0.1 Cascade Reconstruction

Our motivation for studying $\Xi K^{\pm}$ systems is to hopefully better understand the striking difference in the ΛK^{+} and ΛK^{-} data at low k^{*} (Figure **??**).

The reconstruction of Ξ particles is one step above V0 reconstruction. V0 particles are topologically reconstructed by searching for the charged daughters' tracks into which they decay. With Ξ particles, we search for the V0 particle and charged daughter into which the Ξ decays. In the case of Ξ^{-}, we search for the Λ (V0) and π^{-} (track) daughters. We will refer to this π as the "bachelor π".

The following cuts were used to select good Ξ^{-} ($\bar{\Xi}^{+}$) candidates:

1. V0 Daughter Reconstruction
   (a) V0 Daughter Particle Cuts
      i. Cuts Common to Both Daughters
         A. $|\eta| < 0.8$
         B. SetTPCnclsDaughters(80)
         C. SetStatusDaughters(AliESDtrack::kTPCrefic)
         D. SetMaxDcaV0Daughters(0.4)
      ii. Pion Specific Daughter Cuts
         A. $p_T > 0.16$
         B. DCA to prim vertex > 0.3
      iii. Proton Specific Daughter Cuts
         A. $p_T > 0.5(p)$ $[0.3(\bar{p})]$ GeV/c
         B. DCA to prim vertex > 0.1
   (b) V0 Cuts
      i. $|\eta| < 0.8$
      ii. $p_T > 0.4$ GeV/c
      iii. $|m_{inv} - m_{PDG}| < 3.8$ MeV
      iv. DCA to prim. vertex > 0.2 cm
      v. Cosine of pointing angle to Ξ decay vertex > 0.9993
      vi. OnFlyStatus = false
      vii. Decay Length < 60 cm
      viii. The misidentification cuts described in Section **??** are utilized
2. Bachelor π Cuts
   (a) $|\eta| < 0.8$
   (b) $p_T < 100$ GeV/c
   (c) DCA to prim vertex > 0.1 cm
   (d) SetTPCnclsDaughters(70)
   (e) SetStatusDaughters(AliESDtrack::kTPCrefic)
3. Ξ Cuts
   (a) $|\eta| < 0.8$
   (b) $0.8 < p_T < 100$ GeV/c

(c) $|m_{inv} - m_{PDG}| < 3.0$ MeV

(d) DCA to prim. vertex < 0.3 cm

(e) Cosine of pointing angle > 0.9992

4. Shared Daughter Cut for Ξ Collection

   – Iterate through Ξ collection to ensure that no daughter is used in more than one Ξ candidate

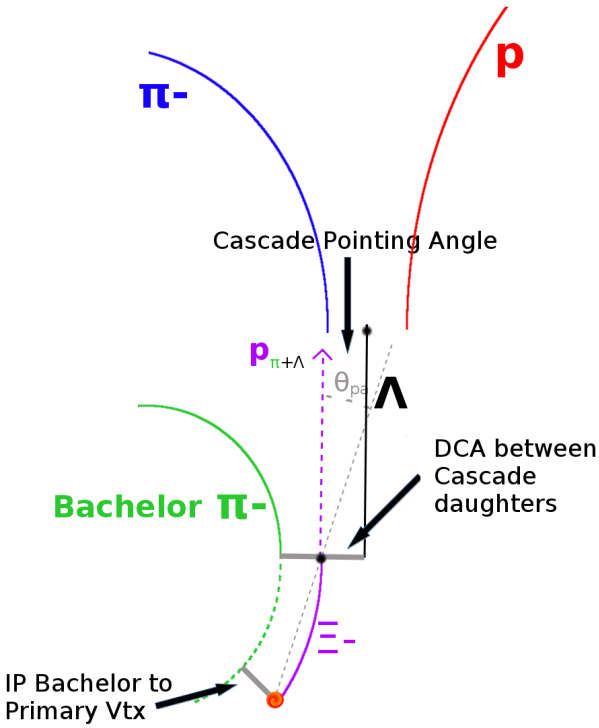
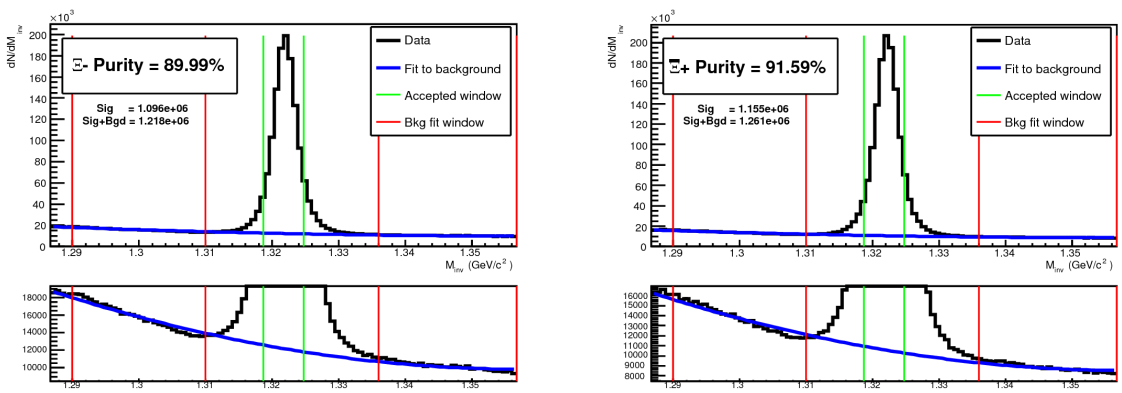


Fig. 1: Ξ Reconstruction

The purity of our Ξ and $\bar{\Xi}$ collections are calculated just as those of our V0 collections **??**. Figure 2, which is used to calculate the purity, shows the m_{inv} distribution of our $\Xi(\bar{\Xi})$ candidates just before the final m_{inv} cut. Currently, we have Purity(Ξ^-) $\approx$ 90% and Purity($\bar{\Xi}^+$) $\approx$ 92%.



(a) Ξ^- Purity (b) $\bar{\Xi}$ Purity

Fig. 2: $\Xi^-(\bar{\Xi}^+)$ Purity 0-10%: Purity(Ξ^-) $\approx$ 90% and Purity($\bar{\Xi}^+$) $\approx$ 92%.