JÜLICH
FORSCHUNGSZENTRUM

p̄anda

Status of study on p̄p→Ξ⁻ (2030) Ξ̄⁺ → ηΞ⁻Ξ̄⁺

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Why Ξ*-? Why Ξ+Ξ- η mode? Why in PANDA?

- Not much is known
  - ☐ spin parity
  - ☐ decay modes
- New modes: Ξπ, Ξη …

Particle	J^P	Overall status	Ξπ	ΛK	ΣK	Ξ(1530)π	Other channels
Ξ(1318)	1/2+	****					Decays weakly
Ξ(1530)	3/2+	****	****				
Ξ(1620)		*	*				
Ξ(1690)		***		***	**		
Ξ(1820)	3/2−	***	**	***	**	**	
Ξ(1950)		***	**	**		*	
Ξ(2030)		***		**	***		
Ξ(2120)		*		*			
Ξ(2250)		**					3-body decays
Ξ(2370)		**					3-body decays
Ξ(2500)		*		*	*		3-body decays

Status as seen in —

- PANDA opens opportunity
  to study Xi*
  - ☐ σ(pp-bar→Ξ Ξ*) ~ μb
    - *(mom pbar~5Gev/c):*
  - ☐ luminosity: ~10^{31} cm^{-2} s^{-1}
  - ☐ → 10^6/day , Day-1 physics

