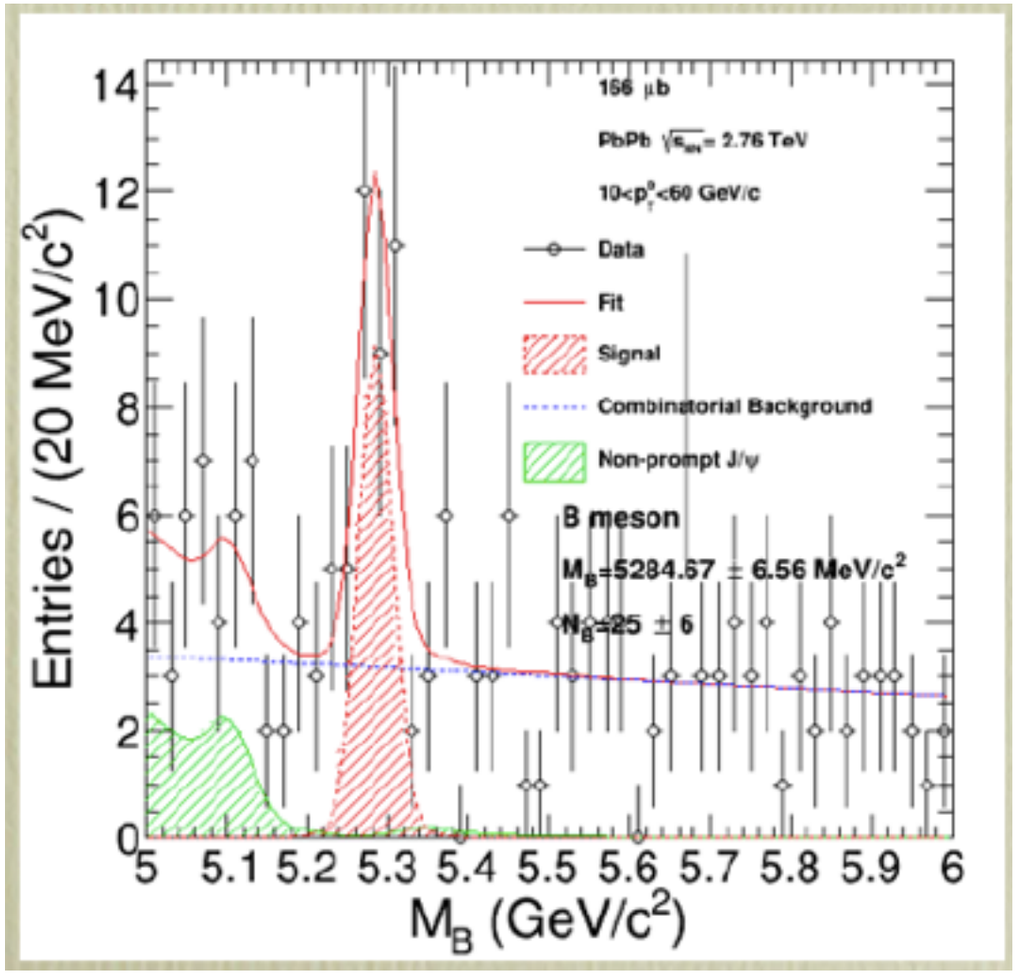
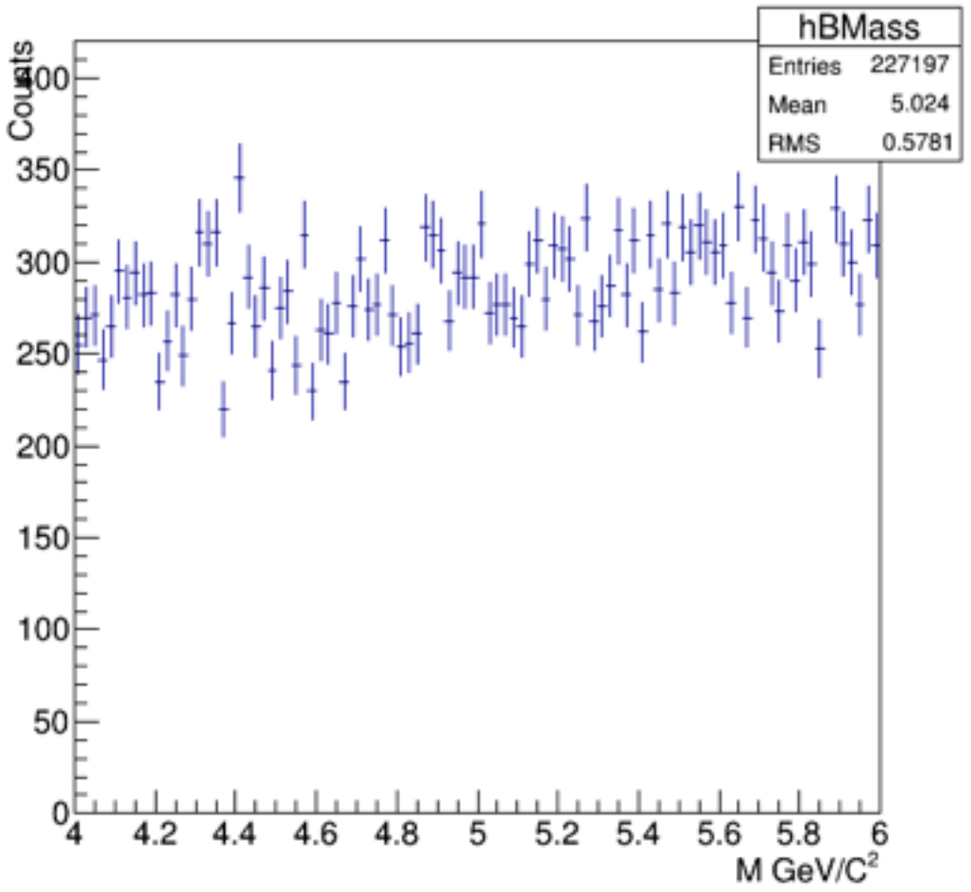
J/ψ track triplet & Upsilon status

