

# MOMENTUM OF THE CHARGED TRACK

BASED ON THE DECAY  $J/\psi \rightarrow \Sigma^0 \bar{\Sigma}^0$

孙浩凯 (Hao-Kai SUN)\*

IHEP CAS

2021 Seminar - Hai-Bo LI's Group

---

\* [sunhk@ihep.ac.cn](mailto:sunhk@ihep.ac.cn)

I. INTRODUCTION

II. ISSUES

III. APPROACHES

IV. RESULTS

V. SUMMARY & OUTLOOK

I. INTRODUCTION

II. ISSUES

III. APPROACHES

IV. RESULTS

V. SUMMARY & OUTLOOK

I. INTRODUCTION

II. ISSUES

III. APPROACHES

IV. RESULTS

V. SUMMARY & OUTLOOK

I. INTRODUCTION

II. ISSUES

III. APPROACHES

IV. RESULTS

V. SUMMARY & OUTLOOK

I. INTRODUCTION

II. ISSUES

III. APPROACHES

IV. RESULTS


V. SUMMARY & OUTLOOK


- ✎ In the previous Workshop, I gave a talk about some possible **irregularity** of reconstructed charged tracks.  
This needs further clarification and maybe a solution.
- ✎ **Invariant mass peak shift** found by several persons (details in next slides).  
This may have influences in the precision measurements, like those of decay asymmetry parameters.
- ✎ **Data-MC difference** has been reported many times, mainly from Patrik(UU).  
**Bias?** need correction; **Systematic uncertainties?** need suppression.

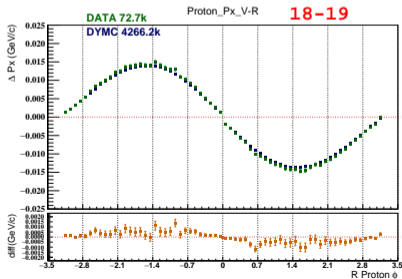
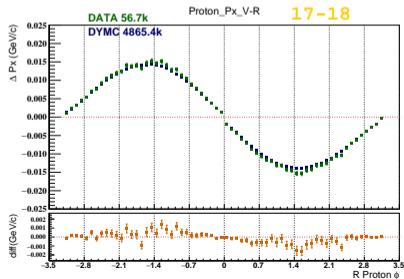
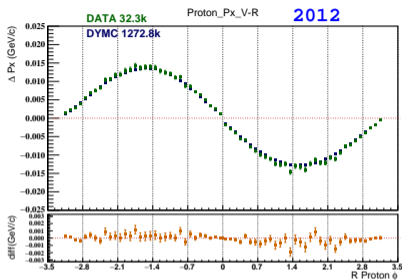
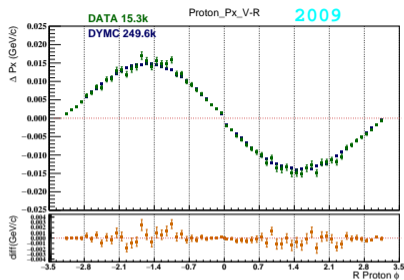
- For  $J/\psi \rightarrow \Sigma^0 \bar{\Sigma}^0$ , there will be  $\sim 1\text{M}$  signal events.  
For  $J/\psi \rightarrow \Lambda \bar{\Lambda}$ , there will be  $\sim 4\text{M}$  signal events.
- The statistical uncertainty has already been at 0.1% level!
- The measurements of hyperons' mass strongly depends on the reconstruction of its charged daughter particles.

