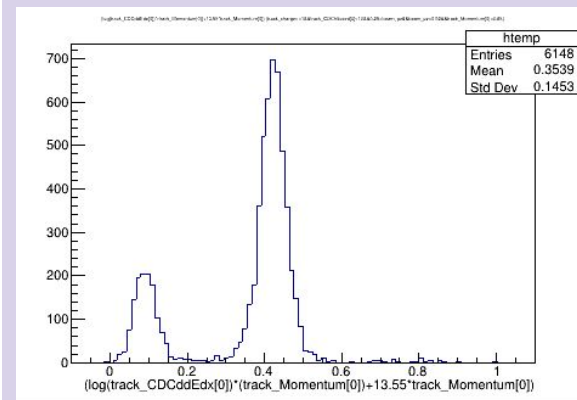
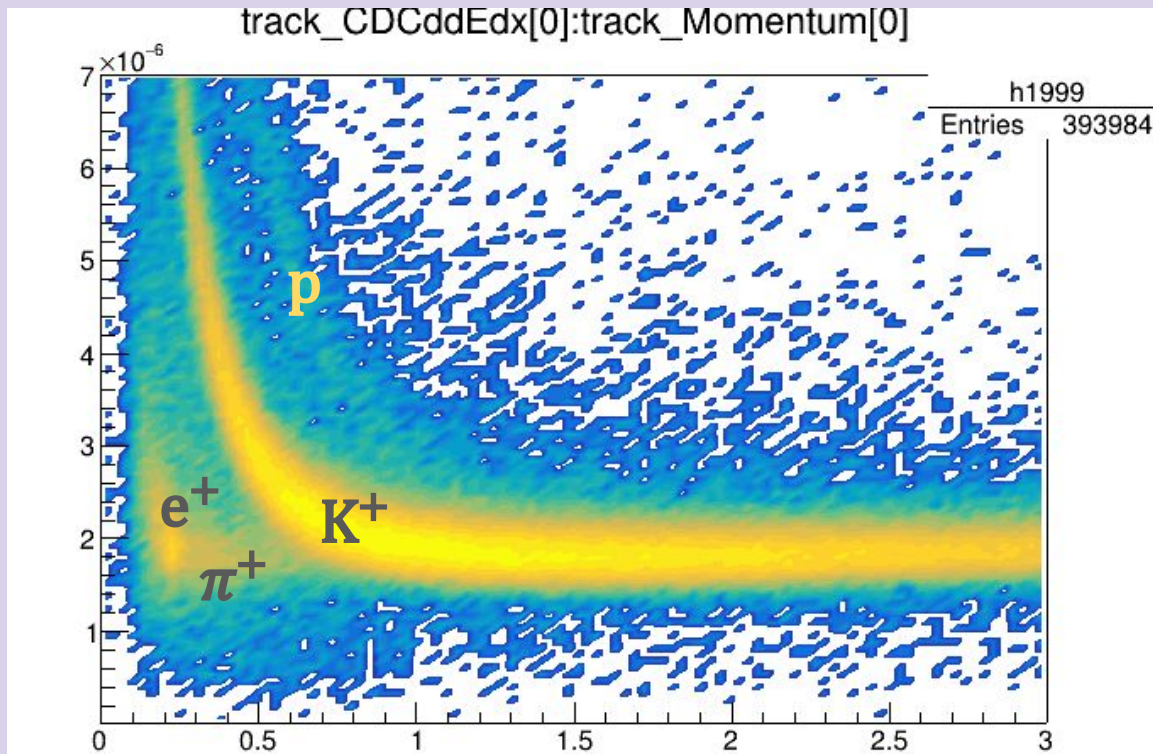




# Reconstruction of $K_L + p \rightarrow K^+ + n$ .

“Flat” beam momentum profile.

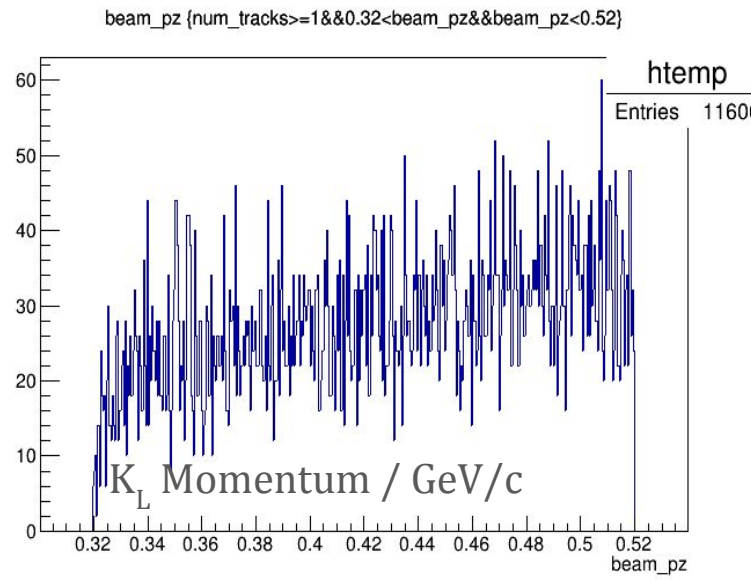
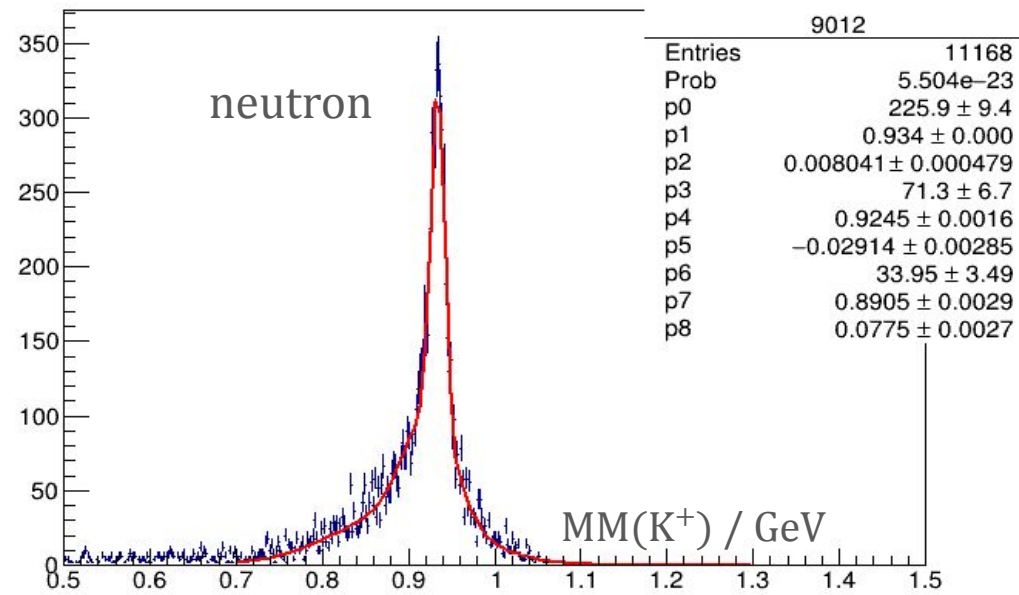




