

## 0.1 V0 Selection

$\Lambda$  ( $\bar{\Lambda}$ ) and  $K_S^0$  are neutral particles which cannot be directly detected, but must instead be reconstructed through detection of their decay products, or daughters. In general, particles which are topologically reconstructed in this fashion are called V0 particles. The class AliFemtoV0TrackCutNSigmaFilter (which is an extension of AliFemtoV0TrackCut) is used to reconstruct the V0s.

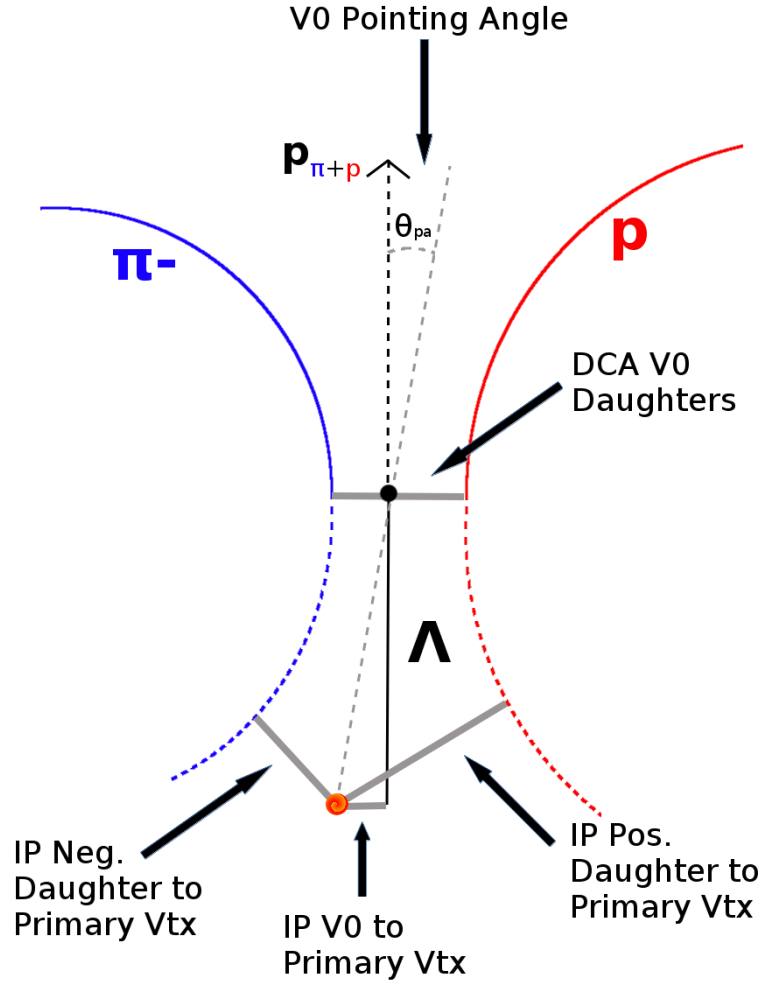


Fig. 1:  $\Lambda$  Reconstruction

### 0.1.1 $\Lambda$ Reconstruction

The following cuts were used to select good  $\Lambda$  ( $\bar{\Lambda}$ ) candidates:

1. Cuts Common to Both Daughters
  - (a)  $|\eta| < 0.8$
  - (b) SetTPCnclsDaughters(80)
  - (c) SetStatusDaughters(AliESDtrack::kTPCrefic)
  - (d) SetMaxDcaV0Daughters(0.4)
2. Pion Specific Daughter Cuts
  - (a)  $p_T > 0.16$