KiSoo Lee

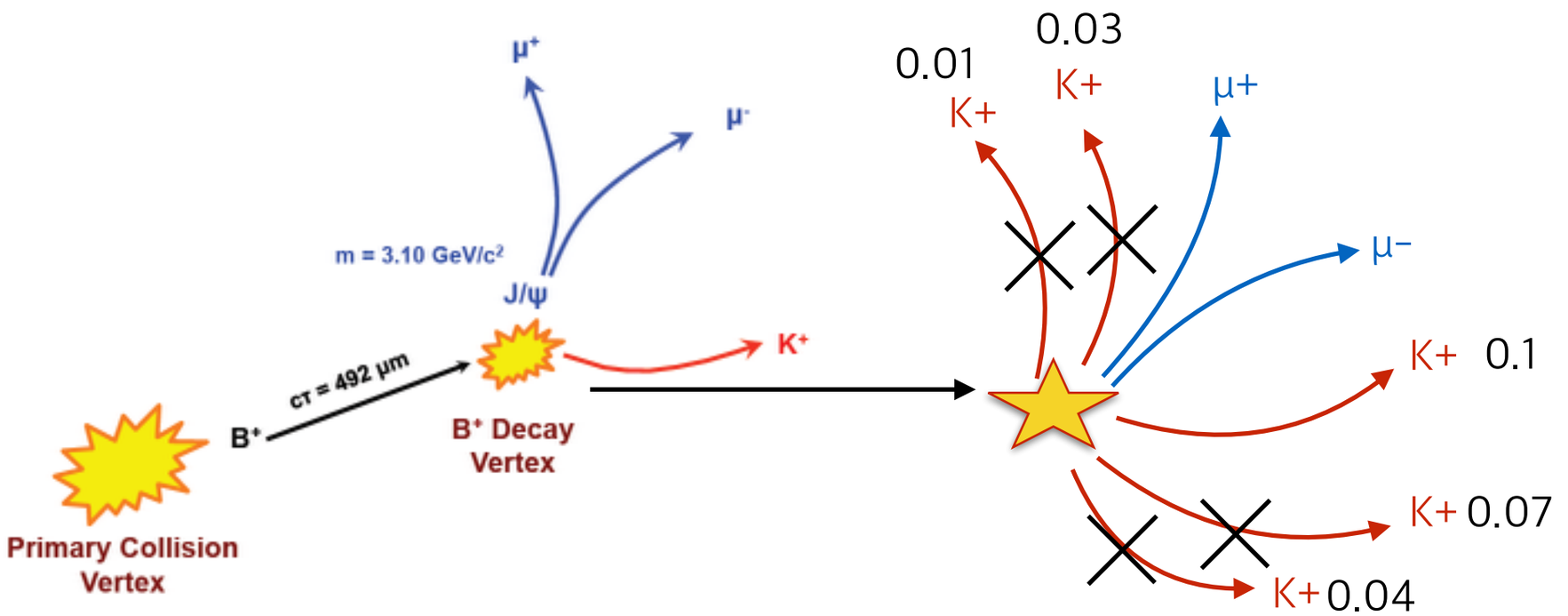
B mass spectrum from Ta-Wei

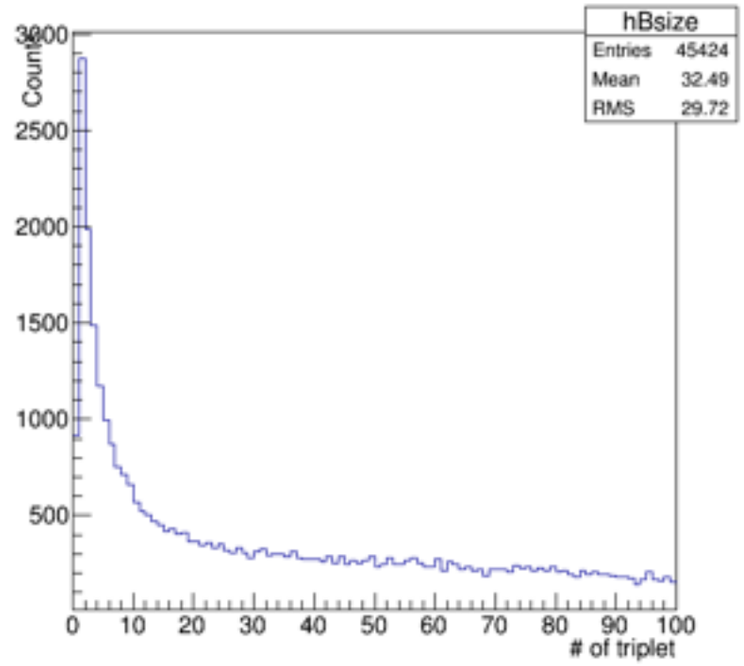




- previously there was no peak from the Onia analyzer J/ψ+ track

B vertex probability cut

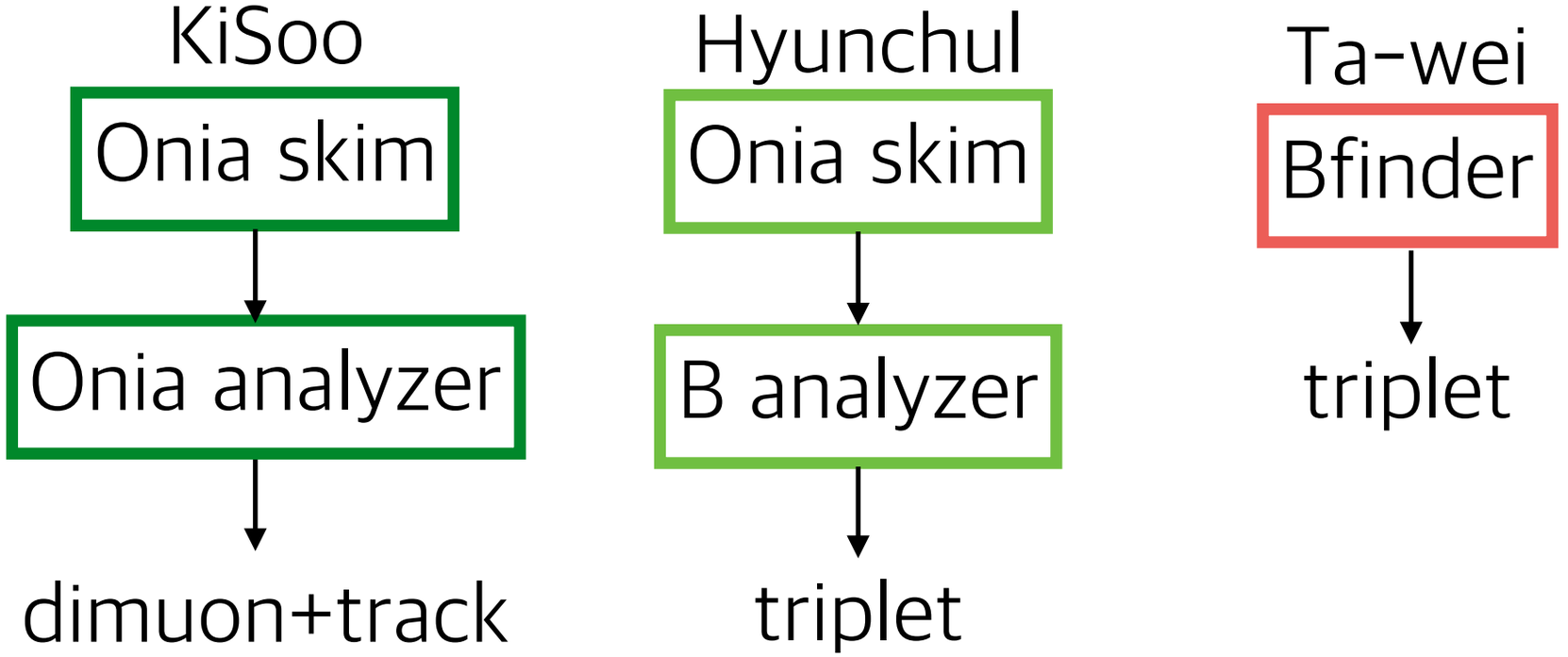




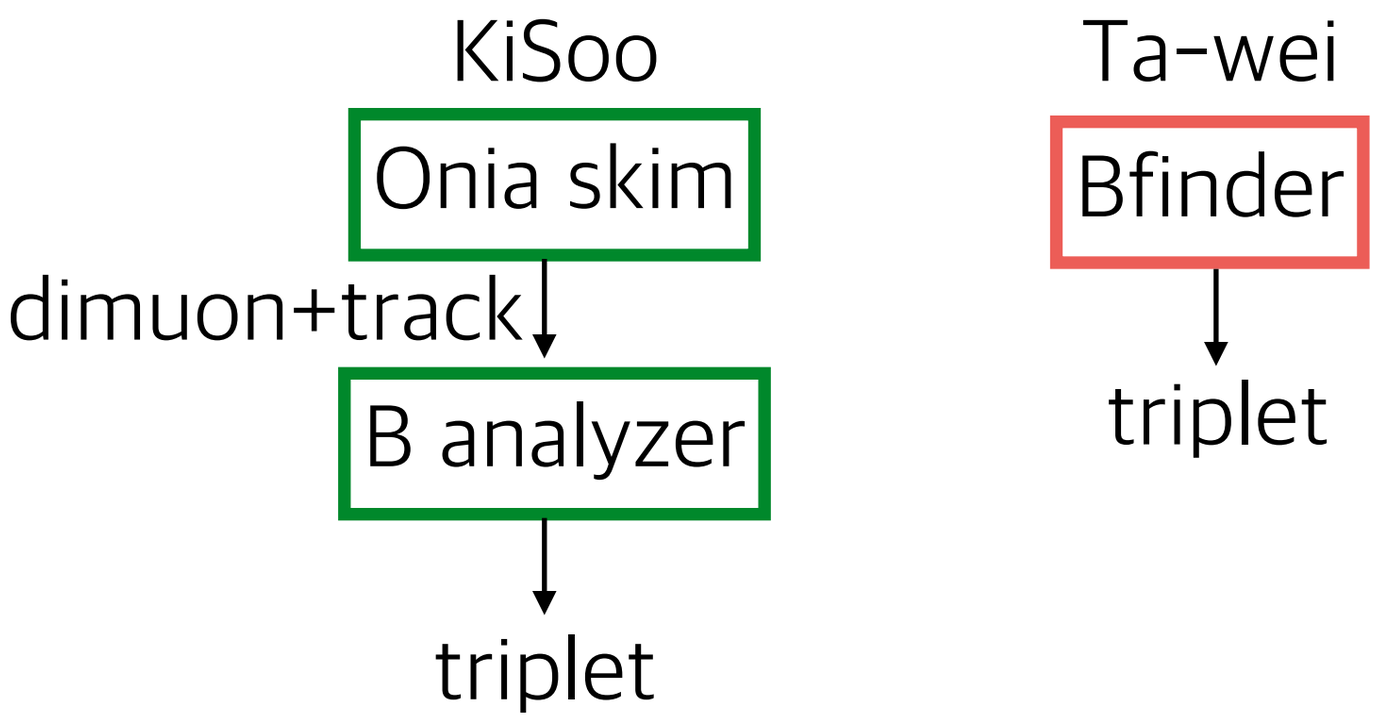
- Vertex probability is calculated with Kalman fitting in the analyzer level
- B vertex probability > 0.027810
- If there are more than 1 candidate passing B vertex probability, only most large probability candidate survive
- Reduce combinatorial background

analyzer

previous



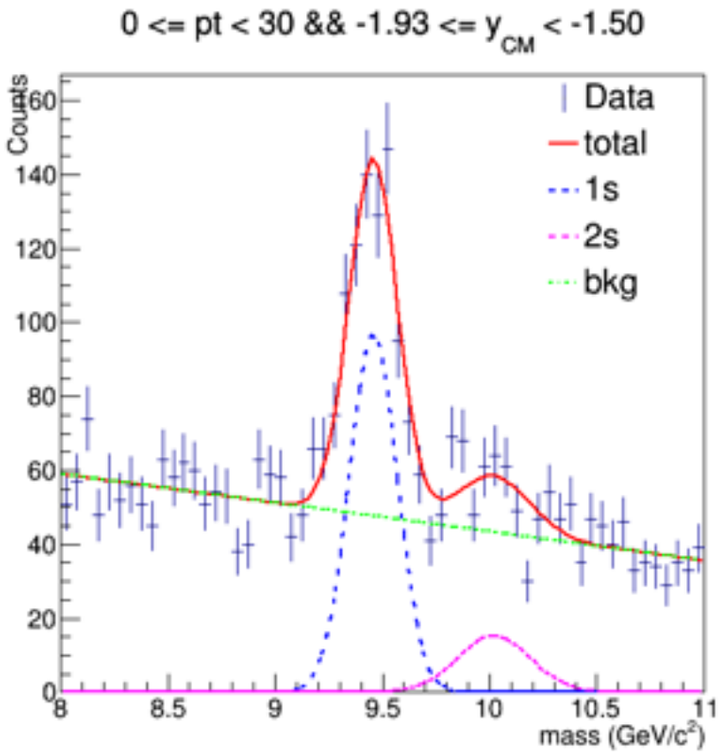
now

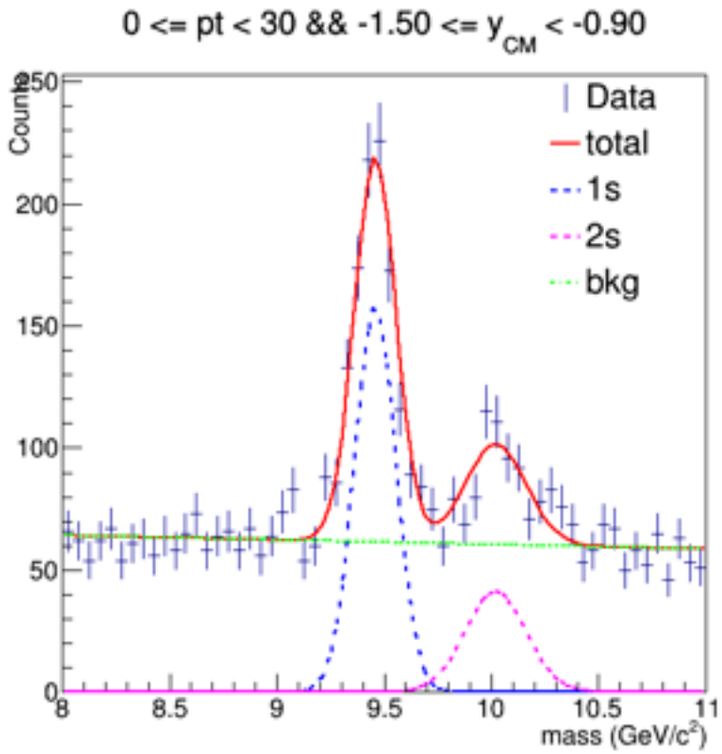


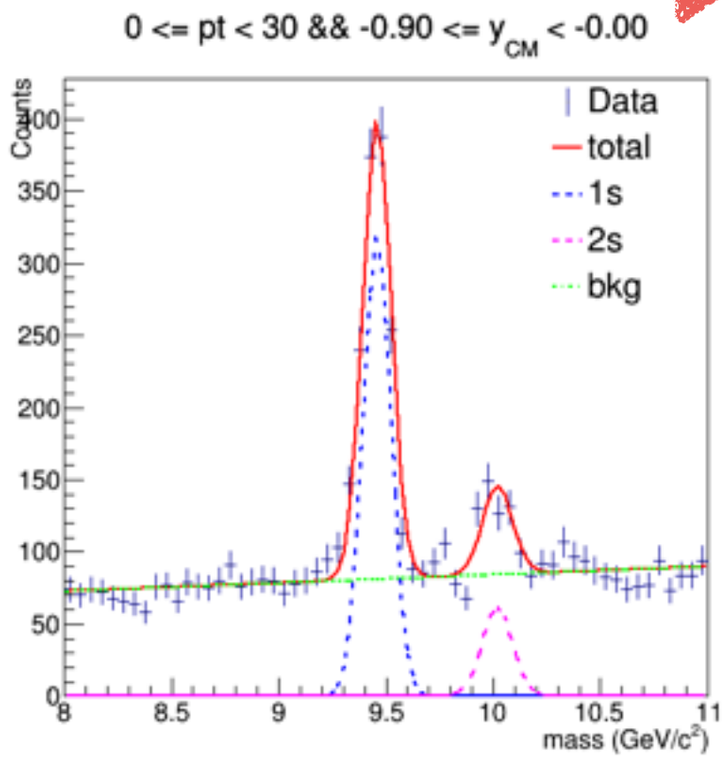
pPb Upsilon

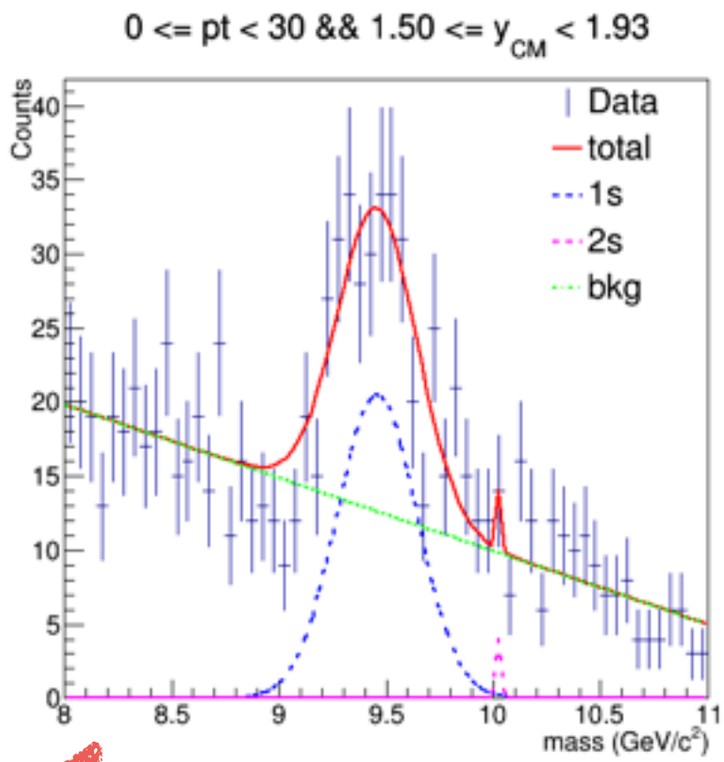
- Data Onia tree for Upsilon
  - -1st period 7run: X
  - -1st period rest: O
  - -2nd period: X
- Camelia have MC for acceptance and efficiency

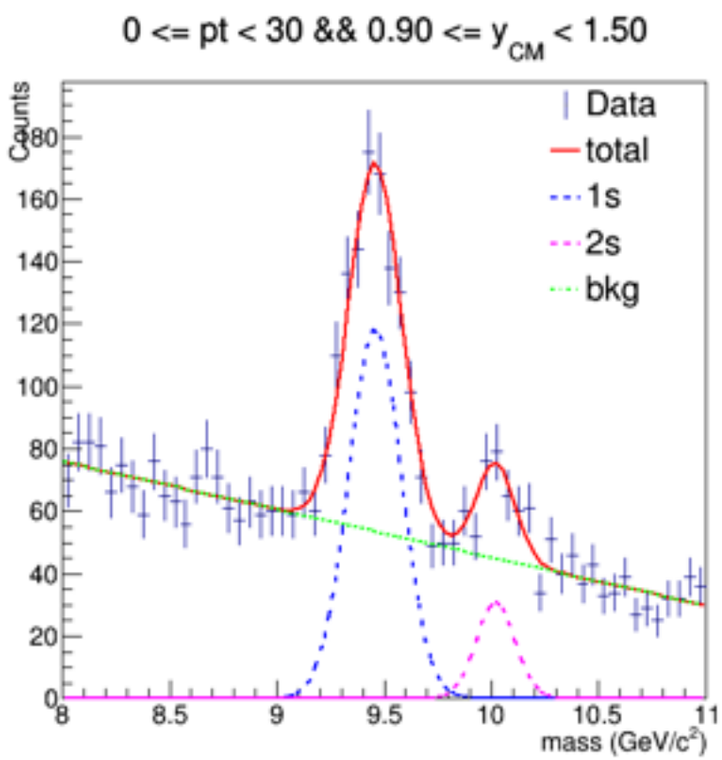
pt integrated(mu pt > 3 GeV/c)

