

1 Correlation Functions

This analysis studies the momentum correlations of both Λ -K and Ξ -K pairs using the two-particle correlation function, defined as $C(k^*) = A(k^*)/B(k^*)$, where $A(k^*)$ is the signal distribution, $B(k^*)$ is the reference (or background) distribution, and k^* is the momentum of one of the particles in the pair rest frame. In practice, $A(k^*)$ is constructed by binning in k^* pairs from the same event. Ideally, $B(k^*)$ is similar to $A(k^*)$ in all respects excluding the presence of femtoscopic correlations [?]; as such, $B(k^*)$ is used to divide out the phase-space effects, leaving only the femtoscopic effects in the correlation function.

In practice, $B(k^*)$ is obtained by forming mixed-event pairs, i.e. particles from a given event are paired with particles from $N_{mix}(= 5)$ other events, and these pairs are then binned in k^* . In forming the background distribution, it is important to mix only similar events; mixing events with different phase-spaces can lead to artificial signals in the correlaton function. Therefore, in this analysis, we mix events with primary vertices within 2 cm and centralities within 5% of each other. Also note, a vertex correction is also applied to each event, which essentially recenters the the primary vertices to $z = 0$.

This analysis presents correlation functions for three centrality bins (0-10%, 10-30%, and 30-50%), and is currently pair transverse momentum ($k_T = 0.5|\mathbf{p}_{T,1} + \mathbf{p}_{T,2}|$) integrated (i.e. not binned in k_T). The correlation functions are constructed separately for the two magnetic field configurations, and are combined using a weighted average:

$$C_{combined}(k^*) = \frac{\sum_i w_i C_i(k^*)}{\sum_i w_i} \quad (1)$$

where the sum runs over the correlation functions to be combined, and the weight, w_i , is the number of numerator pairs in $C_i(k^*)$. Here, the sum is over the two field configurations.

Figures 1, 2, and 3 show the correlation functions for all centalities studied for $\Lambda K_S^0(\bar{\Lambda} K_S^0)$, $\Lambda K^+(\bar{\Lambda} K^-)$, and $\Lambda K^-(\bar{\Lambda} K^+)$, respectively. All were normalized in the range $0.32 < k^* < 0.4$ GeV/c.

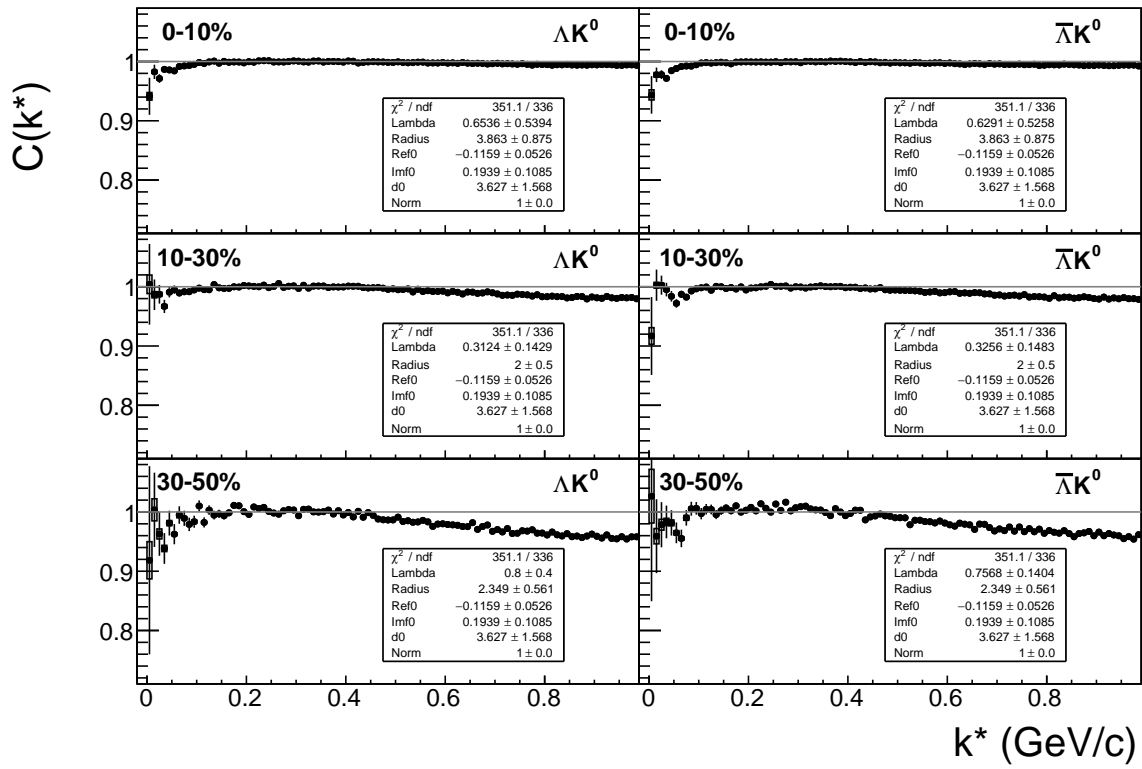


Fig. 1: ΛK_S^0 (left) and $\bar{\Lambda} K_S^0$ (right) correlation functions for 0-10% (top), 10-30% (middle), and 30-50% (bottom) centralities. The lines represent the statistical errors, while the boxes represent the systematic errors.