# Reconstruction Eff. of $K_L + p \rightarrow K^+ + n$ at $K_L$ momentum (.32, 0.52) GeV/c.

The histogram includes Missing Masses of all  $K^+$ .

(track\_KaPIMiss at )&&(num\_tracks>=1&&0.32<beam\_pz&&beam\_pz<0.52)



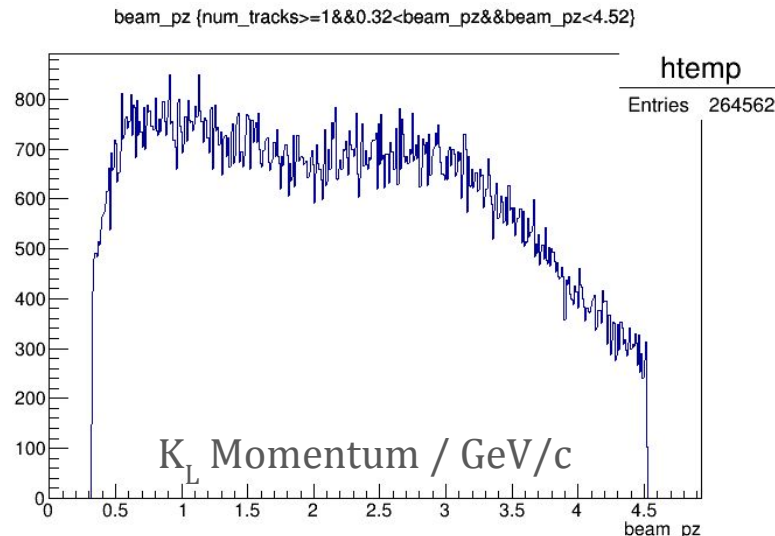
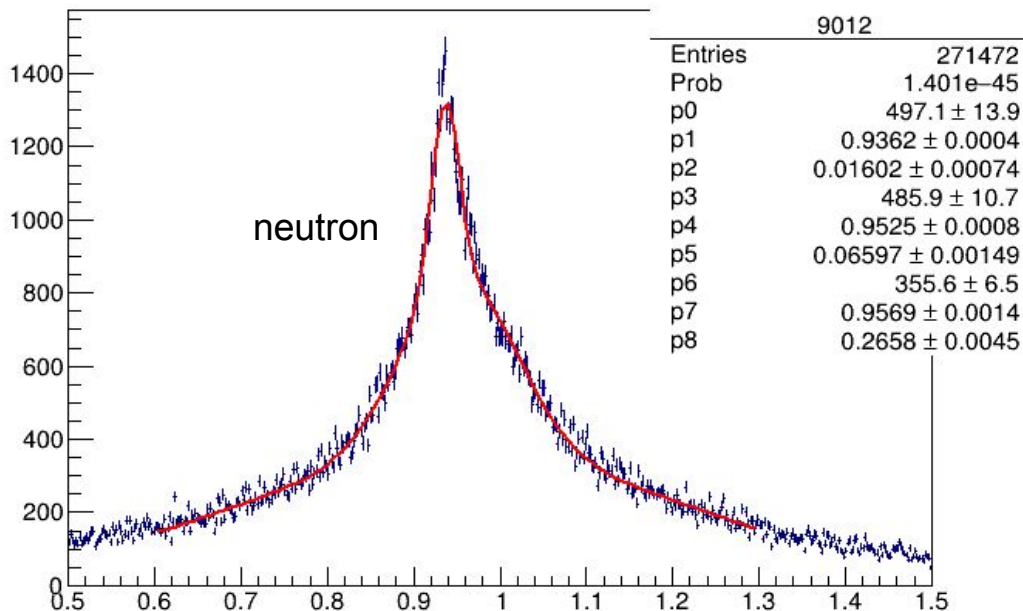
- Gaussian-1  $S_1 = p0[1/ch] * \sqrt{2\pi} * p2[GeV] * [ch/GeV] = 226 * 2.5 * 0.008 * 500 = 2260$
- Gaussian-2  $S_2 = p3[1/ch] * \sqrt{2\pi} * p5[GeV] * [ch/GeV] = 71 * 2.5 * 0.029 * 500 = 2660$
- **In 5q region** Reconstruction Efficiency =  $2260 / 11600 = \sim 20\%$  ( $\sim 40\%$  with two Gaussians).



# Reconstruction of $K_L + p \rightarrow K^+ + n$ at $K_L$ momentum (0.32, 4.52) GeV/c.

The histogram includes Missing Masses of all  $K^+$  in an event.

