Data-quality check using $e^+e^- \to \pi^0\pi^0 J/\psi$ samples

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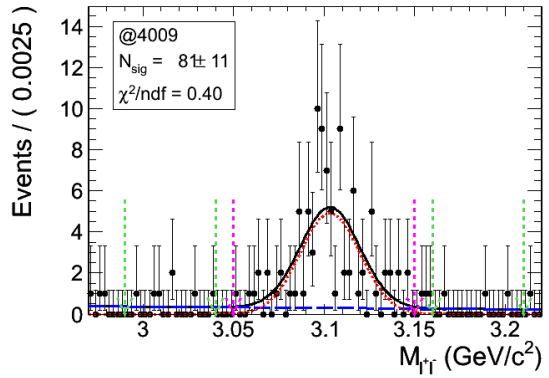
Events selection

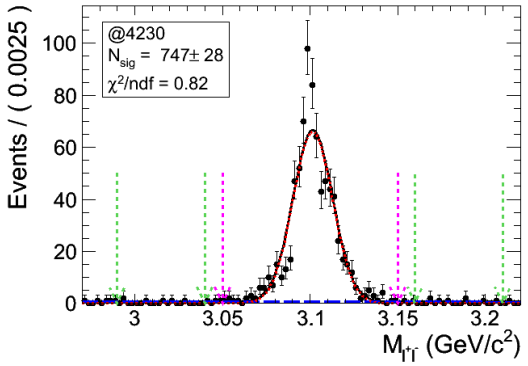
Decay channel: $e^+e^- \to \pi^0\pi^0 J/\psi, J/\psi \to\ e^+\ e^-/\mu^+\mu^-$

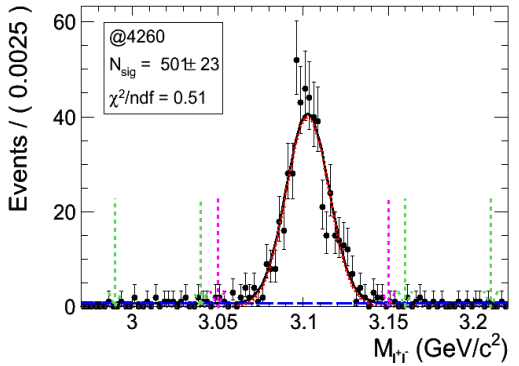
- Only two Good tracks with total charge =0
  - Electron: E/p>0.7 for both tracks, $\theta_{e^+e^-} < 175°$ if $\cos\theta_{e^+}$>0.5 or $\cos\theta_{e^-}$<-0.5
  - Muon: E/p<0.3 for both tracks, at least one matches more than 6 MUC layers
- At least 4 good photons
  - Barrel: E>0.025GeV && |cosθ|<0.8
  - Endcap: E>0.05GeV && 0.86<|cosθ|<0.92
  - Time: 0 < t < 14 (×50ns)
- 4-constraints kinematic fit to select 4 photons with minimal χ^2, χ^2<80
- Select two pi0s with minimal $\chi^2_{\pi^0} = (M_{\gamma_1\gamma_2} - M_{\pi^0})^2 + (M_{\gamma_3\gamma_4} - M_{\pi^0})^2$
- Mass window requirement: $M_{\pi^0} \in (0.12, 0.15)\mathrm{GeV/c^2}$, $M_{J/\psi} \in (3.05, 3.15)\mathrm{GeV/c^2}$