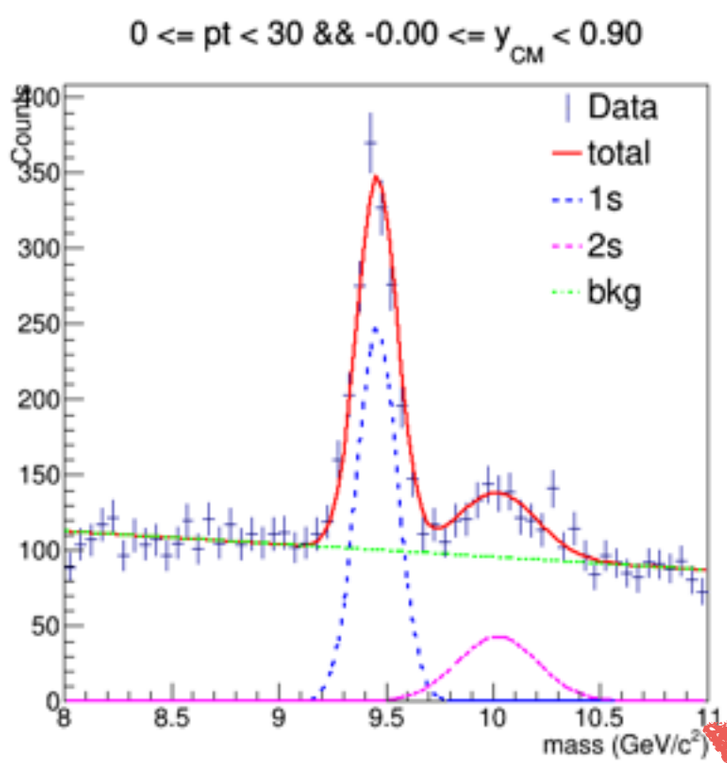




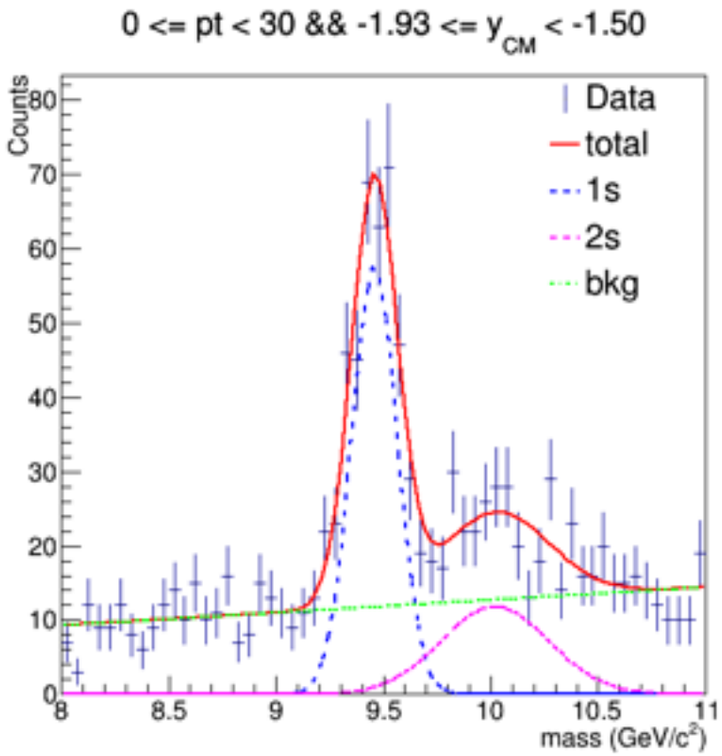


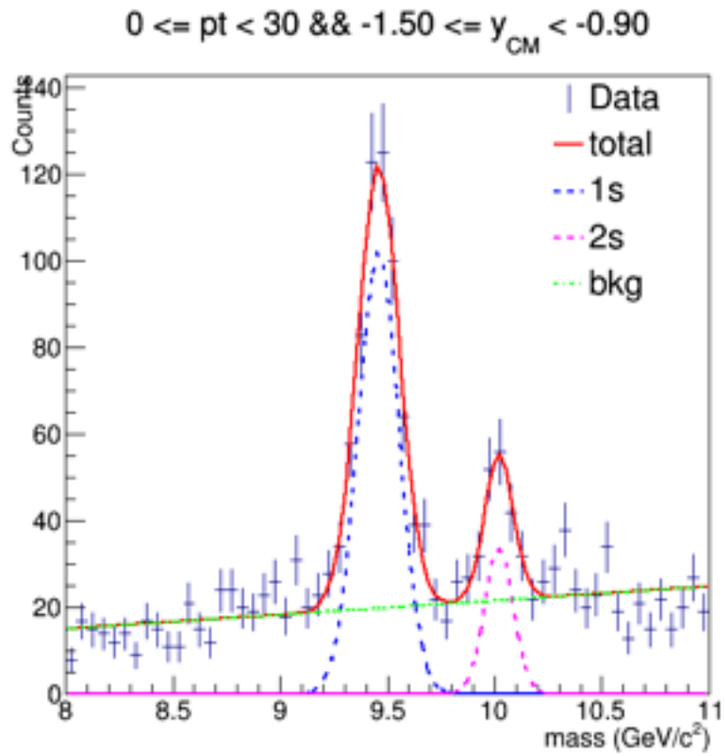


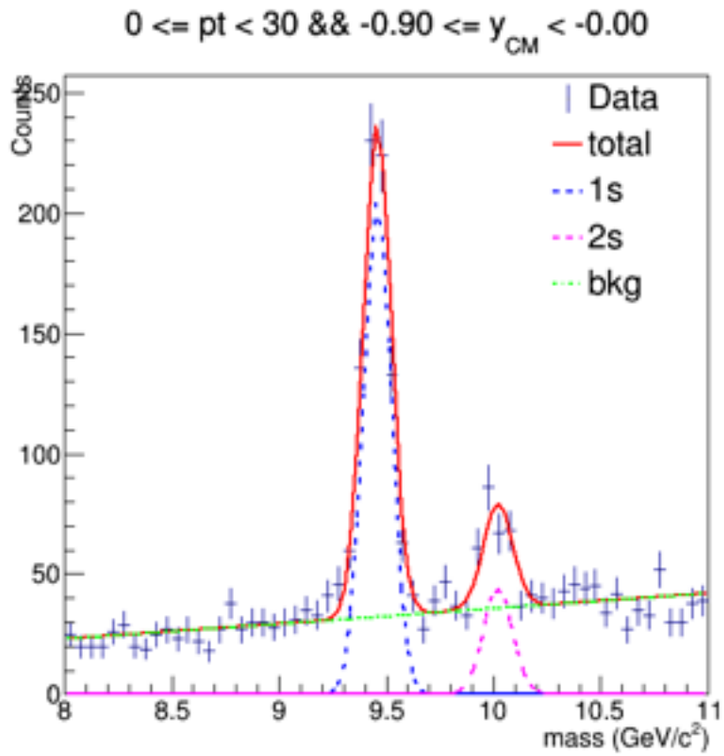


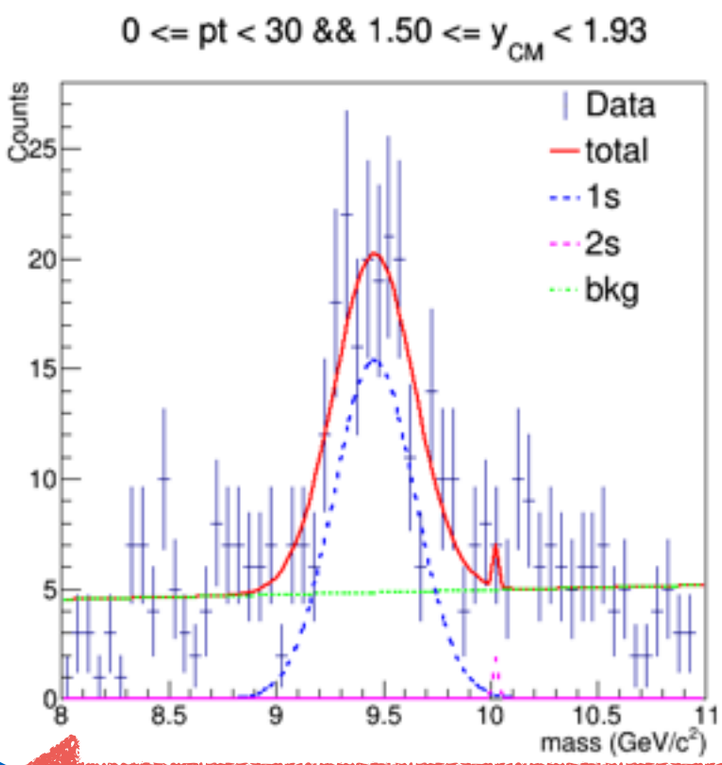


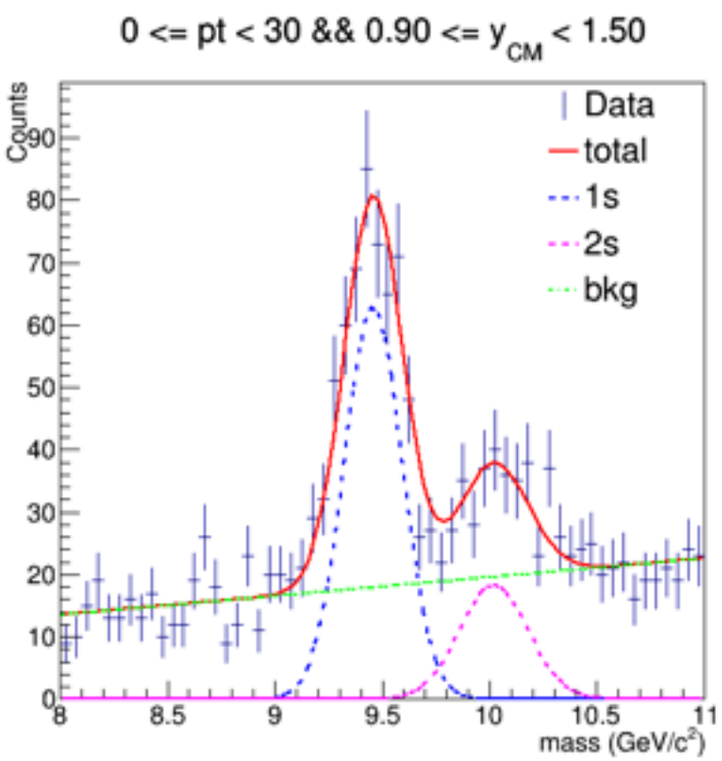
pt integrated(mu pt > 4 GeV/c)

