

Central J/ψ in 2023 UPCs

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7. miniworkshop difrakce a ultraperiferních srážek

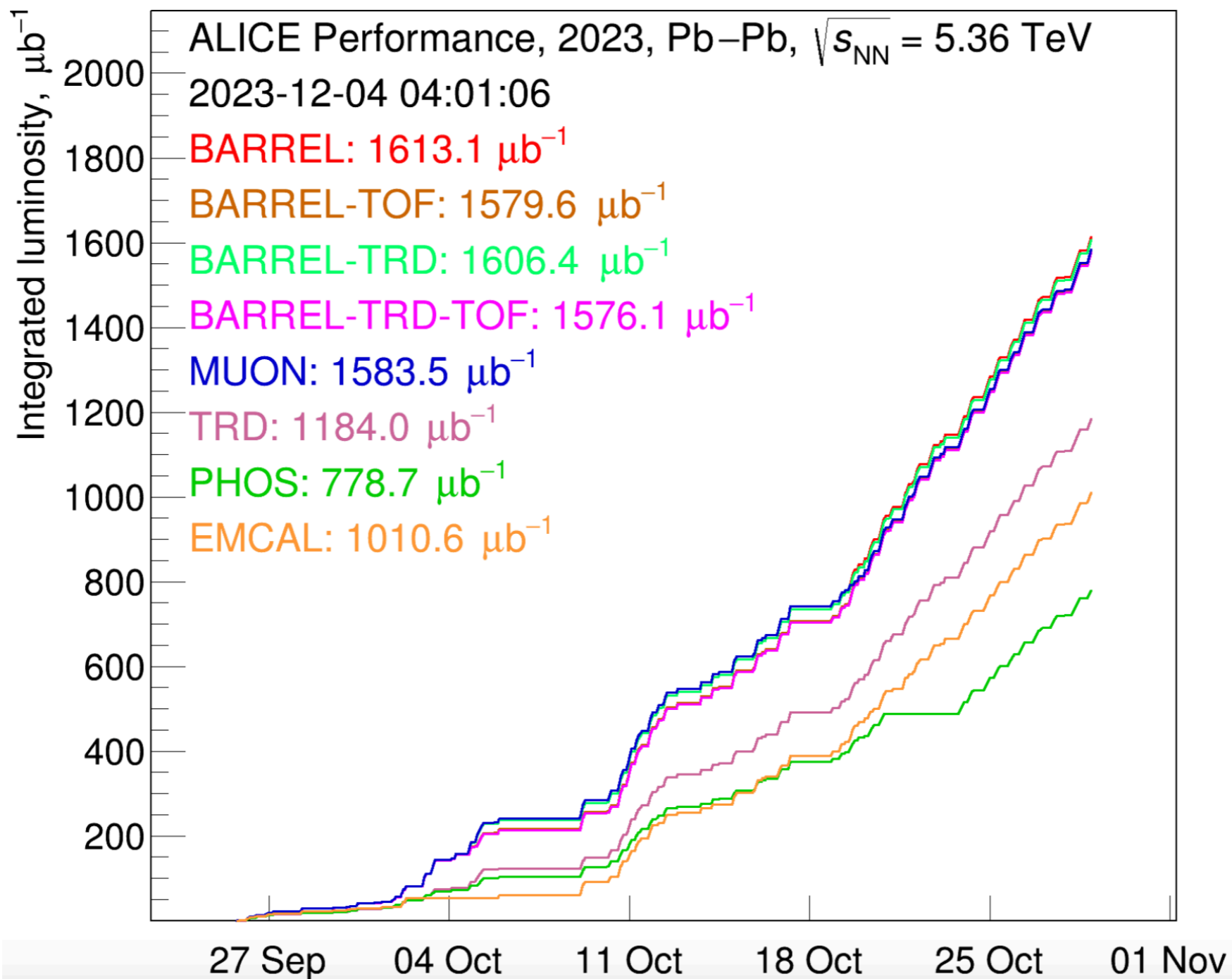
20.09.2024

Run 3 data taking

You think you understood? Wrong!

- ALICE had a lot of detector upgrades (TPC, ITS, MFT,..).
- A major upgrade concerning readout -> continuous readout.
 - Continuous readout -> large amount of data.
 - Larger amount of data -> more efficient data skimming and system.
- Learn everything again..

Run3 2023 PbPb



Run3 2023 PbPb

- Not all runs are usable (large TPC issues).
- Presented analysis only on 30 runs (still corresponding 400 GB after first set of skimming).

544013	544028	544032	544091	544095	544098	544116	544121	544122	544123	544124	544167	544180	544184	544185	544389
544390	544391	544392	544451	544454	544474	544475	544476	544477	544490	544491	544492	544508	544510		

- Luminosity of those 30 runs $\sim 276 \mu b^{-1}$.
- So far analysis done on analysis pass2 with upc settings.
 - Effects mostly at small mass region.
- pass4 reconstruction ongoing, only with upc settings

Data selections

Primary (skimming) selections

- Data were skimmed using DG candidate producer.
 - Dataset: UD_LHC23zzfghik_pass2_upc_jpsi.
- Collisions with exactly 2 PV tracks.
- $|\eta| < 1.5$
- track $p_T > 0.7 \text{ GeV}/c$
- TSC veto.

Data selections

Secondary selections

- Secondary selections done with upcJpsiCentralBarrelCorr.cxx.
- Good track selections:
 - $dcaZ < 2$, $dcaXY < 1e10$ (p_T dependent cut?)
 - track has ITS, TPC
 - ITS Number of Clusters > 4 (6 for the future)
 - ITS Chi2 Ncls < 36
 - TPC NClS Crossed Rows > 70
 - TPC Chi2 NClS < 4
 - $|\eta| < 0.9$

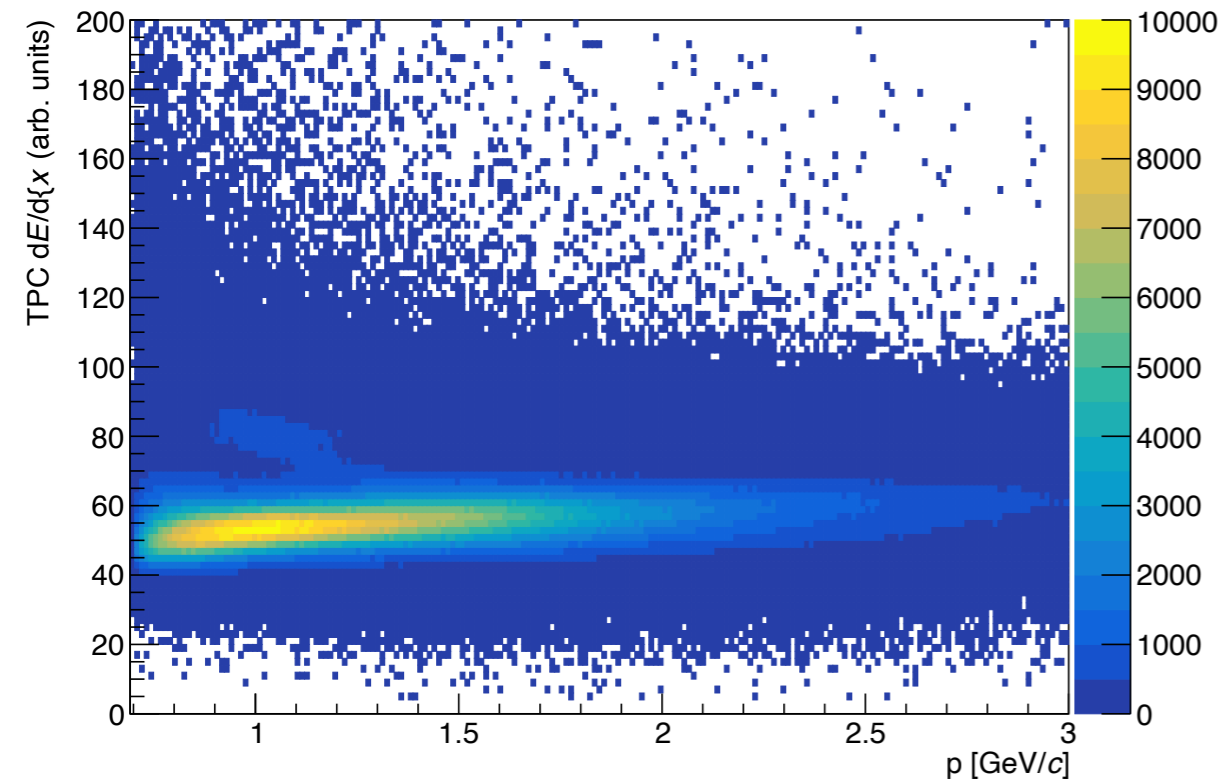
Data selections

Secondary selections

- J/ψ candidate selections
 - $|y| < 0.8$
 - tracks have opposite charges
 - $IVM > 2 \text{ GeV}$
 - $\sigma_{\mu 1}^2 + \sigma_{\mu 2}^2 < \sigma_{e 1}^2 + \sigma_{e 2}^2$ (muons) (only TPC PID)
 - $\sigma_{\mu 1}^2 + \sigma_{\mu 2}^2 > \sigma_{e 1}^2 + \sigma_{e 2}^2$ (electrons) (only TPC PID)
 - $p_T < 0.2 \text{ GeV}/c$ (coherent)
 - $p_T > 0.2 \text{ GeV}/c$ (incoherent)