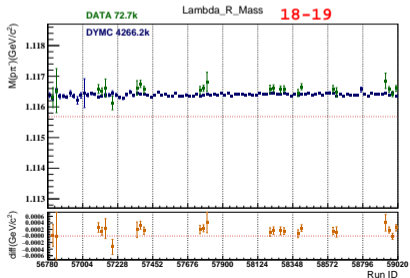
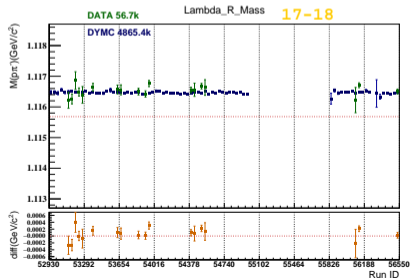
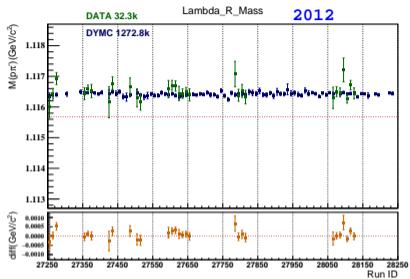
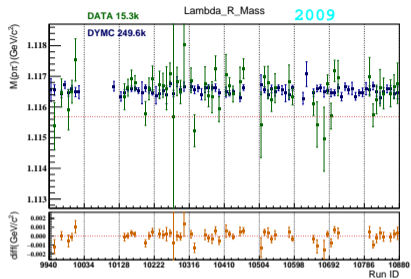
$\Lambda$	$1115.683 \pm 0.006$	$\Sigma^+$	$1189.37 \pm 0.07$
$\Sigma^0$	$1192.642 \pm 0.024$	$\Sigma^-$	$1197.449 \pm 0.030$
$\Xi^0$	$1314.86 \pm 0.20$	$\Xi^-$	$1321.71 \pm 0.07$
$\Omega^-$	$1672.45 \pm 0.29$		

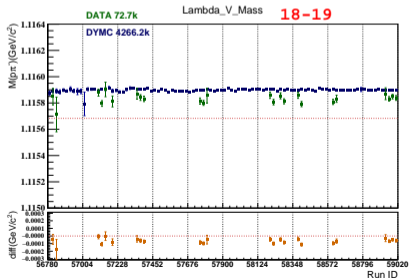
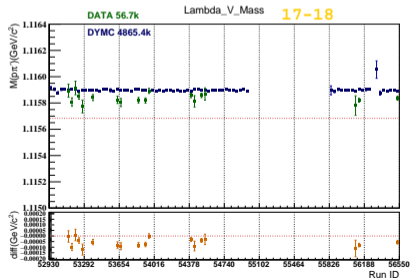
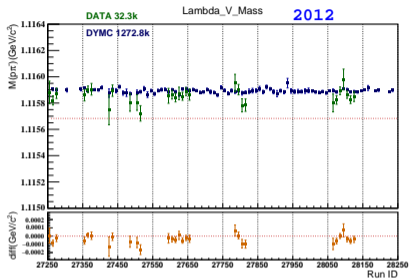
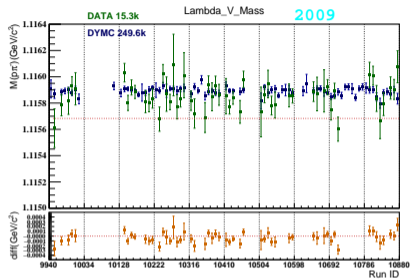


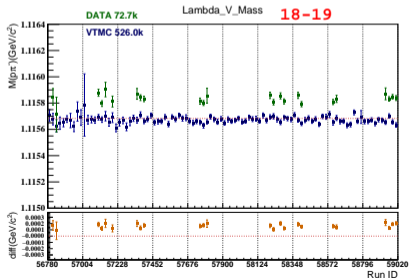
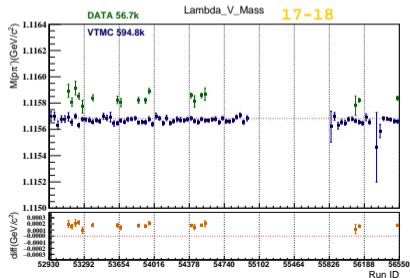
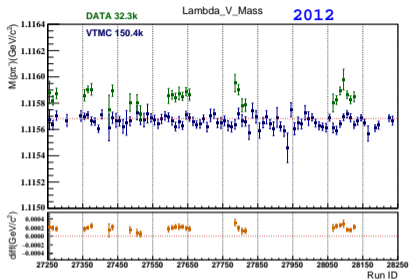
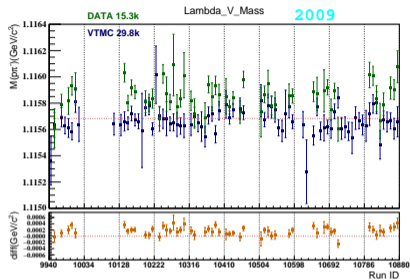
  $|\vec{P}| \implies \text{Mass}$

