Study of $e^+e^- \to \pi^+\pi^-\psi(3686)$, $\psi \longrightarrow \pi^+\pi^- J/\psi$

Li Xuhong, Zhou Xiaorong,*Peng Haiping*

University of Science and Technology of China
State Key Laboratory of Particle Detection and Electronics

Data Sets

- Boss Version 702.p01;
- 2017 new data samples

Event selection

- **Good Charged Tracks Selection**

  $|V_r| < 1.0$, $|V_z| < 10.0$, $|\mathrm{Cos}\theta| < 0.93$;

  $N_{good} = 6$ or 5 ; $N(l^-) = N(l^+) = 1$, $l = e(\mu)$;

- **PID**

  lepton: $p > 1.0\ GeV/c$,

  e^+e^-: $\frac{E}{p} > 0.7$,

  $\mu^+\mu^-$: $E < 0.45\ GeV$;

  Pion: $p < 0.65\ GeV/c$;

- **4C and 5C Kinematic fit for 6 tracks**

  $\chi^2_{4C} < 60$, no χ^2_{5C} cut

  l^+l^- mass range: [3.05, 3.15] GeV

- **1C and 2C Kinematic fit for 5 tracks**

  $\chi^2_{1C} < 60$, no χ^2_{2C} cut

  l^+l^- mass range: [3.05, 3.15] GeV

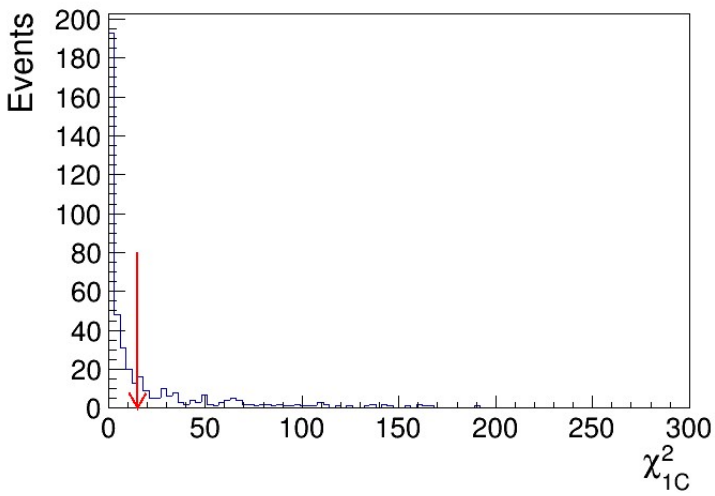
Chisq of kinematic fit(4180)

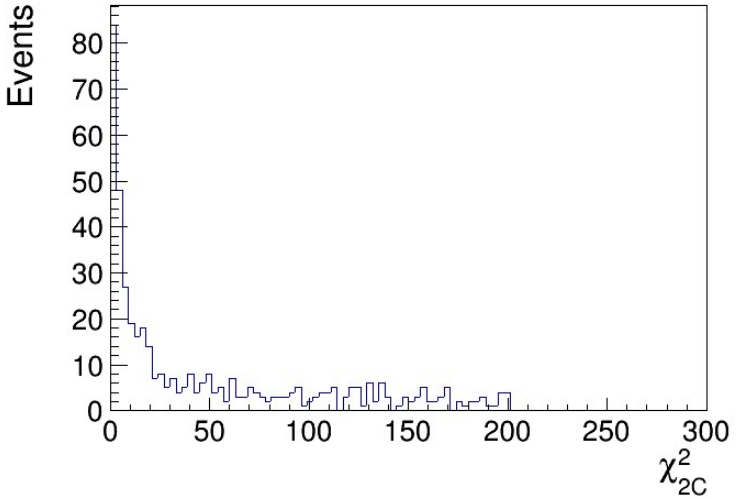
- For 5 tracks case:

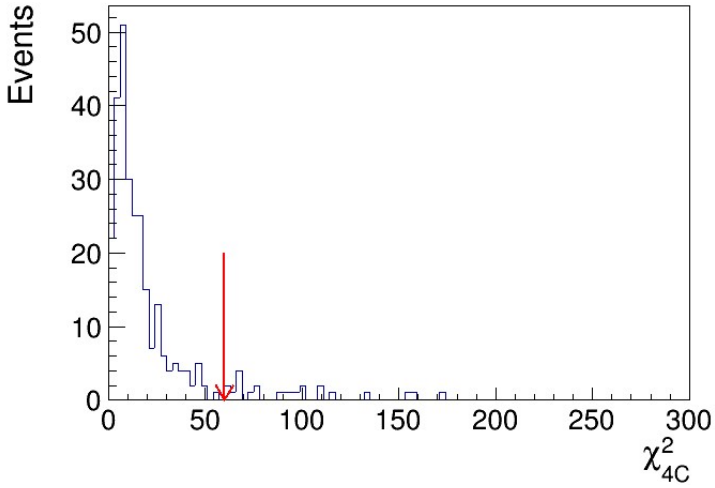
  χ^2_{4C}<60, no χ^2_{5C} cut

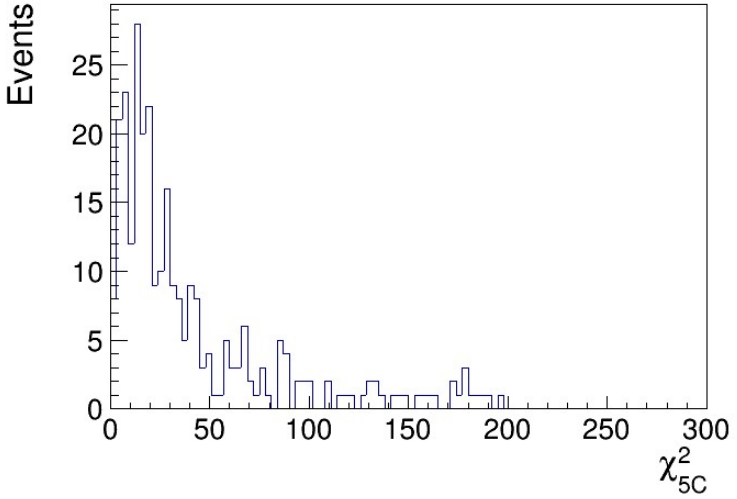
- For 6 tracks case:

  χ^2_{1C}<60, no χ^2_{2C} cut





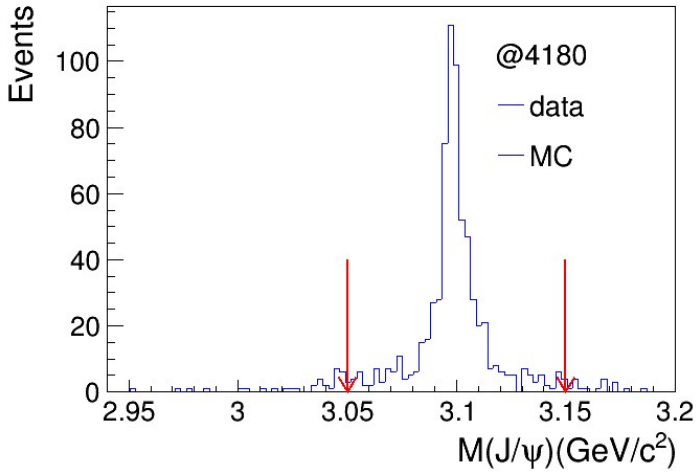




Mass window

- After 1C or 4C:

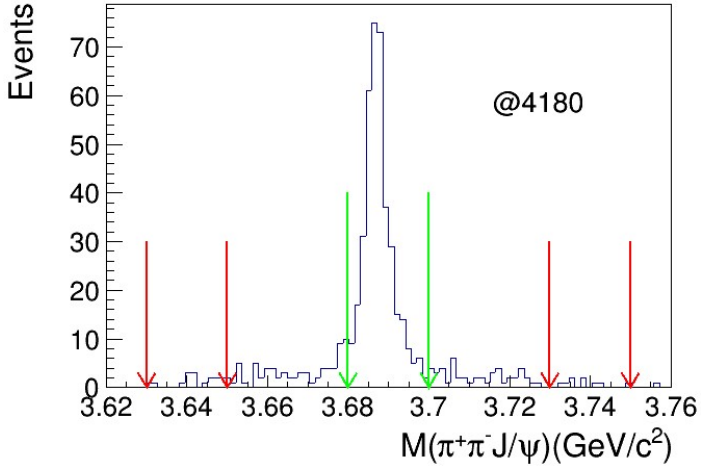
  l^+l^- mass range: [3.05, 3.15] GeV



- For study of intermediate states:

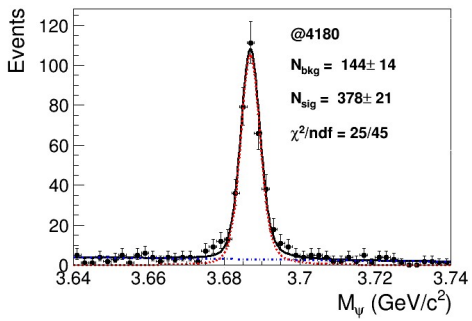
  $\psi(3686)$mass range: [3.68, 3.70] GeV

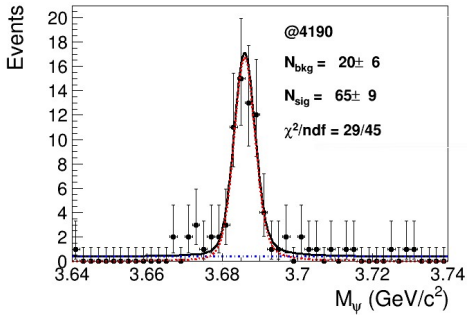
  Sideband range:[3.63,3.65] GeV,[3.73,3.75] GeV