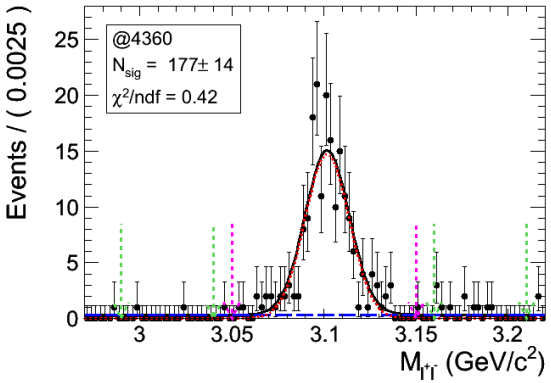
Fit results at different energy

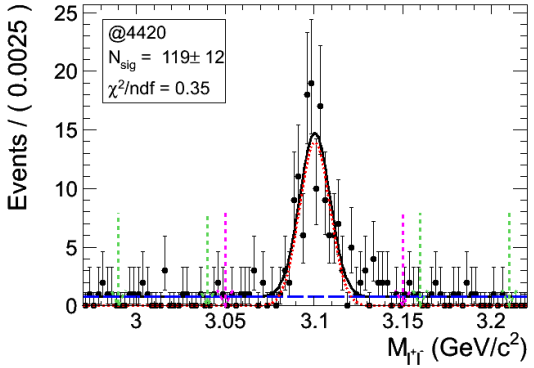
- Gaussian + 1st polynomial

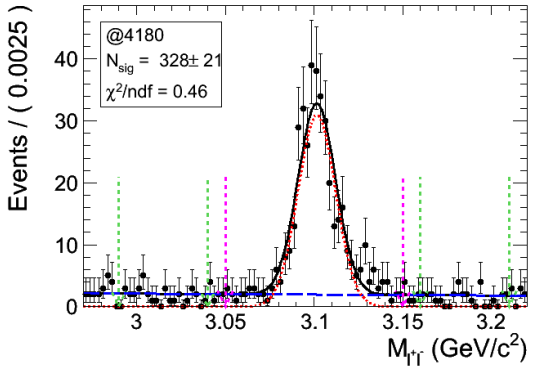


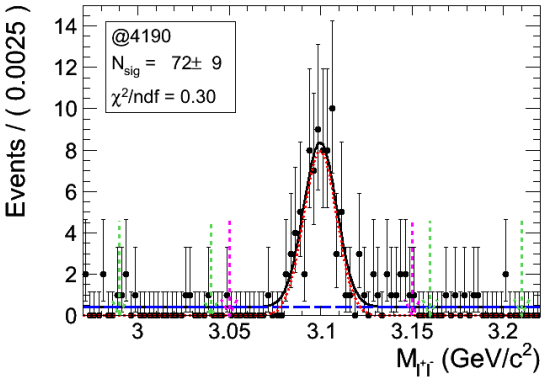


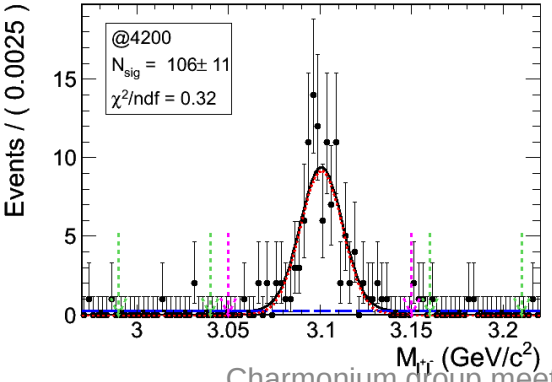


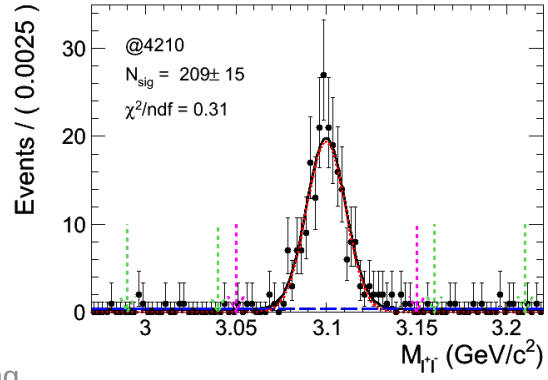




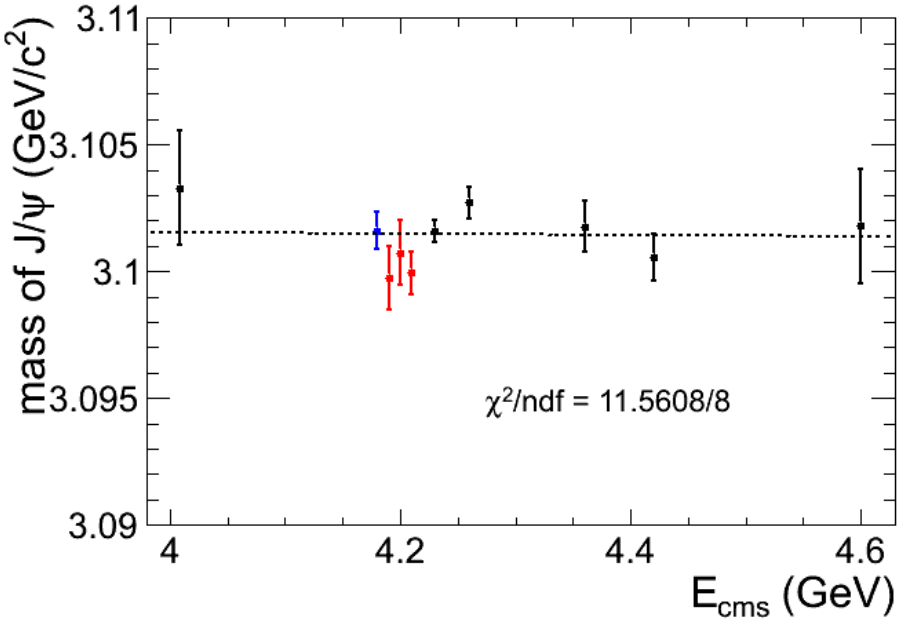