MC data set

- Signal:
  - □ **ppbar→Ξ⁻ (2030)Ξ ⁺→ ηΞ⁻Ξ⁺**
  - □ Tracks of Ξ+Ξ- are Helixes(Thanks to Dominik)
  - □ 392979 events, Revision:29820
  - □ p-bar beam: 5.4 GeV/c
- BG:
  - □ Dual Parton Model (DPM)
  - □ σ_{BG}/σ_{sig}~50mb/1μb=50000
  - □ need:~20 billion
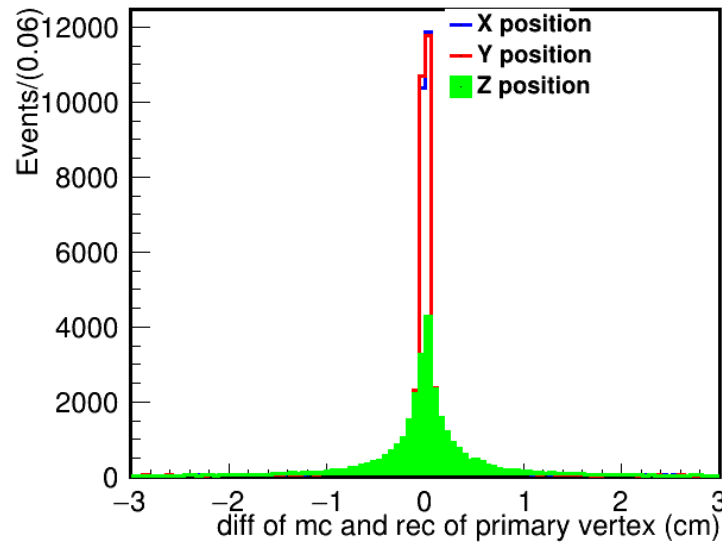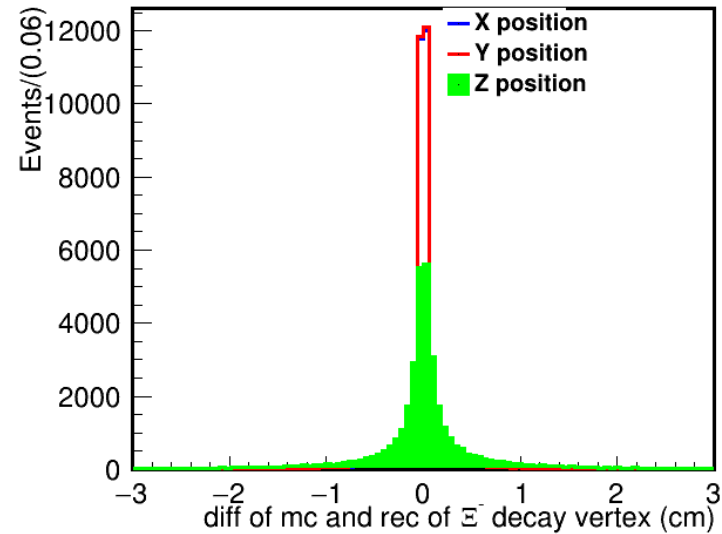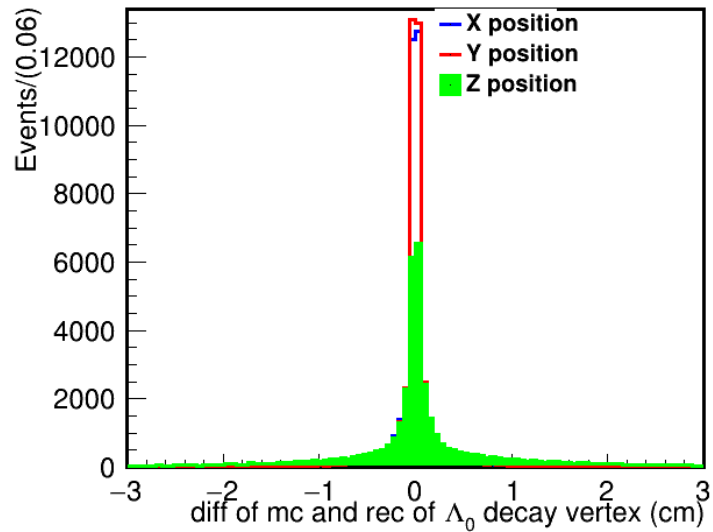 - □ Now: 23560000 events
  - □ Still generating…
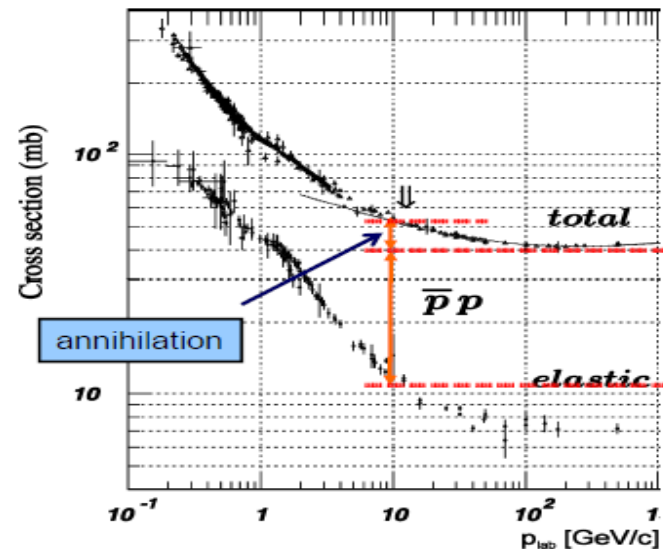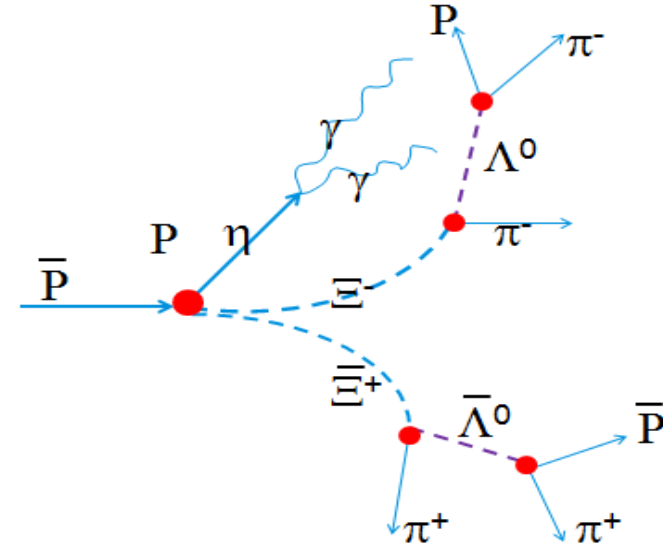
The analysis process
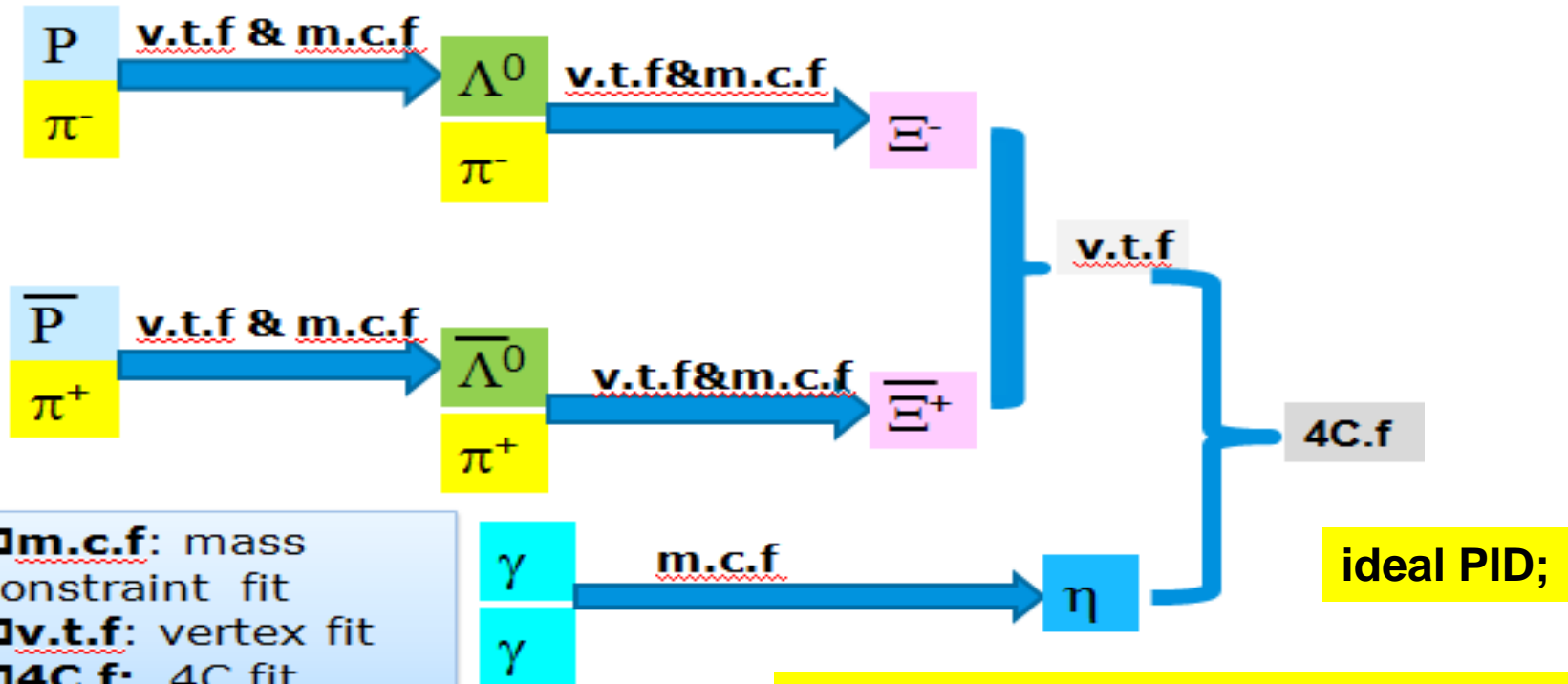
Initial selection criteria:
□All the fits success.
□Charged Track: HitTag==1 (HitTag==1 means the tagged charged track has >3 hits in MVD or STT or GEM)
□4C.f :χ^2 <200(tentatively, optimized according to s/sqrt(s+B))

