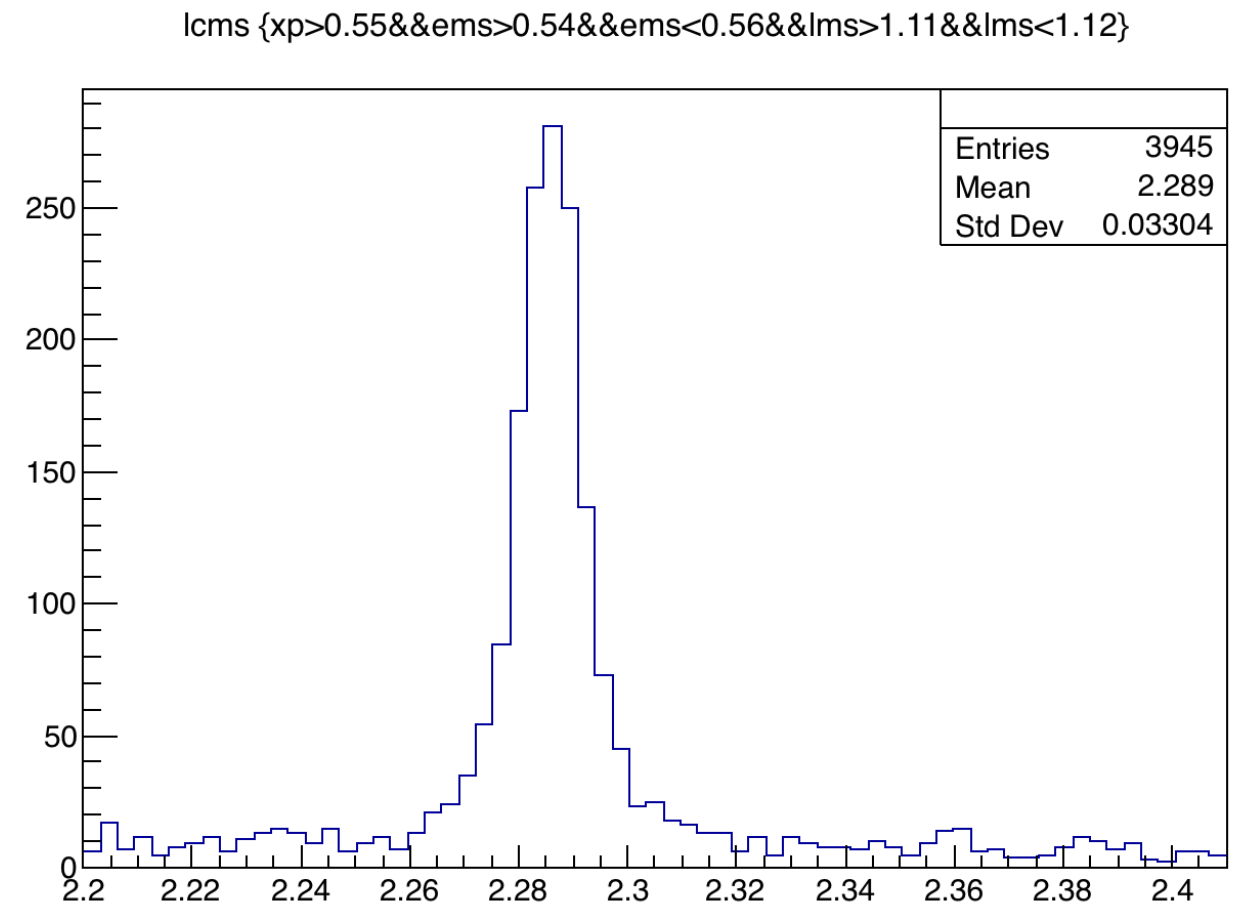
$$e+e-\rightarrow\Lambda_c^+\rightarrow\eta\Lambda\pi^+\ (\eta\rightarrow\gamma\gamma)\ 100\%$$

MC (exp63)

Signal MC (50000 Λ_c^+)



GeV/c2



GeV/c2

Selection Criteria

Cut:

single gamma E in endcap region > 100 MeV, in Barrel region > 50 MeV for π^0 + mass cut (from 120 to 150)