Cut effects on TPC

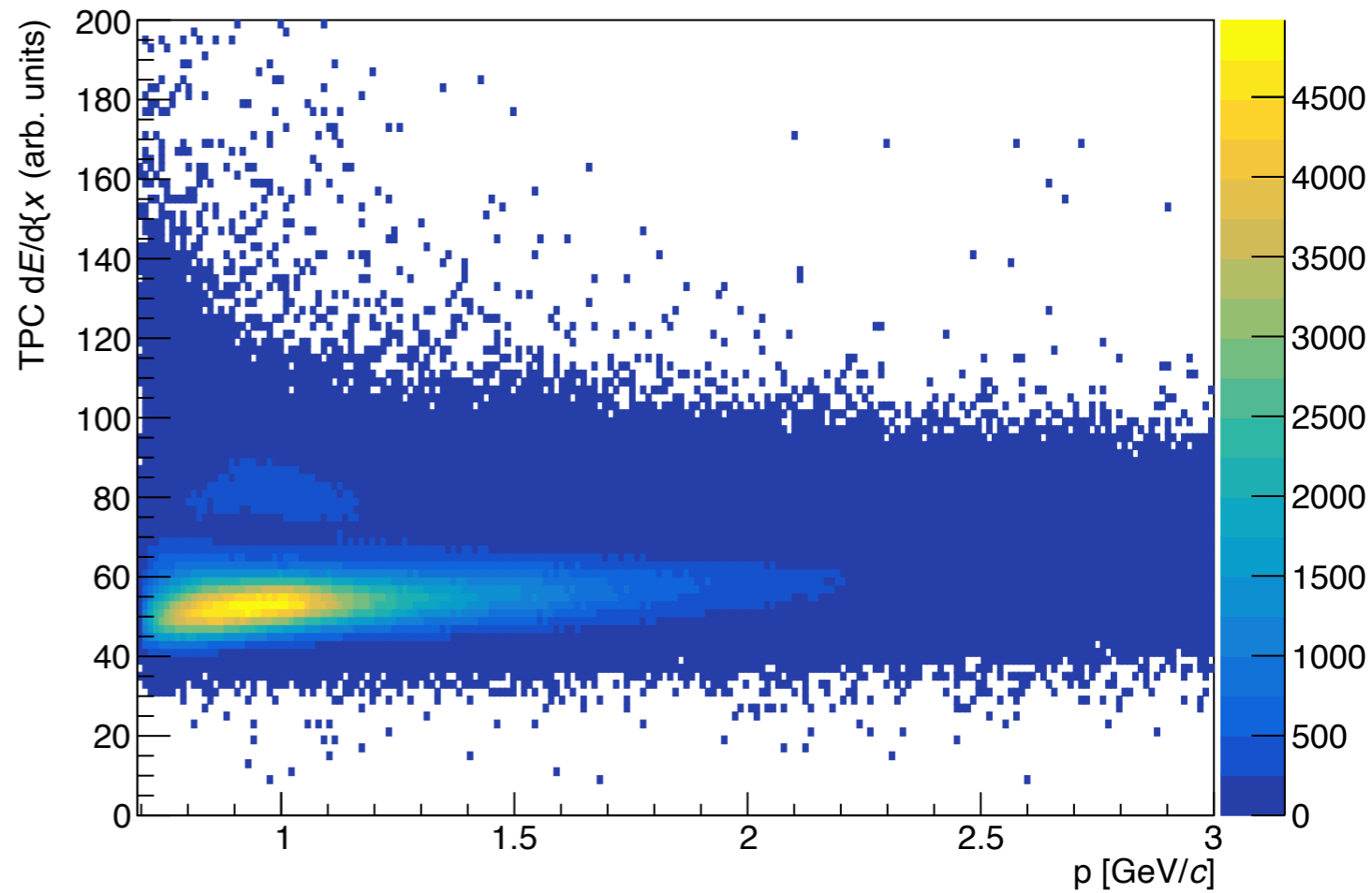
hTPCVsP



Two good tracks

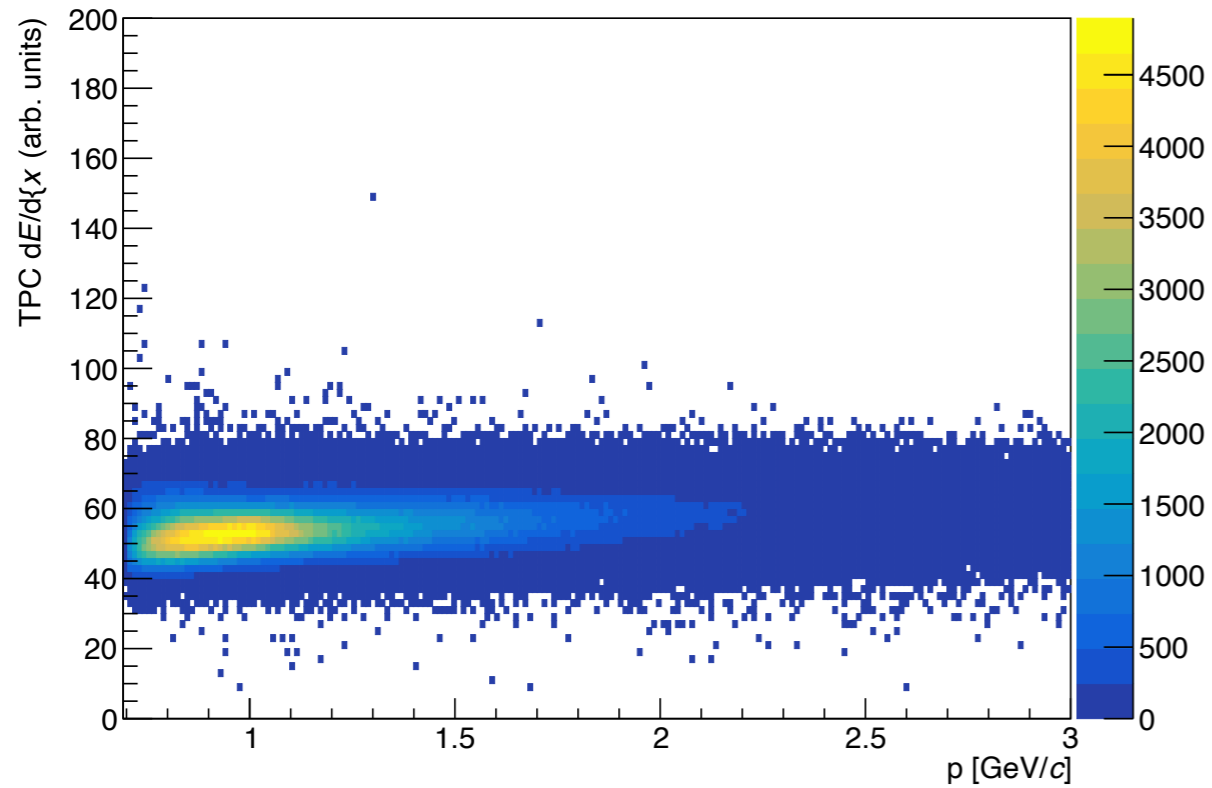
Two PV tracks

hTPCVsP



Cut effects on TPC

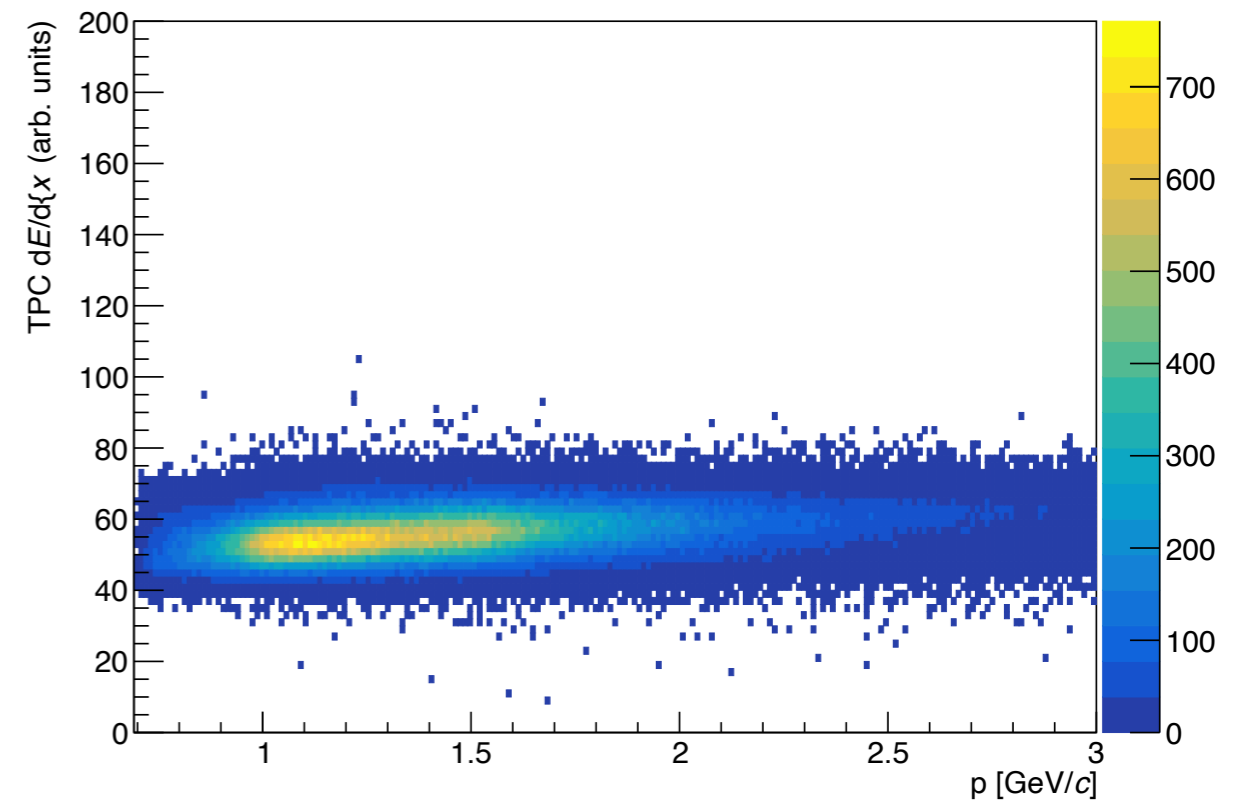
hTPCVsP



Tracks for meson candidate