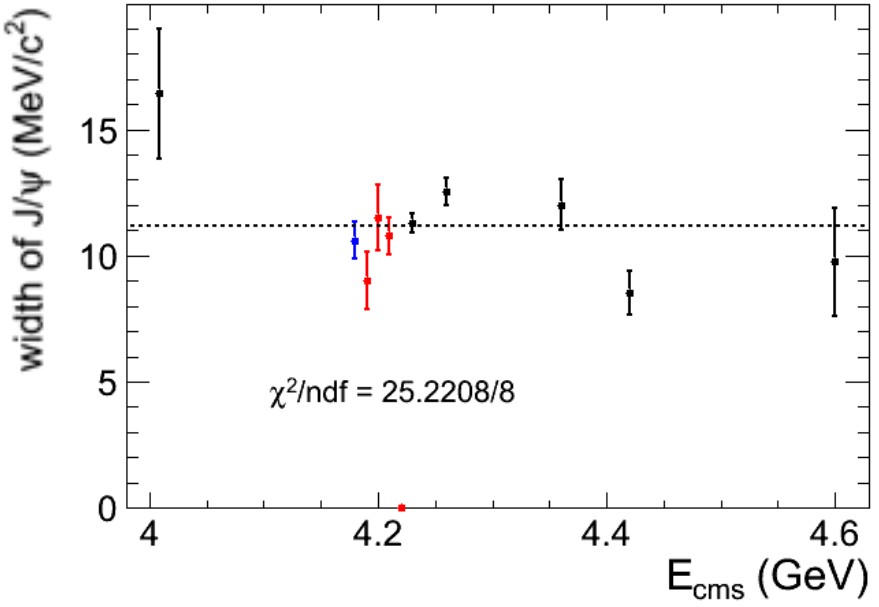






Mass and width of J/ψ

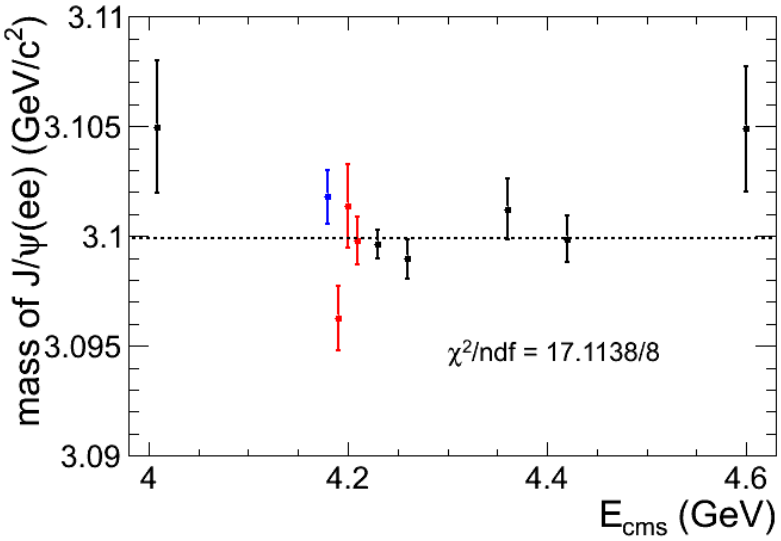


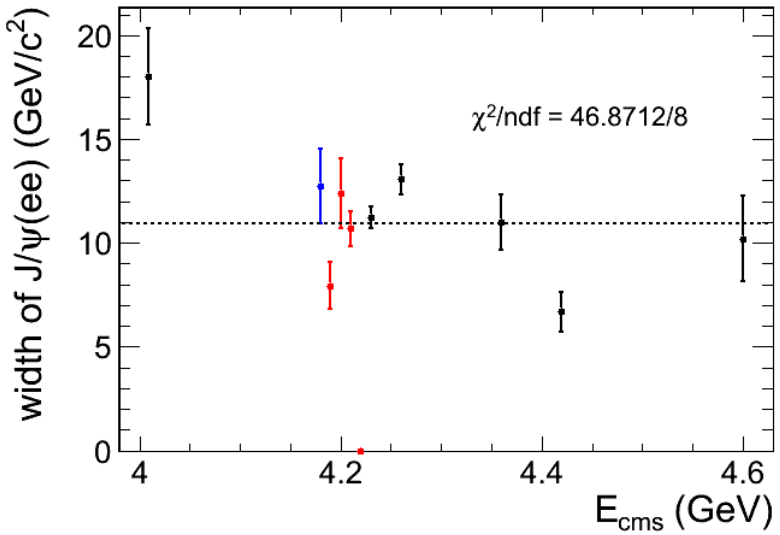


- Old data
- 4180
- New data

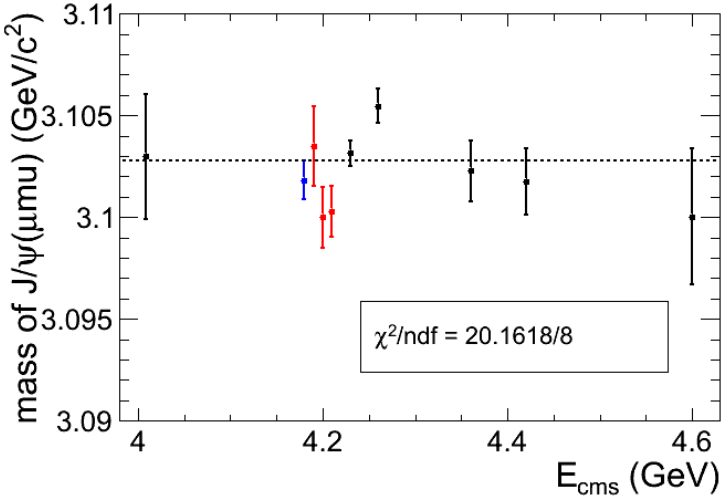
Mass and width of J/ψ

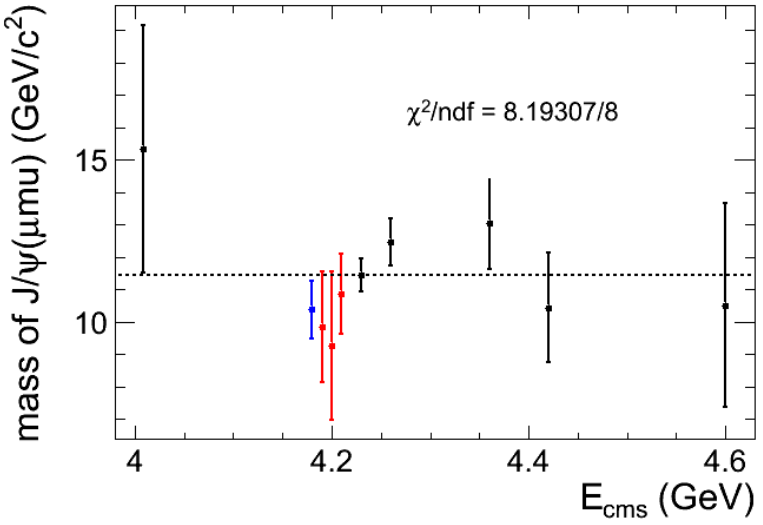
- $J/\psi \rightarrow e^+ e^-$





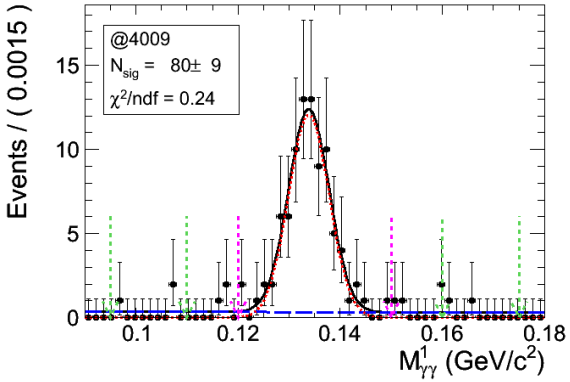
- $J/\psi \rightarrow \mu^+ \mu^-$