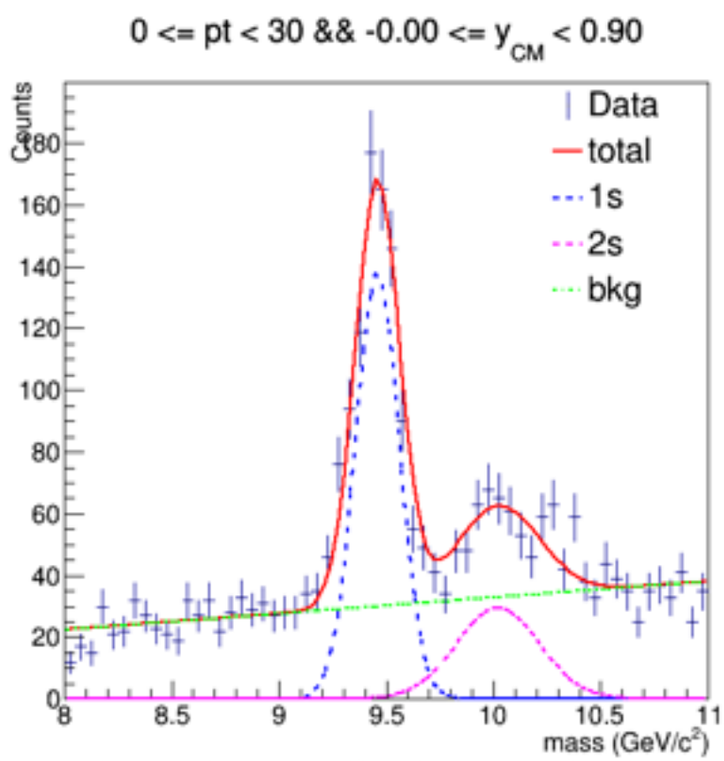






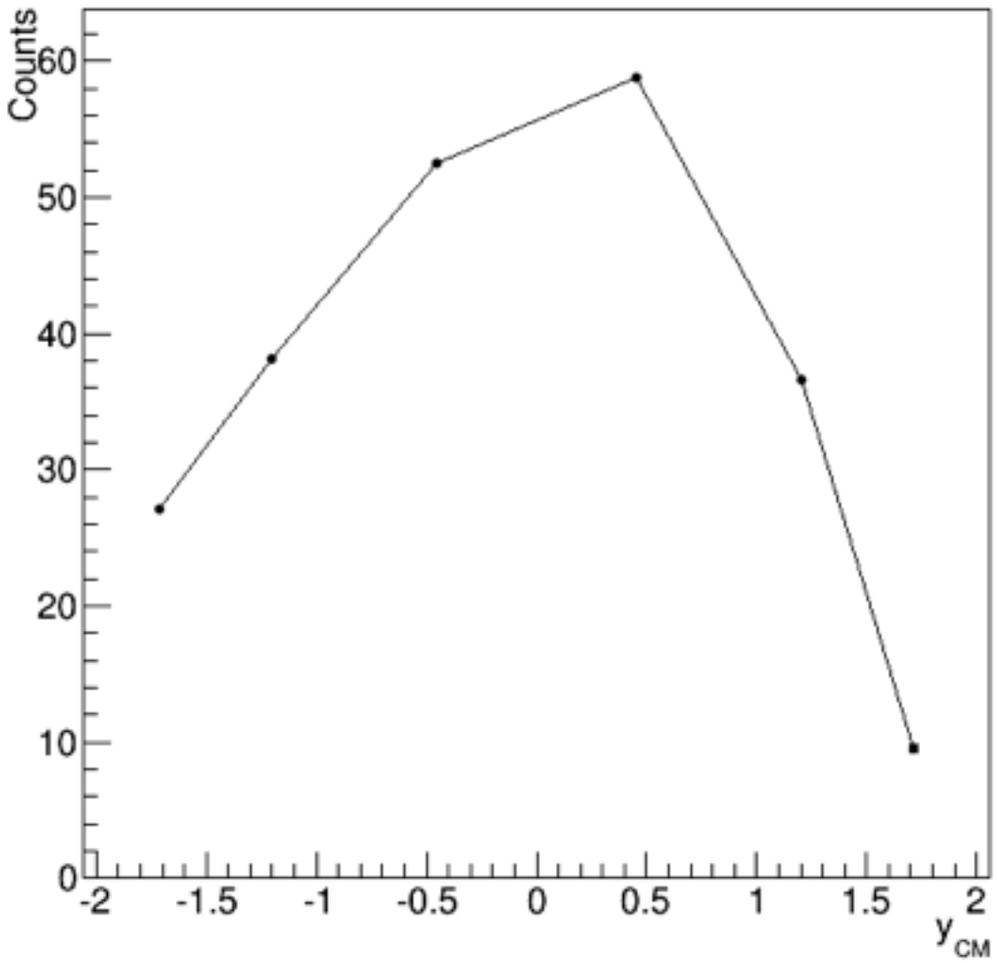




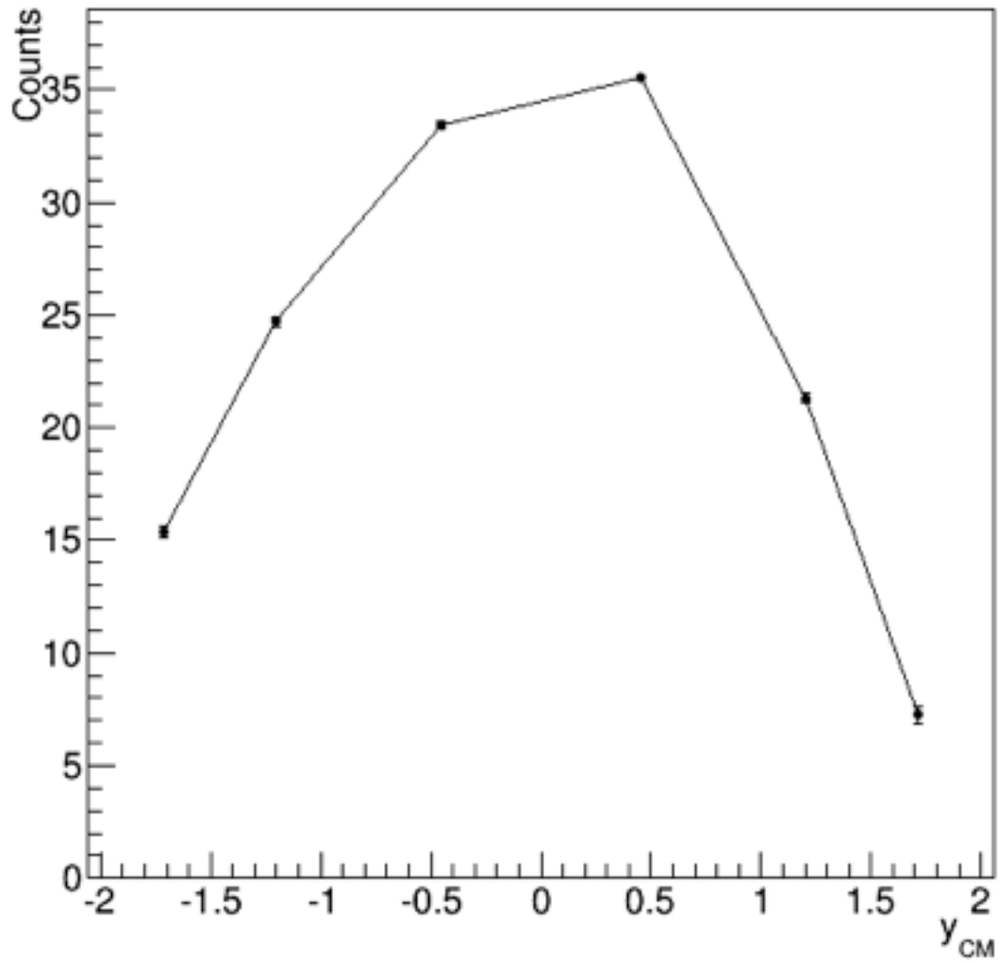


number of 1s

mu pt > 3 GeV/c



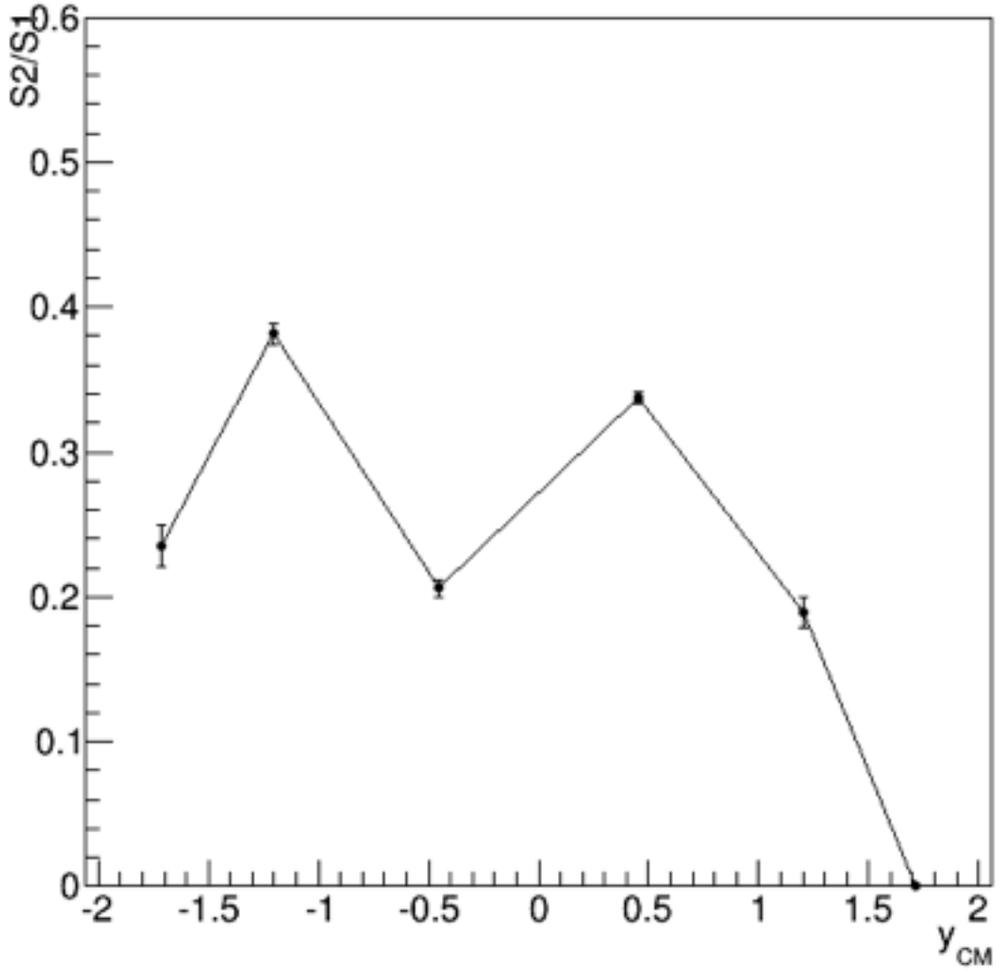
mu pt > 4 GeV/c



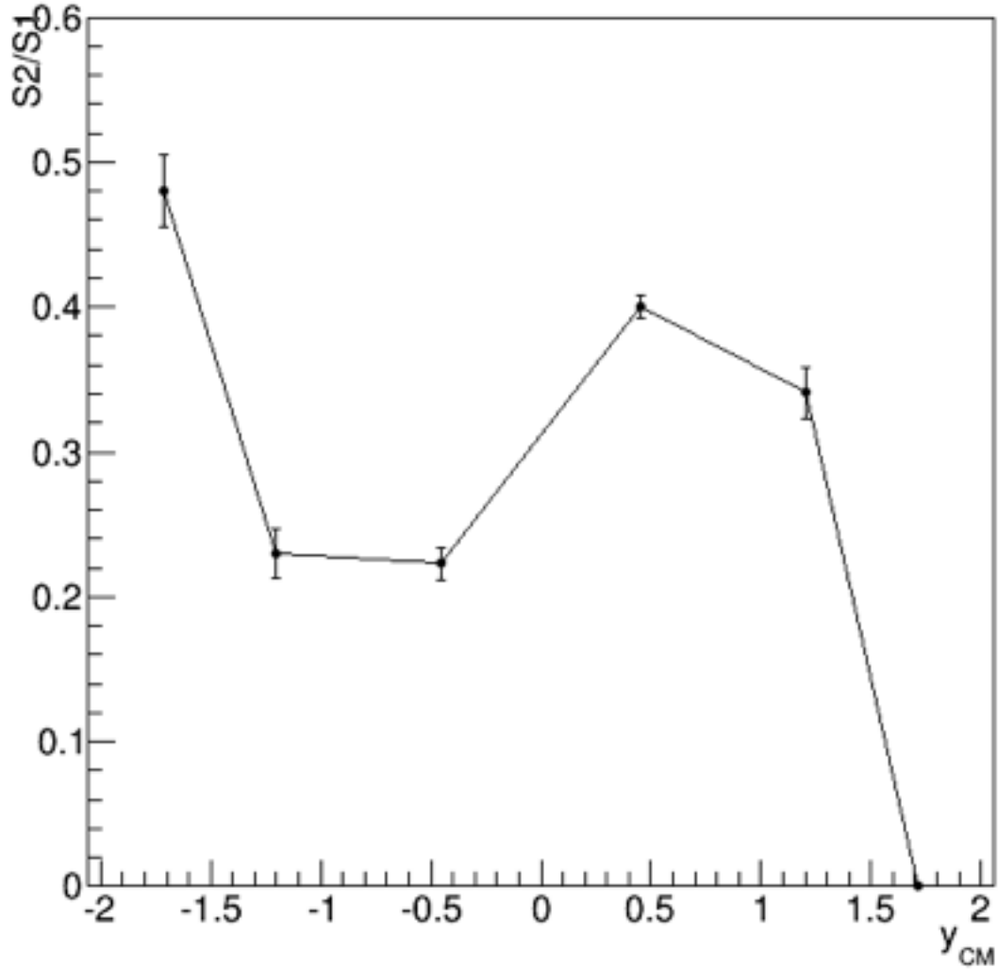
- acceptance and efficiency are needed to see exact trend