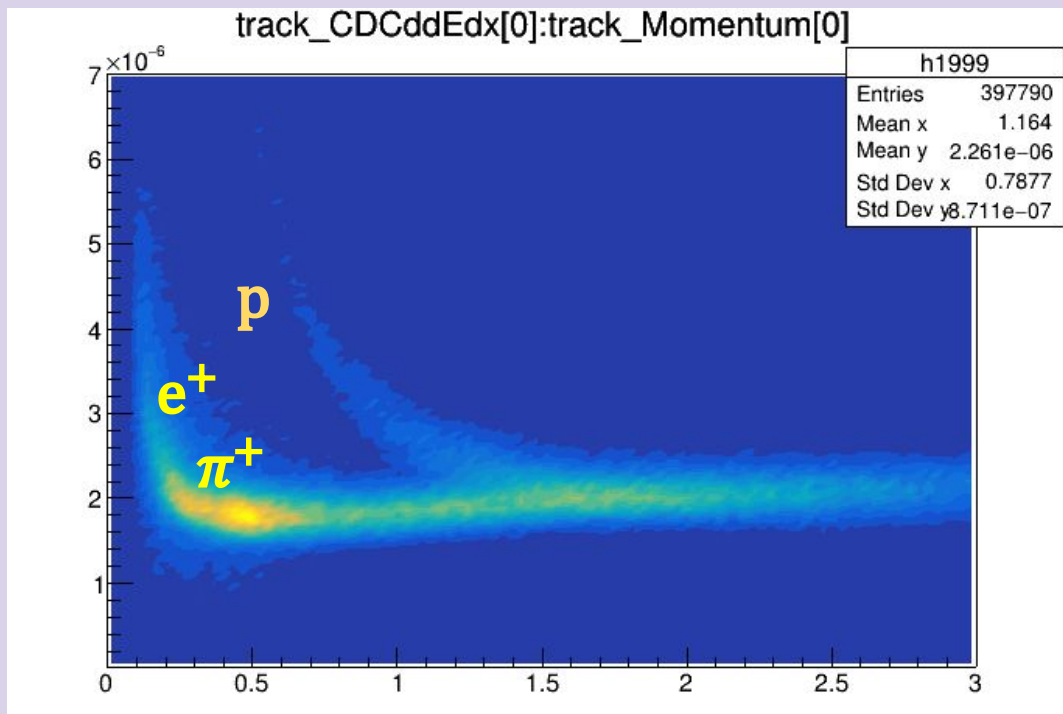
(track\_KaPIMiss at)&&(num\_tracks>=1&&0.32<beam\_pz&&beam\_pz<4.52)



- Peak area  $S = A[\#/ch] \sqrt{2\pi\sigma}[\text{GeV}] [\text{ch/GeV}] = 497 * 2.5 * 0.016 * 500 = \sim 10,000$
- Rec. Eff. =  $\sim 3.8\%$ .



# Reconstruction of $K_L + p \rightarrow \pi^+ + \Sigma^0$

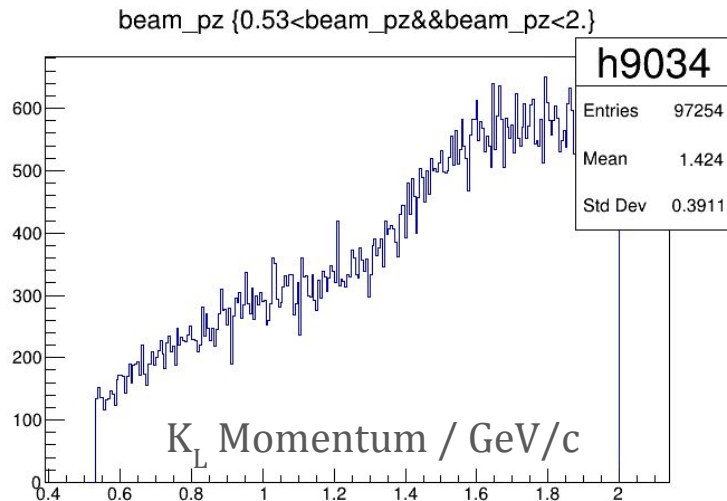
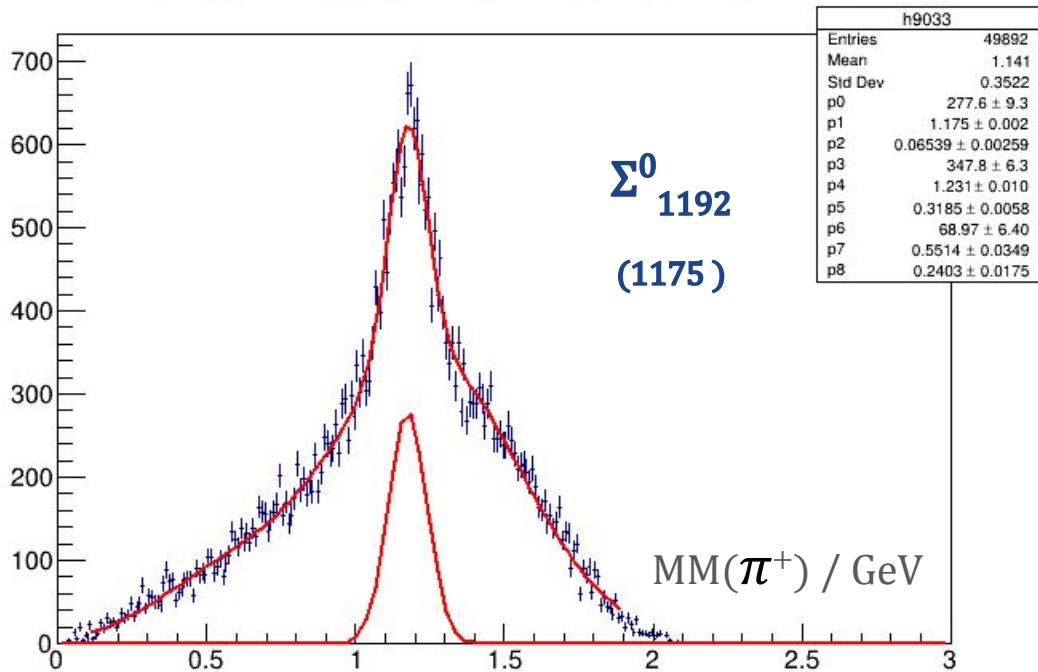




# Reconstruction of $K_L + p \rightarrow \pi^+ + \Sigma^0$ at $K_L$ momentum (0.53, 2) GeV/c.

## The histogram includes Missing Mass of all $\pi^+$ .

(MissMass(Pi+) at CDChit=4 & )&((num\_piplu==2&&num\_pimin==1&&num\_tracks==8)&&(0.53<beam\_pz&&beam\_pz<2.))