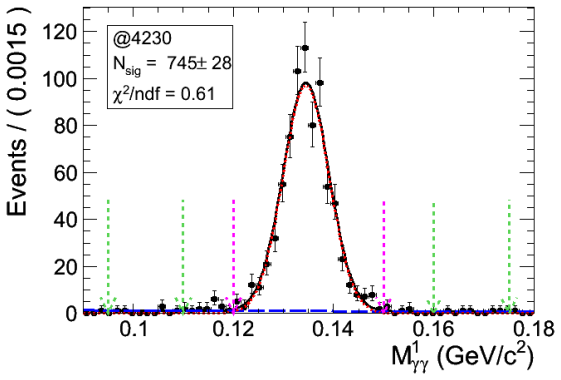


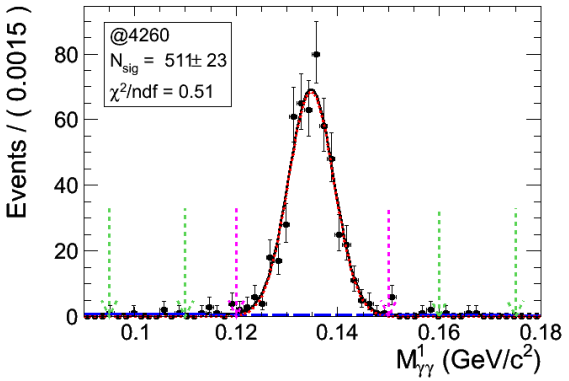


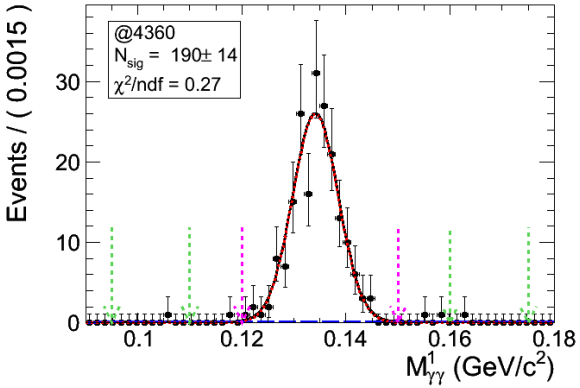
Fit to first π^0

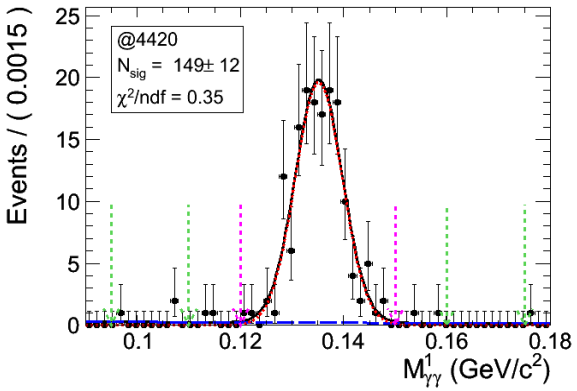
- Gaussian + 1st polynomial

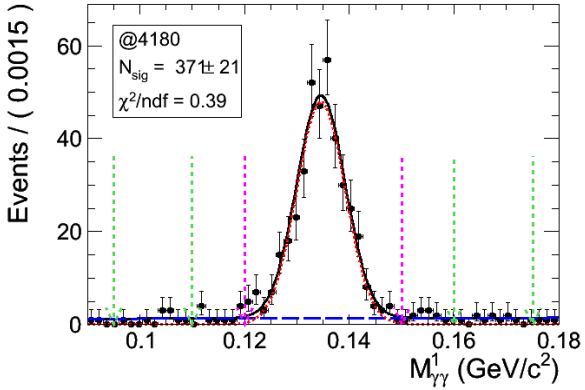


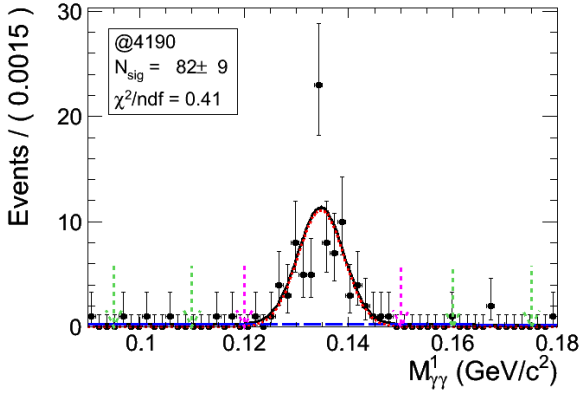


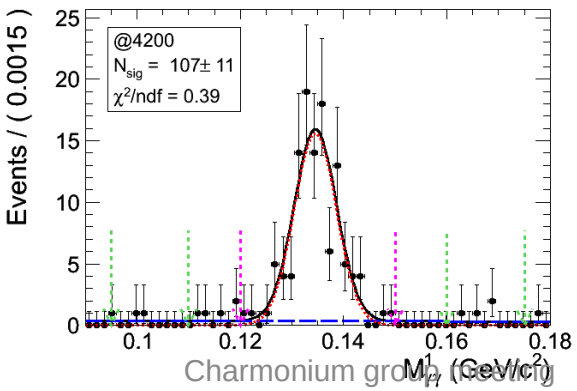


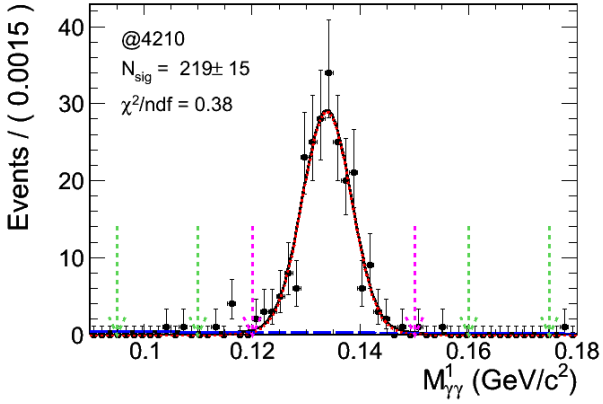