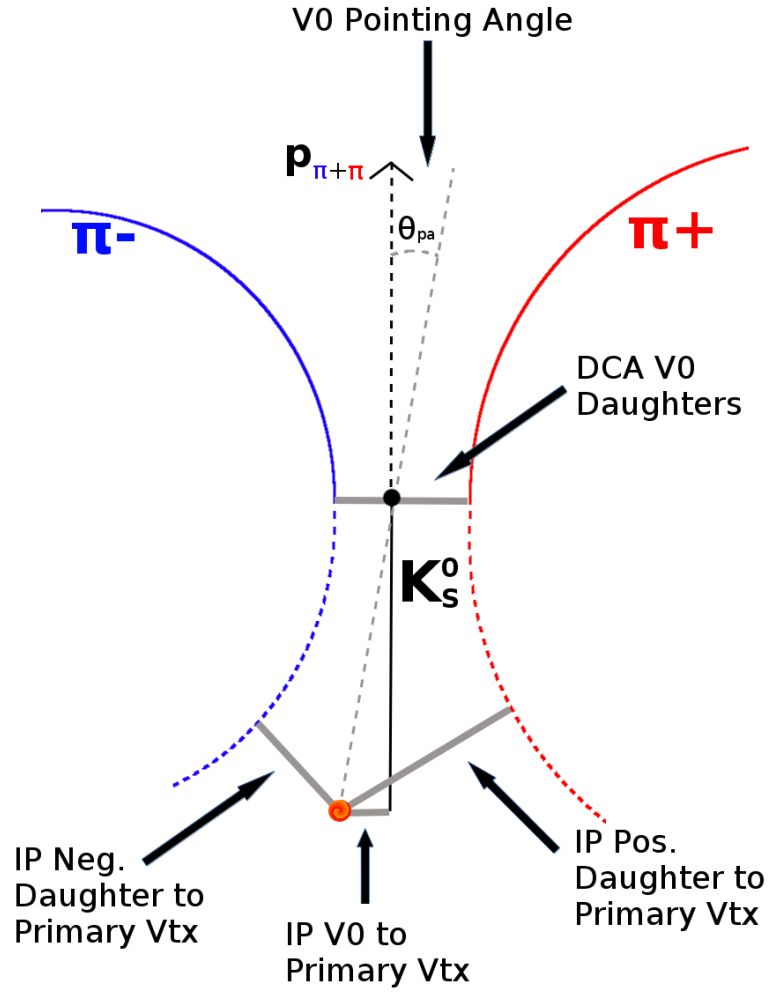


Fig. 2:  $K_S^0$  Reconstruction

(b) DCA to prim vertex  $> 0.3$

### 3. Proton Specific Daughter Cuts

(a)  $p_T >$

–  $0.5 (p)$

–  $0.3 (\bar{p})$

(b) DCA to prim vertex  $> 0.1$

### 4. Lambda Cuts

(a)  $|\eta| < 0.8$

(b)  $p_T > 0.4$

(c)  $|m_{inv} - m_{PDG}| < 3.8 \text{ MeV}$

(d) Cosine of pointing angle  $> 0.9993$

(e) OnFlyStatus = false

(f) Decay Length  $< 60 \text{ cm}$

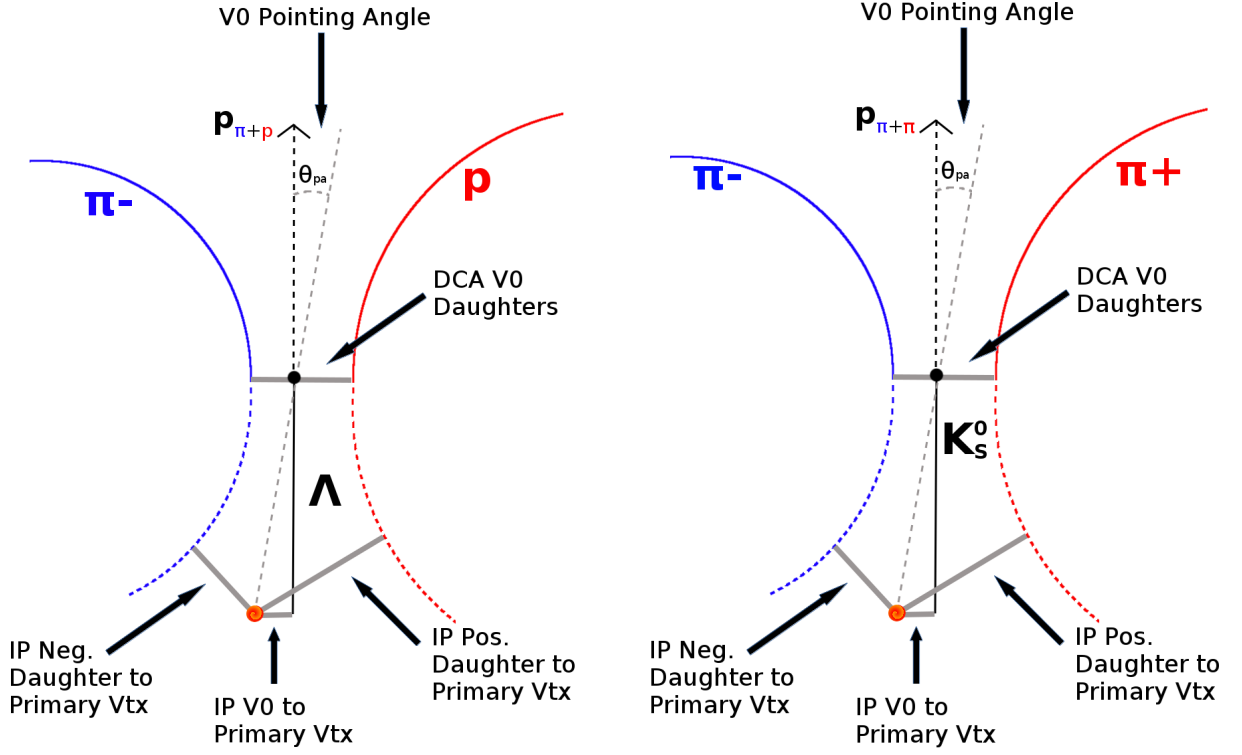
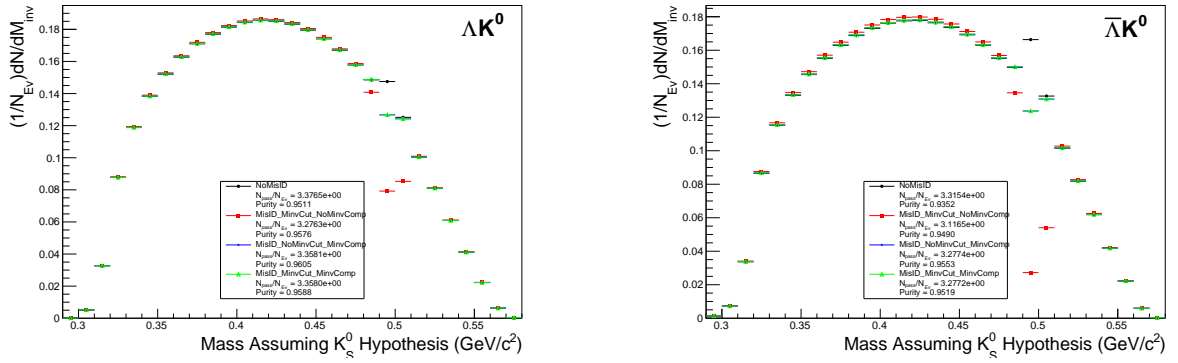


Fig. 3: Long caption



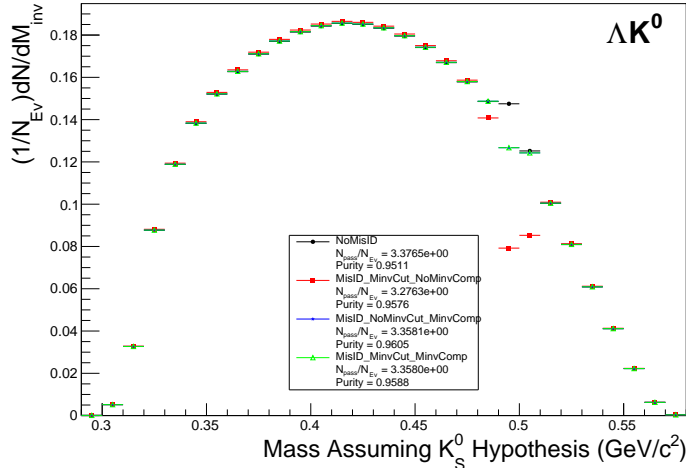
**Fig. 4:** Mass assuming  $K_S^0$ -hypothesis for V0 candidates passing all  $\Lambda$  ( $\bar{\Lambda}$ ) cuts, i.e. assume the daughters are  $\pi^+\pi^-$  instead of  $p^+\pi^-$  ( $\pi^+\bar{p}^-$ ). The slight peak around  $m_{inv} = 0.5$  GeV/ $c^2$  likely contains misidentified  $K_S^0$  particles in our  $\Lambda$  collection. If one simply cuts out the entire peak, good  $\Lambda$  particles will be lost. Ideally, the  $\Lambda$  selection and  $K_S^0$  misidentification cuts are selected such that the peak is removed from this plot while leaving the distribution continuous.