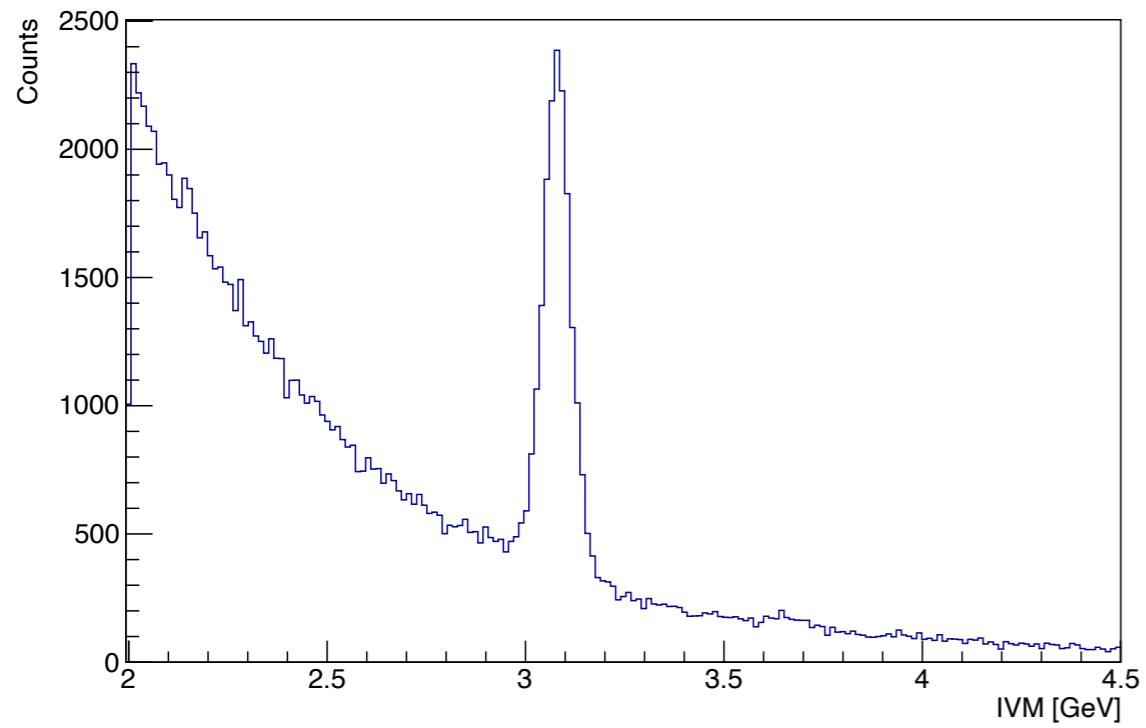
Two good muon tracks

hTPCVsP

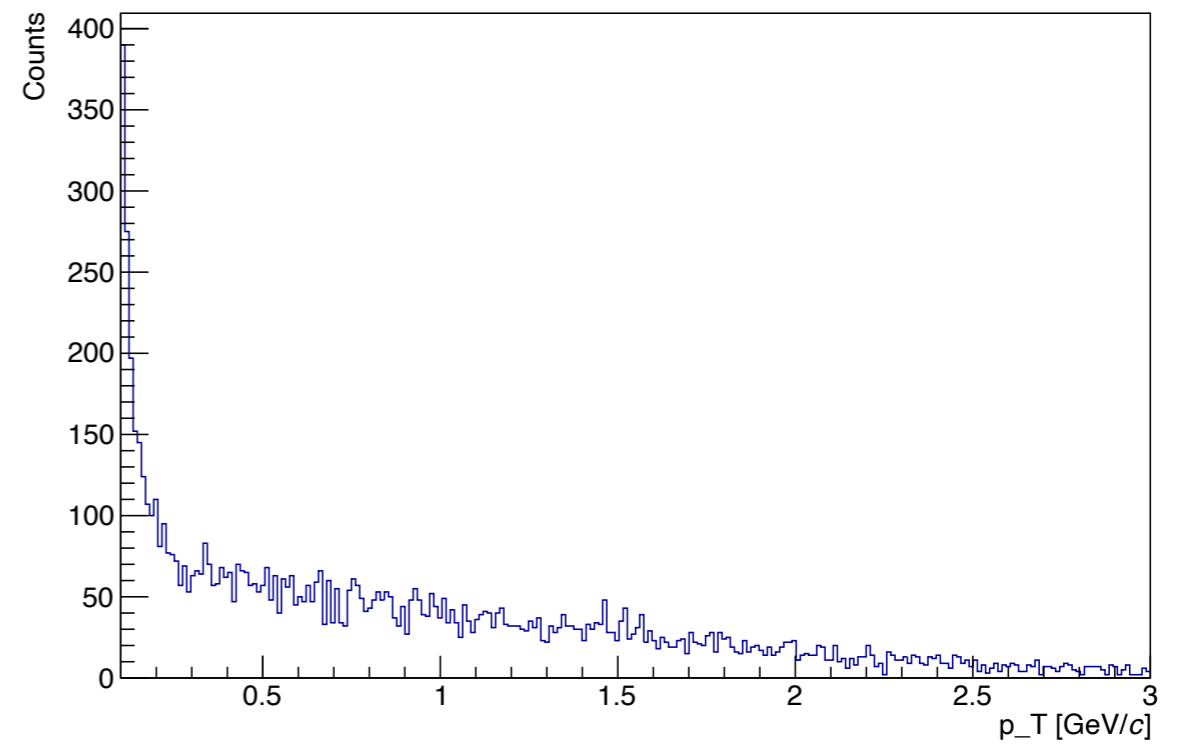


$$J/\psi \rightarrow \mu^+ \mu^-$$

hPairIVM



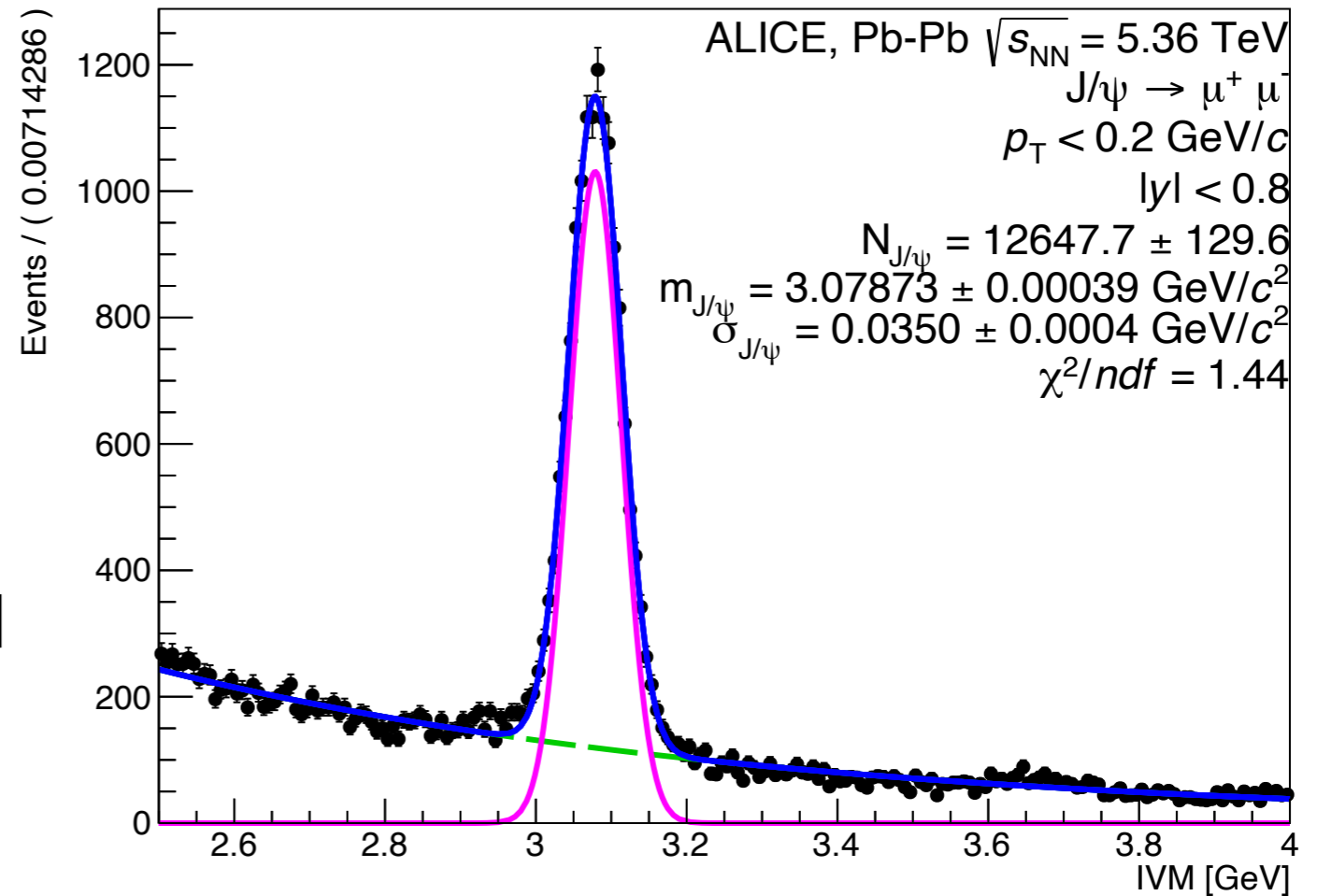
hJpsiPt



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