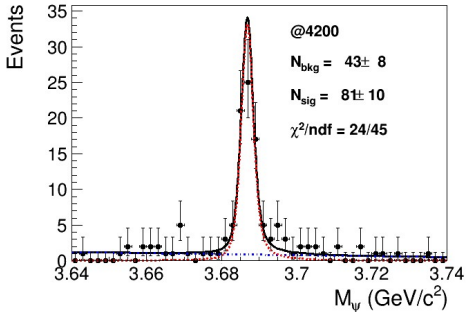


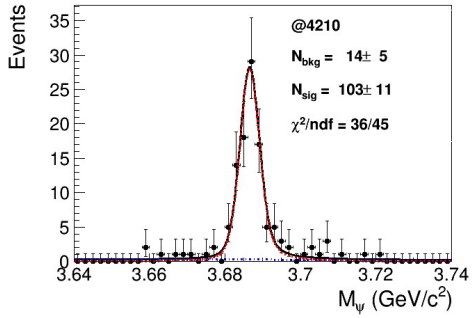
Fit result

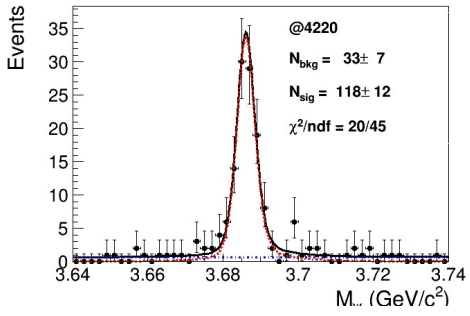
Fit method: MC⊗Gaussian

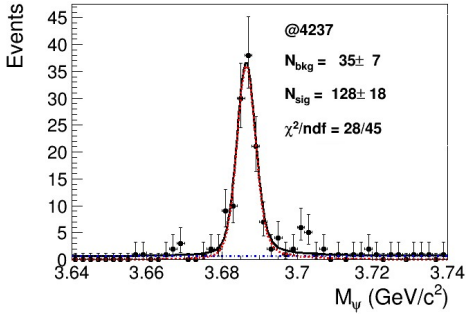


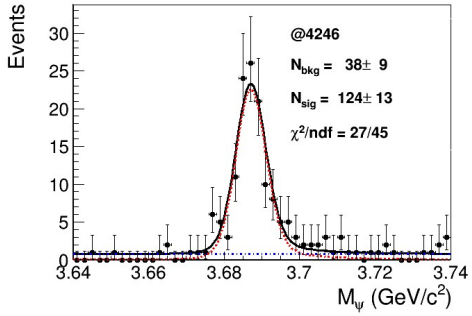


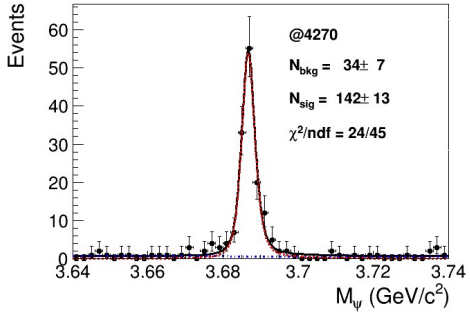


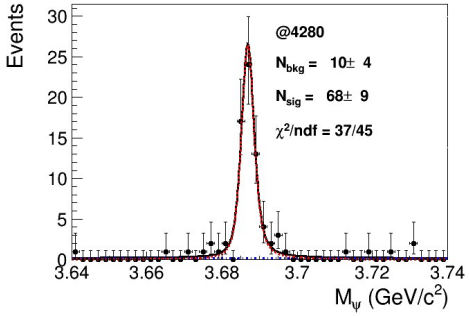




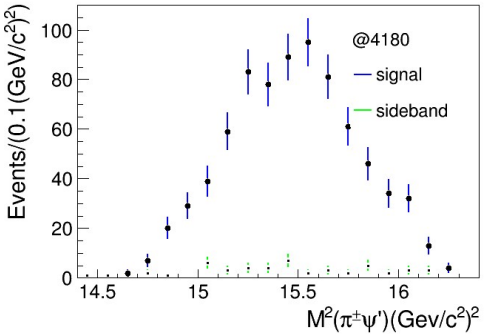


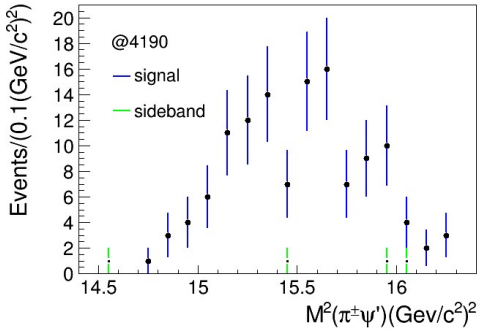


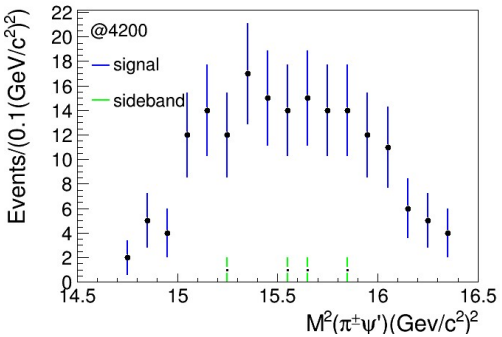