$R(K|\pi) < 0.6$, $R(P|\pi) < 0.6$, $R(e) < 0.9$, $nSVD > 0$,
impact parameter $dr < 0.1$ cm $dz < 2.0$ cm for charged pions

Mdst good lambda = 1 or 2 for lambda selection

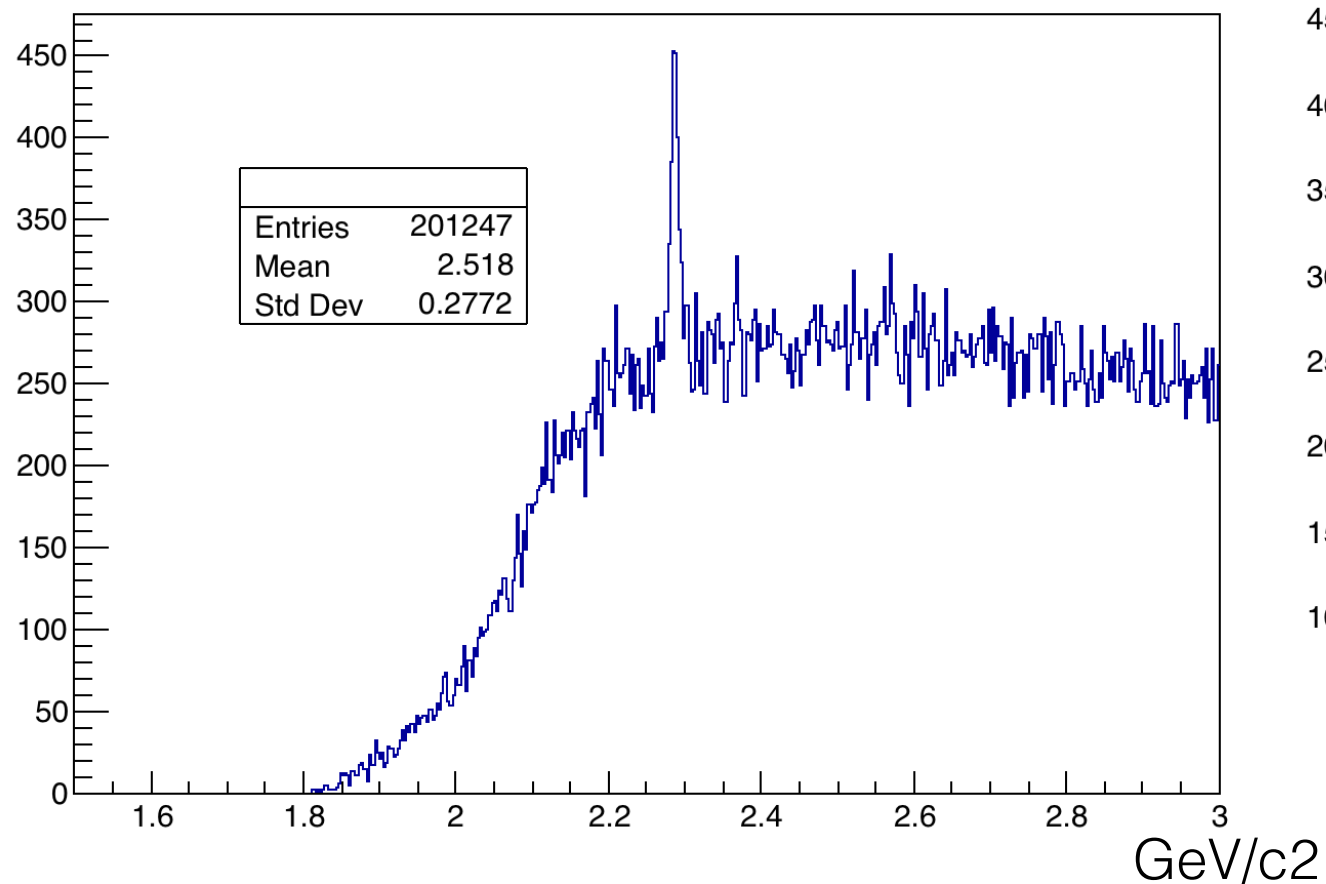