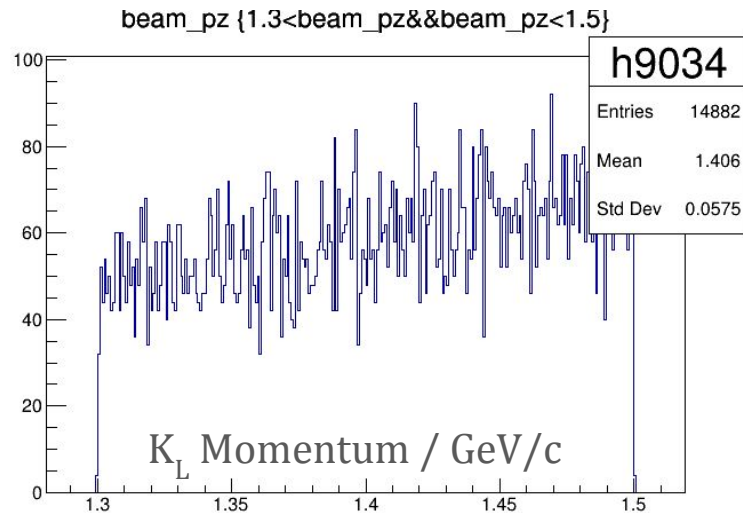
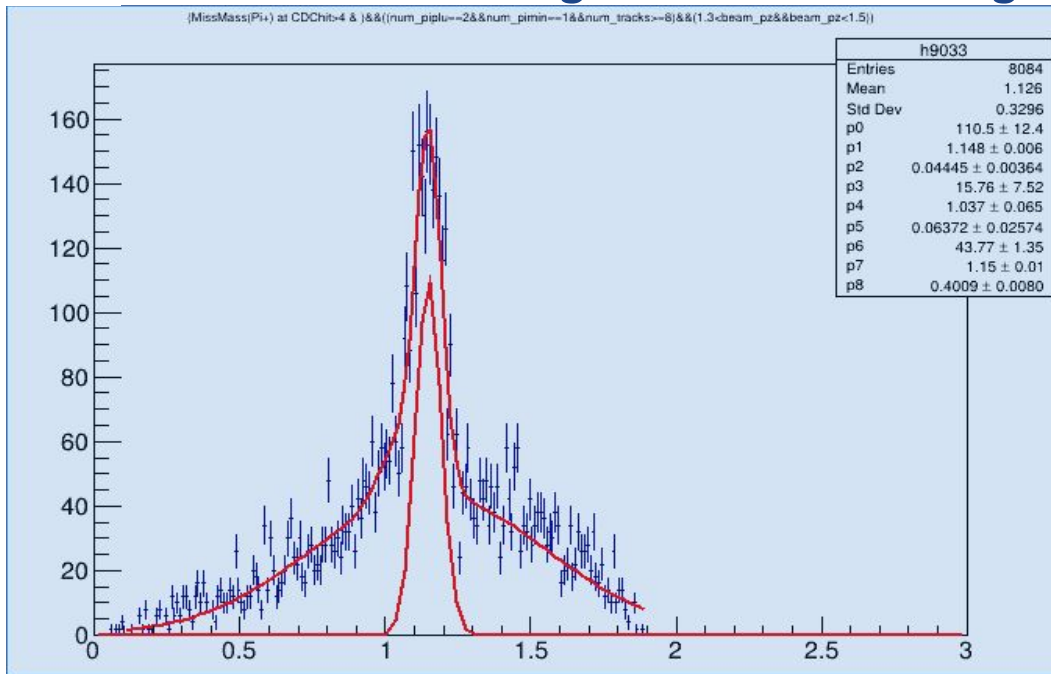


- Peak area  $S=A[\#/ch]\sqrt{2\pi\sigma}[\text{GeV}] [\text{ch/GeV}]=278*0.065*100*2.5=\sim 4,500$
- Rec. Eff. =  $4.5\text{K}/97\text{K} = \sim 4.6\%$ .



# Reconstruction of $K_L + p \rightarrow \pi^+ + \Sigma^0$ at $K_L$ momentum (1.3, 1.5) GeV/c.

The histogram includes Missing Mass of all  $\pi^+$  in an event.