2s/1s

mu pt > 3 GeV/c



mu pt > 4 GeV/c



$$r=\frac{2s}{1s} \qquad \sigma_{1s}=\frac{1}{\sqrt{1s}} \qquad \sigma_{2s}=\frac{1}{\sqrt{2s}} \qquad \sigma_r=r\sqrt{\left(\frac{\sigma_{1s}}{1s}\right)^2+\left(\frac{\sigma_{2s}}{2s}\right)^2}$$

back up

condition

KiSoo

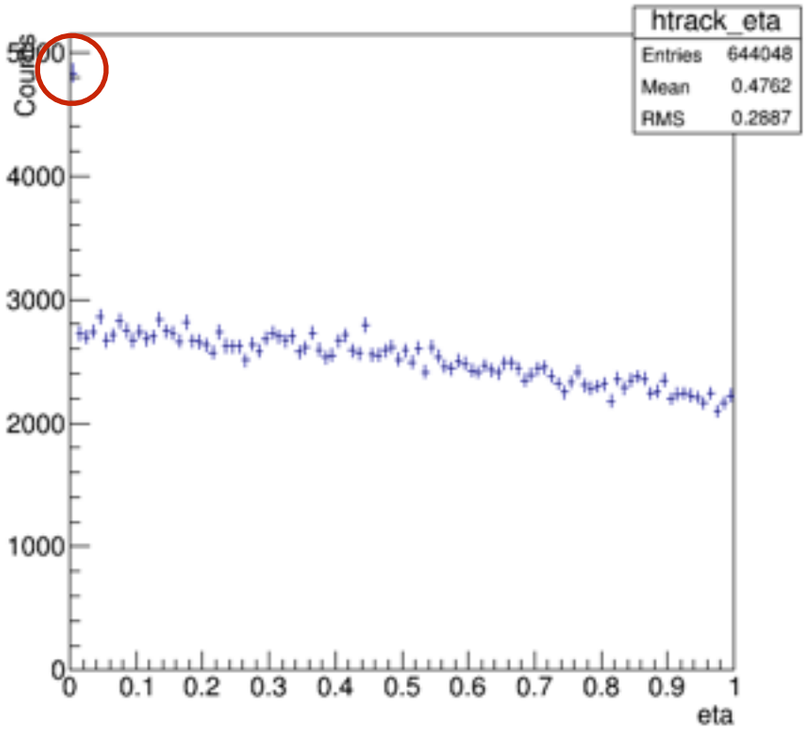
- J/ψ mass: 2.6 ~ 3.5
- muon acceptance
  - |η| <= 1.0: pT > 3.4
  - 1.0 <= |η| < 1.5: pT >= 5.8-2.4*|η|
  - 1.5 <= |η| <= 2.4: pT >= 3.3667-7.0/9.0*|η|
- muon valid hit + pixel > 6
- J/ψ vertex probability > 0.01
- cτ/cτ error > 3.4
- |z vertex| < 15
- TMOneStaTight
- global muon
- HLT_HIL2Mu3_NHitQ_v*

Ta-wei

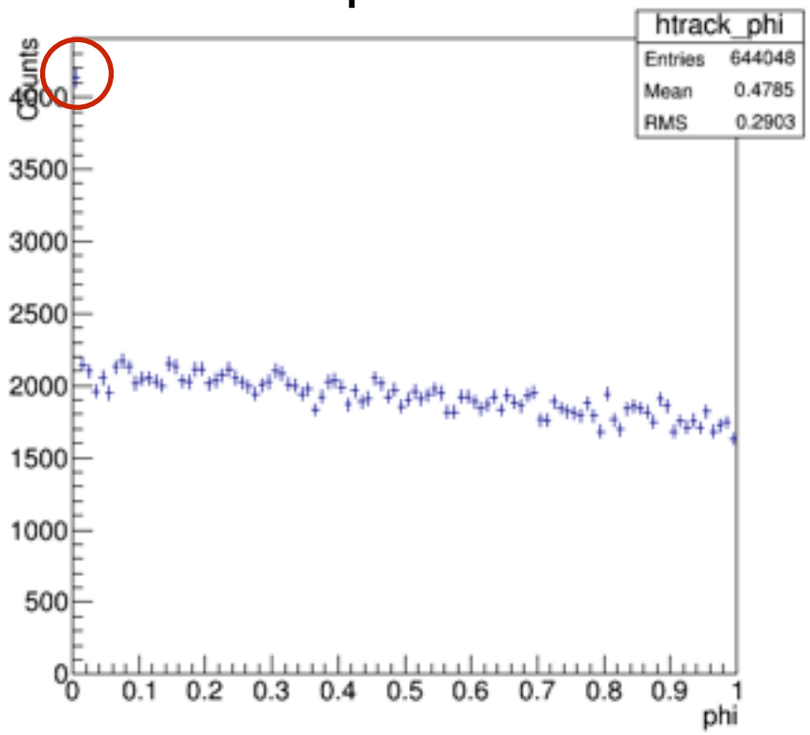
- J/ψ mass: 2.94 ~ 3.24
- J/ψ pt > 3
- mu1 pt > 1.846169
- mu2 pt > 3.277974
- track pt > 1.499871
- d0/d0Err > 4.485757
- cos(dtheta) > 0.207521
- |trk1Dxy/trk1D0Err| > 0.802233
- TMOneStaTight
- muon valid hit + pixel > 6
- B vertex probability > 0.027810
- HLT_HIL2DoubleMu3_v1, 2, 5

exclude muon from track

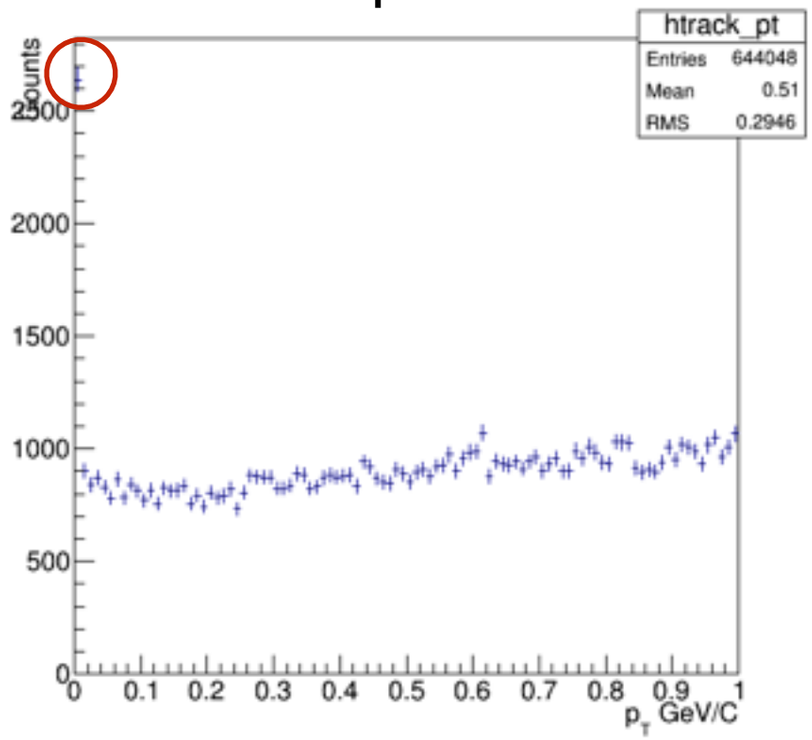
eta



phi



pt



- |track pt-muon pt| < 0.1
- |track eta-muon eta| < 0.1
- |track phi-muon phi| < 0.1
- If satisfy three condition, the track is regard as muon

J/ψ vertex probability

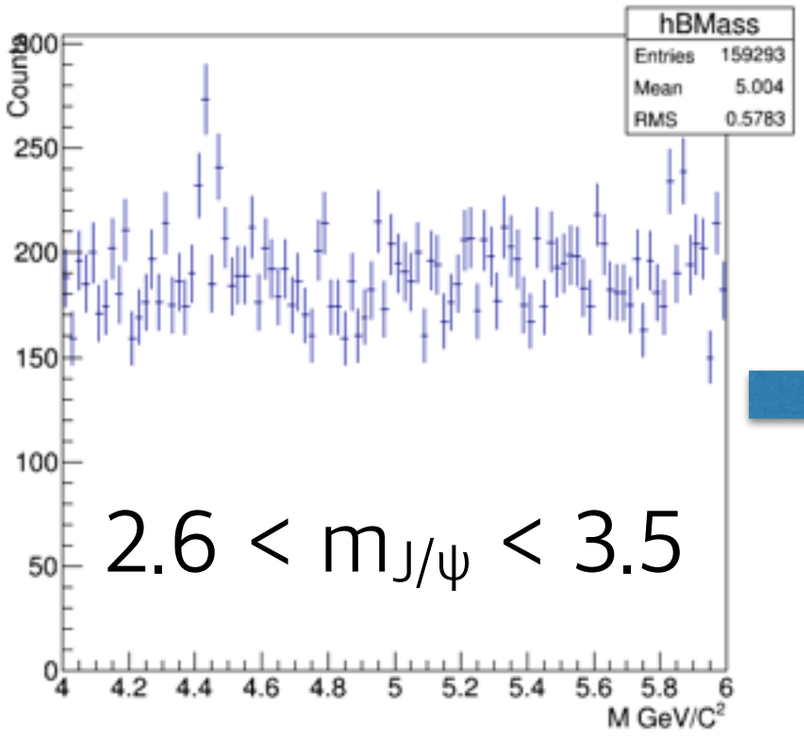
J/ψ vertex probability: vProb(x,r)

$$vProb(x,\ r)=\int_{x}^{+\infty}\frac{1}{\Gamma(r/2)2^{r/2}}y^{r/2-1}e^{-y/2}dy$$

x: chi2, r: n.d.f

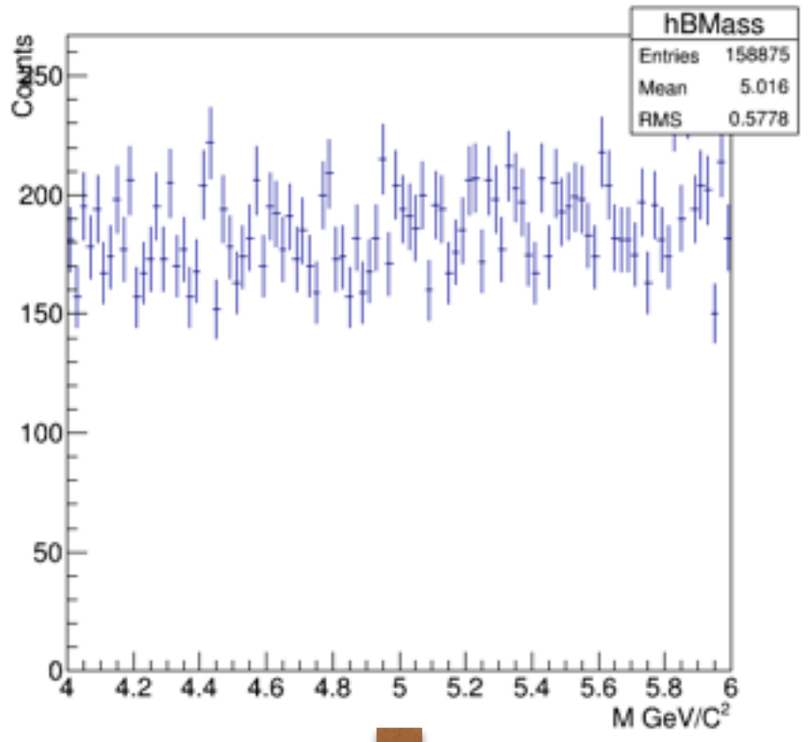
- n.d.f and chi2 are result of Kalman vertex fitting