Real Data vs Generic MC

(exp.63 whole data) - 2 gammas

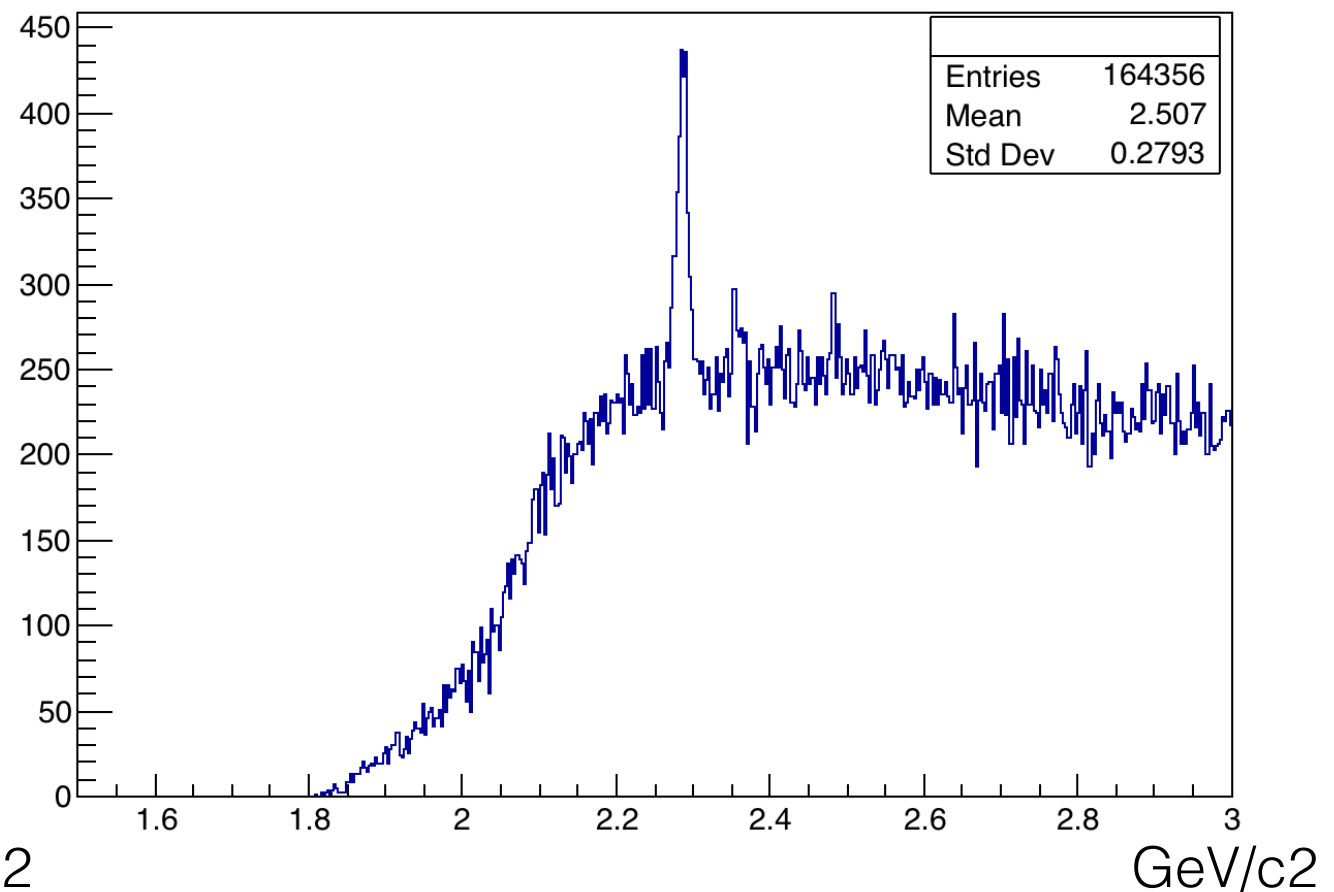
$$\Lambda_c^+ \rightarrow \eta \Lambda \pi^+ (\eta \rightarrow \gamma\gamma)$$

