

Test Table

| Pair Type             | Centrality | Fit Results                     |                                 |                                 |     |
|-----------------------|------------|---------------------------------|---------------------------------|---------------------------------|-----|
|                       |            | 4 vs 5 mm                       |                                 |                                 |     |
|                       |            | A                               | B                               | C                               | Sig |
| $\Lambda K_S^0$       | 0-10%      | $2.709 \pm 1.940 \text{ e-04}$  | $1.531 \pm 4.020 \text{ e+00}$  | $-1.004 \pm 3.031 \text{ e-04}$ | No  |
|                       | 10-30%     | $6.759 \pm 5.899 \text{ e-04}$  | $3.834 \pm 4.817 \text{ e+00}$  | $1.195 \pm 1.309 \text{ e-04}$  | No  |
|                       | 30-50%     | $9.913 \pm 42.821 \text{ e-02}$ | $9.782 \pm 43.696 \text{ e-03}$ | $9.844 \pm 42.816 \text{ e-02}$ | No  |
| $\bar{\Lambda} K_S^0$ | 0-10%      | $2.846 \pm 4.418 \text{ e-04}$  | $8.631 \pm 7.200 \text{ e+00}$  | $-6.912 \pm 2.311 \text{ e-05}$ | No  |
|                       | 10-30%     | $3.324 \pm 14.472 \text{ e-04}$ | $9.543 \pm 84.997 \text{ e-01}$ | $2.489 \pm 17.182 \text{ e-04}$ | No  |
|                       | 30-50%     | $2.783 \pm 2.179 \text{ e-03}$  | $6.009 \pm 4.843 \text{ e+00}$  | $4.436 \pm 1.804 \text{ e-04}$  | No  |
|                       |            | 5 vs 6 mm                       |                                 |                                 |     |
| $\Lambda K_S^0$       | 0-10%      | $8.225 \pm 5.836 \text{ e-03}$  | $4.683 \pm 2.083 \text{ e+01}$  | $-7.929 \pm 1.566 \text{ e-05}$ | No  |
|                       | 10-30%     | $4.508 \pm 31.591 \text{ e-03}$ | $3.350 \pm 23.967 \text{ e-02}$ | $4.499 \pm 31.591 \text{ e-03}$ | No  |
|                       | 30-50%     | $1.884 \pm 0.700 \text{ e-01}$  | $1.265 \pm 0.289 \text{ e+02}$  | $-1.571 \pm 0.751 \text{ e-04}$ | Yes |
| $\bar{\Lambda} K_S^0$ | 0-10%      | $8.108 \pm 10.711 \text{ e-05}$ | $2.062 \pm 5.974 \text{ e+00}$  | $-8.981 \pm 8.008 \text{ e-05}$ | No  |
|                       | 10-30%     | $1.329 \pm 4.550 \text{ e-02}$  | $3.045 \pm 11.469 \text{ e-02}$ | $1.311 \pm 4.551 \text{ e-02}$  | No  |
|                       | 30-50%     | $1.510 \pm 3.137 \text{ e-02}$  | $7.268 \pm 16.222 \text{ e-02}$ | $1.436 \pm 3.145 \text{ e-02}$  | No  |

Table 1: Test Table

Test Table2

| Pair Type             | Centrality | Fit Amplitudes |             |     |            |             |     |
|-----------------------|------------|----------------|-------------|-----|------------|-------------|-----|
|                       |            | 4 vs 5 mm      |             |     | 5 vs 6 mm  |             |     |
|                       |            | Amplitude      | Error       | Sig | Amplitude  | Error       | Sig |
| $\Lambda K_S^0$       | 0-10%      | 2.709 e-04     | 1.940 e-04  | No  | 8.225 e-03 | 5.836 e-03  | No  |
|                       | 10-30%     | 6.759 e-04     | 5.899 e-04  | No  | 4.508 e-03 | 31.591 e-03 | No  |
|                       | 30-50%     | 9.913 e-02     | 42.821 e-02 | No  | 1.884 e-01 | 0.700 e-02  | Yes |
| $\bar{\Lambda} K_S^0$ | 0-10%      | 2.846 e-04     | 4.418 e-04  | No  | 8.108 e-05 | 10.711 e-05 | No  |
|                       | 10-30%     | 3.324 e-04     | 14.472 e-04 | No  | 1.329 e-02 | 4.550 e-02  | No  |
|                       | 30-50%     | 2.783 e-03     | 2.179 e-03  | No  | 1.510 e-02 | 3.137 e-02  | No  |