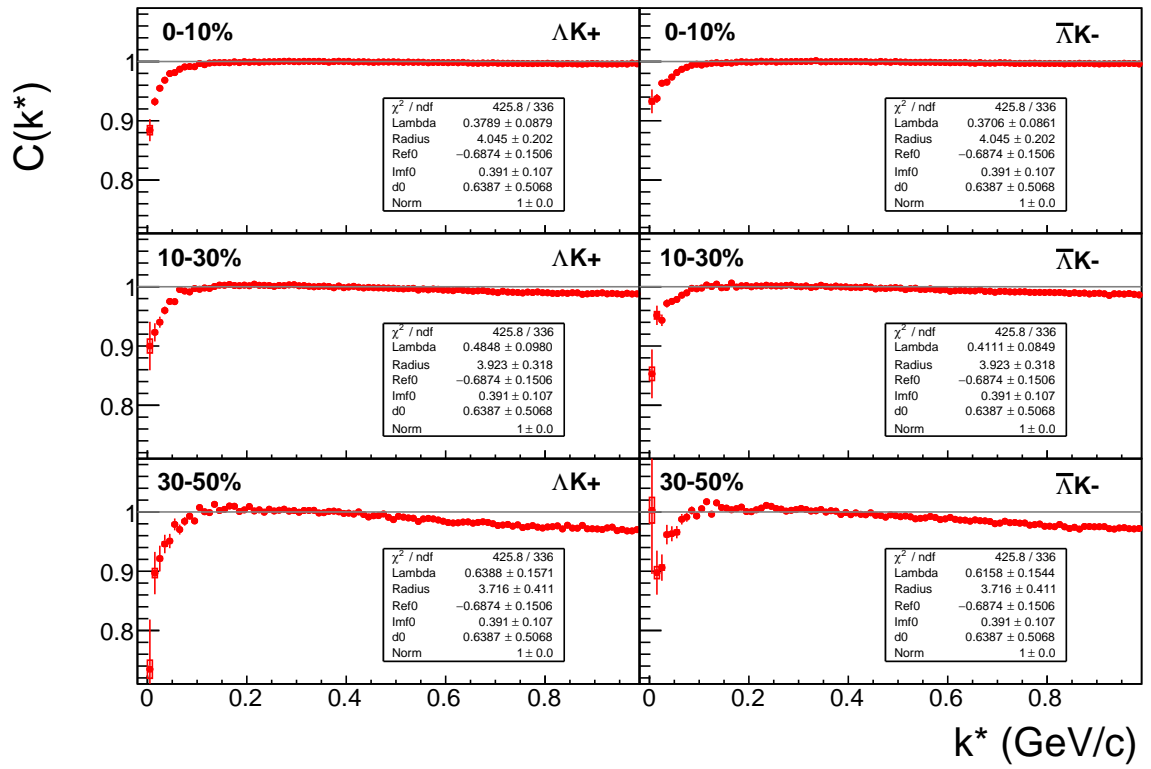


Fig. 2: ΔK^+ (left) and ΛK^- (right) correlation functions for 0-10% (top), 10-30% (middle), and 30-50% (bottom) centralities. The lines represent the statistical errors, while the boxes represent the systematic errors.