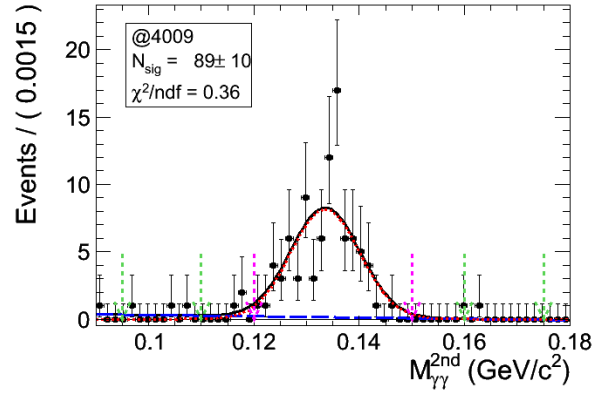


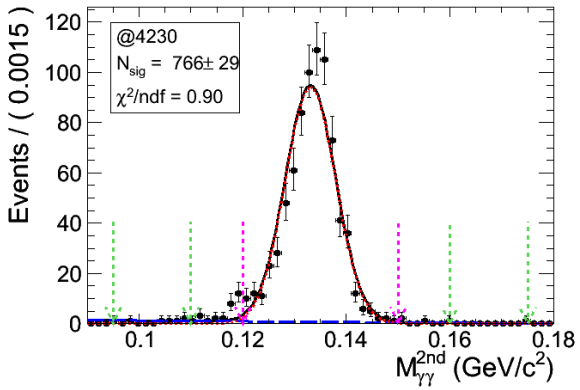


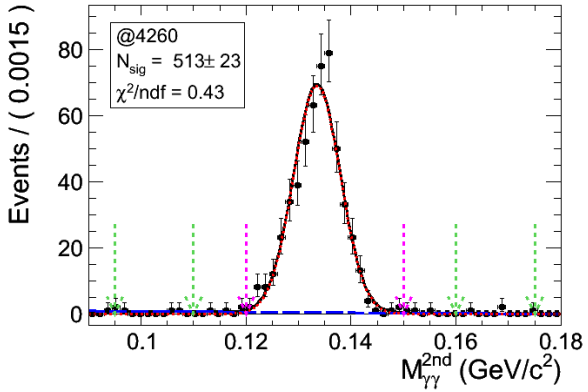


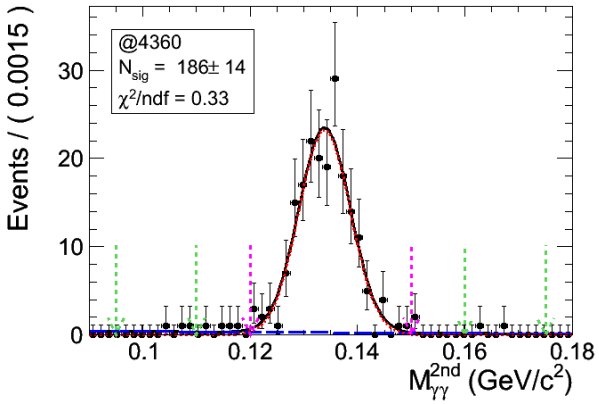
Fit to second π^0

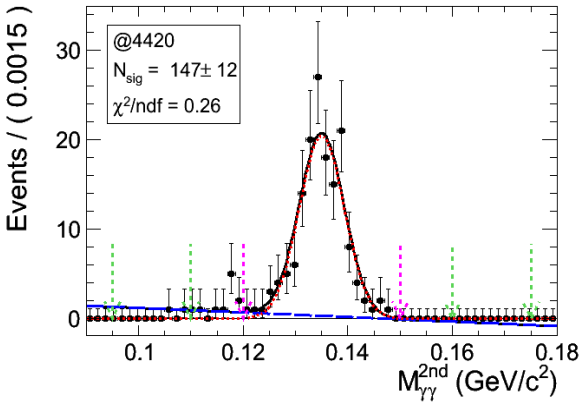
- Gaussian + 1st polynomial

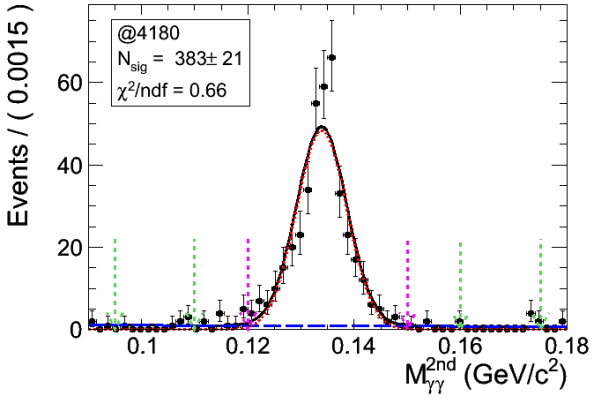


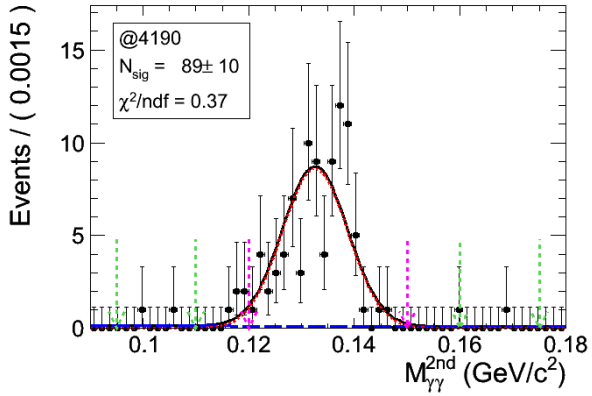


