$$\Lambda_c^+ \rightarrow p\, K_s^0(\pi^+\pi^-)$$

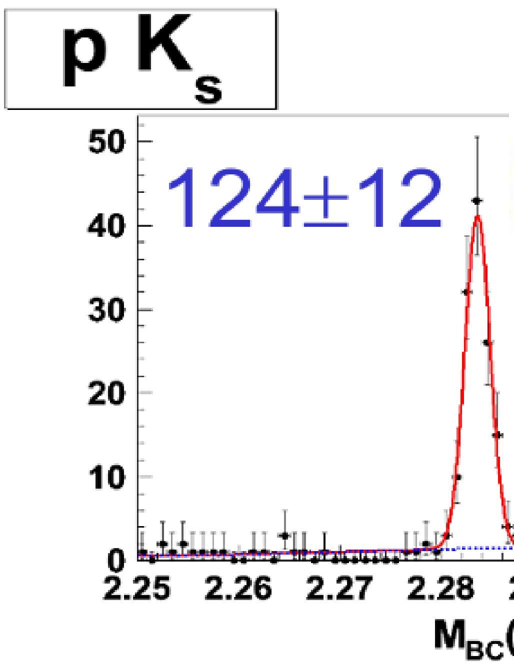
@4600MeV

L = 500Pb^{-1}

Motivation(I)

Measurement of the decay asymmetries α in the processes $\Lambda_c^+ \to \mathcal{B}(\frac{1}{2}^+) + P$ is useful to discriminate different models [7, 8]. Up to now, only the asymmetries of $\Lambda_c^+ \to \Lambda\pi^+$ and $\Lambda_c^+ \to \Sigma^+\pi^0$ are measured. A data set of at least $500\,pb^{-1}$ is potential to make first measurements of other modes, such as $\alpha(\Lambda_c^+ \to pK_s)$ and $\alpha(\Lambda_c^+ \to \Sigma^0\pi^+)$.

Proposal of Studying the Charmed Baryon Lambda_c at BESIII



Liu PeiLiang talk on Workshop (BeiHang University)

Data set: L = 50 Pb^{-1}

N_signal = 124.

L = 500 Pb^{-1}

N_total = 1240 ???

Motivation(II)

- ……(Theory)(How to extract the asymmetry parameters).