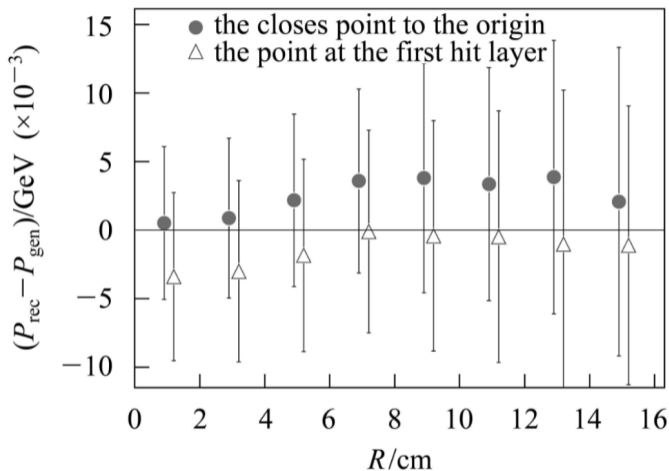
  $|\vec{P}_{x,y,z}| \implies (\theta, \phi) \implies \alpha, \beta, \dots$














XU Min, HE Kang-Lin, ZHANG Zi-Ping and WANG Yi-Fang. *Decay vertex reconstruction and 3-dimensional lifetime determination at BESIII*[J]. Chinese Physics C, 2009, 33(6): 428-435.

 Genfit:

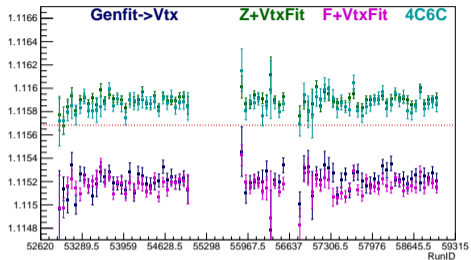
- 1 Track ZHelix +  $(0, 0, 0) \Rightarrow (\text{VertexFit}) \Rightarrow V_{tx}$
- 2  $V_{tx} < \text{beampipe}$ : Tracks  $\Rightarrow (\text{Genfit}) \Rightarrow$  extrapolate to  $V_{tx}$
- 3  $V_{tx} \geq \text{beampipe}$ :  $\Rightarrow$  Track FHelix +  $V_{tx} \Rightarrow (\text{VertexFit}) \Rightarrow V_{tx2}$
- 4 Tracks  $\Rightarrow (\text{Genfit}) \Rightarrow$  extrapolate to  $V_{tx2}$

 ZHelix: Track ZHelix +  $(0, 0, 0) \Rightarrow (\text{VertexFit}) \Rightarrow V_{tx}$

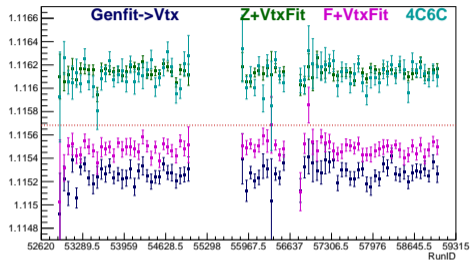
 FHelix: Track FHelix +  $(0, 0, 0) \Rightarrow (\text{VertexFit}) \Rightarrow V_{tx}$

 KalmanFit: ongoing, almost finished.