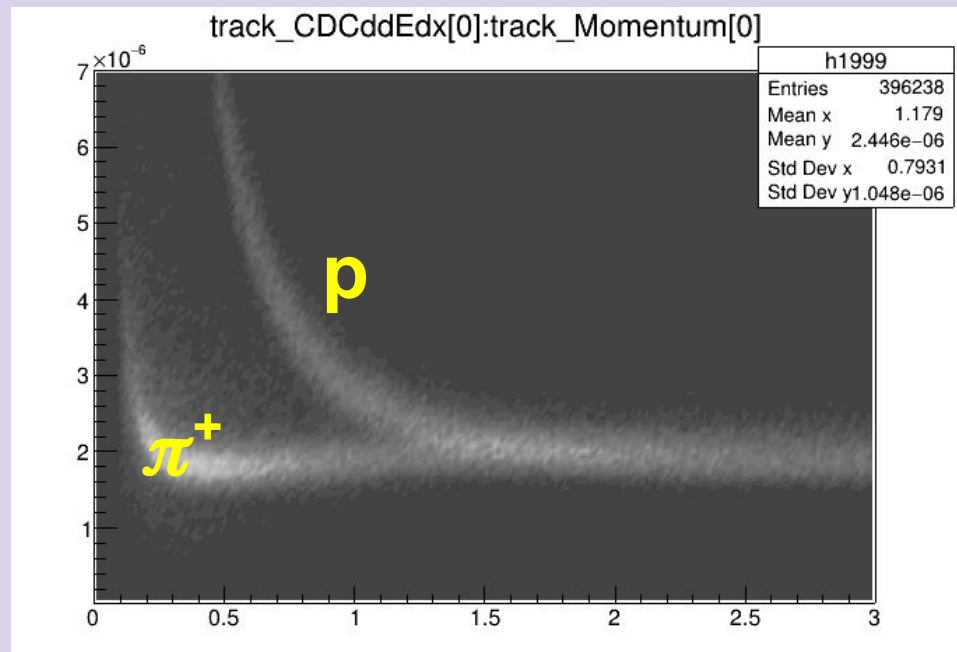


- Peak area  $S = A[\#/ch] \sqrt{2\pi\sigma}[\text{GeV}] [\text{ch/GeV}] = 110 * 0.0444 * 100 * 2.5 = \sim 1,220$
- Rec. Eff. =  $1.22K/149K = \sim 8.2\%$ .





and

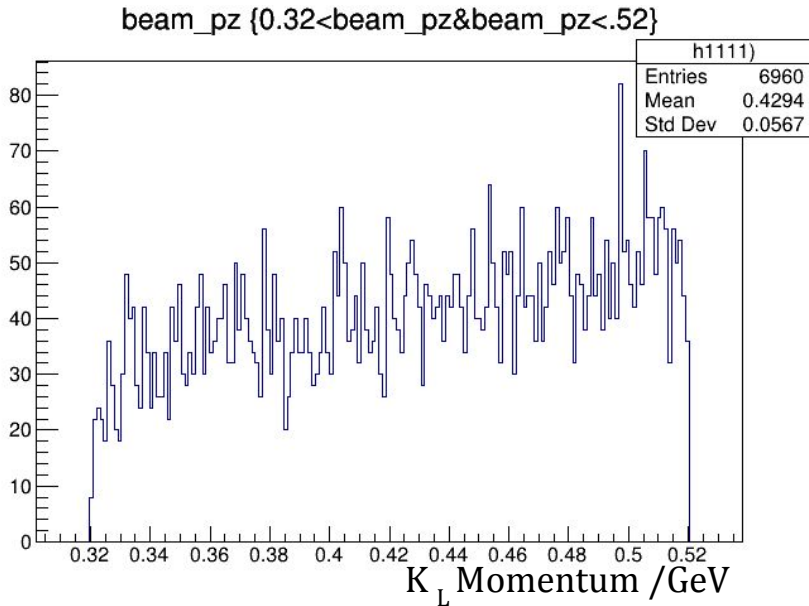
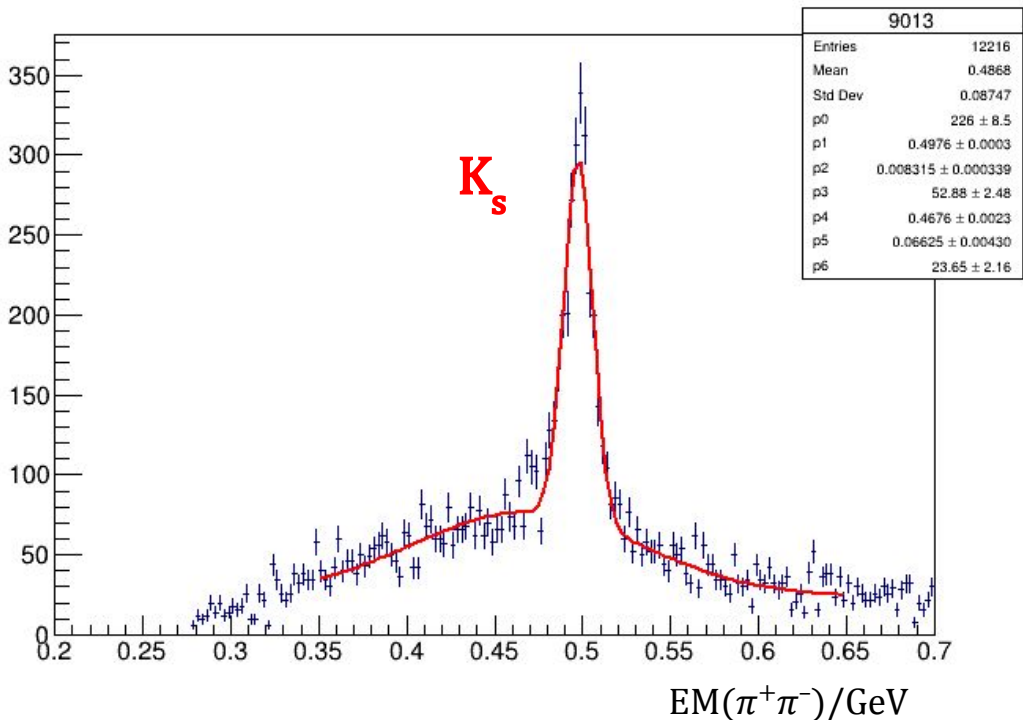




# Reconstruction $K_L + p \rightarrow K_S(\pi^+\pi^-) + \dots$ at $K_L$ momentum $(0.32, 0.52)$ GeV/c.

The histogram includes Effective Mass of all  $\pi^+\pi^-$  pair in each event.