Table 2: Test Table2

DCA  $\Lambda(\bar{\Lambda})$ 

| Pair Type             | Centrality | p-value   |           |
|-----------------------|------------|-----------|-----------|
|                       |            | 4 vs 5 mm | 5 vs 6 mm |
| $\Lambda K_S^0$       | 0-10%      | 0.36      | 0.05      |
|                       | 10-30%     | 0.10      | 0.37      |
|                       | 30-50%     | 0.27      | 6.7e-8    |
| $\bar{\Lambda} K_S^0$ | 0-10%      | 0.08      | 3.2e-4    |
|                       | 10-30%     | 0.15      | 0.31      |
|                       | 30-50%     | 3.7e-3    | 7.1e-3    |

Table 3:  $\Lambda(\bar{\Lambda})K_S^0$  Analyses: DCA  $\Lambda(\bar{\Lambda})$  caption

## 1 Systematic Errors

This study is currently ongoing. See Table 3.

### 1.1 Systematic Errors: $\Lambda K_S^0$

Talk about stuff

| DCA $K_S^0$           |            |           |           |
|-----------------------|------------|-----------|-----------|
| Pair Type             | Centrality | p-value   |           |
|                       |            | 2 vs 3 mm | 3 vs 4 mm |
| $\Lambda K_S^0$       | 0-10%      | 0.32      | 0.76      |
|                       | 10-30%     | 2.1e-3    | 0.13      |
|                       | 30-50%     | 0.04      | 0.06      |
| $\bar{\Lambda} K_S^0$ | 0-10%      | 2.8e-7    | 1.3e-4    |
|                       | 10-30%     | 0.22      | 0.62      |
|                       | 30-50%     | 0.76      | 0.02      |

**Table 4:**  $\Lambda(\bar{\Lambda})K_S^0$  Analyses: DCA  $K_S^0$  caption

| DCA $\Lambda(\bar{\Lambda})$ Daughters |            |           |           |
|--|------------|-----------|-----------|
| Pair Type                              | Centrality | p-value   |           |
|  |            | 3 vs 4 mm | 4 vs 5 mm |
| $\Lambda K_S^0$                        | 0-10%      | 0.39      | 0.51      |
|  | 10-30%     | 0.30      | 0.84      |
|  | 30-50%     | 1.3e-38   | 8.7e-3    |
| $\bar{\Lambda} K_S^0$                  | 0-10%      | 0.35      | 0.07      |
|  | 10-30%     | 0.07      | 0.13      |
|  | 30-50%     | 0.44      | 0.01      |

**Table 5:**  $\Lambda(\bar{\Lambda})K_S^0$  Analyses: DCA  $\Lambda(\bar{\Lambda})$  Daughters

| DCA $K_S^0$ Daughters |            |           |           |
|-----------------------|------------|-----------|-----------|
| Pair Type             | Centrality | p-value   |           |
|                       |            | 2 vs 3 mm | 3 vs 4 mm |
| $\Lambda K_S^0$       | 0-10%      | 0.08      | 0.29      |
|                       | 10-30%     | 0.01      | 0.47      |
|                       | 30-50%     | 6.6e-3    | 0.82      |
| $\bar{\Lambda} K_S^0$ | 0-10%      | 0.38      | 0.44      |
|                       | 10-30%     | 0.13      | 0.25      |
|                       | 30-50%     | 0.06      | 0.53      |