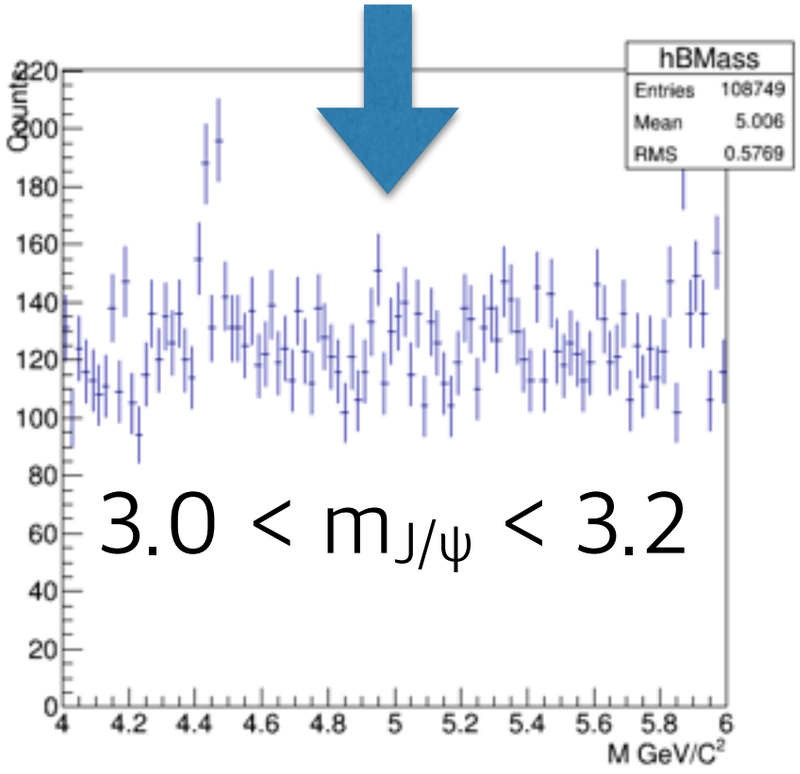
triplet mass



$2.6 < m_{J/\psi} < 3.5$

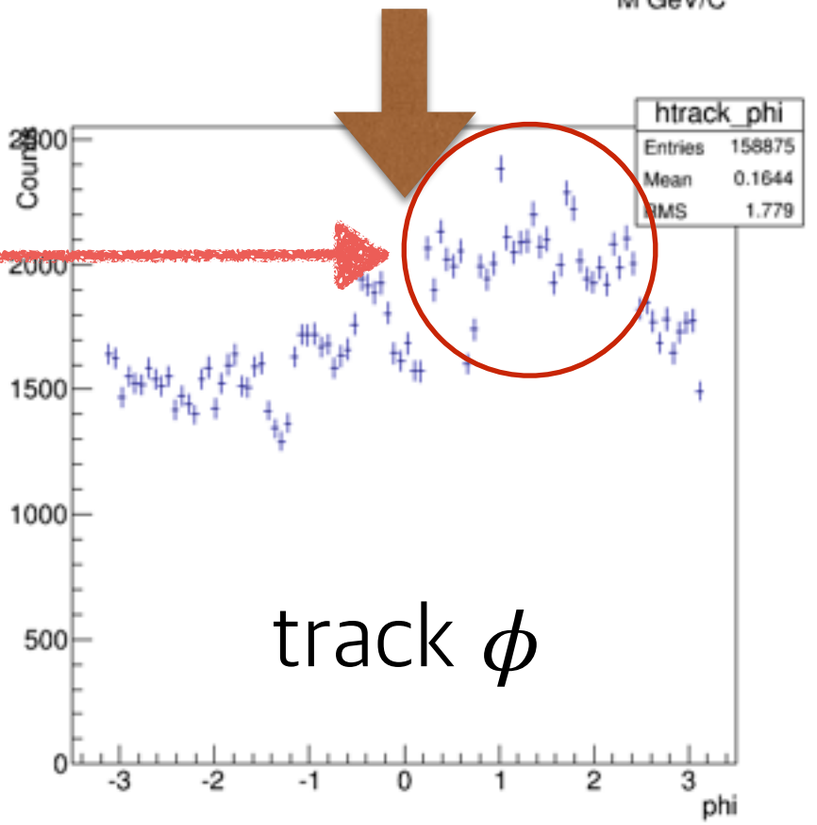
|track pt-muon pt| < 0.1
|track eta-muon eta| < 0.1
|track phi-muon phi| < 0.1





$3.0 < m_{J/\psi} < 3.2$

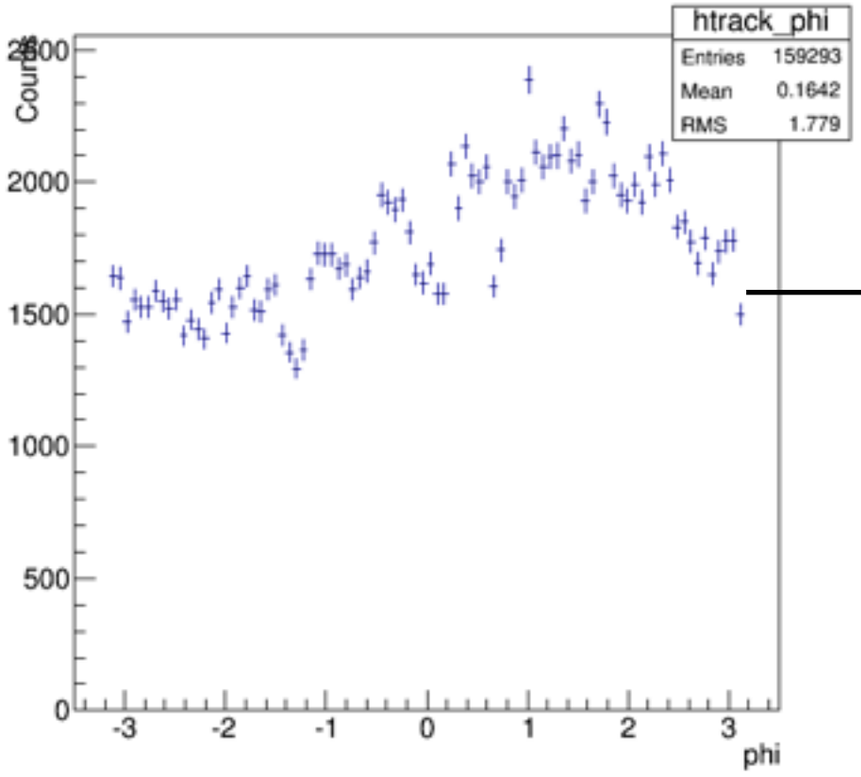
track phi asymmetry is not from muon track

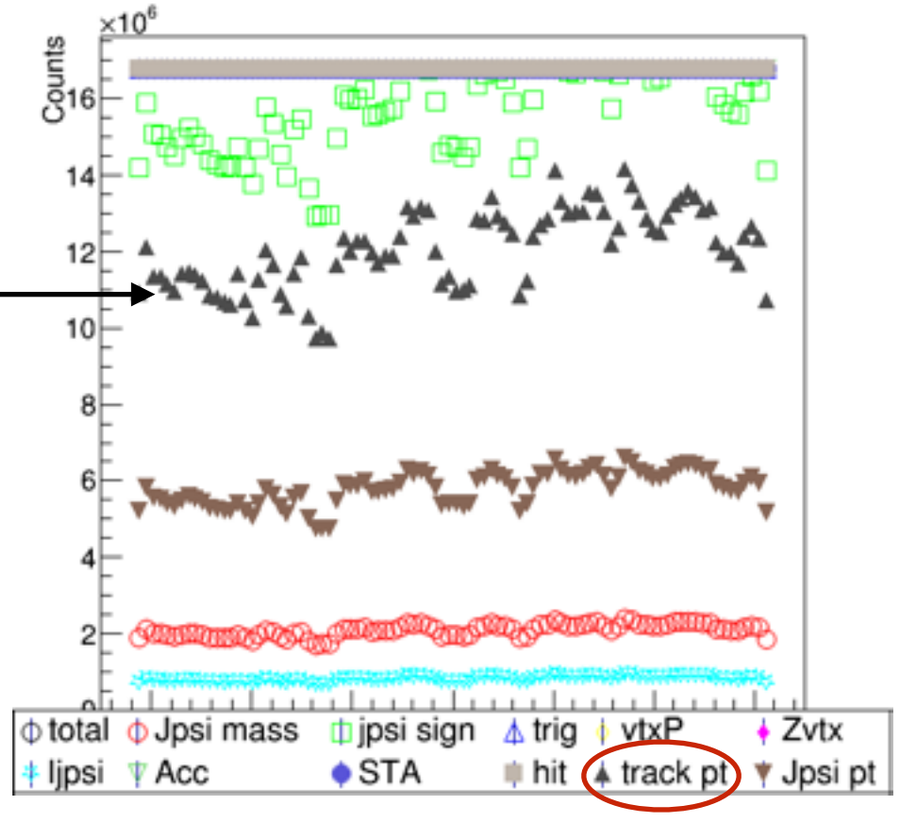


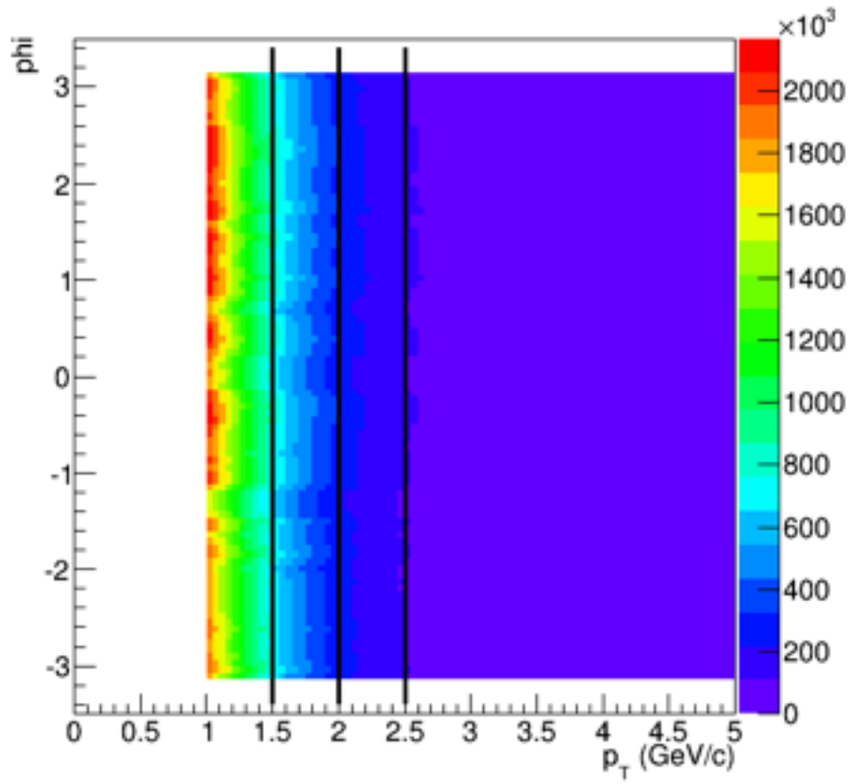
track ϕ

- track pt > 2 GeV, J/ψ pt > 5 GeV, triplet pt > 9 GeV

track phi asymmetry



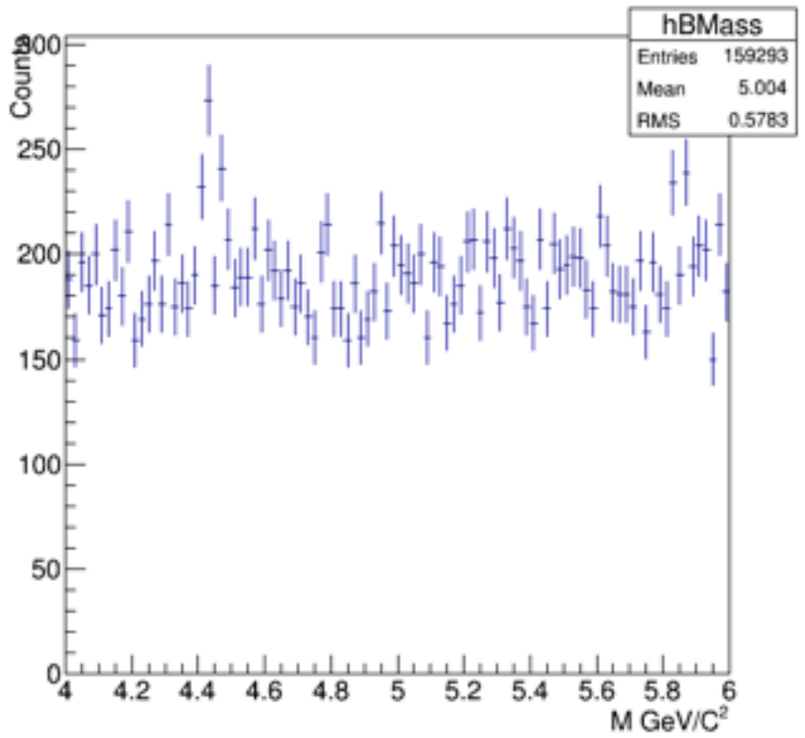




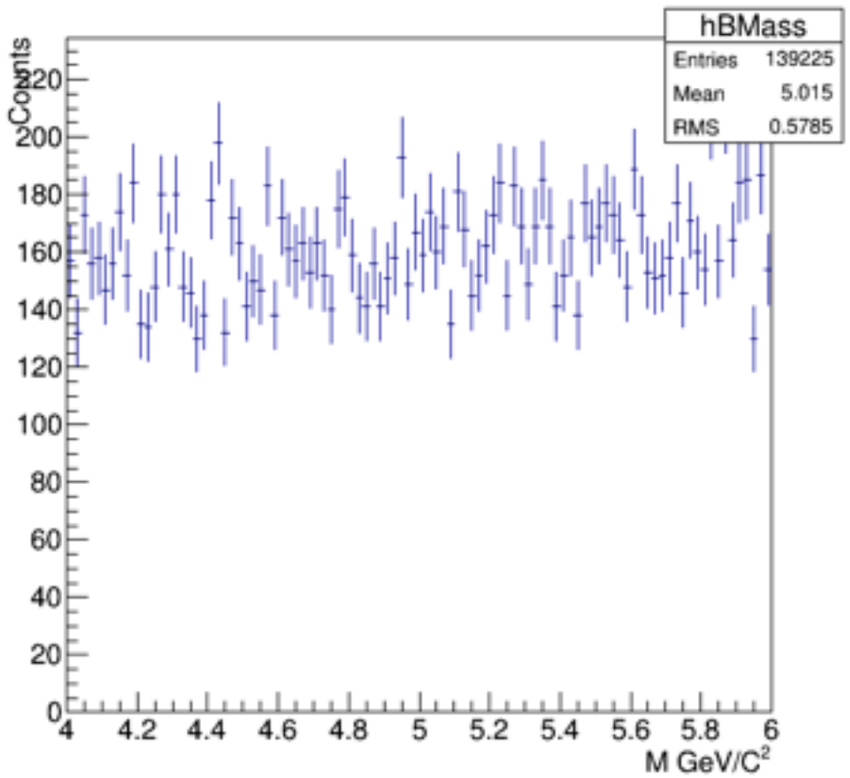
- pt vs. phi of track have asymmetric phi distribution