(Effective Mass( $K_S \rightarrow \pi^+\pi^-$ ) at  $\sqrt{s}$  num\_prots=0&&num\_piplu=0&&num\_pimn=0&&num\_tracks=1&&0.35-beam\_pz&&beam\_pz<0.55)



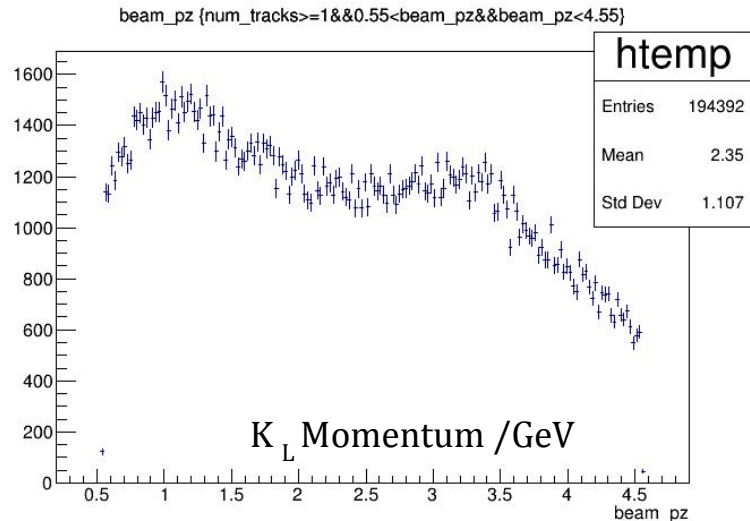
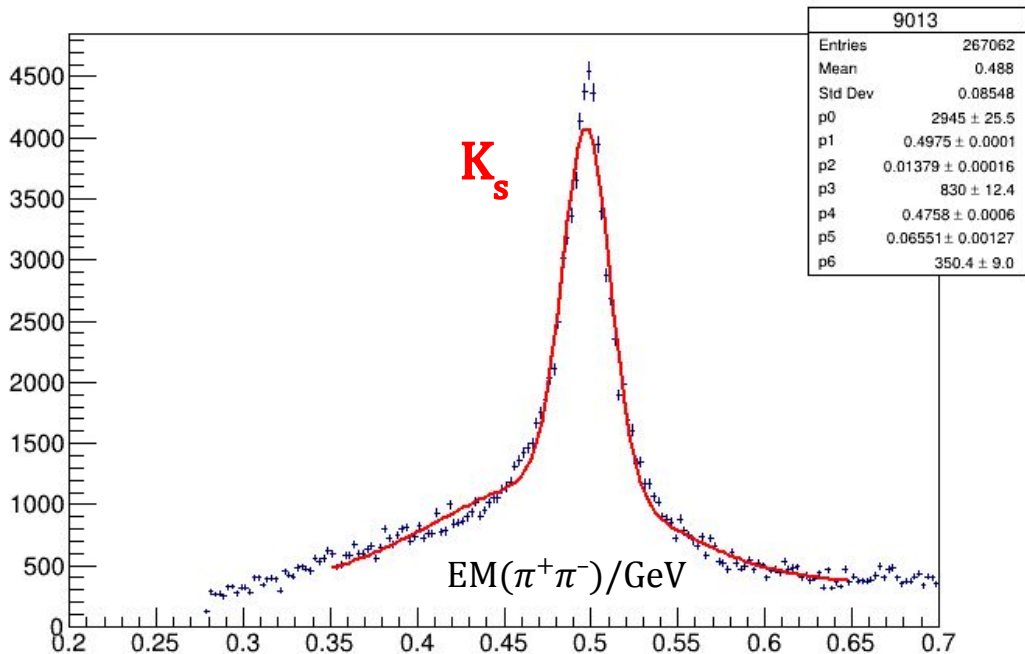
- $K_S$  Gaussian Area =  $A[1/\text{ch}] \times \sqrt{2\pi} \times \sigma[\text{GeV}] \times [\text{ch}/\text{GeV}] = 226 \times 2.5 \times 0.008315 \times 400 = 1,880$
- In **5q region** Reconstruction Efficiency of  $K_S$  :  $\#K_S/\#K_L = 1.88K/6.96K = \sim 30\%$  !





# Reconstruction of $K_L + p \rightarrow K_S (\pi^+\pi^-) + \dots$ at $K_L$ momentum $(0.55, 4.55)\text{GeV}/c$ . The histogram includes Effective Mass of all $\pi^+\pi^-$ pair in each event.

(Effective Mass( $K_S \rightarrow \pi^+\pi^-$ ) at  $\sqrt{s}(\text{num\_proto} \geq 0 \& \text{num\_pi} \geq 0 \& \text{num\_p} \geq 0) \& (\text{num\_tracks} \geq 1 \& 0.55 < \text{beam\_pz} \& \text{beam\_pz} < 4.55)$ )