Coherent

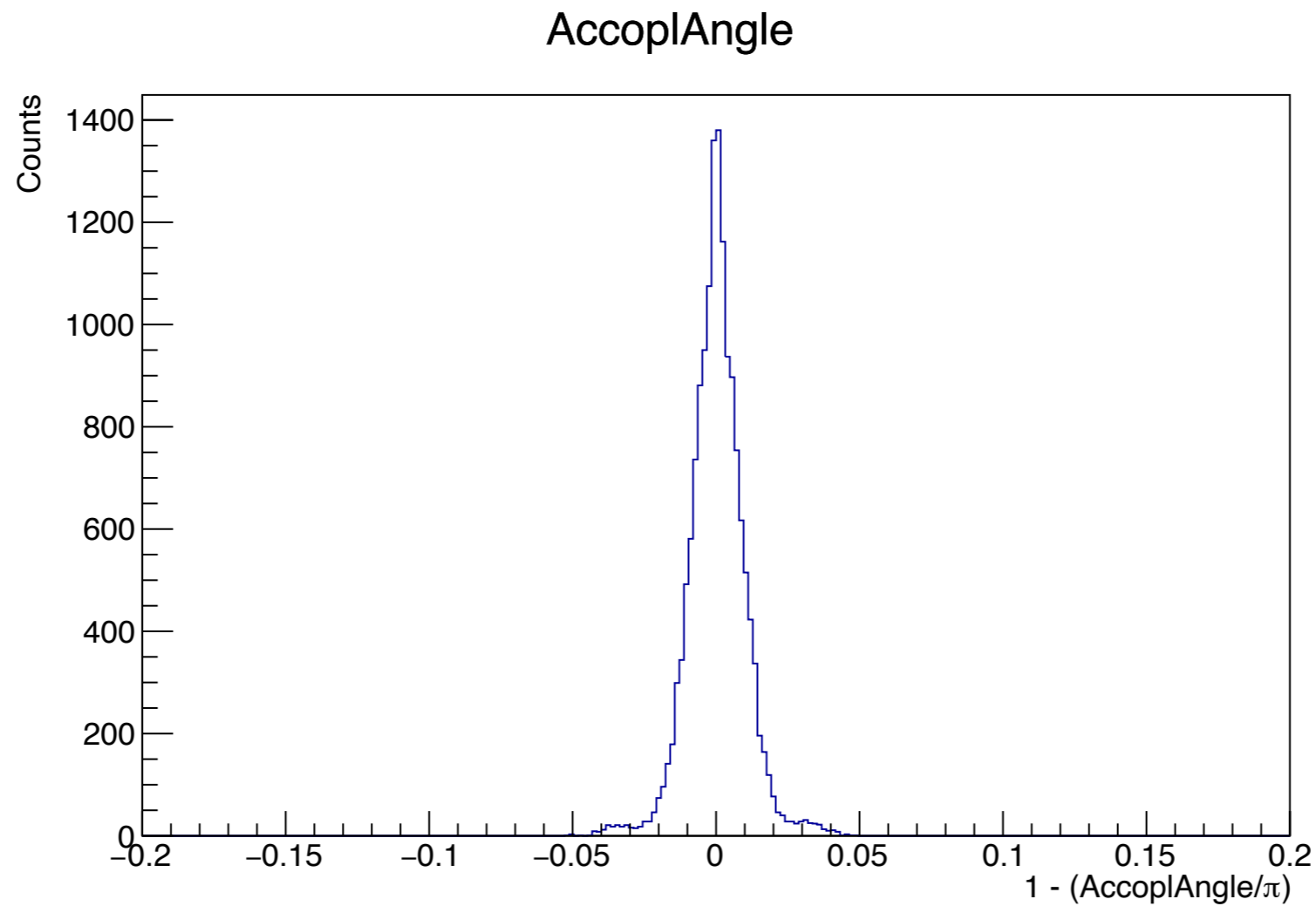
- Lumi $\sim 276 \mu b^{-1}$.
- 3 times more than in Run2 2018.
- Fit parameters NOT calculated from MC.
- Clear peak slightly shifted to the left (in comparison with PDG value 3.096).