lJ/ψ cut

cτ/cτ error > 3.4



cτ/cτ error > 4



|track pt-muon pt| < 0.1

|track eta-muon eta| < 0.1

|track phi-muon phi| < 0.1

- track pt > 2 GeV, J/ψ pt > 5 GeV, triplet pt > 9 GeV

muon acceptance range

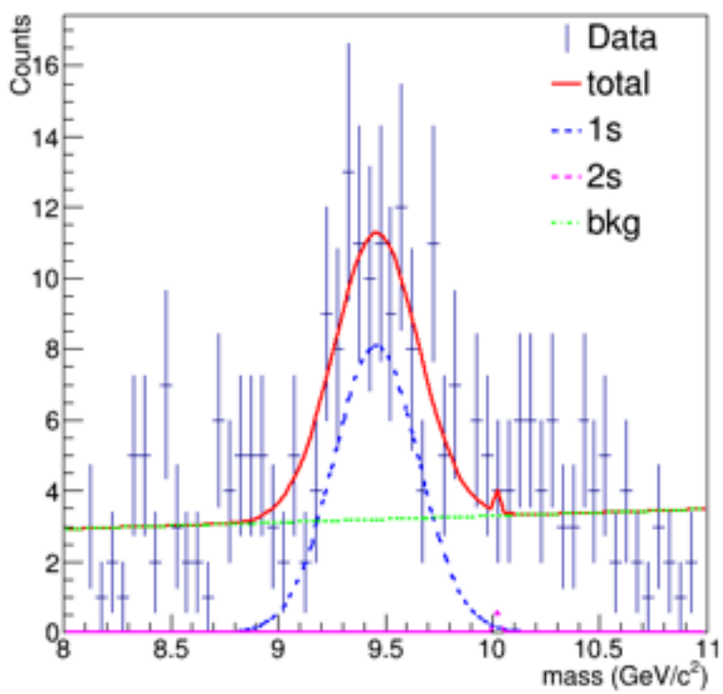
- number of valid muon hits: muon hit matched to the global fit

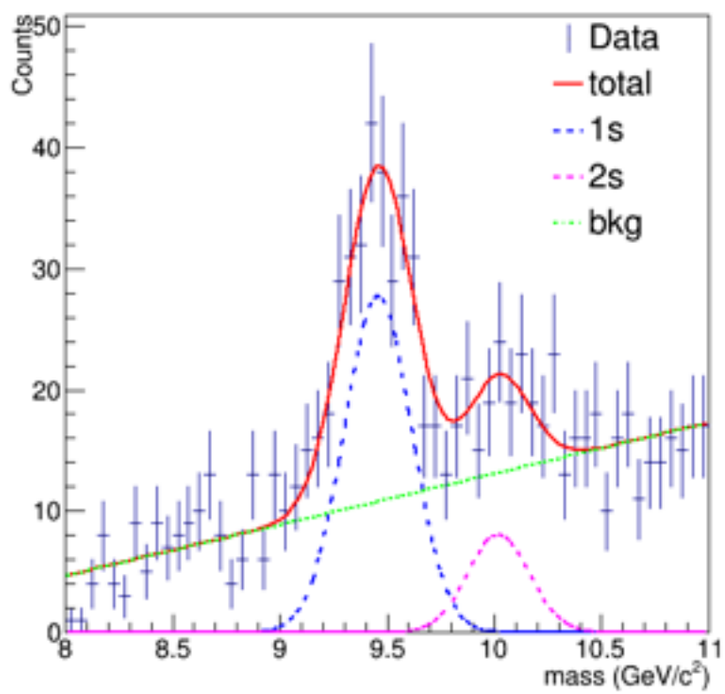
- pixel layers with measurement: number of pixel sub-ditector layer in the tracker(Barrel+Endcap)

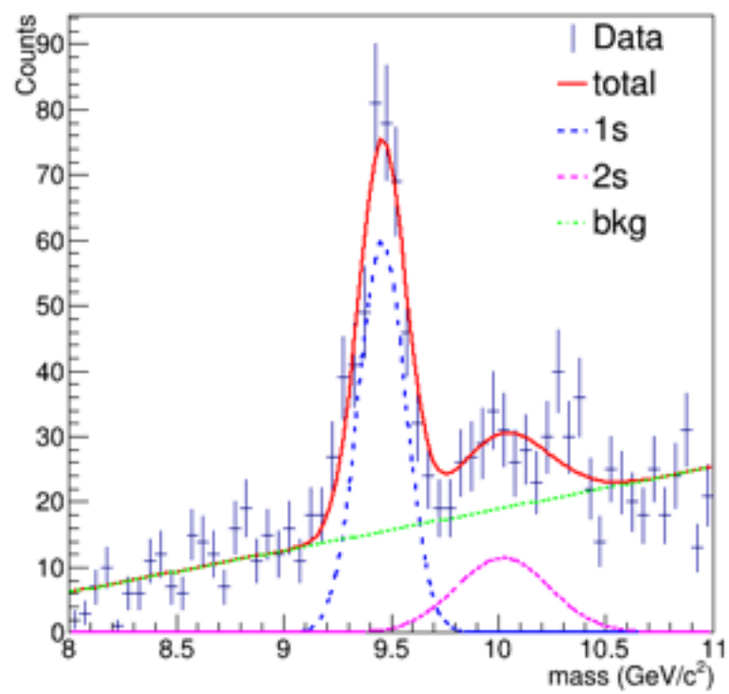
50 MeV mass binning(0 < pt < 5 GeV)