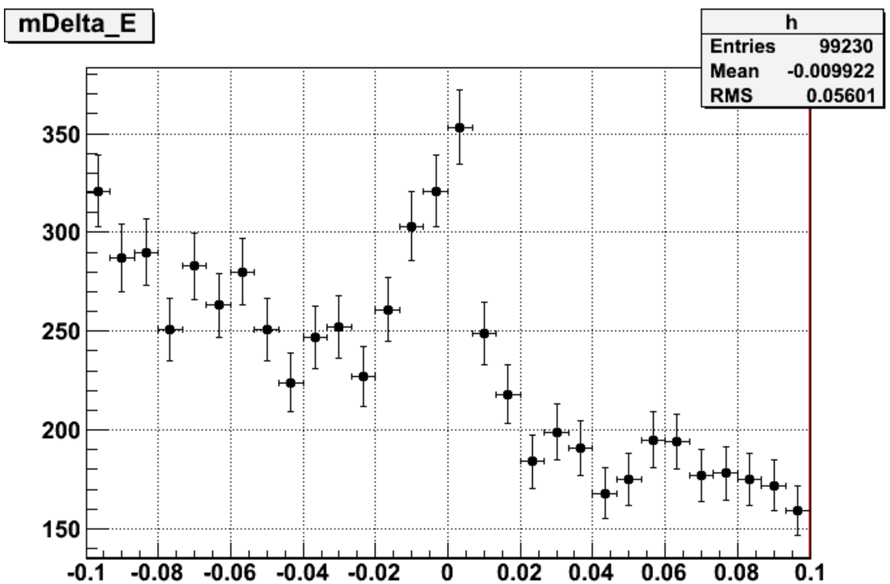
Event selection

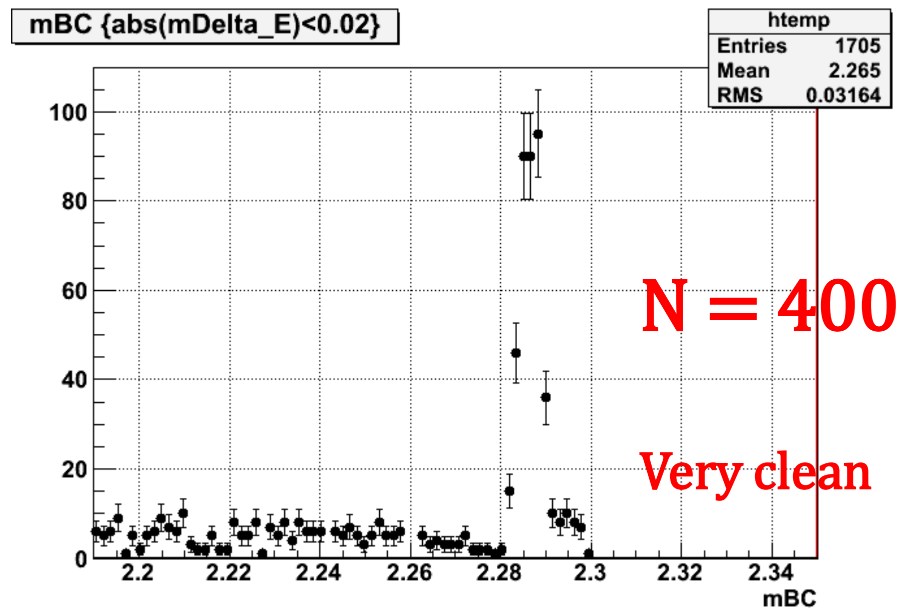
- Good charged tracks: $|\cos\theta|<0.93$; nGood>3
- PID (dE/dx and TOF): p^+; $\pi^\pm$
- K_s^0 reconstruction: Second Vertex fit Method ($\pi^+ \pi^-$)
- Λ_c^+ Reconstruction: $M(p^+ K_s^0)$;

  Minimum $|M(p^+ K_s^0)-M(\Lambda_c^+)|$;

