1 Systematic Errors

In order to understand my systematic uncertainties, the analysis code was run many times using slightly different values for a number of important cuts, and the results were compared.

In order to quantify the systematic errors on the data, all correlation functions built using all varied cut values were bin-by-bin averaged, and the resulting variance of each bin was taken as the systematic error. The cuts which were utilized in this study are presented in Sections 1.1.1 (ΛK_S^0) and 1.2.1 ($\Lambda K^\pm$).

Similarly, the fit parameters extracted from all of these correlation functions were averaged, and the resulting variances were taken as the systematic errors for the fit parameters. As with the systematic errors on the data, this was performed for all varied cut values. Additionally, a systematic analysis was done on our fit method (which, for now, just includes our choice of fit range). These two sources of uncertainty were combined in quadrature to obtain the final systematic uncertainties on the extracted fit parameters.

1.1 Systematic Errors: ΛK_S^0

1.1.1 Particle and Pair Cuts

The cuts included in the systematic study, as well as the values used in the variations, are listed below. Note, the central value corresponds to that used in the analysis.

1. DCA $\Lambda(\bar{\Lambda})$: {4, 5, 6 mm}

2. DCA K_S^0: {2, 3, 4 mm}

3. DCA $\Lambda(\bar{\Lambda})$ Daughters: {3, 4, 5 mm}

4. DCA K_S^0 Daughters: {2, 3, 4 mm}

5. $\Lambda(\bar{\Lambda})$ Cosine of Pointing Angle: {0.9992, 0.9993, 0.9994}

6. K_S^0 Cosine of Pointing Angle: {0.9992, 0.9993, 0.9994}

7. DCA to Primary Vertex of $p(\bar{p})$ Daughter of $\Lambda(\bar{\Lambda})$: {0.5, 1, 2 mm}

8. DCA to Primary Vertex of $\pi^-(\pi^+)$ Daughter of $\Lambda(\bar{\Lambda})$: {0.5, 1, 2 mm}

9. DCA to Primary Vertex of π^+ Daughter of K_S^0: {2, 3, 4 mm}

10. DCA to Primary Vertex of π^- Daughter of K_S^0: {2, 3, 4 mm}

11. Average Separation of Like-Charge Daughters: {5, 6, 7 cm}

1.1.2 Non-Flat Background

Still needs to be done. Currently, we fit our non-flat background with a linear function. We will also use a quadratic form, and analyze how this choice affects our extracted parameter sets.

1.1.3 Fit Range

Our choice of k^* fit range was varied by $\pm$ 25%. The resulting uncertainties in the extracted parameter sets were combined with our uncertainties arising from our particle and pair cuts.

1.2 Systematic Errors: $\Lambda K^{\pm}$

1.2.1 Particle and Pair Cuts

The cuts included in the systematic study, as well as the values used in the variations, are listed below. Note, the central value corresponds to that used in the analysis.

1. DCA $\Lambda(\bar{\Lambda})$: {4, 5, 6 mm}

2. DCA $\Lambda(\bar{\Lambda})$ Daughters: {3, 4, 5 mm}

3. $\Lambda(\bar{\Lambda})$ Cosine of Pointing Angle: {0.9992, 0.9993, 0.9994}

4. DCA to Primary Vertex of $p(\bar{p})$ Daughter of $\Lambda(\bar{\Lambda})$: {0.5, 1, 2 mm}

5. DCA to Primary Vertex of $\pi^{-}(\pi^{+})$ Daughter of $\Lambda(\bar{\Lambda})$: {0.5, 1, 2 mm}

6. Average Separation of $\Lambda(\bar{\Lambda})$ Daughter with Same Charge as $K^{\pm}$: {7, 8, 9 cm}

1.2.2 Non-Flat Background

Still needs to be done. Currently, we fit our non-flat background with a linear function. We will also use a quadratic form, and analyze how this choice affects our extracted parameter sets.

1.2.3 Fit Range

Our choice of k^{*} fit range was varied by $\pm\ 25\%$. The resulting uncertainties in the extracted parameter sets were combined with our uncertainties arising from our particle and pair cuts.