### 0.1.2 $K_S^0$ Reconstruction

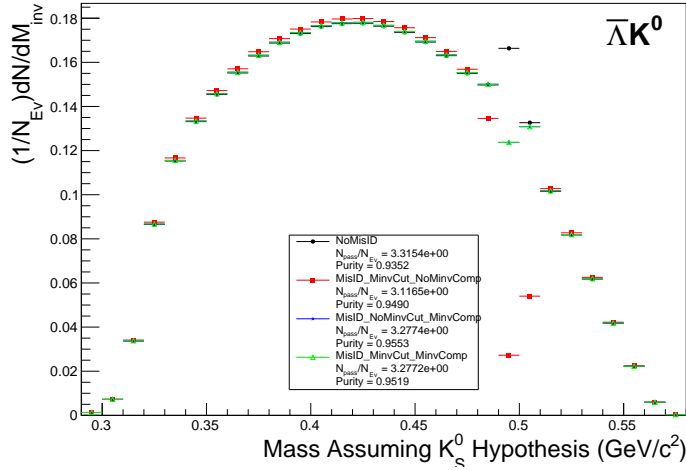
The following cuts were used to select good  $K_S^0$  candidates:

#### 1. Pion Daughter Cuts

- $|\eta| < 0.8$
- SetTPCnclsDaughters(80)
- SetStatusDaughters(AliESDtrack::kTPCrefic)
- SetMaxDcaV0Daughters(0.3)



**Fig. 5:** Mass assuming  $K_S^0$ -hypothesis for V0 candidates passing all  $\Lambda$  cuts, i.e. assume the daughters are  $\pi^+\pi^-$  instead of  $p^+\pi^-$ . The slight peak around  $m_{inv} = 0.5 \text{ GeV}/c^2$  likely contains misidentified  $K_S^0$  particles in our  $\Lambda$  collection. If one simply cuts out the entire peak, good  $\Lambda$  particles will be lost. Ideally, the  $\Lambda$  selection and  $K_S^0$  misidentification cuts are selected such that the peak is removed from this plot while leaving the distribution continuous.



**Fig. 6:** Mass assuming  $K_S^0$ -hypothesis for V0 candidates passing all  $\bar{\Lambda}$  cuts, i.e. assume the daughters are  $\pi^+\pi^-$  instead of  $\pi^+\bar{p}^-$ . Similar to Figure ??