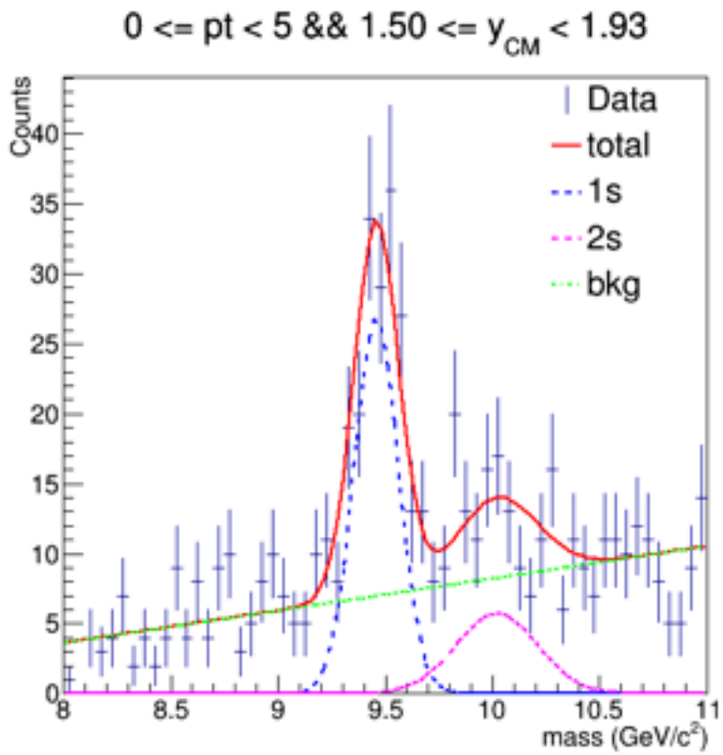
forward

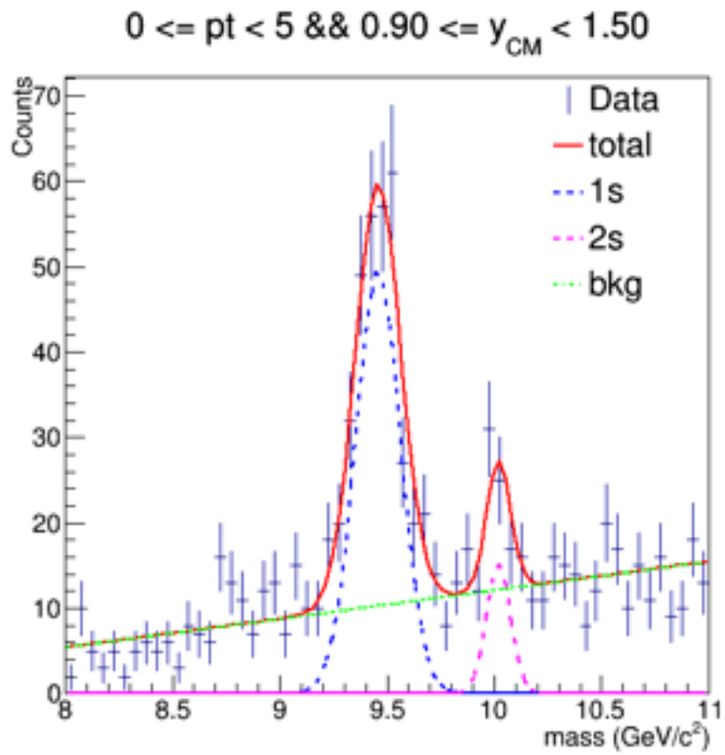
mid

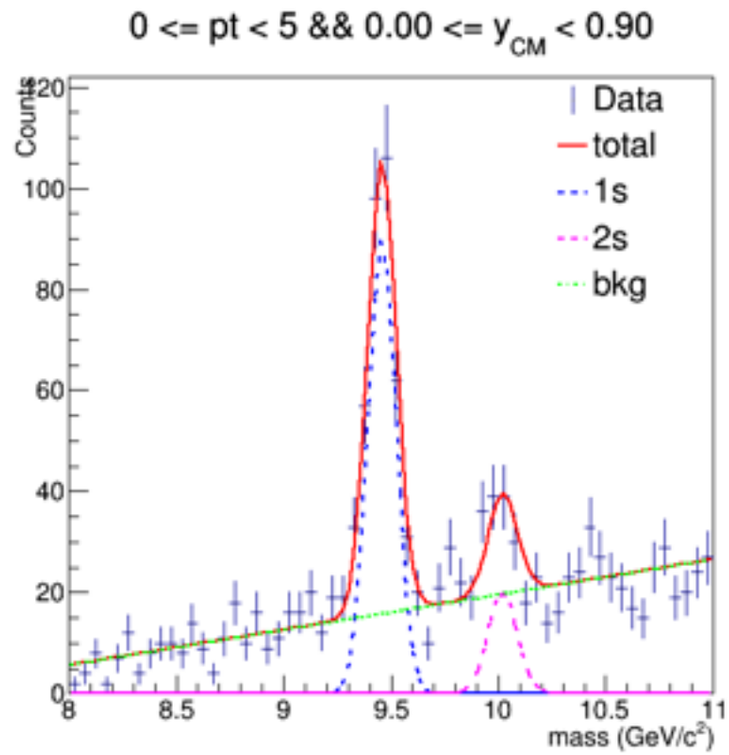




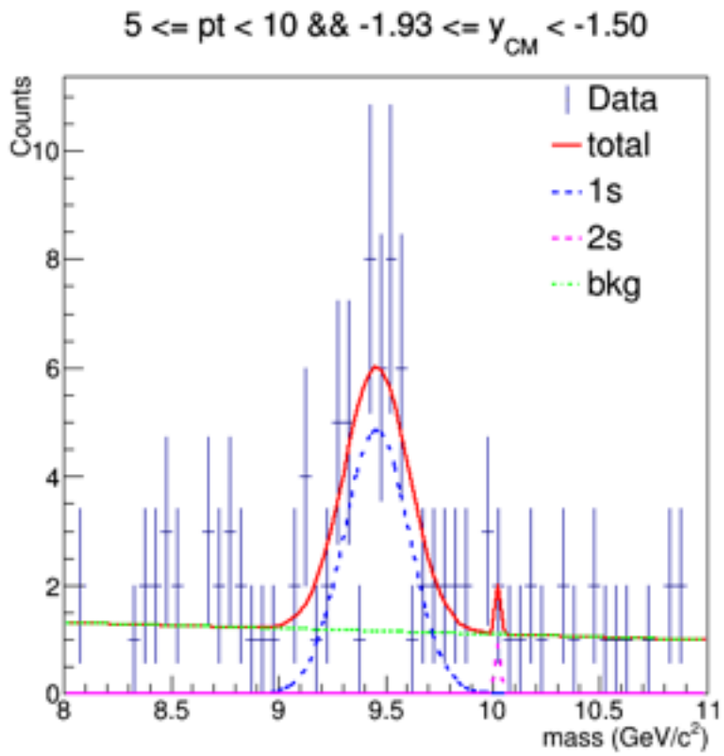


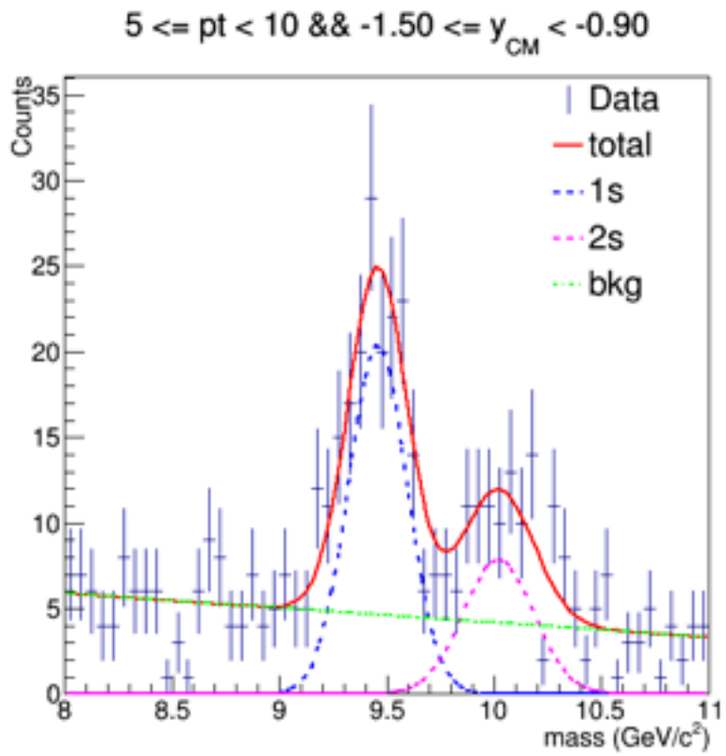


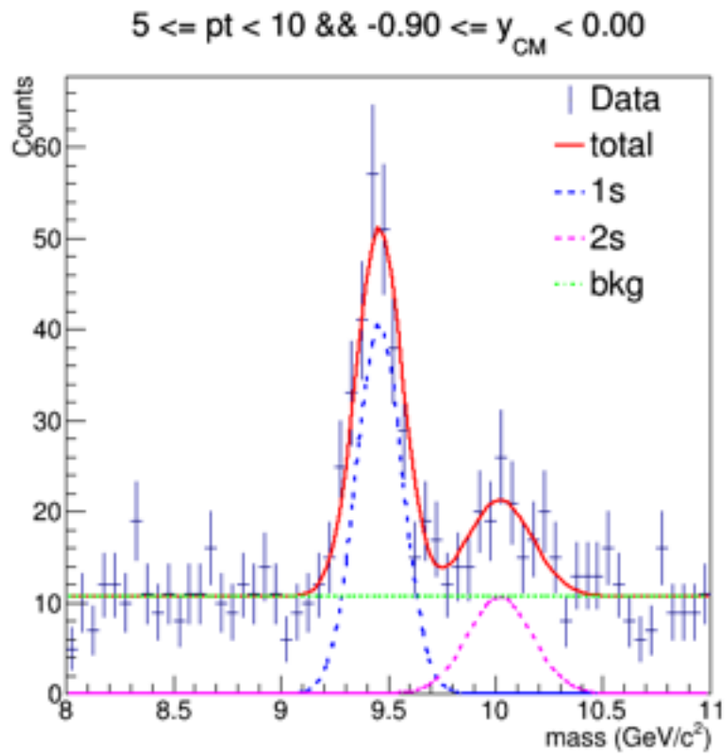


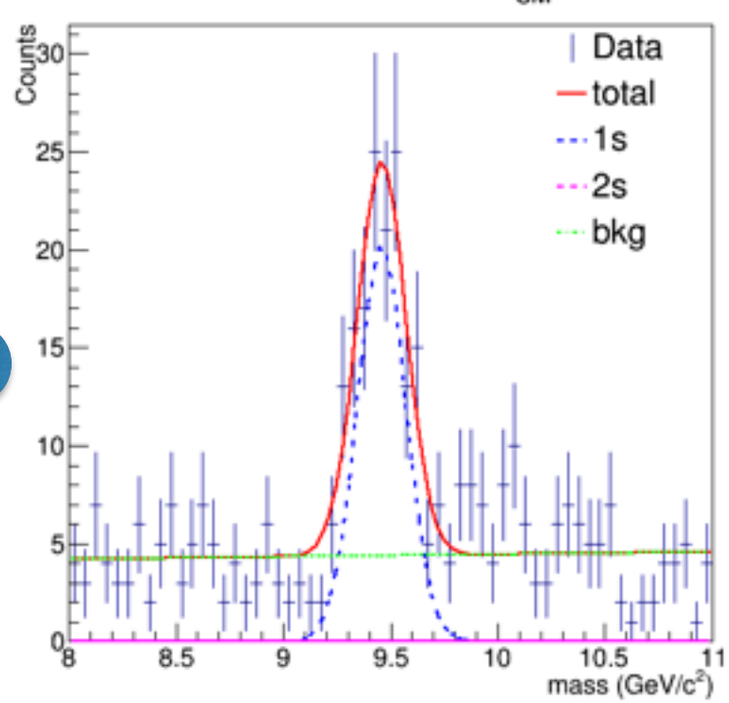


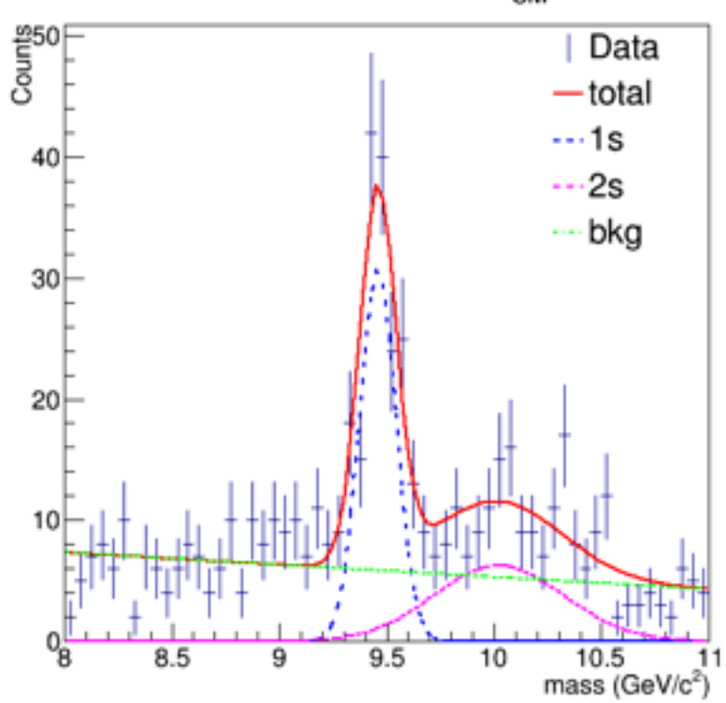
50 MeV mass binning(5 < pt < 10 GeV)

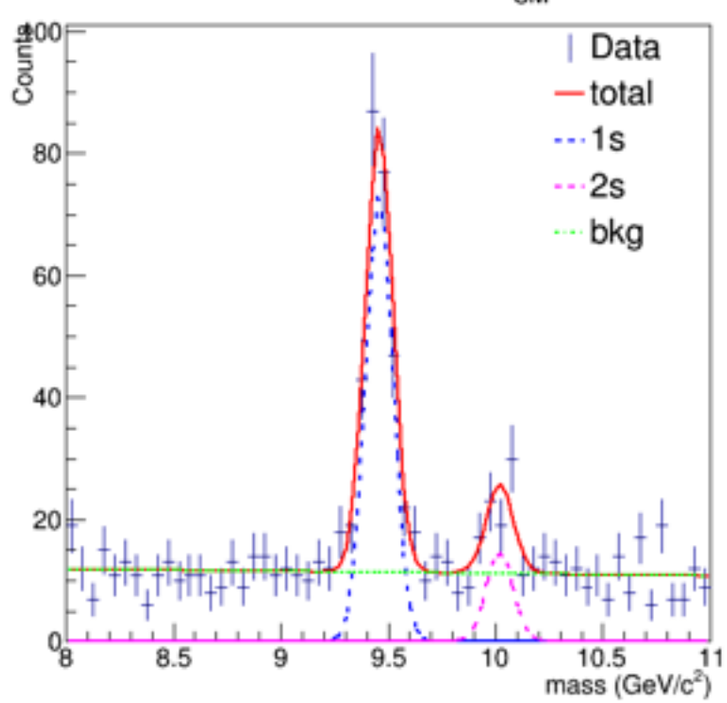






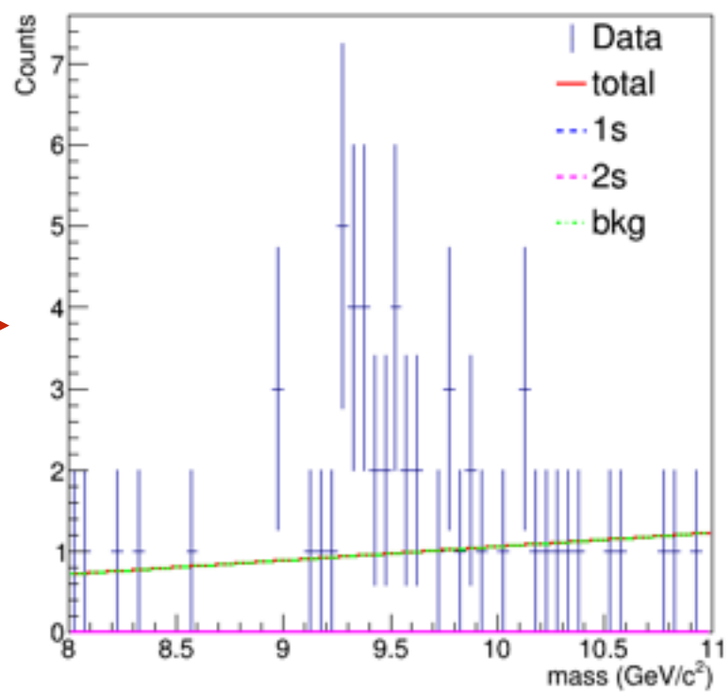


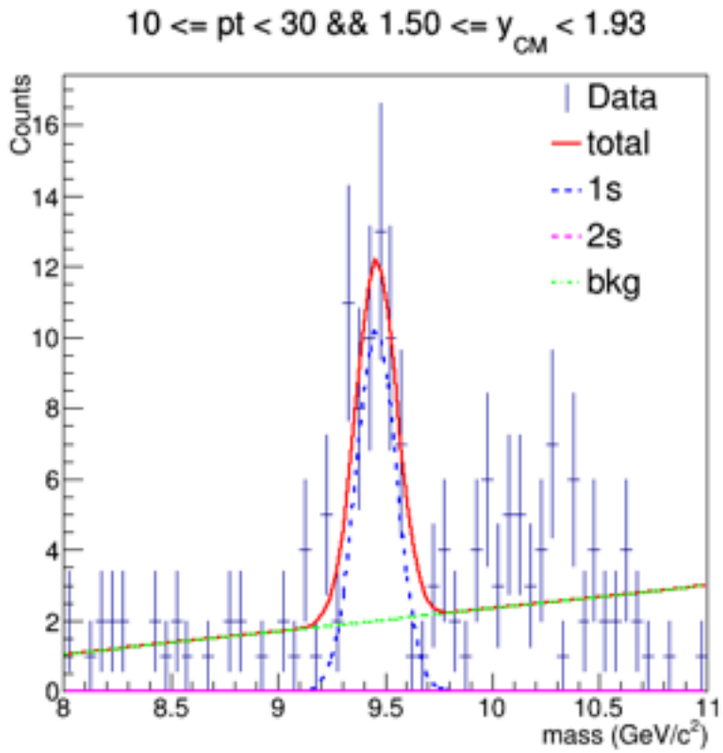




50 MeV mass binning(10 < pt < 30 GeV)

forward





mid