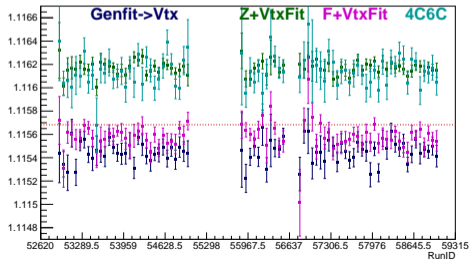
LmdMass



LmdMass Lxy > 3.5 cm

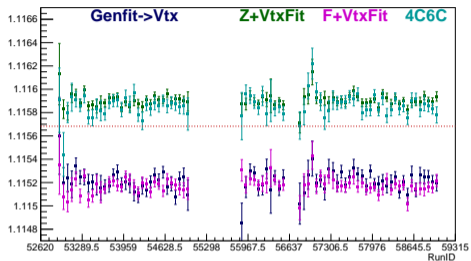


LmdMass Lxy > 6.0 cm

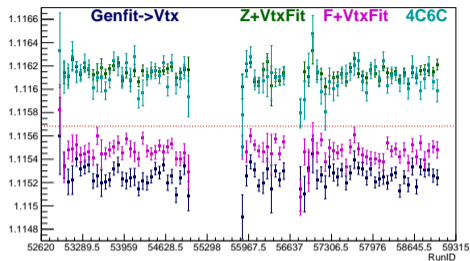




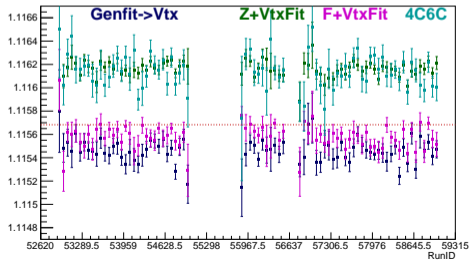
LmbarMass

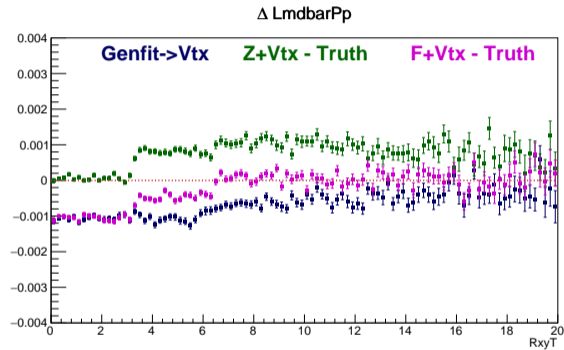
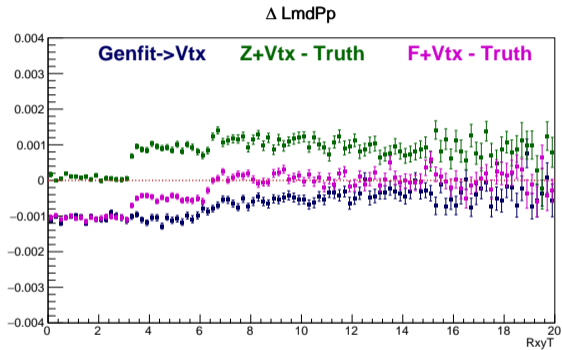


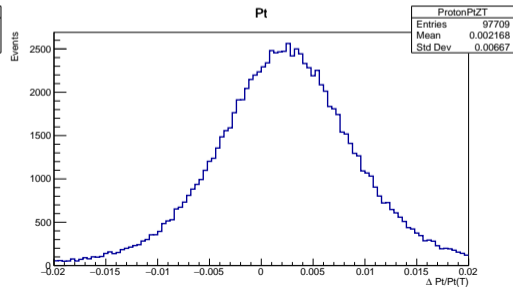
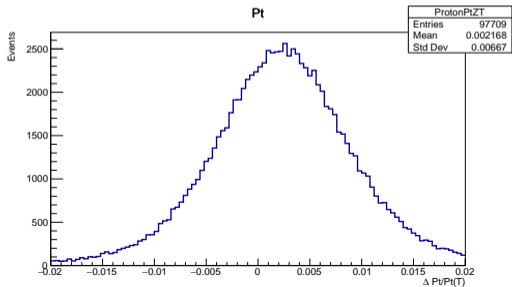
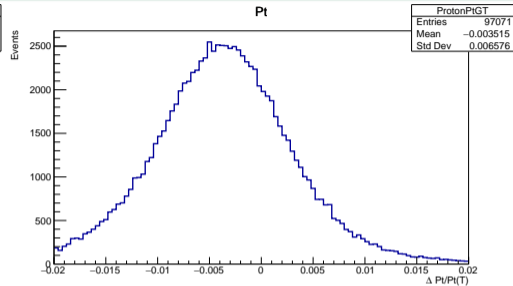
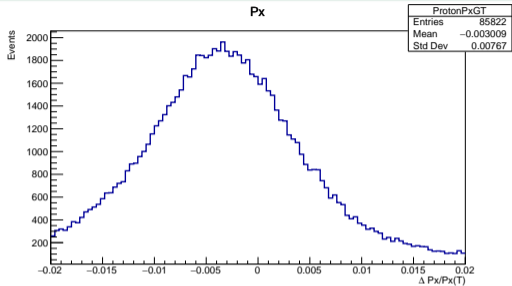
LmbarMass > 3.5 cm



LmbarMass > 6.0 cm







 aaa

 bbb

# BACKUP

aaa