Real (exp63 whole data) MC (exp63 on resonance only)

lcms {xp>0.55&&ems>0.54&&ems<0.56&&lms>1.11&&lms<1.12}



lcms {xp>0.55&&ems>0.54&&ems<0.56&&lms>1.11&&lms<1.12}

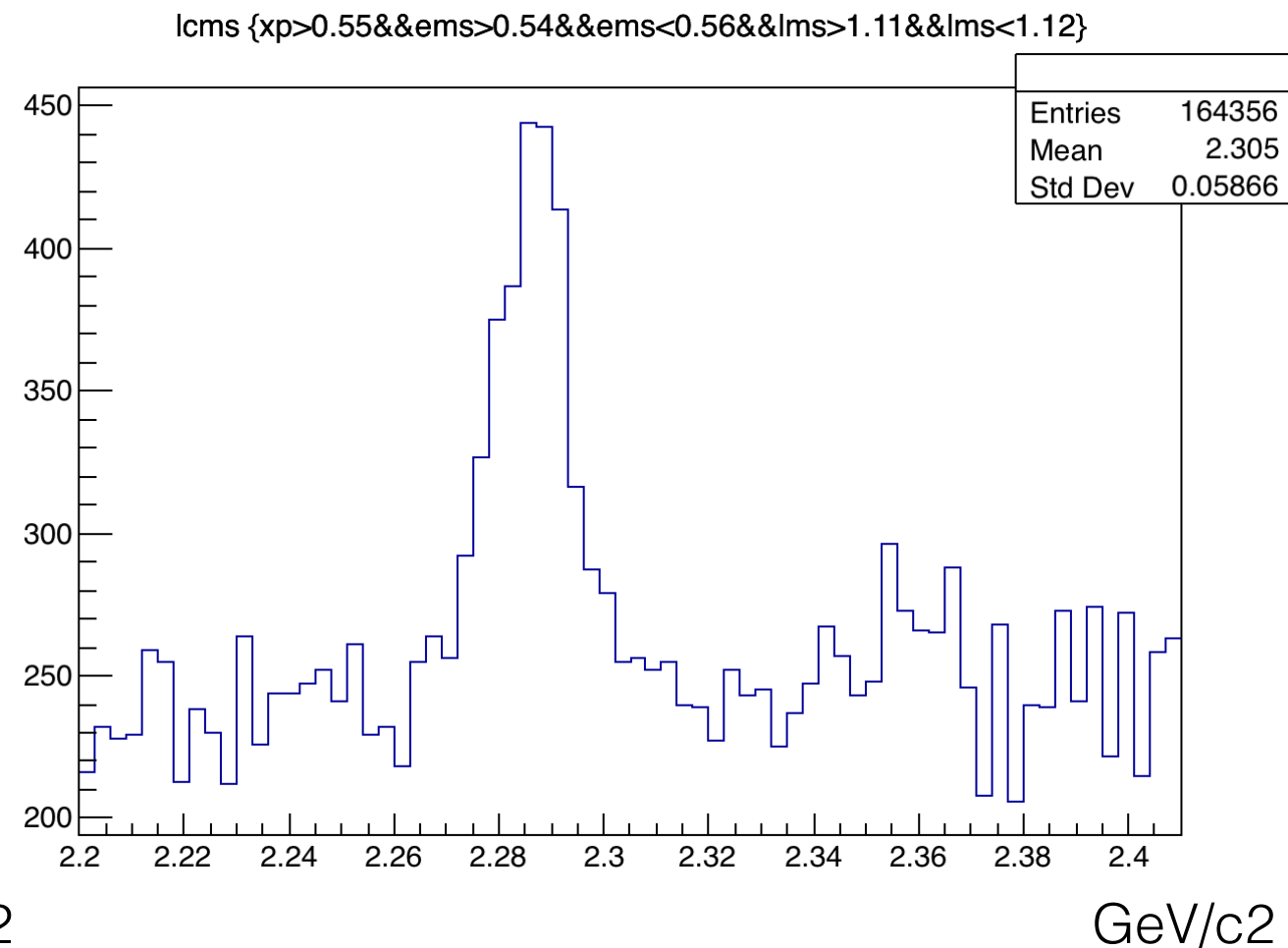
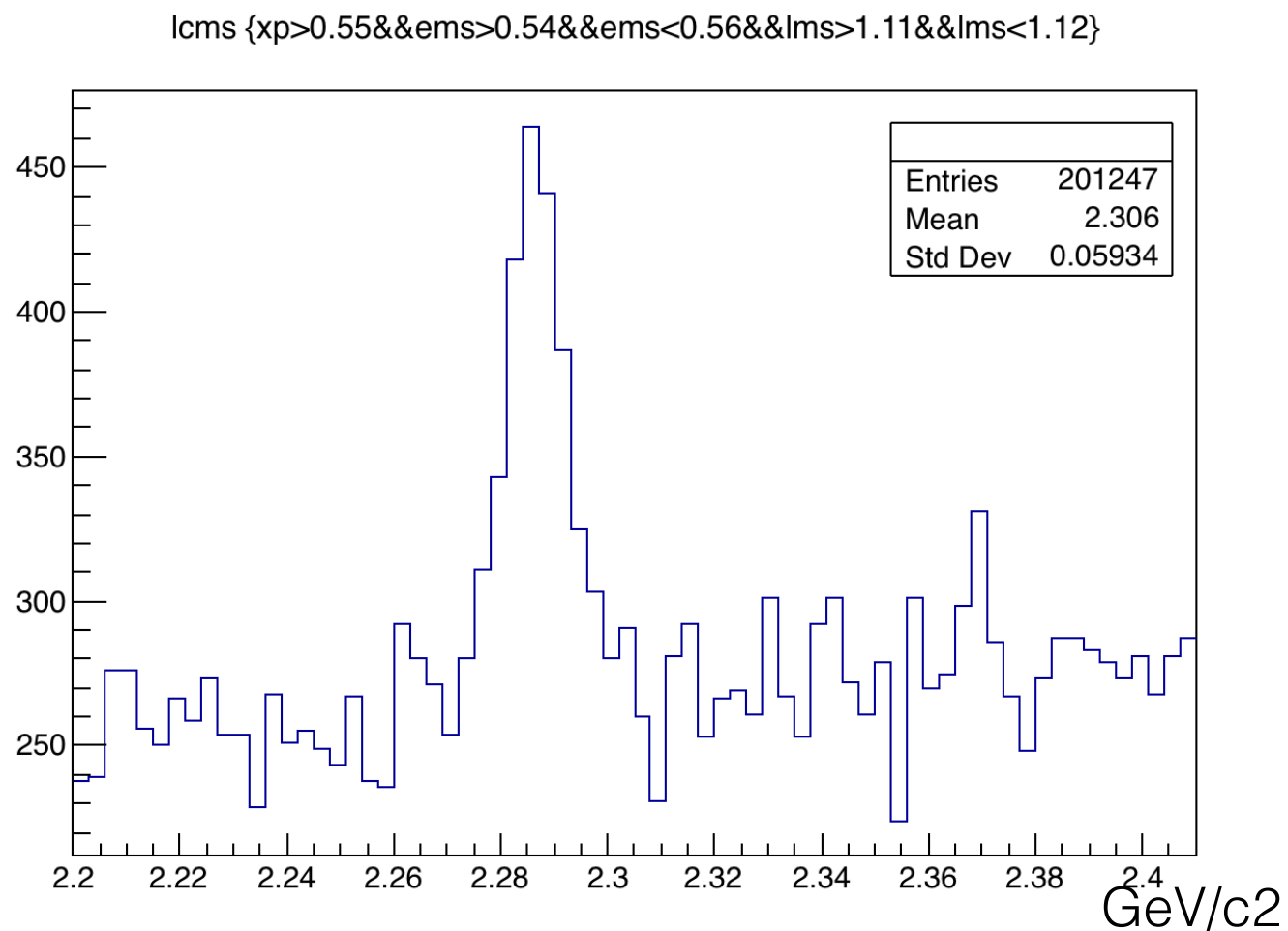