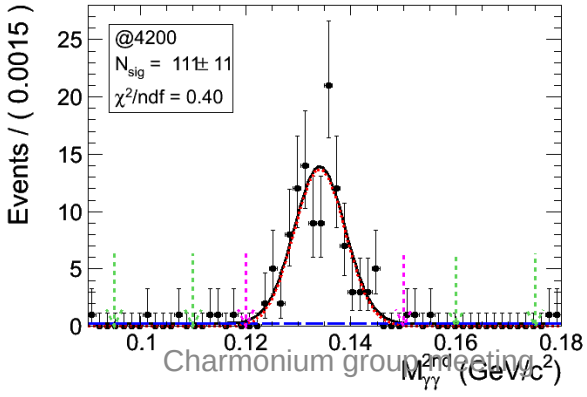


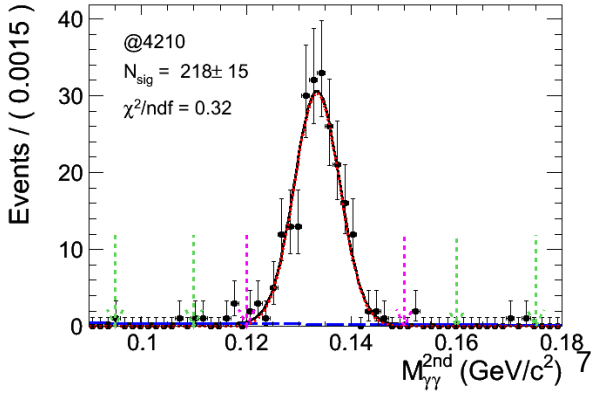








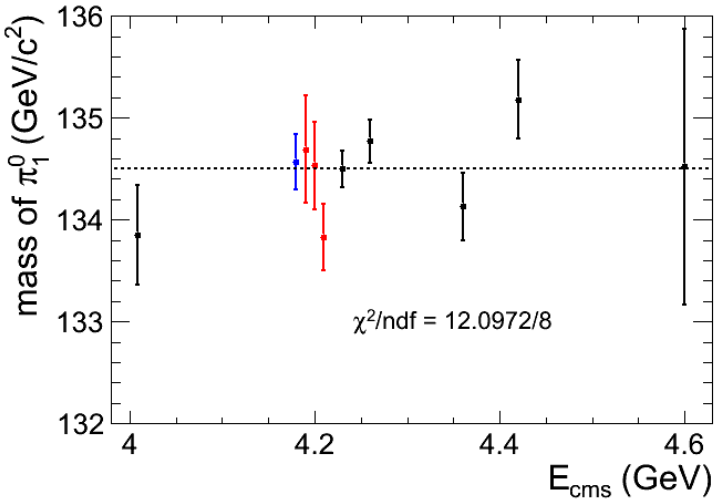




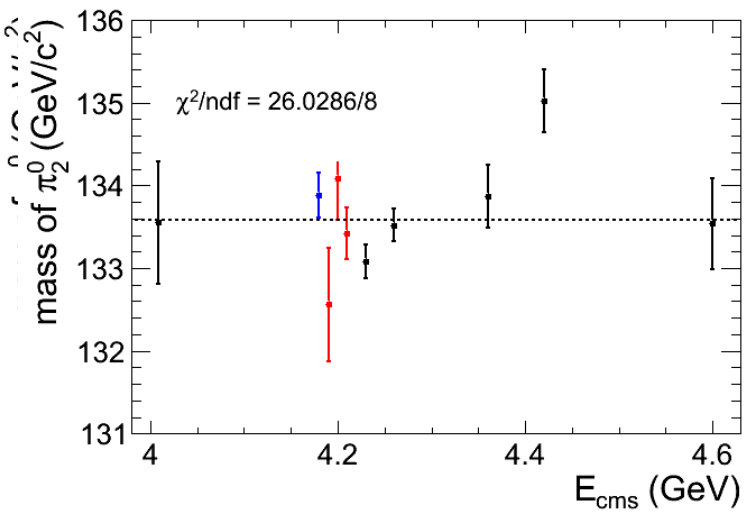
Mass and width of π^0_1 and π^0_2

mass

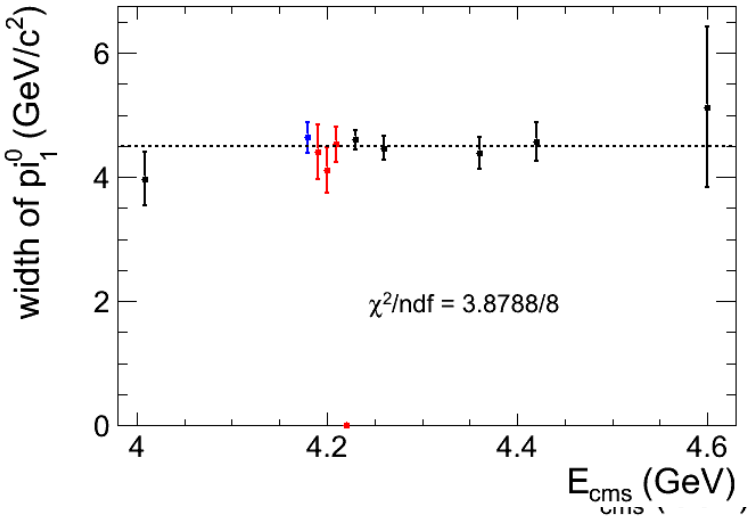
- 1st π^0

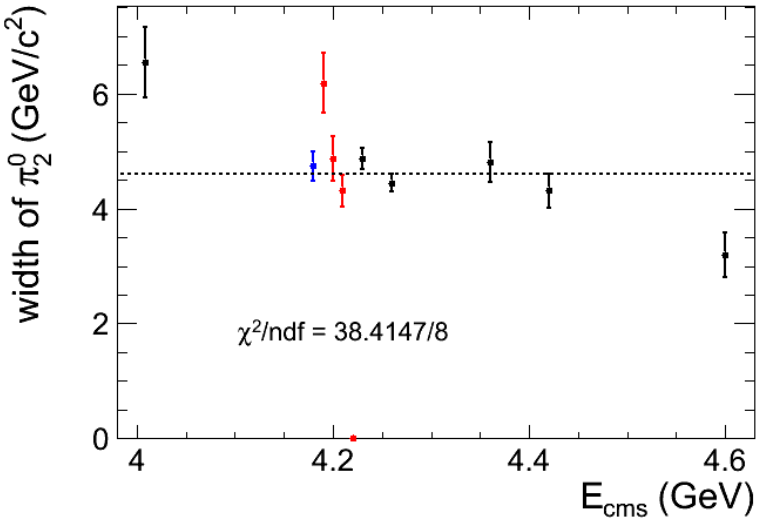


- 2nd π^0

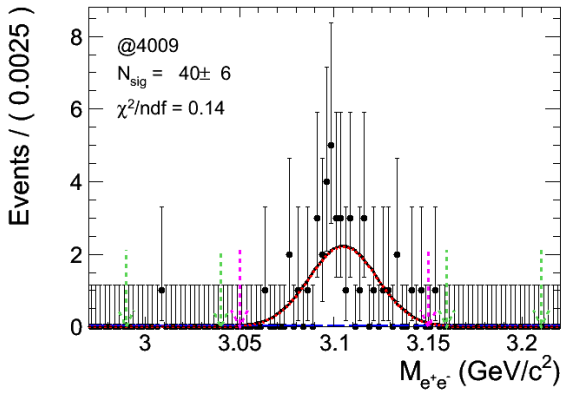