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

Coherent

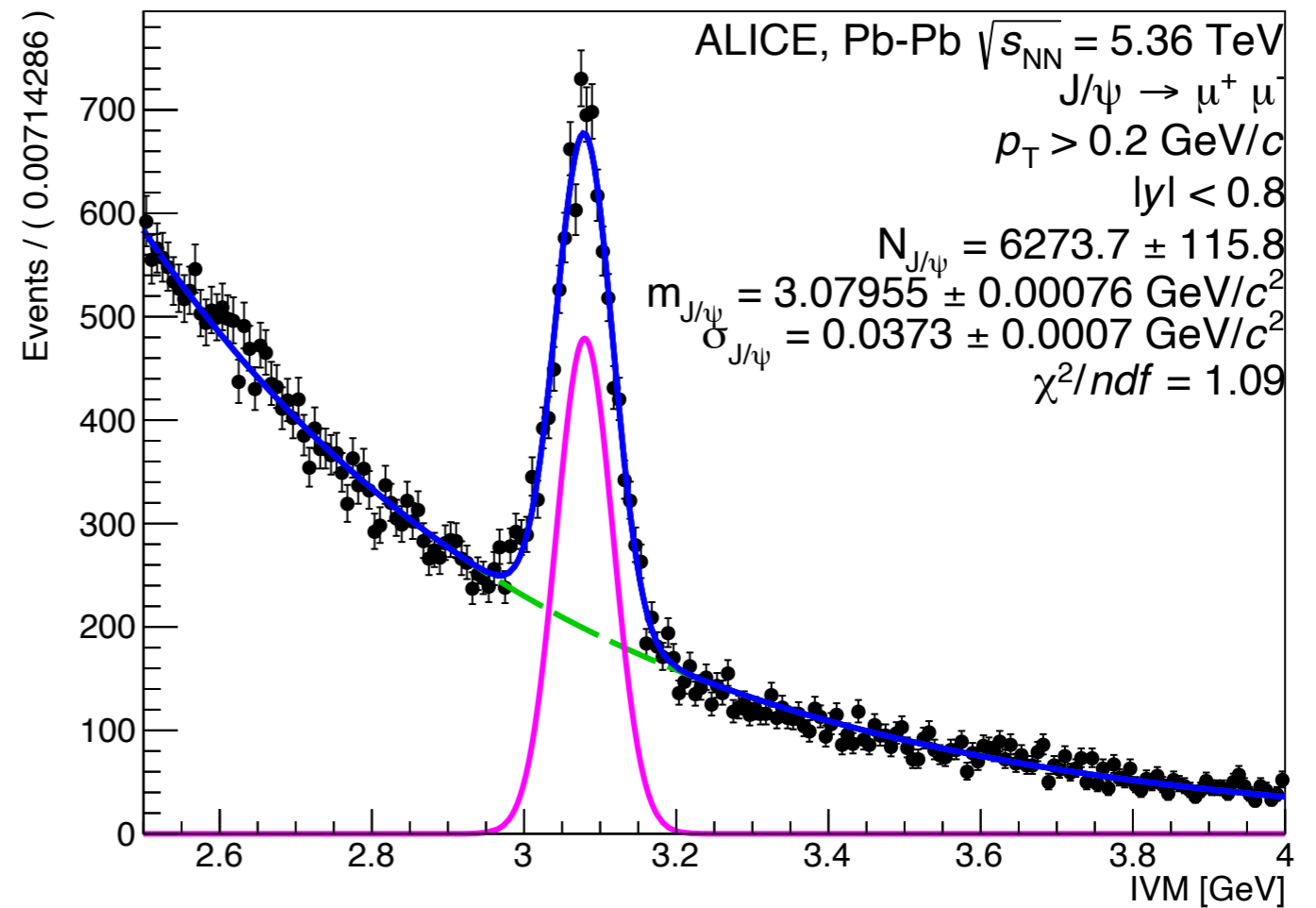
- Events are mostly back to back.



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

Incoherent

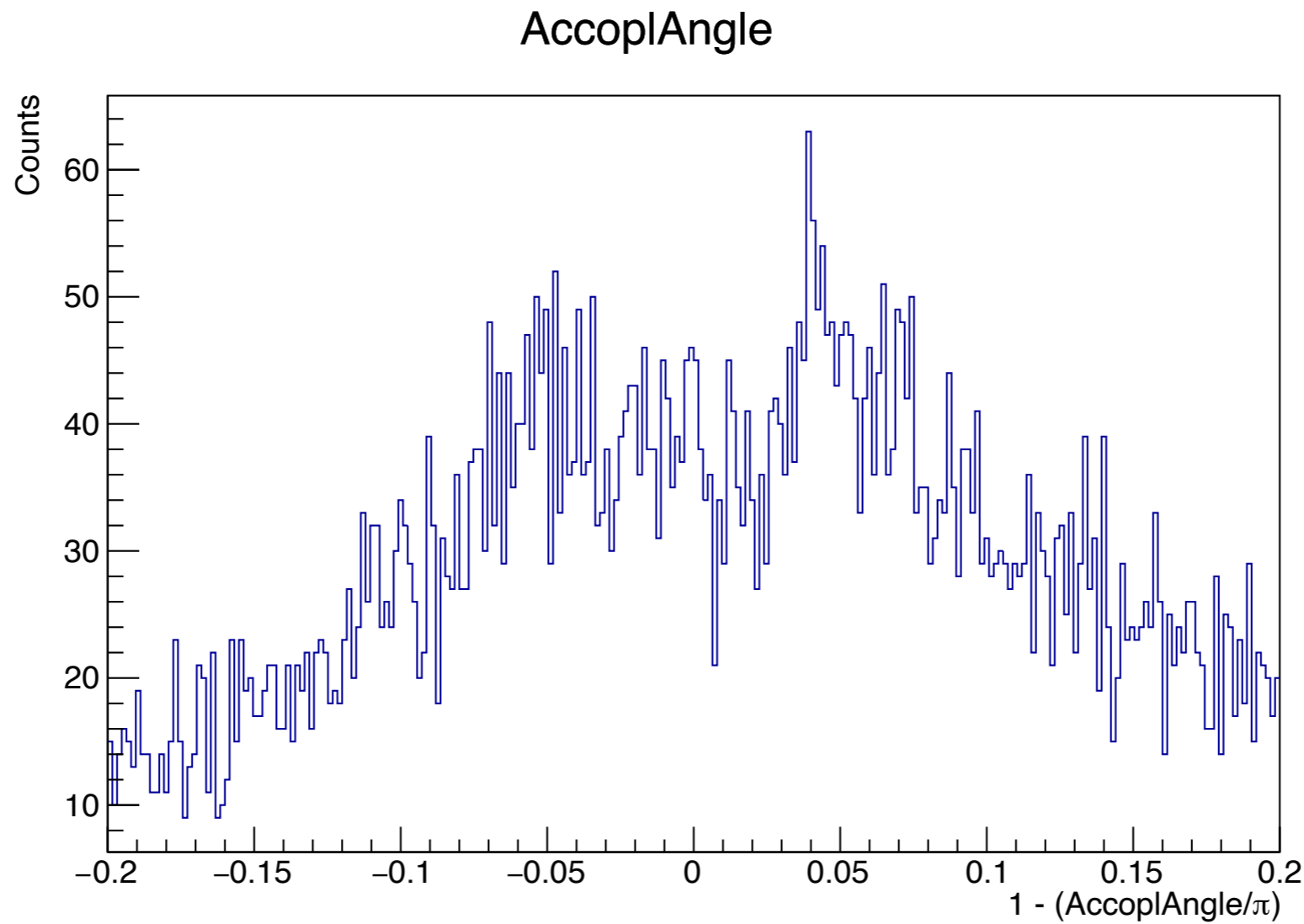
- Lumi $\sim 276 \mu b^{-1}$
- Mass is again shifted to the lower region.