(e)  $p_T > 0.15$

(f) DCA to prim vertex  $> 0.3$

## 2. $K_S^0$ Cuts

(a)  $|\eta| < 0.8$

(b)  $p_T > 0.2$

(c)  $m_{PDG} - 13.677 \text{ MeV} < m_{inv} < m_{PDG} + 2.0323 \text{ MeV}$

(d) Cosine of pointing angle  $> 0.9993$

(e) OnFlyStatus = false

(f) Decay Length  $< 30 \text{ cm}$

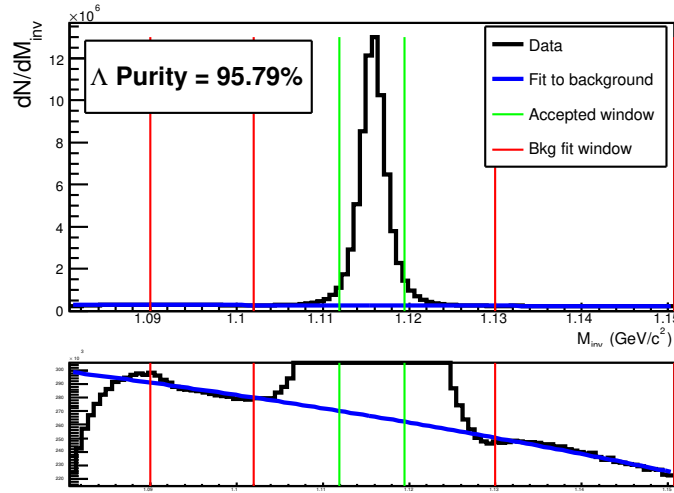
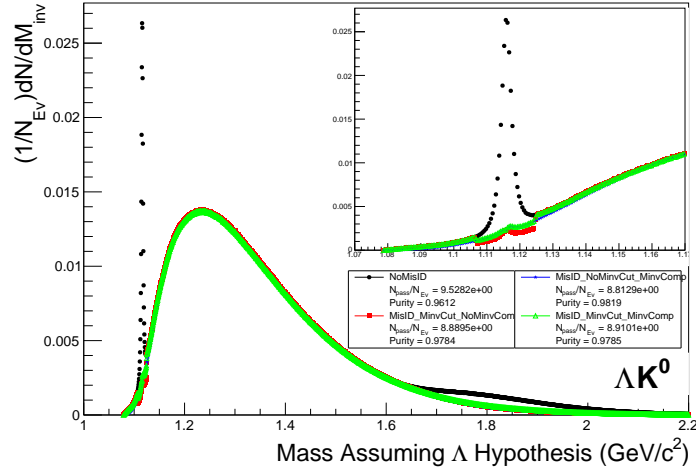


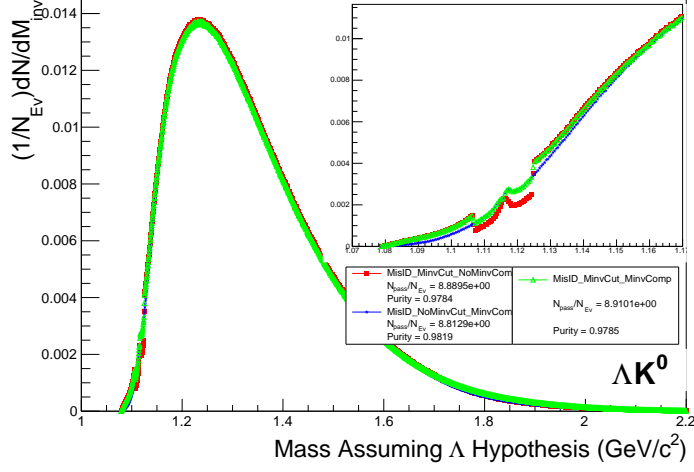
Fig. 7:  $\Lambda$  Purity



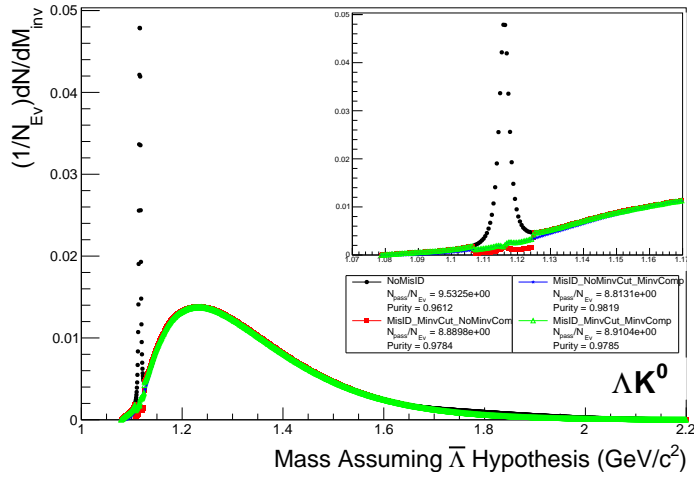
**Fig. 8:** Mass assuming  $\Lambda$ -hypothesis for V0 candidates passing all  $K_S^0$  cuts, i.e. assume the daughters are  $p^+\pi^-$  instead of  $\pi^+\pi^-$ . The peak around  $m_{inv} = 1.115$   $\text{GeV}/c^2$  likely contains misidentified  $\Lambda$  particles in our  $K_S^0$  collection. If one simply cuts out the entire peak, some good  $K_S^0$  particles will be lost. Ideally, the  $K_S^0$  selection and  $\Lambda(\bar{\Lambda})$  misidentification cuts can be selected such that the peak is removed from this plot while leaving the distribution continuous.