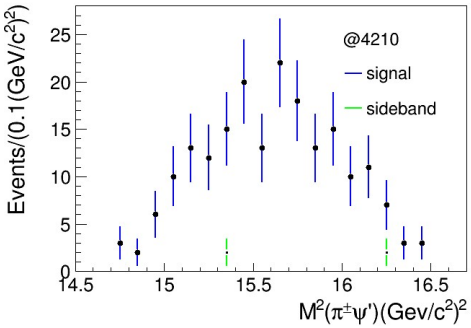


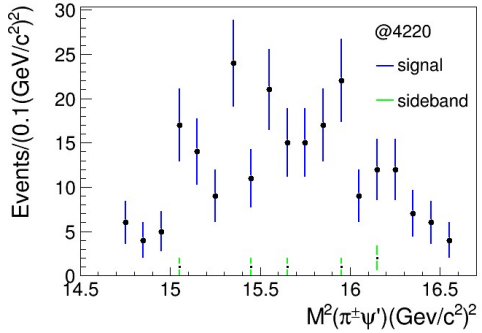
Study of intermediate states

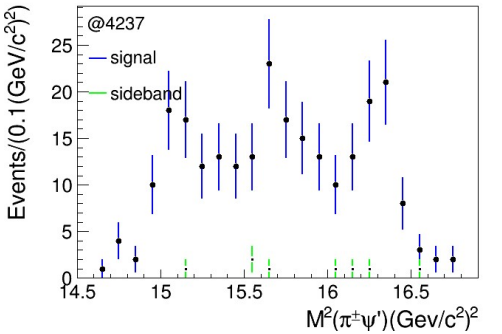


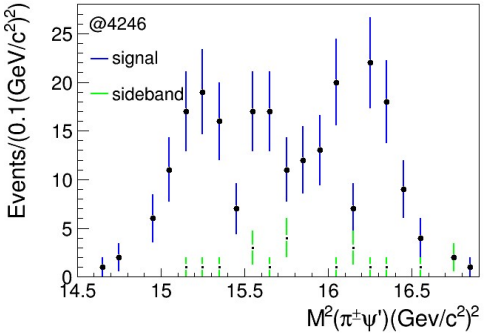


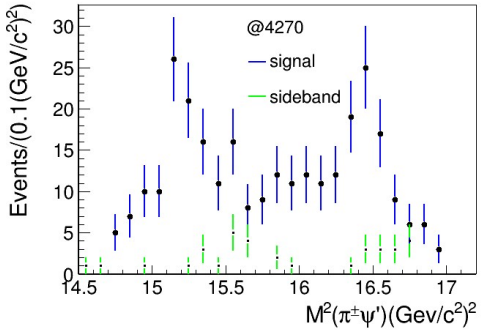


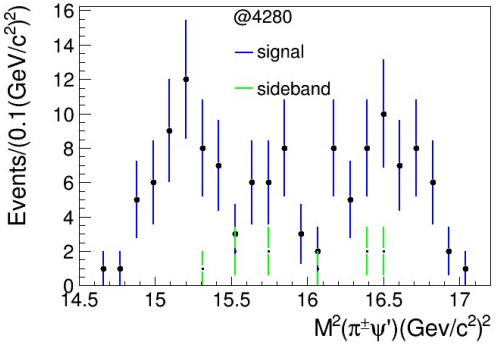




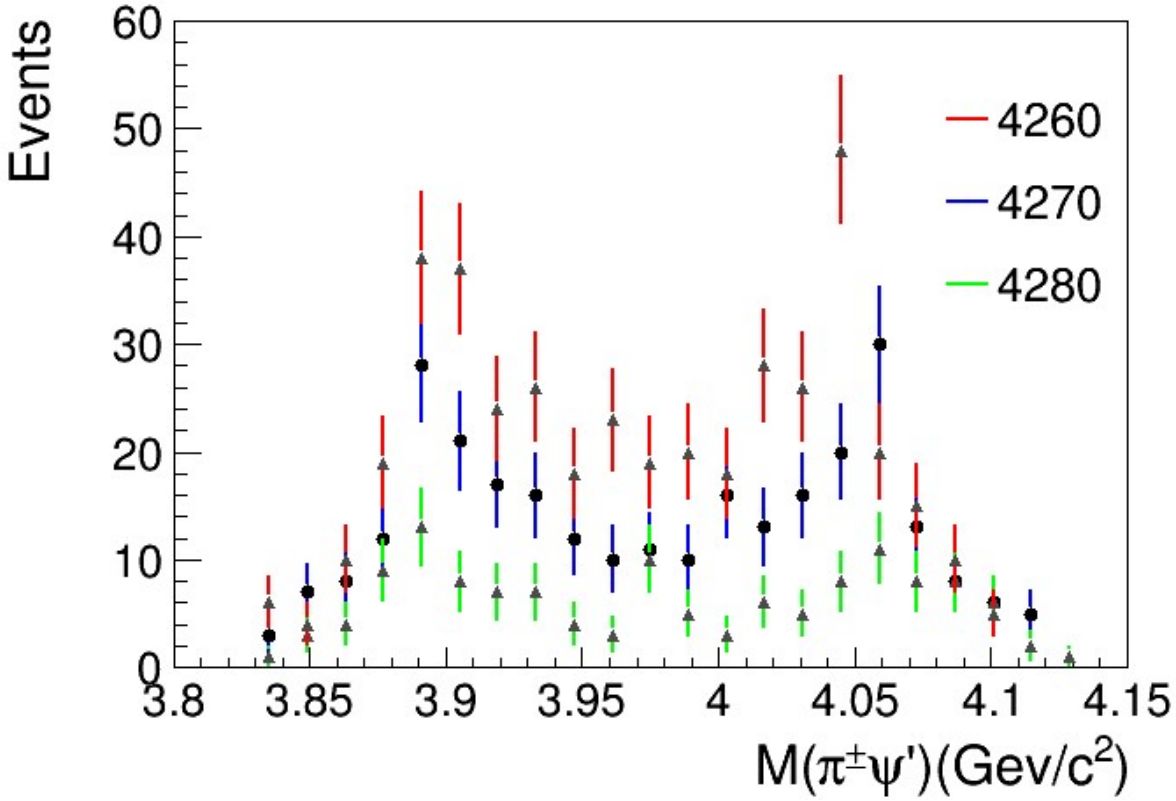






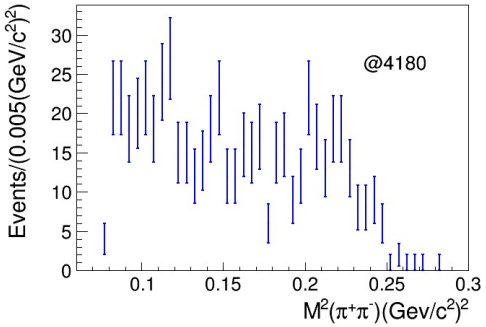


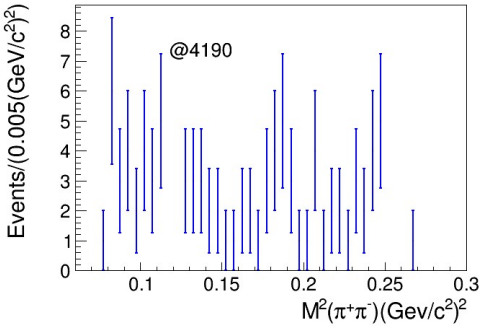
Study of intermediate states

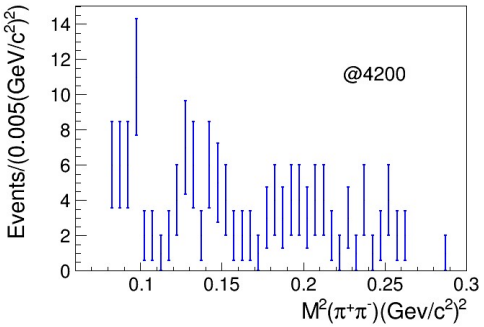


