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) SetTPCnclsDaughters(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 MeV $< m_{inv} < m_{PDG} +$ 2.0323 MeV
   (d) Cosine of pointing angle > 0.9993
   (e) OnFlyStatus = false
   (f) Decay Length < 30 cm

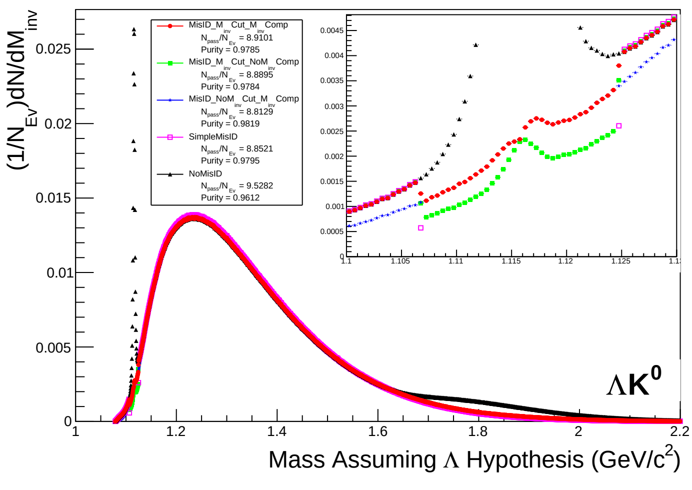

Fig. 1: Mass assuming Λ-hypothesis for V0 candidates passing all K_S^0 cuts, i.e. assume the daughters are $p^+\pi^-$ instead of $\pi^+\pi^-$. The peak around $m_{inv} = 1.115$ GeV/c^2 contains misidentified Λ particles in our K_S^0 collection. If one simply cuts out the entire peak, some good K_S^0 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. Also note, the excess around $1.65 < m_{inv} < 2.1$ GeV/c^2 shows misidified $\bar{\Lambda}$ particles in our K_S^0 collection.

As can be seen in Figures 1 and 2, some misidentified Λ and $\bar{\Lambda}$ particles contaminate our K_S^0 sample. Figure 1 shows the mass assuming Λ-hypothesis for V0 candidates passing all K_S^0 cuts, i.e. assume the daughters are $p^+\pi^-$ instead of $\pi^+\pi^-$. Figure 2 is similar, but shows the mass assuming $\bar{\Lambda}$ hypothesis for the same K_S^0 collection, i.e. assume the daughters are $\pi^+\bar{p}^-$ instead of $\pi^+\pi^-$. The Λ contamination

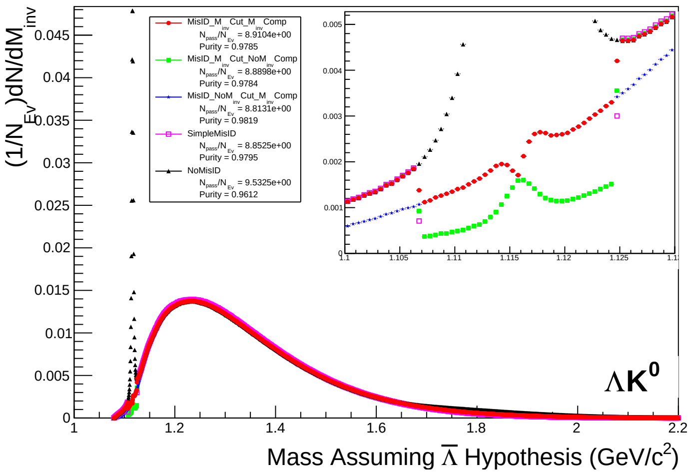

Fig. 2: Mass assuming $\bar{\Lambda}$-hypothesis for V0 candidates passing all K^0_S cuts, i.e. assume the daughters are $\pi^+\bar{p}^-$ instead of $\pi^+\pi^-$. Similar to Figure 1

can be seen in Figure 1, and the $\bar{\Lambda}$ contamination in Figure 2, in the peaks around m_{inv} = 1.115 GeV/c^2. Additionally, the $\bar{\Lambda}$ contamination is visible in Figure 1, and the Λ contamination visible in Figure 2, in the region of excess around $1.65 < m_{inv} < 2.1$ GeV/c^2. This is confirmed as the number of misidentified Λ particles in the sharp peak of Figure 1 (misidentified $\bar{\Lambda}$ particles in the sharp peak of Figure 2) approximately equals the excess found in the $1.65 < m_{inv} < 2.1$ GeV/c^2 region of Figure 2 (Figure 1).

The peak around $m_{inv} = 1.115$ GeV/c^2 in Figure 1 (Figure 2)contains both misidentified Λ ($\bar{\Lambda}$) particles and good K^0_S. If one simply cuts out the entire peak, some good K^0_S particles will be lost. Ideally, the K^0_S selection and $\Lambda(\bar{\Lambda})$ misidentification cuts can be selected such that the peak is removed from this plot while leaving the distribution continuous. To attempt to remove these Λ and $\bar{\Lambda}$ contaminations without throwing away good K^0_S particles, the following misidentification cuts are imposed; a K^0_S candidate is rejected if all of the following criteria are satisfied:

- $|m_{inv,\ \Lambda(\bar{\Lambda})\ Hypothesis} - m_{PDG,\ \Lambda(\bar{\Lambda})}| < 9.0$ 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

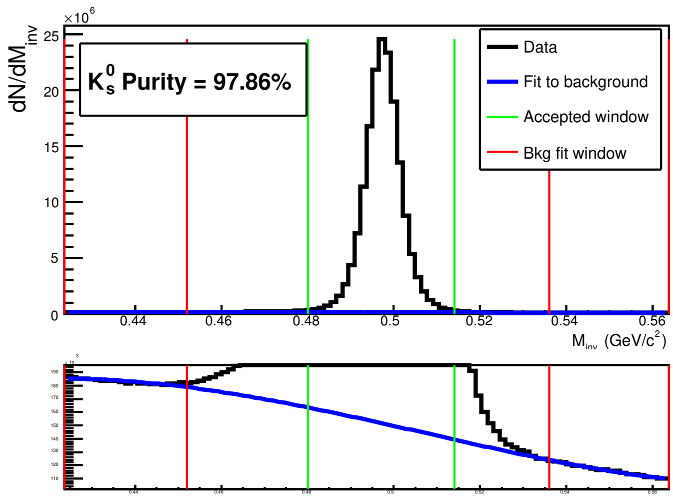

Fig. 3: K_S^0 Purity