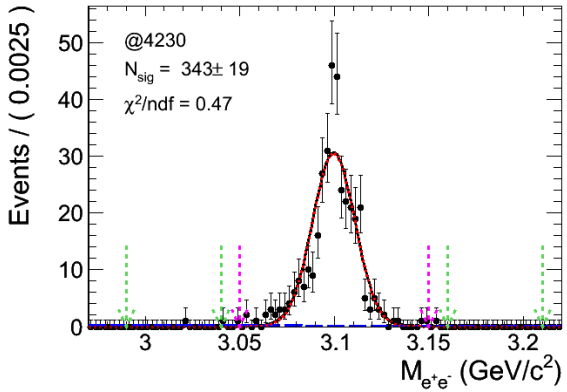
width

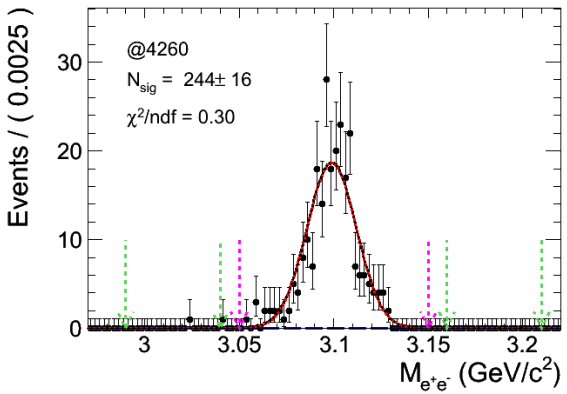


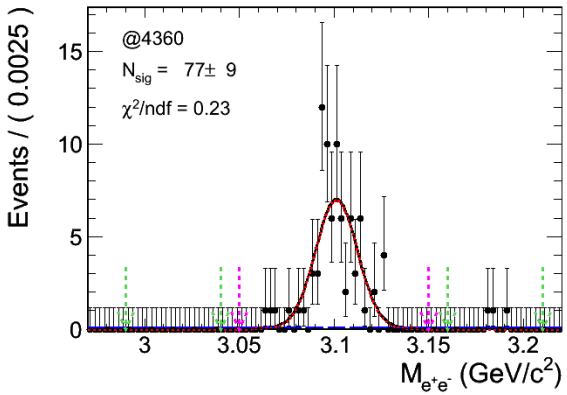


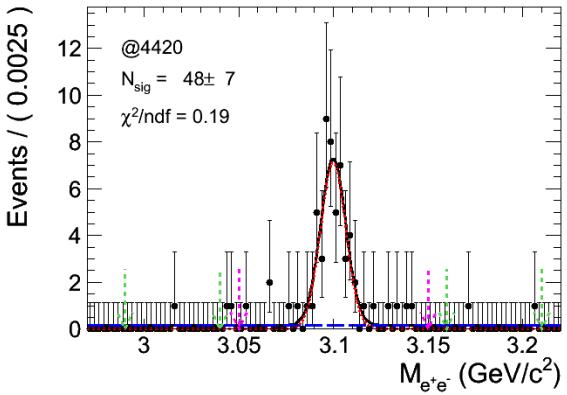
Back up Fit to J/ψ → ee

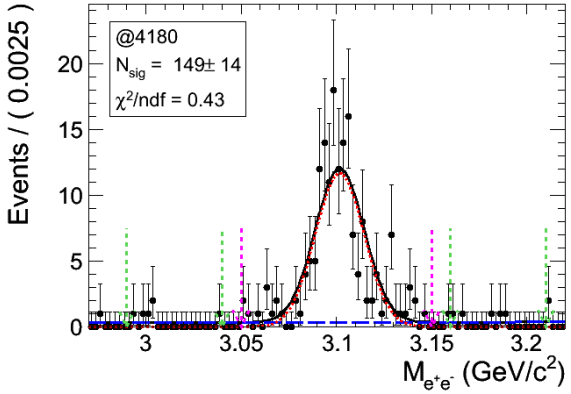


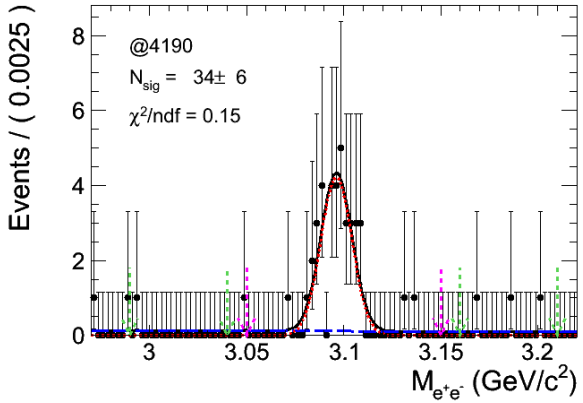


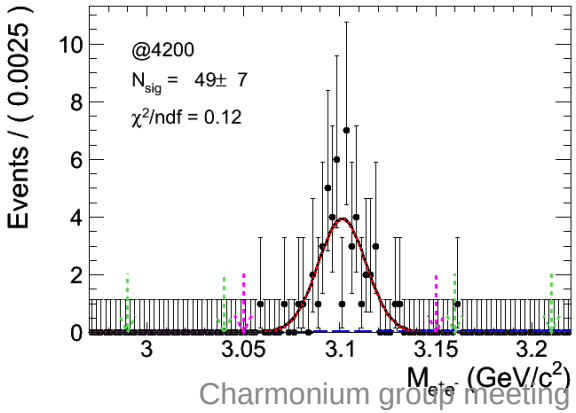


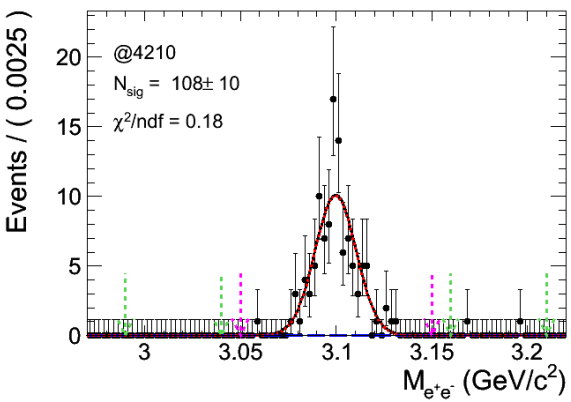
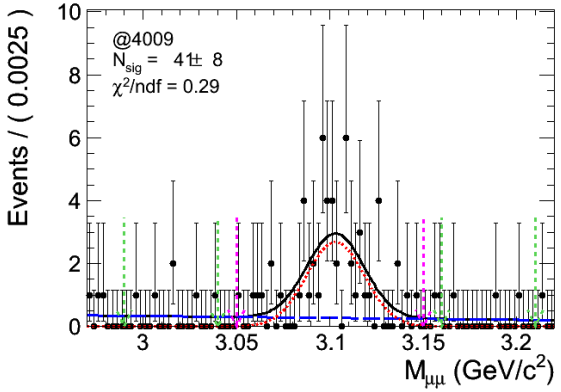