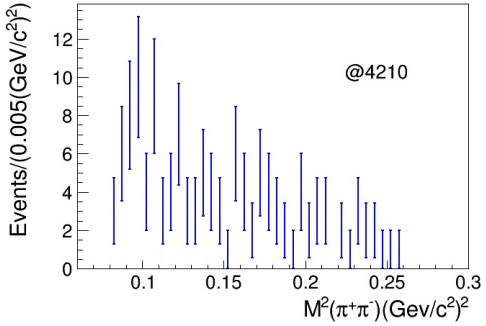
The peaks are at the same point

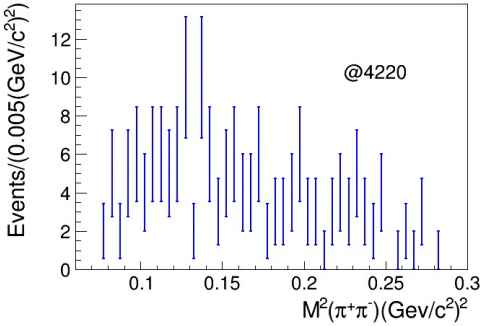
Study of intermediate states

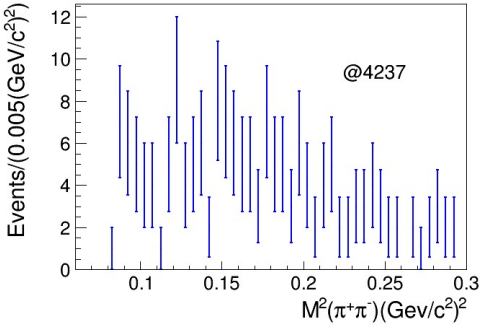


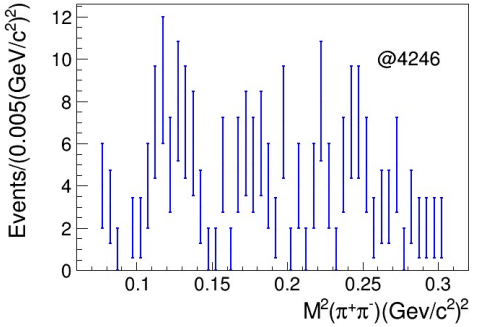


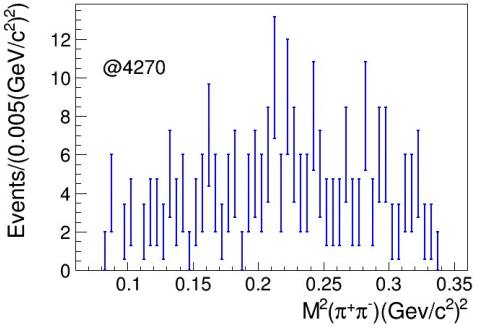


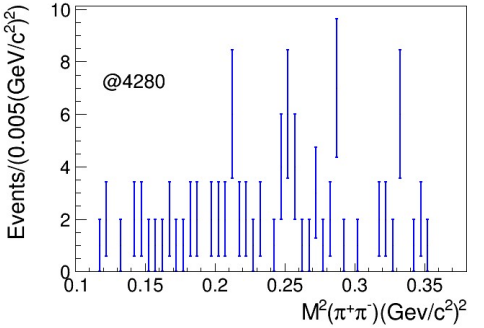












backup

energy	$\mu^+\mu^-$		e^+e^-		5 tracks		6 tracks		total	
	N_{sig}	ϵ	N_{sig}	ϵ	N_{sig}	ϵ	N_{sig}	ϵ	N_{sig}	ϵ
4180		26.80%	±	18.17%		21.20%	±	23.76%	378±21	44.96%
4190		26.97%	±	18.38%	±	21.16%	±	24.20%	65±9	45.36%
4200		27.14%	±	18.37%	±	21.09%	±	24.43%	81±10	45.51%
4210		27.19%	±	18.38%	±	20.91%	±	24.66%	103±11	45.57%
4220		27.12%	±	18.42%	±	20.77%	±	24.77%	118±12	45.54%
4237		26.73%	±	18.13%	±	20.51%	±	24.35%	128±18	44.86%
4246		26.51%	±	17.96%	±	20.18%	±	24.29%	124±13	44.47%
4270		26.21%	±	17.67%	±	19.85%	±	24.03%	142±13	43.88%
4280		26.20%	±	17.64%	±	19.73%	±	24.11%	68±9	43.84%