As can be seen in Figures ?? and ??, some misidentified  $\Lambda$  and  $\bar{\Lambda}$  particles contaminate our  $K_S^0$  sample. To attempt to remove these contaminations without throwing away good  $K_S^0$  particles, the following misidentification cuts are imposed; a  $K_S^0$  candidate is rejected if all of the following criteria are satisfied:

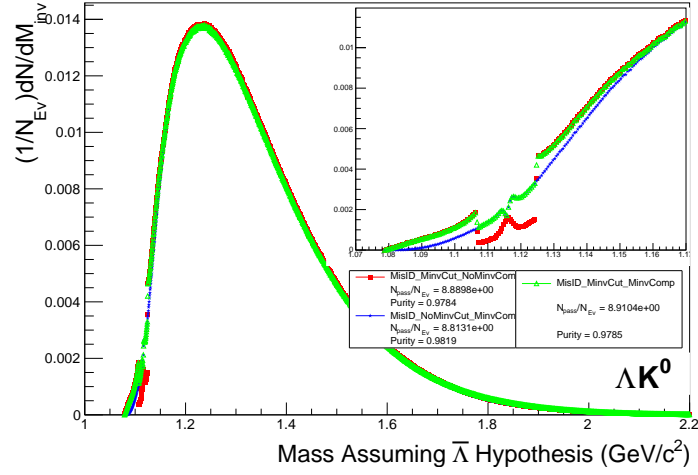
- $|m_{inv, \Lambda(\bar{\Lambda}) \text{ Hypothesis}} - m_{PDG, \Lambda(\bar{\Lambda})}| < 9.0 \text{ MeV}/c^2$
- Positive daughter passes  $p^+(\pi^+)$  daughter cut implemented for  $\Lambda(\bar{\Lambda})$  reconstruction
- Negative daughter passes  $\pi^-(\bar{p}^-)$  daughter cut implemented by  $\Lambda(\bar{\Lambda})$  reconstruction



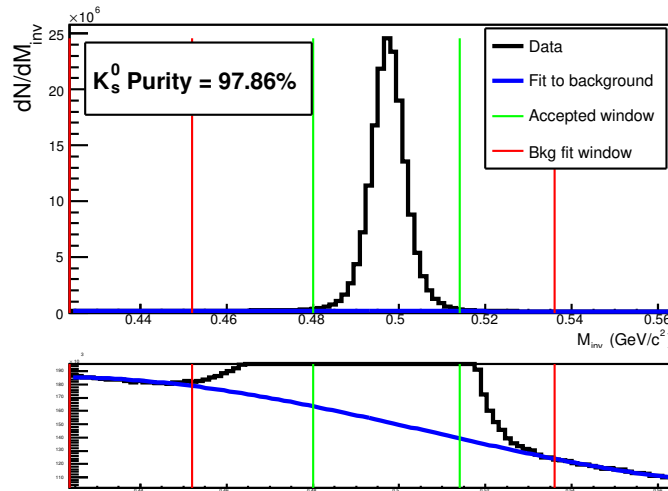
**Fig. 9:** Mass assuming  $\Lambda$ -hypothesis for V0 candidates passing all  $K_S^0$  cuts, i.e. assume the daughters are  $p^+\pi^-$  instead of  $\pi^+\pi^-$ . The peak around  $m_{inv} = 1.115 \text{ GeV}/c^2$  likely contains misidentified  $\Lambda$  particles in our  $K_S^0$  collection. If one simply cuts out the entire peak, some good  $K_S^0$  particles will be lost. Ideally, the  $K_S^0$  selection and  $\Lambda(\bar{\Lambda})$  misidentification cuts can be selected such that the peak is removed from this plot while leaving the distribution continuous.



**Fig. 10:** Mass assuming  $\bar{\Lambda}$ -hypothesis for V0 candidates passing all  $K_S^0$  cuts, i.e. assume the daughters are  $\pi^+\bar{p}^-$  instead of  $\pi^+\pi^-$ . Similar to Figure ??



**Fig. 11:** Mass assuming  $\bar{\Lambda}$ -hypothesis for V0 candidates passing all  $K_S^0$  cuts, i.e. assume the daughters are  $\pi^+ \bar{p}^-$  instead of  $\pi^+ \pi^-$ . Similar to Figure ??



**Fig. 12:**  $K_S^0$  Purity