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

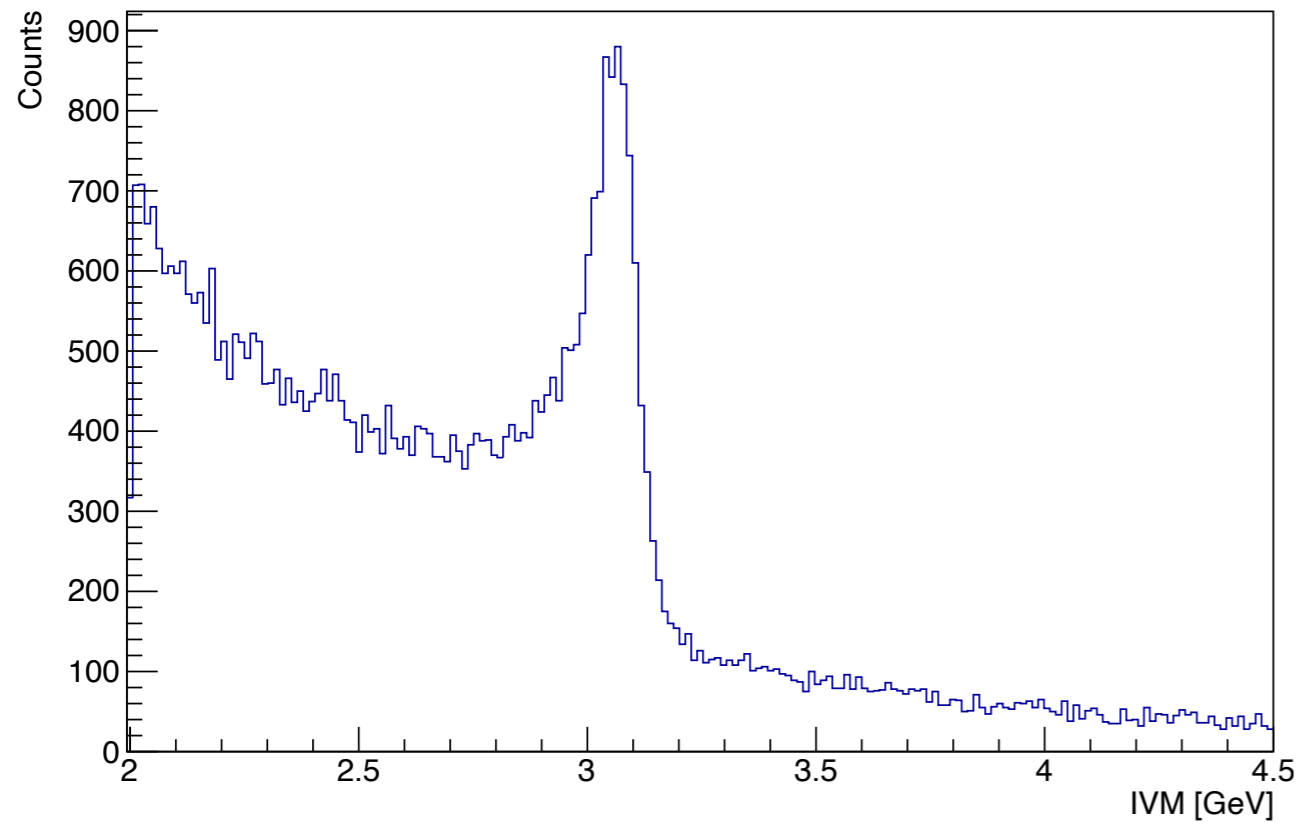
Incoherent

- Events not back to back?