Real Data vs Generic MC

(exp.63 whole data) - 2 gammas

$$\Lambda_c^+ \rightarrow \eta \Lambda \pi^+ (\eta \rightarrow \gamma\gamma)$$

Real (exp63 whole data) MC (exp63 on resonance only)



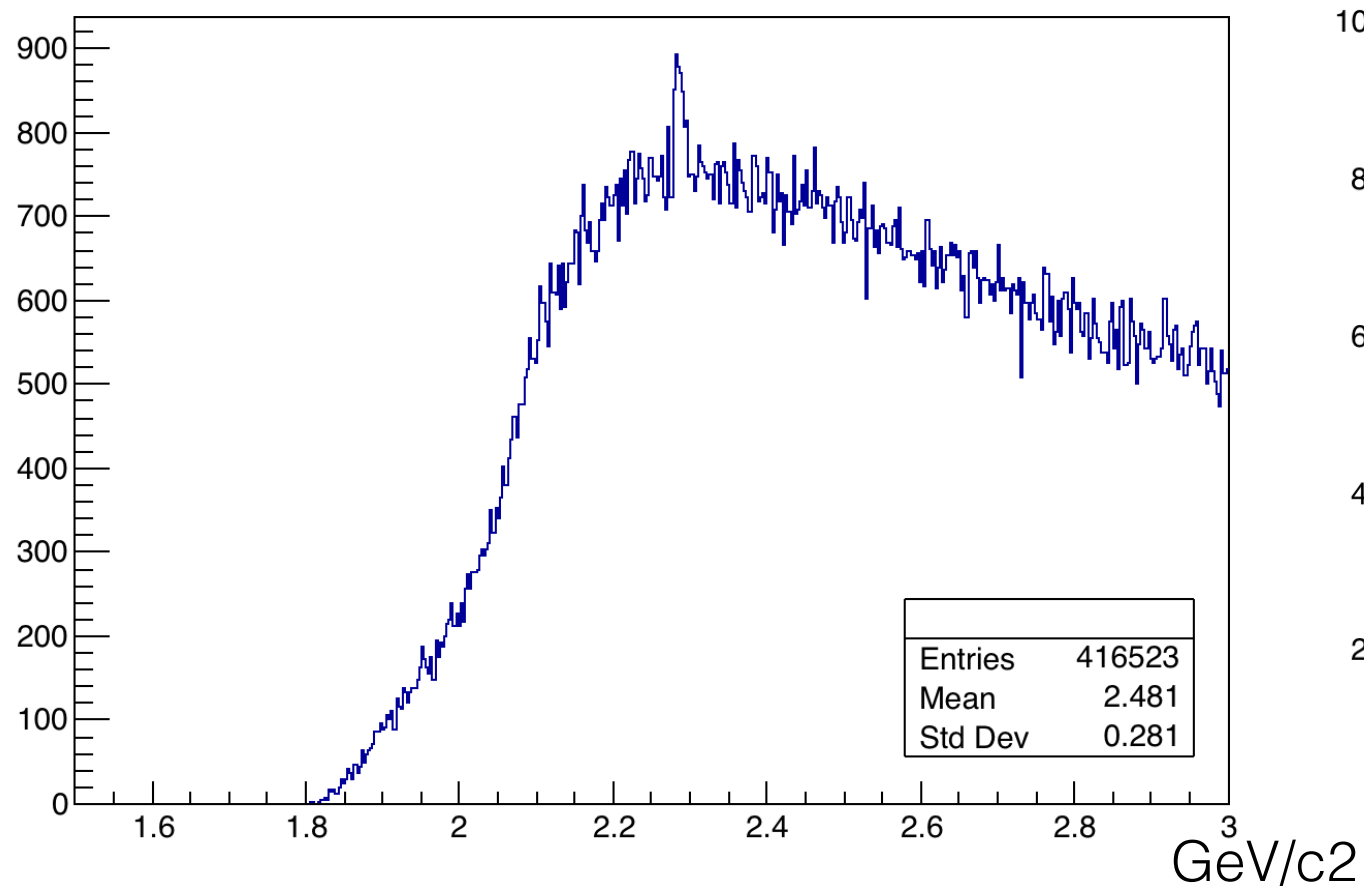
Real Data vs Generic MC

(exp.63 whole data) - 3 pions

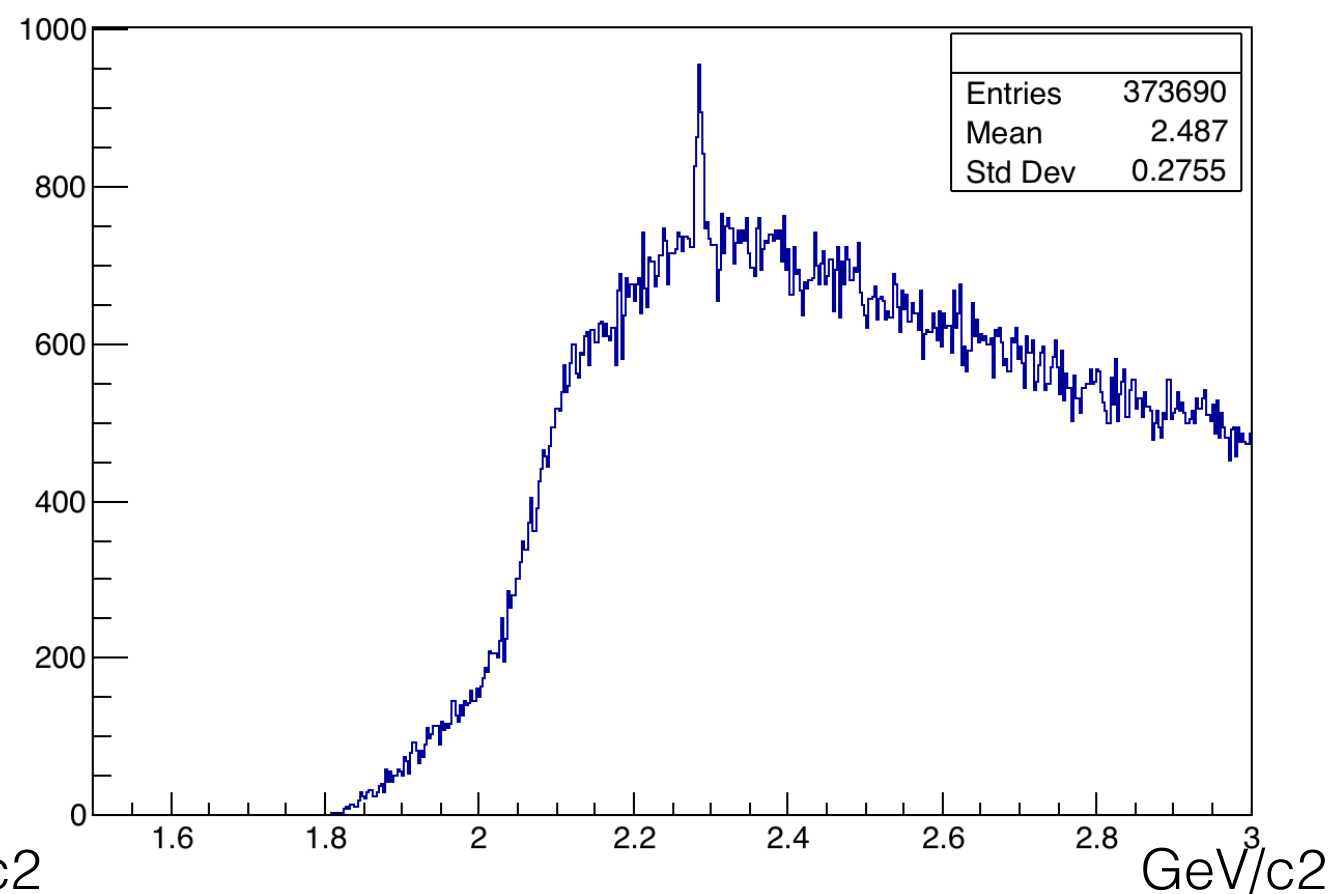
$\Lambda_c^+ \rightarrow \eta \Lambda \pi^+ (\eta \rightarrow \pi^+ \pi^- \pi^0)$

Real (exp63 whole data) MC (exp63 on resonance only)

lcms {xp>0.55&&ems>0.54&&ems<0.56&&lms>1.11&&lms<1.12}



lcms {xp>0.55&&ems>0.54&&ems<0.56&&lms>1.11&&lms<1.12}



Real Data vs Generic MC

(exp.63 whole data) - 3 pions

$$\Lambda_c^+ \rightarrow \eta \Lambda \pi^+ (\eta \rightarrow \pi^+ \pi^- \pi^0)$$

Real (exp63 whole data) MC (exp63 on resonance only)

