

### 0.0.1 $K_S^0$ Reconstruction

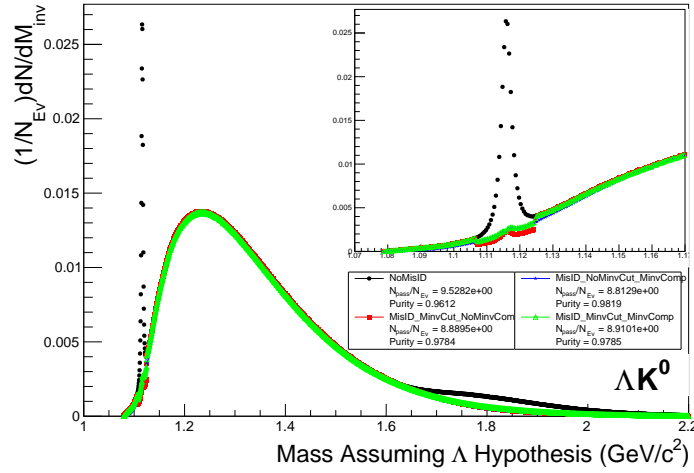
The following cuts were used to select good  $K_S^0$  candidates:

#### 1. Pion Daughter Cuts

- (a)  $|\eta| < 0.8$
- (b) SetTPCncIsDaughters(80)
- (c) SetStatusDaughters(AliESDtrack::kTPCrefic)
- (d) SetMaxDcaV0Daughters(0.3)
- (e)  $p_T > 0.15$
- (f) DCA to prim vertex  $> 0.3$

#### 2. $K_S^0$ Cuts

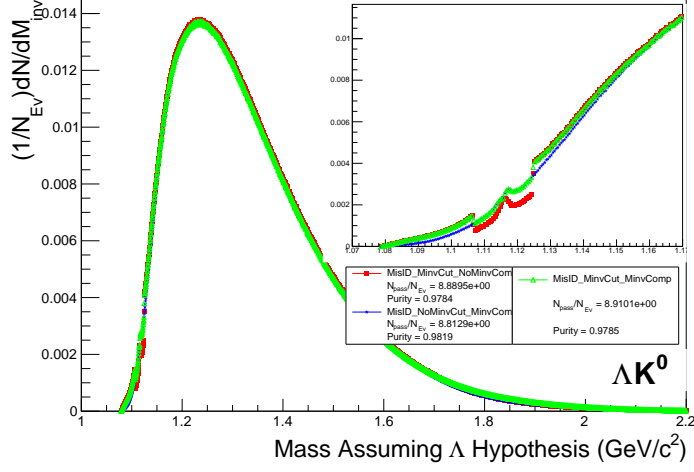
- (a)  $|\eta| < 0.8$
- (b)  $p_T > 0.2$
- (c)  $m_{PDG} - 13.677 \text{ MeV} < m_{inv} < m_{PDG} + 2.0323 \text{ MeV}$
- (d) Cosine of pointing angle  $> 0.9993$
- (e) OnFlyStatus = false
- (f) Decay Length  $< 30 \text{ cm}$



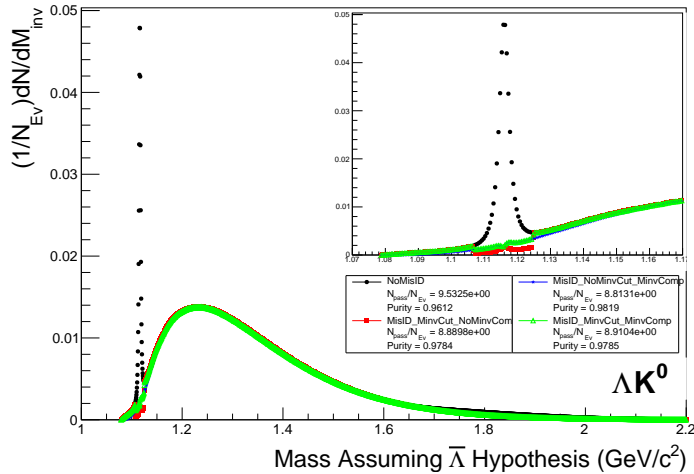
**Fig. 1:** Mass assuming  $\Lambda$ -hypothesis for V0 candidates passing all  $K_S^0$  cuts, i.e. assume the daughters are  $p^+\pi^-$  instead of  $\pi^+\pi^-$ . The peak around  $m_{inv} = 1.115 \text{ GeV}/c^2$  likely contains misidentified  $\Lambda$  particles in our  $K_S^0$  collection. If 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:

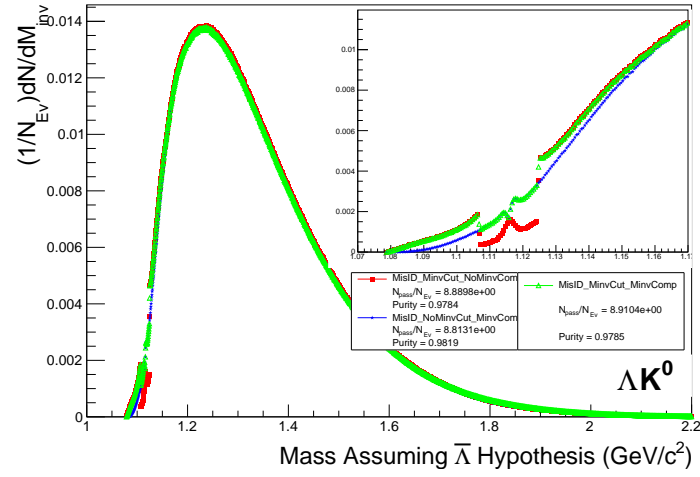
- $|m_{inv, \Lambda(\bar{\Lambda}) \text{ Hypothesis}} - m_{PDG, \Lambda(\bar{\Lambda})}| < 9.0 \text{ MeV}/c^2$
- Positive daughter passes  $p^+(\pi^+)$  daughter cut implemented for  $\Lambda(\bar{\Lambda})$  reconstruction
- Negative daughter passes  $\pi^-(\bar{p}^-)$  daughter cut implemented by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



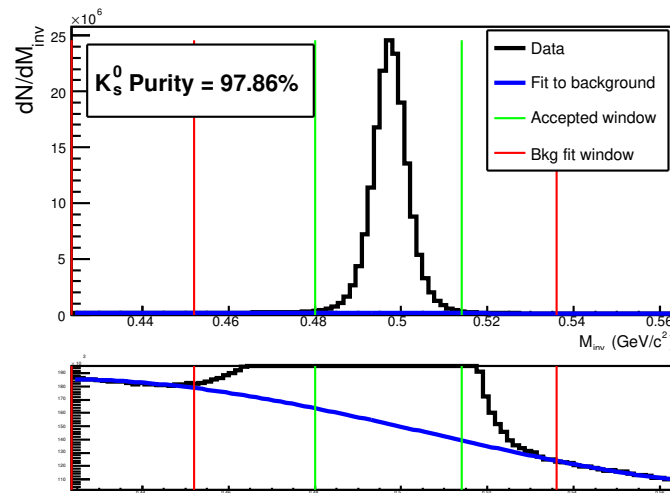
**Fig. 2:** Mass assuming  $\Lambda$ -hypothesis for V0 candidates passing all  $K_S^0$  cuts, i.e. assume the daughters are  $p^+\pi^-$  instead of  $\pi^+\pi^-$ . The peak around  $m_{inv} = 1.115 \text{ GeV}/c^2$  likely contains misidentified  $\Lambda$  particles in our  $K_S^0$  collection. If 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. 3:** 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. 4:** 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. 5:**  $K_S^0$  Purity