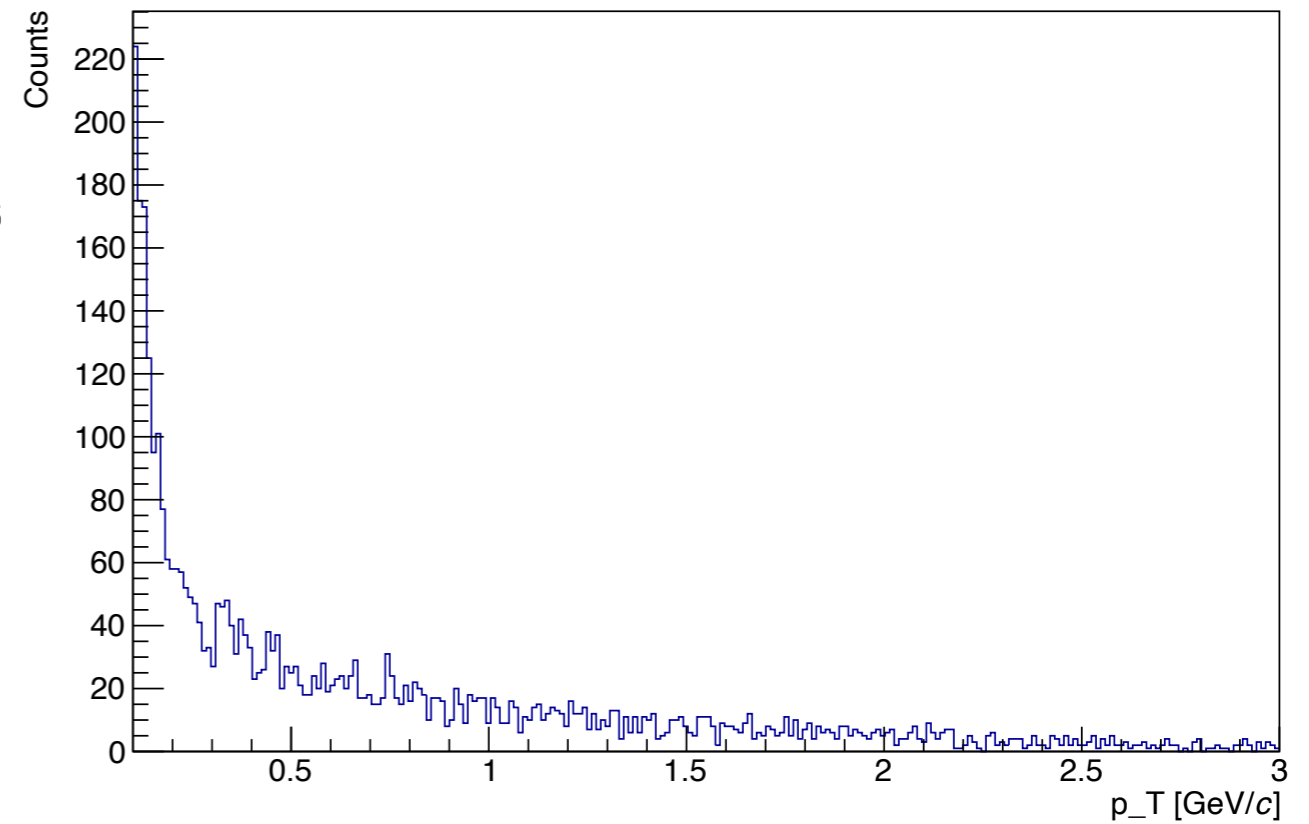


$$J/\psi \rightarrow e^+e^-$$

hPairIVM



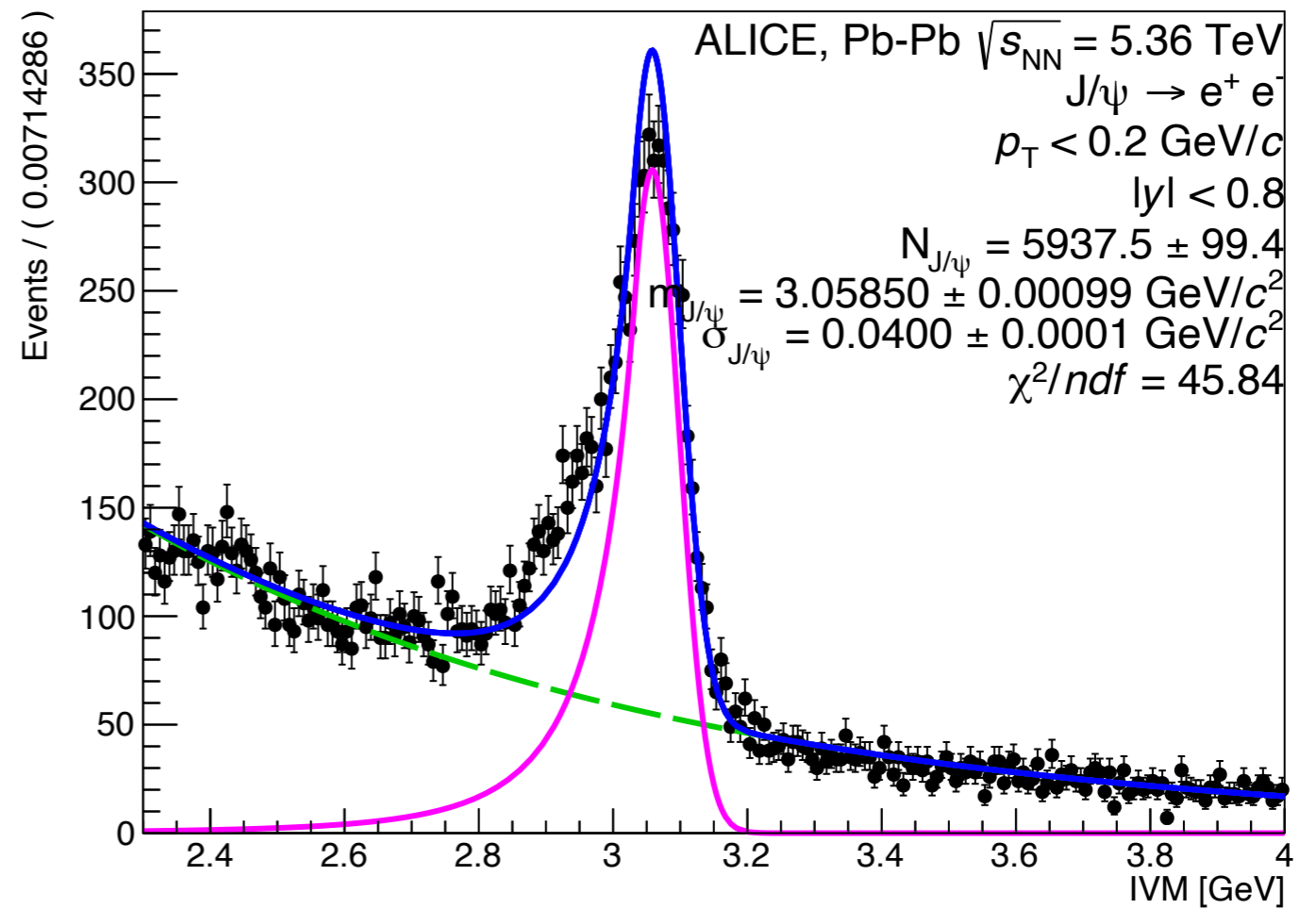
hJpsiPt



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

Coherent

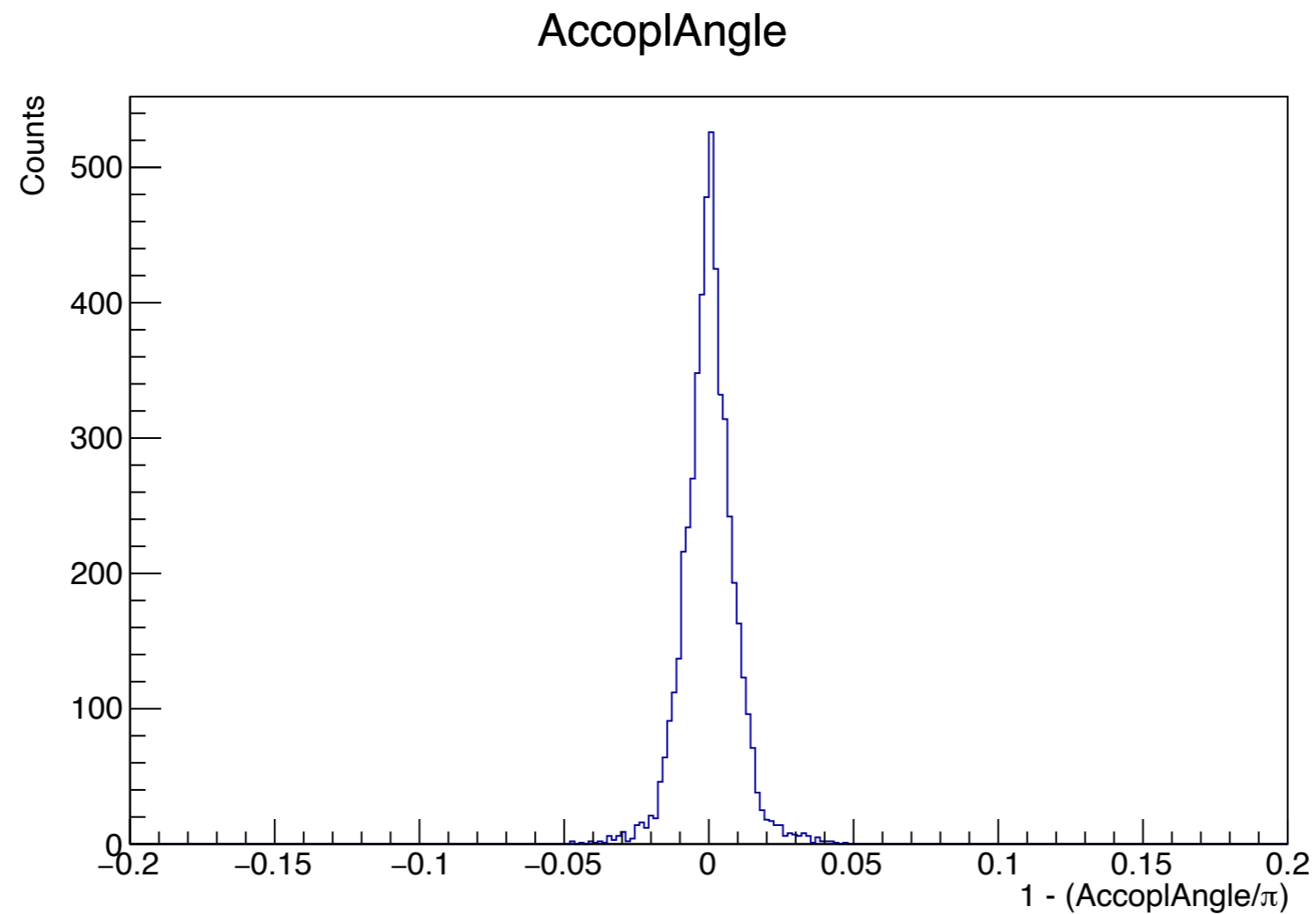
- Lumi $\sim 276 \mu b^{-1}$
- Expected number of mesons based on lumi and results of Run 2 is ~ 2800 events.
- Larger mass shift (due to large radiative tail?).



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

Coherent

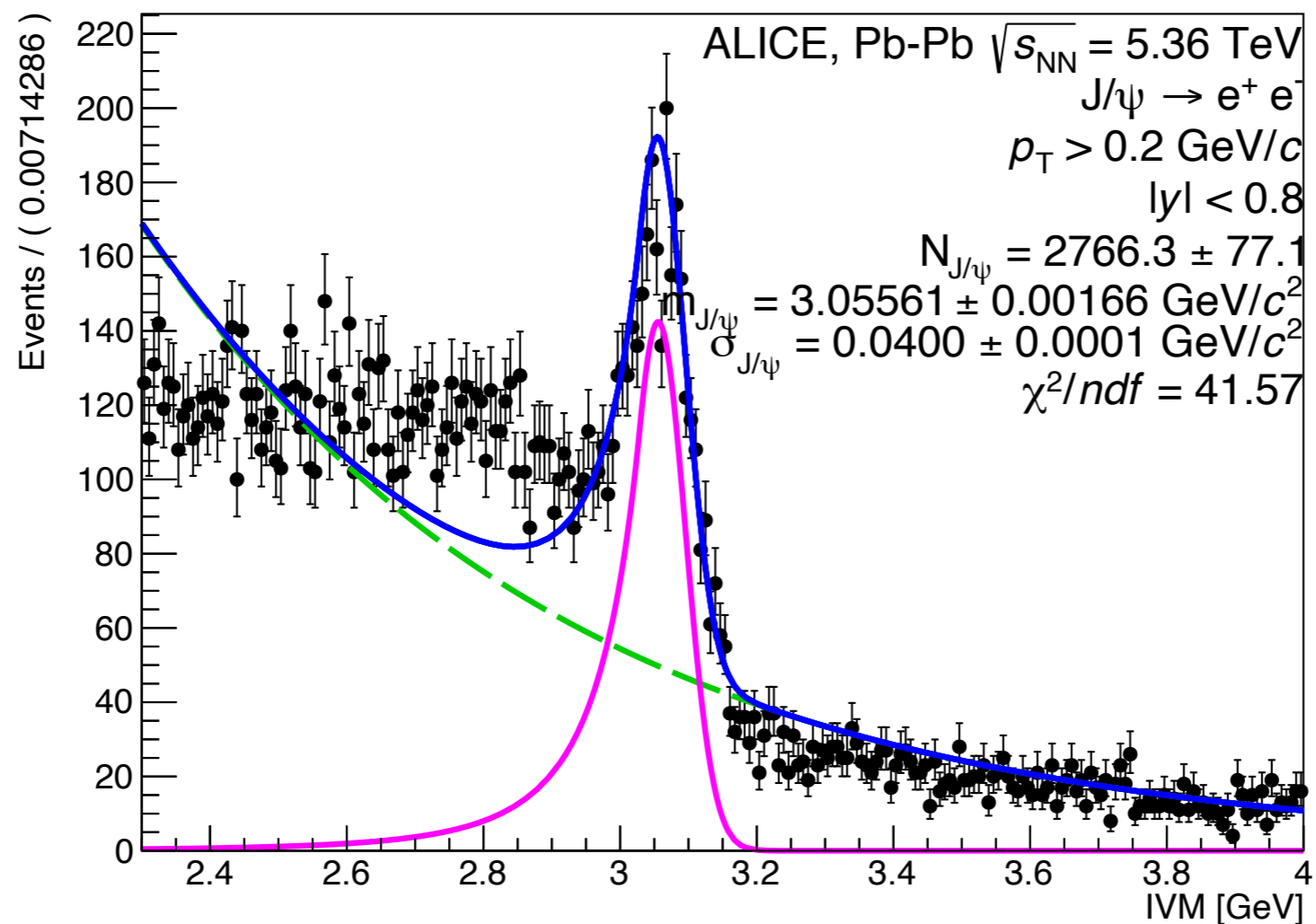
- Events are mostly back to back.