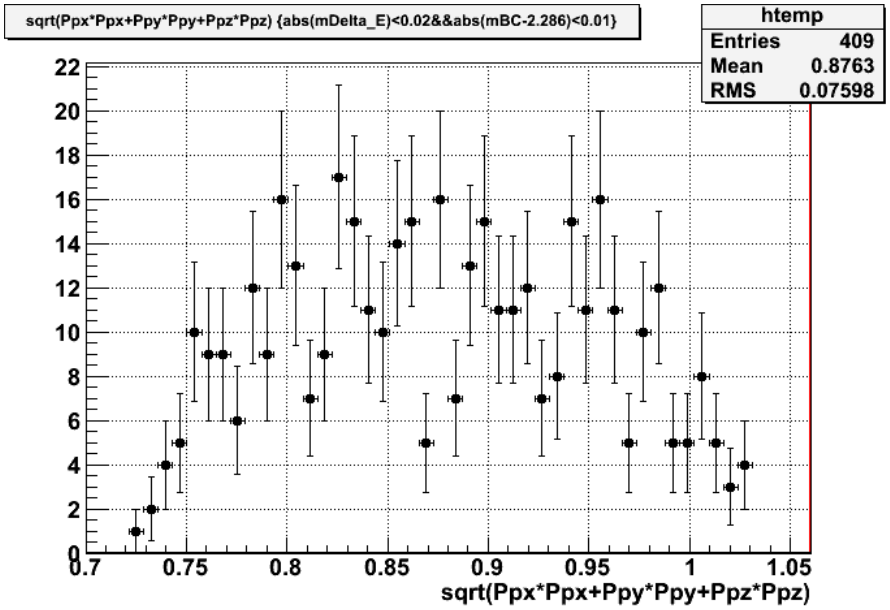
ΔE and M_BC

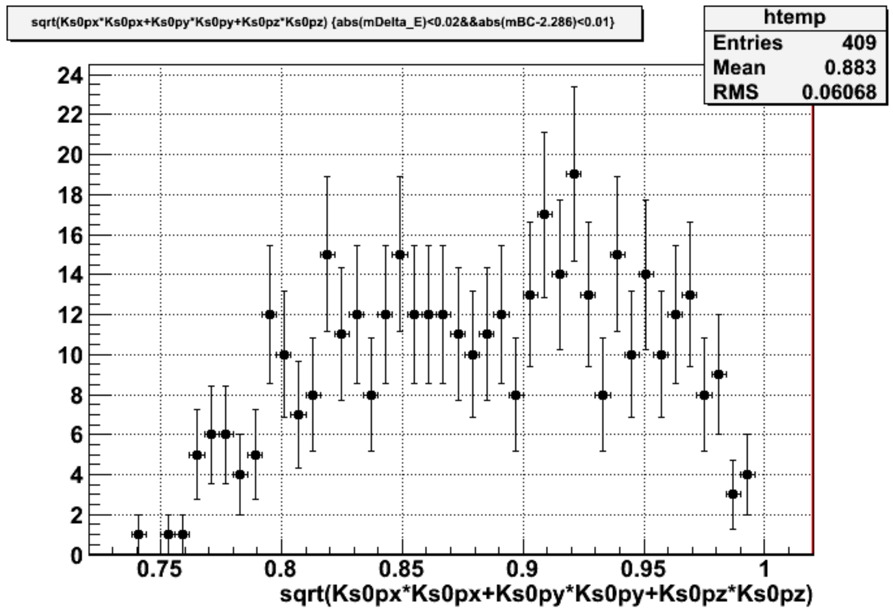
- (1) $\Delta E = E(\Lambda_c^+)$-E_beam
- (2) M_BC = sqrt[E_beam^2 - $P(\Lambda_c^+)^2$]





Momentum distributions



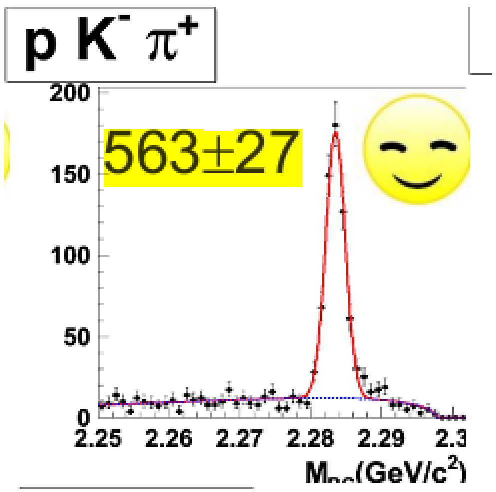


(1)Some angular distributions will be fitted to extract the asymmetry parameters.

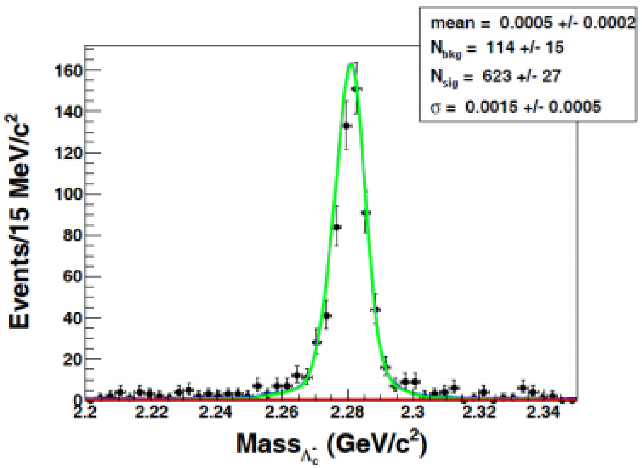
(2)Event selection criteria need to optimized.(???)

Check ?