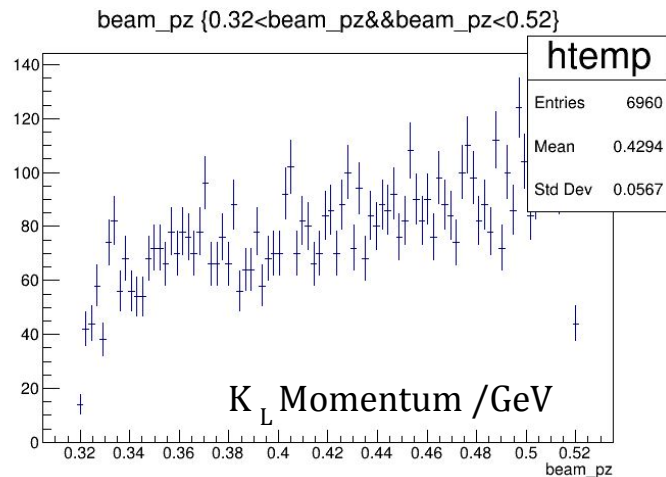
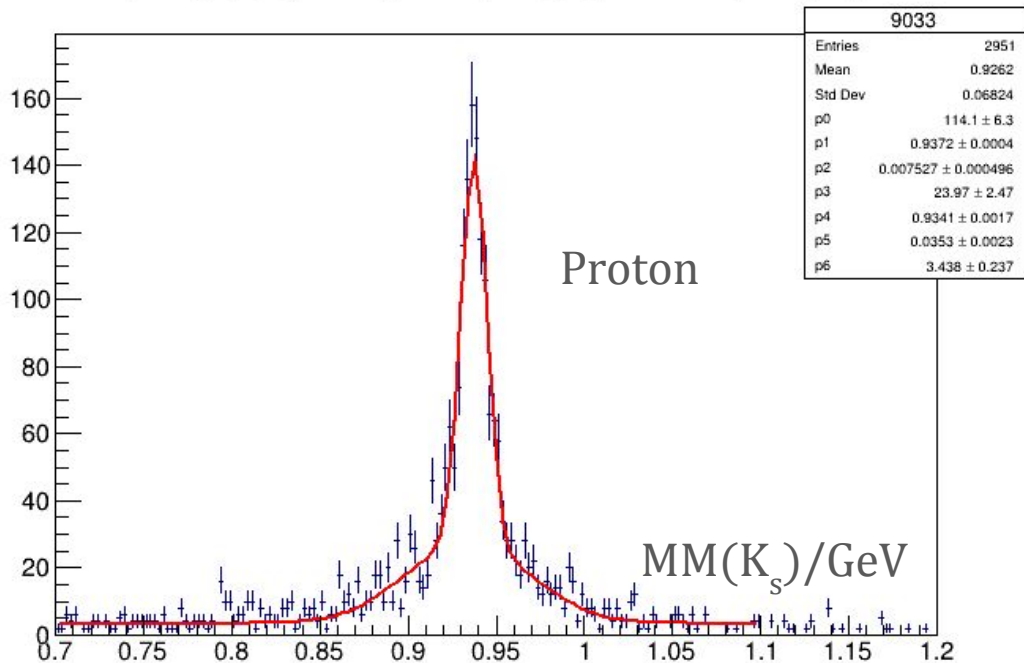


- $K_S$  Gaussian Area =  $A[1/\text{ch}] \times \sqrt{2\pi} \times \sigma[\text{GeV}] \times [\text{ch}/\text{GeV}] = 2945 \times 2.5 \times 0.014 \times 400 = 41,230$
- Reconstruction Efficiency of  $K_S$  :  $\#K_S/\#K_L = 41\text{K}/194\text{K} = \sim 21\%$  !



# Reconstruction of $K_L + p \rightarrow K_S + p$ at $K_L$ momentum (0.32, 0.52) GeV/c. The histogram includes Missing Masses of all $K_S \rightarrow \pi^- \pi^+$ in an event

(MissMass(Ks) at |&&(num\_proto>=0&&num\_pi0>=1&&num\_pimr>=1)&&(num\_tracks==1&&0.32<beam\_pz&&beam\_pz<0.52)

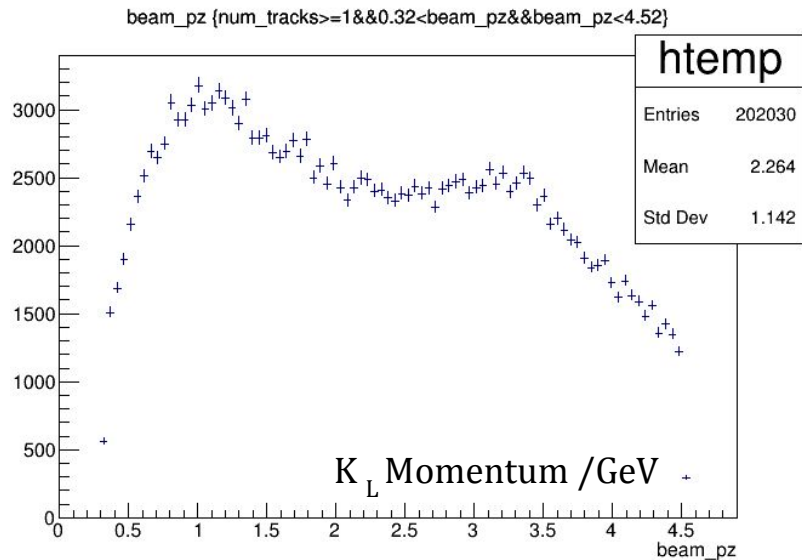
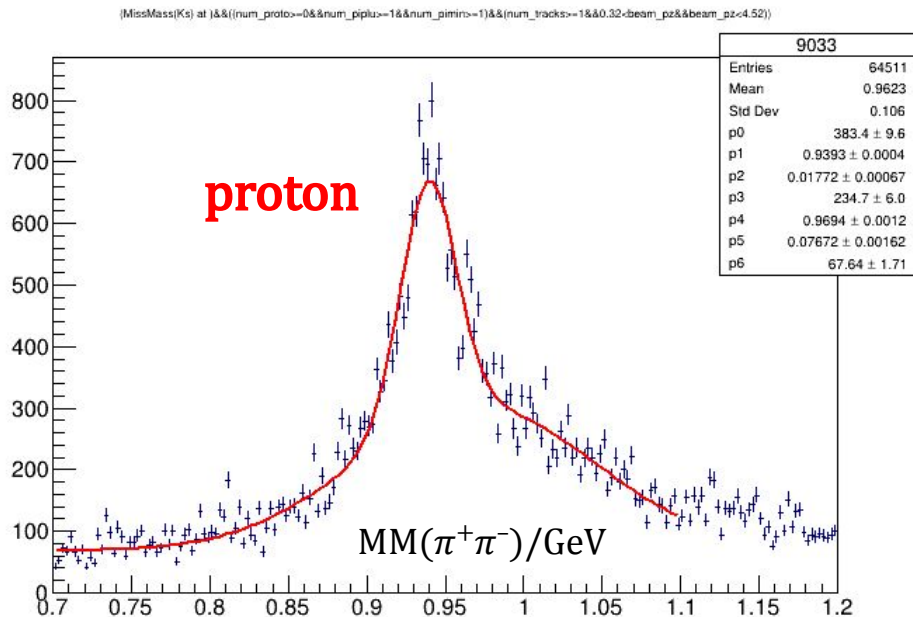


- Proton peak area  $S = p_0 [1/\text{ch}] * \sqrt{2\pi} * \sigma [\text{GeV}] * [\text{ch}/\text{GeV}] = 114 * 2.5 * 0.00753 * 400 = 858$
- **In 5q region** FS Proton Reconstruction Efficiency =  $858/6960 = \sim 12\%$ .