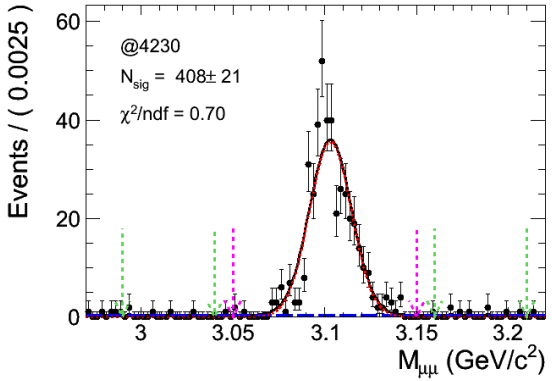
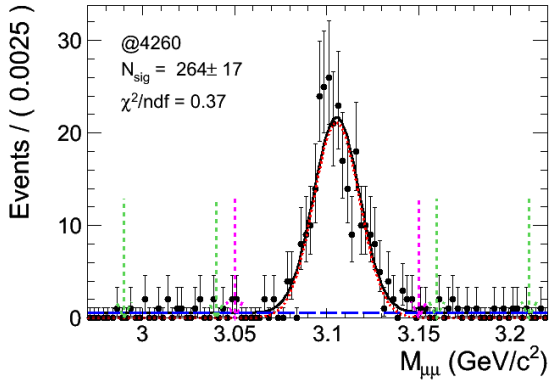
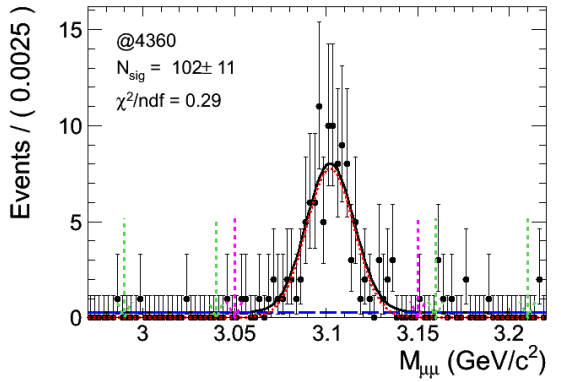
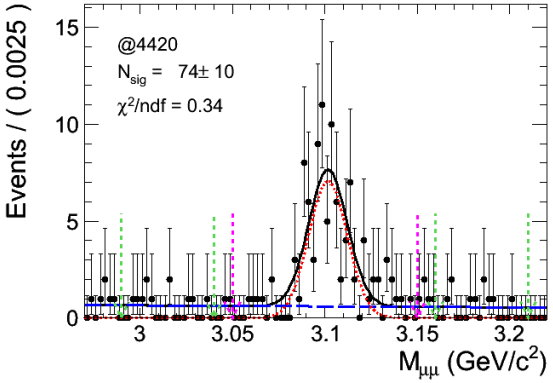
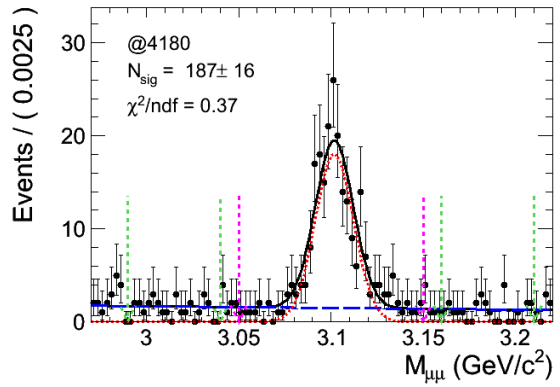
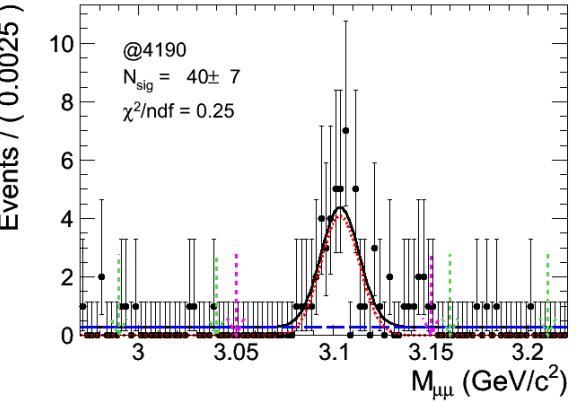
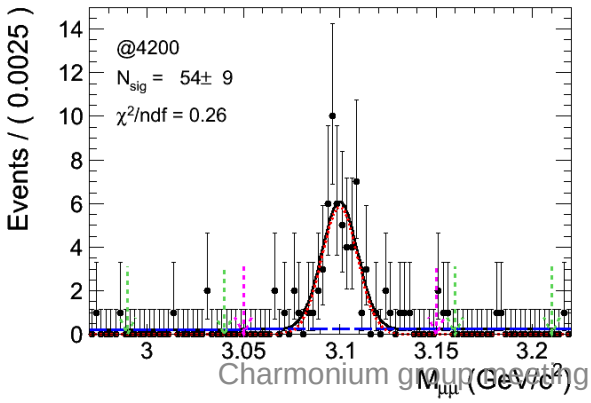
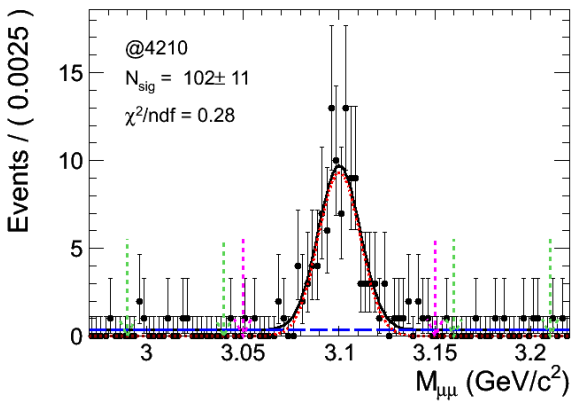












Back up Fit to J/ψ → μμ