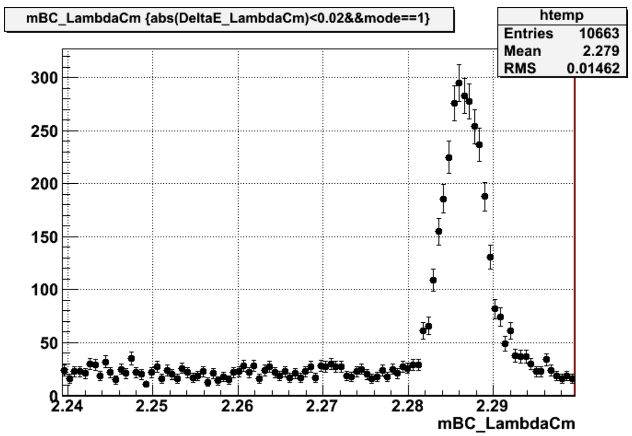
Liu PeiLian



Song WeiMin



Our work



L = 54.5Pb-1
N = 563

N_total = 5630

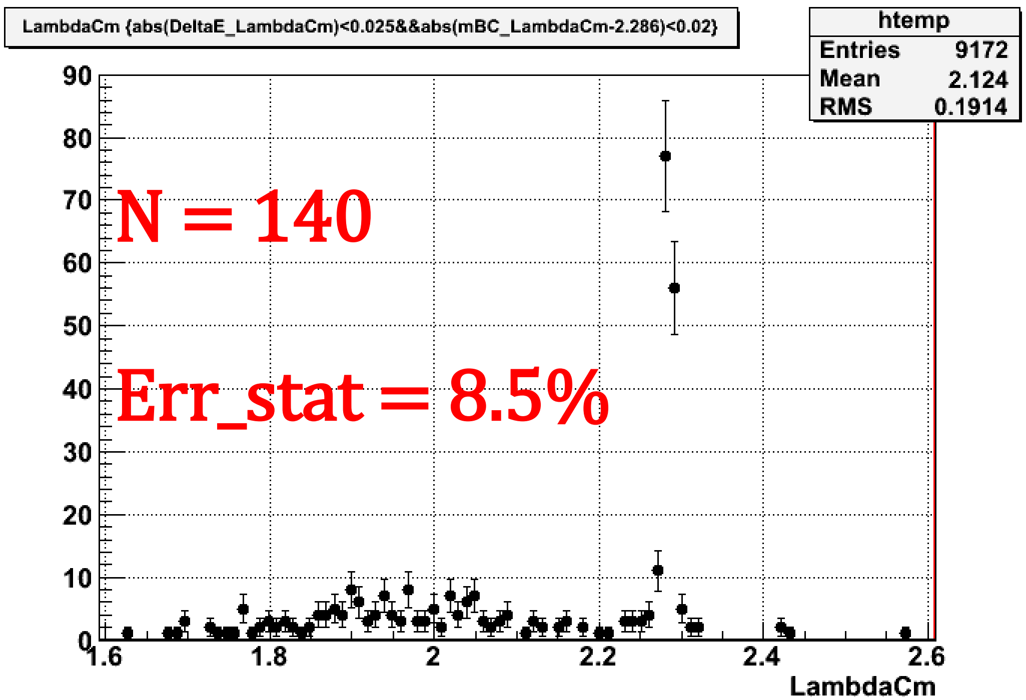
L = 110 Pb-1
N = 623

N_total = 2831

L = 500 Pb-1

N_total = 2911

$Br(\Lambda_c^+ \rightarrow p\,K^-\pi^+)$



Decay modes	Branching fraction
$\Lambda_c \rightarrow p^+\pi^+K^-$	$(5.0\pm1.3)\%$
$\Lambda_c \rightarrow p^+K_s^0,\ K_s^0\rightarrow\pi^+\pi^-$	$(0.80\pm0.21)\%$
$\Lambda_c \rightarrow \Lambda\pi^+,\ \Lambda\rightarrow p^+\pi^-$	$(0.68\pm0.18)\%$
$\Lambda_c \rightarrow p^+\pi^+K^-\pi^0,\ \pi^0\rightarrow\gamma\gamma$	$(3.36\pm0.99)\%$
$\Lambda_c \rightarrow p^+K_s^0\pi^0,\ K_s^0\rightarrow\pi^+\pi^-,\ \pi^0\rightarrow\gamma\gamma$	$(1.13\pm0.34)\%$
$\Lambda_c \rightarrow \Lambda\pi^+\pi^0,\ \Lambda\rightarrow p^+\pi^-,\ \pi^0\rightarrow\gamma\gamma$	$(2.27\pm0.82)\%$
Summary	$(13.24\pm1.88)\%$

If we missing a particle (p or K or pi): to increase N_s ??

Form factors in $\Lambda_c^+ \to p\, K^- \pi^+$

- PRL 94,191801,(2005) : **$\Lambda_c^+ \to \Lambda\, e^+ \nu_e$**

(1)Form factor ratio

(2)Pole mass

(3)Decay asymmetry parameter of Λ_c^+

(4)CP violation

[Semileptonic decay]

- **How about ($\Lambda_c^+ \to p\, K^- \pi^+$) ??? N = 2900 (intermediate states)(not Good!)**
- **How about ($\Lambda_c^+ \to \Lambda\, \mu^+ \nu_\mu$)??? N = 1200**