# Reconstruction of $K_L + p \rightarrow K_s + p$ at $K_L$ momentum (.32,4.52) GeV/c.

The histogram includes Missing Masses of all  $K_s$ .



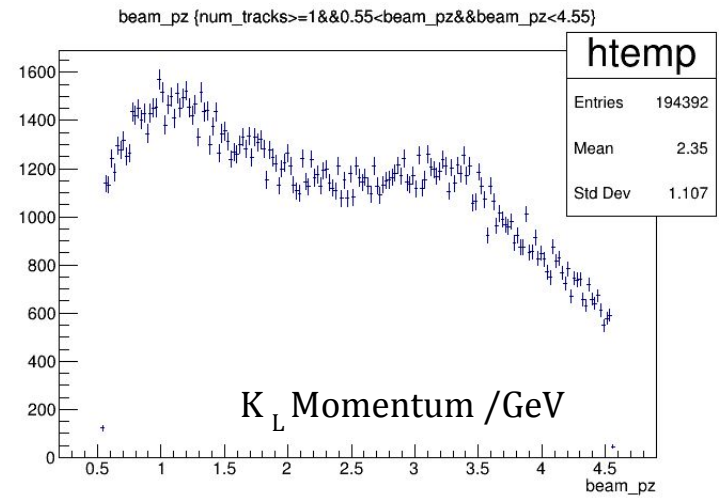
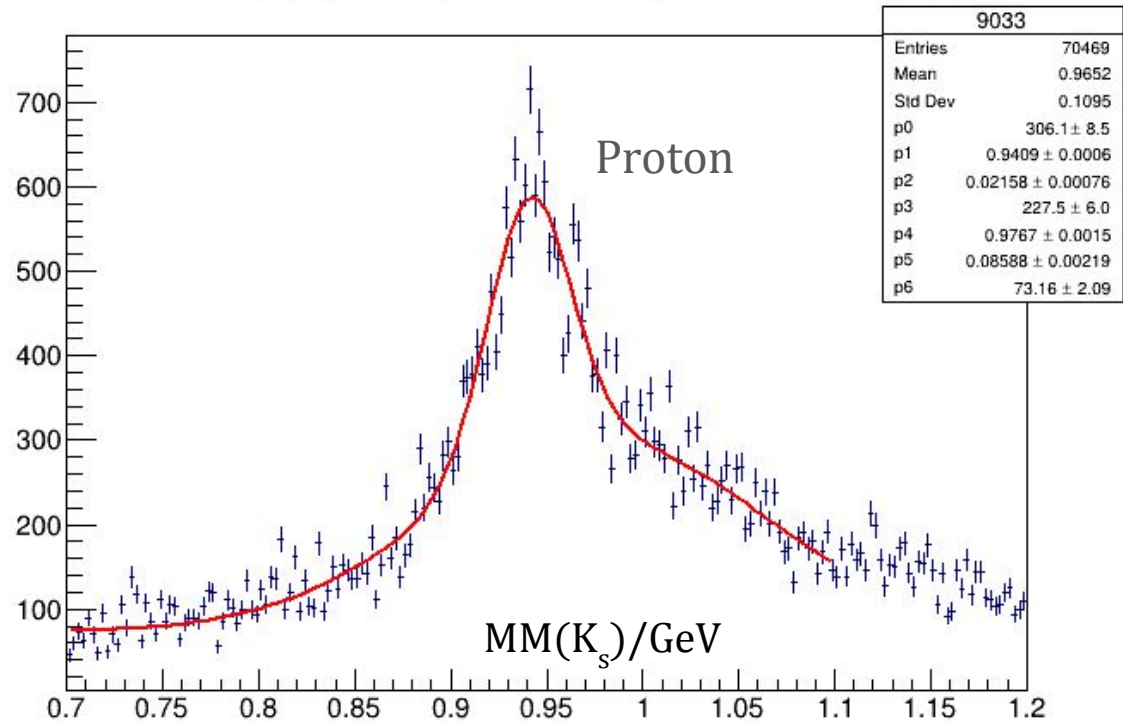
- Peak area  $S = A[\#/ch] \sqrt{2\pi\sigma}[\text{GeV}] [\text{ch}/\text{GeV}] = 383 * 2.5 * 0.0177 * 400 = \sim 6,780$
- Reconstruction Efficiency =  $6,780 / 200,000 = \sim 3.5\%$ .



# Reconstruction of $K_L + p \rightarrow K_s + p$ at $K_L$ momentum (.55, 4.55) GeV/c.

## The histogram includes Missing Masses of all $K_s \rightarrow \pi^- \pi^+$ in an event

[MisMas(Pi+Pi-) at ]&&((num\_proto=0&&num\_piplus=0&&num\_pimin=0)&&(num\_tracks>=1&&0.55<beam\_pz&&beam\_pz<4.55))



- Proton peak area  $S = p_0 [1/\text{ch}] * \sqrt{2\pi} * \sigma [\text{GeV}] * [\text{ch}/\text{GeV}] = 306 * 2.5 * 0.0216 * 400 = 6610$
- Proton Reconstruction Efficiency =  $6,610 / 194,000 = \sim 3.5\%$ .