BG: After applied the same cuts with signal: 46 events survived

ideal PID;

The reconstruction for Λ^0 , Ξ^- , vertex of $\Xi^-\Xi^+$

The reconstruction for Ξ^-(2030)

■ Rough fit

- unbinned Maximum likelihood fit

- no efficiency or PHSP correction;

- BW(M, Γ)$\otimes$ Gaussian(σ)

- Mass: 2025 $\pm$1 MeV

- Width: 25 MeV (fixed at generated value)

- Sigma: 8$\pm$1 MeV

- Events: 31463$\pm$177

- efficiency: (7.91$\pm$0.01)%

mean = 2.02480 ± 0.00012
sigma = 0.00792 ± 0.00022
signalyield = 31463 ± 177
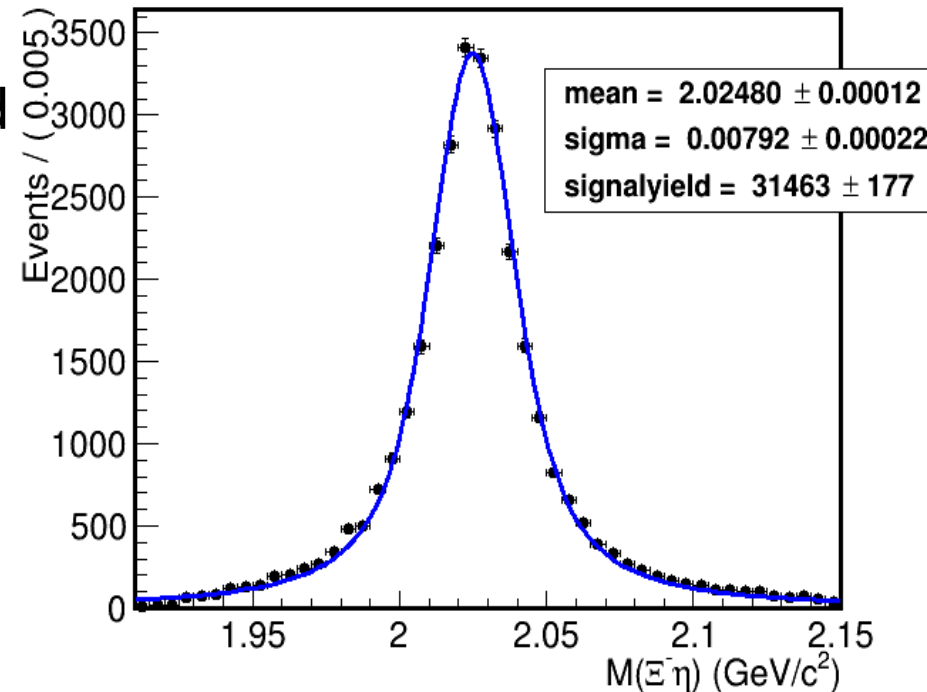
Summary&next to do

☐ A rough eff~8%;

☐ More BG events!

☐ To use non-ideal PID;