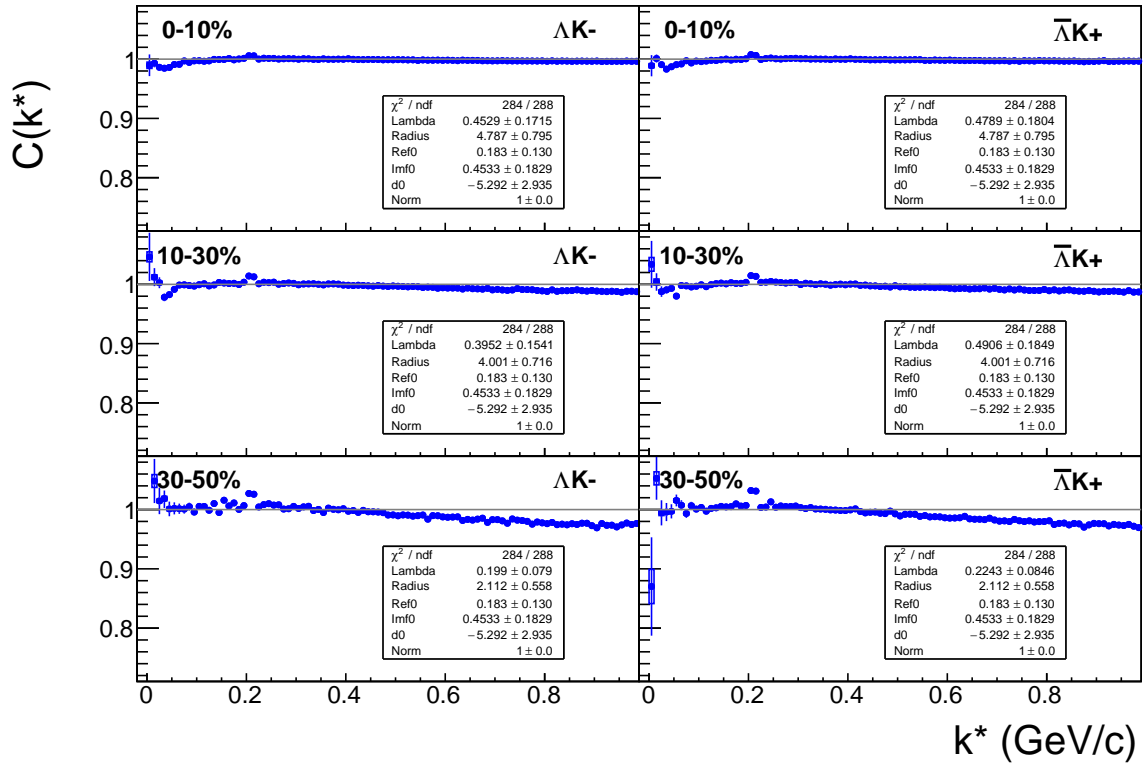


Fig. 3: ΛK^- (left) and $\bar{\Lambda} K^+$ (right) correlation functions for 0-10% (top), 10-30% (middle), and 30-50% (bottom) centralities. The lines represent the statistical errors, while the boxes represent the systematic errors. The peak at $k^* \approx 0.2$ GeV/c is due to the Ω^- resonance.

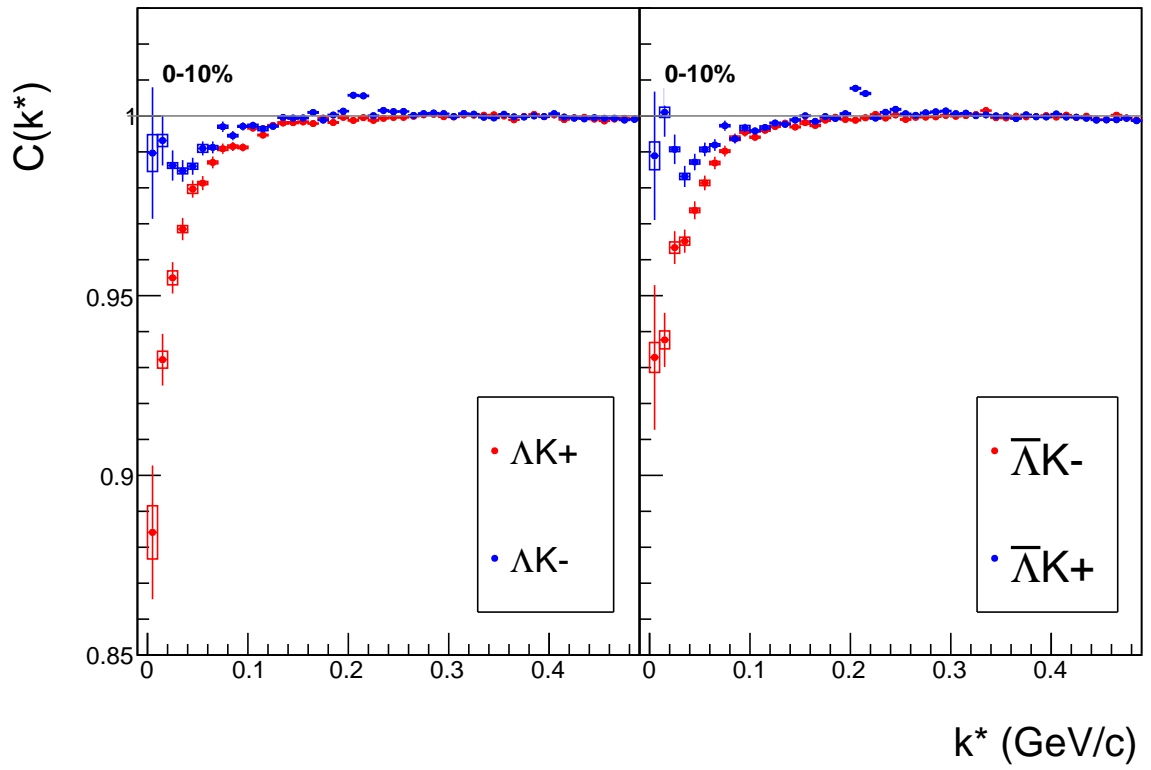


Fig. 4: Correlation Functions: ΛK^+ vs ΛK^- ($\bar{\Lambda} K^+$ vs $\bar{\Lambda} K^-$) for 0-10% centrality. The peak in ΛK^- ($\bar{\Lambda} K^+$) at $k^* \approx 0.2$ GeV/c is due to the Ω^- resonance. The lines represent the statistical errors. (NOTE: This figure is slightly dated, and a new one will be generated which includes both statistical and systematic uncertainties)