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

Incoherent

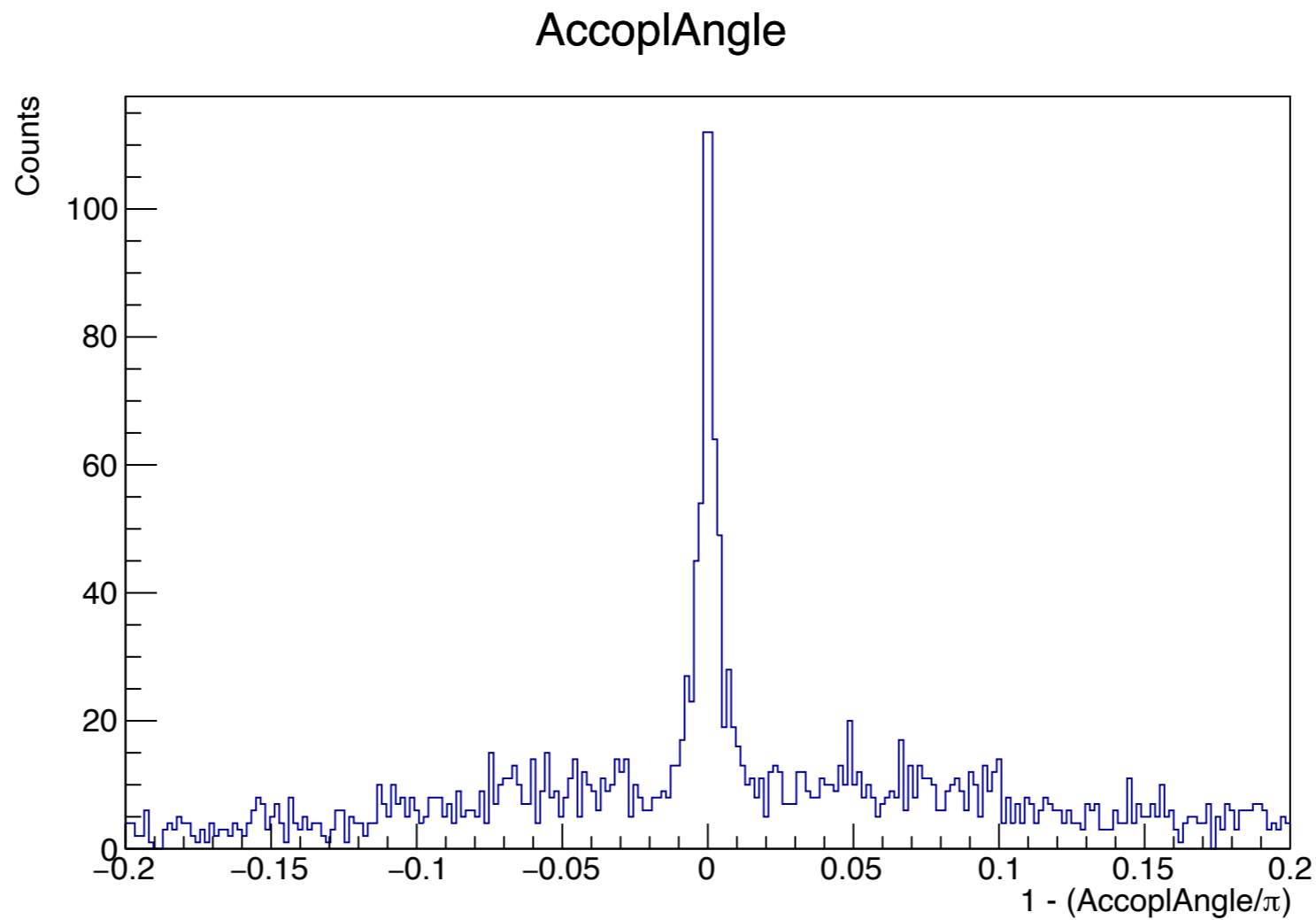
- Lumi $\sim 276 \mu b^{-1}$, strange tail?



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

Incoherent

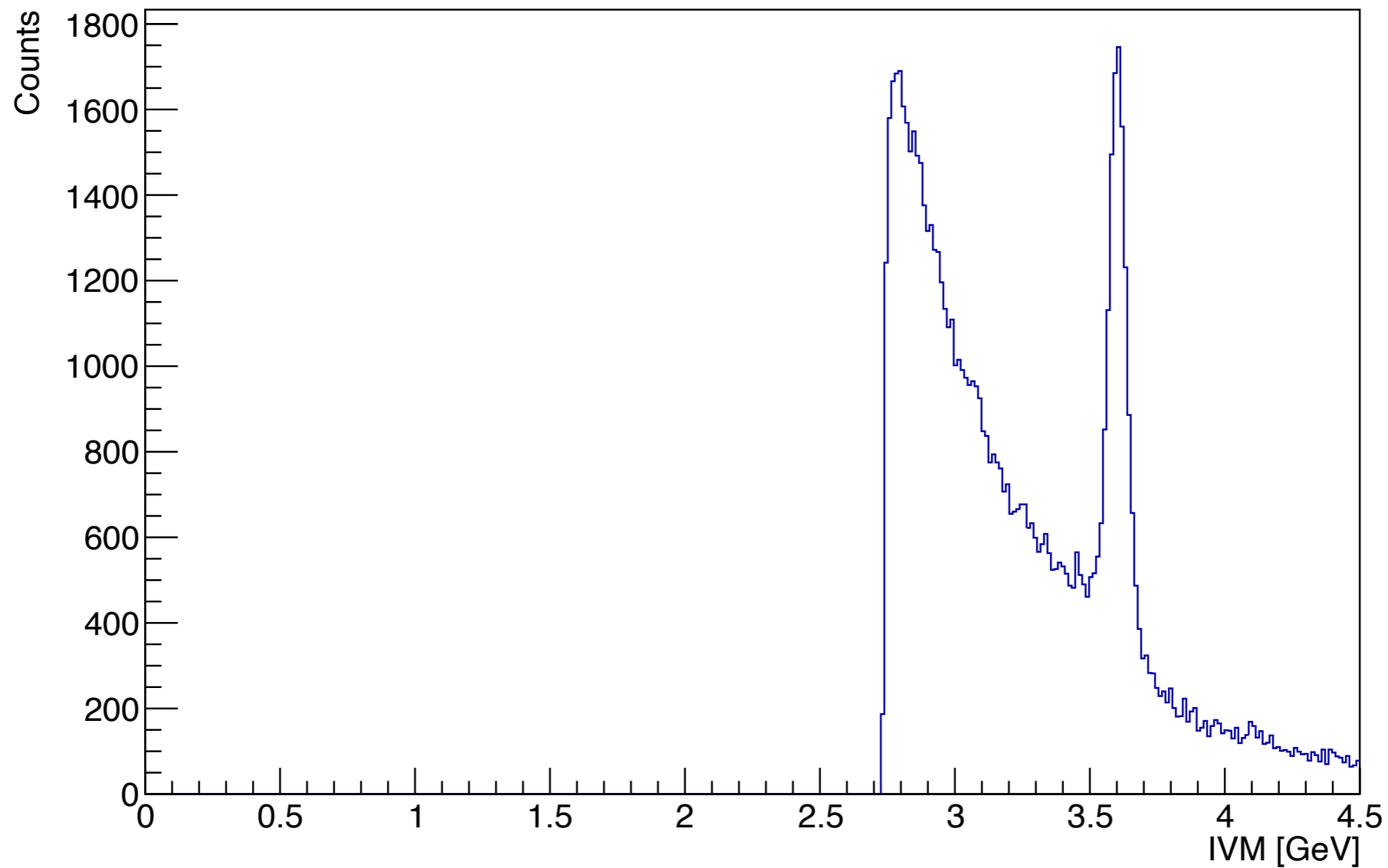
- Events are mostly back to back.



$J/\psi \rightarrow p\bar{p}$

- Currently PID problems (just for me).

hPairIVM



Summary

Outlook

- I presented my first results on central barrel J/ψ .
- Next steps of the analysis:
 - study FIT cuts and their effect on the event selection,
 - DCAxy cut,
 - study of oncoming datasets
 - apass4 and MC,
 - comparison of SG and DG producer and DG producer development.

**Thank you for you
attention!**