**Table 6:**  $\Lambda(\bar{\Lambda})K_S^0$  Analyses: DCA  $K_S^0$  Daughters

| $\Lambda(\bar{\Lambda})$ Cosine of Pointing Angle |            |                  |                  |
|---|------------|------------------|------------------|
| Pair Type   | Centrality | p-value          |                  |
|   |            | 0.9992 vs 0.9993 | 0.9993 vs 0.9994 |
| $\Lambda K_S^0$                                   | 0-10%      | 0.17             | 0.50             |
|   | 10-30%     | 1.2e-3           | 0.10             |
|   | 30-50%     | 5.4e-3           | 5.6e-9           |
| $\bar{\Lambda} K_S^0$                             | 0-10%      | 0.87             | 0.77             |
|   | 10-30%     | 0.09             | 0.13             |
|   | 30-50%     | 9.8e-9           | 0.09             |

**Table 7:**  $\Lambda(\bar{\Lambda})K_S^0$  Analyses:  $\Lambda(\bar{\Lambda})$  Cosine of Pointing Angle

| $K_S^0$ Cosine of Pointing Angle |            |                  |                  |
|----------------------------------|------------|------------------|------------------|
| Pair Type                        | Centrality | p-value          |                  |
|                                  |            | 0.9992 vs 0.9993 | 0.9993 vs 0.9994 |
| $\Lambda K_S^0$                  | 0-10%      | 0.02             | 0.01             |
|                                  | 10-30%     | 0.34             | 0.63             |
|                                  | 30-50%     | 0.55             | 1.8e-7           |
| $\bar{\Lambda} K_S^0$            | 0-10%      | 0.30             | 0.18             |
|                                  | 10-30%     | 2.2e-4           | 0.32             |
|                                  | 30-50%     | 0.41             | 0.11             |

**Table 8:**  $\Lambda(\bar{\Lambda})K_S^0$  Analyses:  $K_S^0$  Cosine of Pointing Angle

| DCA to Primary Vertex of $p^+(\bar{p}^-)$ Daughter of $\Lambda(\bar{\Lambda})$ |            |             |           |
|--|------------|-------------|-----------|
| Pair Type  | Centrality | p-value     |           |
|  |            | 0.5 vs 1 mm | 1 vs 2 mm |
| $\Lambda K_S^0$  | 0-10%      | 1           | 0.33      |
|  | 10-30%     | 1           | 0.68      |
|  | 30-50%     | 1           | 0.05      |
| $\bar{\Lambda} K_S^0$  | 0-10%      | 1           | 0.34      |
|  | 10-30%     | 1           | 0.09      |
|  | 30-50%     | 1           | 0.32      |

**Table 9:**  $\Lambda(\bar{\Lambda})K_S^0$  Analyses: DCA to Primary Vertex of  $p^+(\bar{p}^-)$  Daughter of  $\Lambda(\bar{\Lambda})$

| DCA to Primary Vertex of $\pi^-(\pi^+)$ Daughter of $\Lambda(\bar{\Lambda})$ |            |           |           |
|--|------------|-----------|-----------|
| Pair Type  | Centrality | p-value   |           |
|  |            | 2 vs 3 mm | 3 vs 4 mm |
| $\Lambda K_S^0$  | 0-10%      | 0.07      | 0.44      |
|  | 10-30%     | 0.03      | 0.20      |
|  | 30-50%     | 9.0e-6    | 0.10      |
| $\bar{\Lambda} K_S^0$  | 0-10%      | 1.4e-3    | 0.88      |
|  | 10-30%     | 0.05      | 3.3e-3    |
|  | 30-50%     | 0.03      | 1.4e-5    |

**Table 10:**  $\Lambda(\bar{\Lambda})K_S^0$  Analyses: DCA to Primary Vertex of  $\pi^-(\pi^+)$  Daughter of  $\Lambda(\bar{\Lambda})$

| DCA to Primary Vertex of $\pi^+$ Daughter of $K_S^0$ |            |           |           |
|--|------------|-----------|-----------|
| Pair Type  | Centrality | p-value   |           |
|  |            | 2 vs 3 mm | 3 vs 4 mm |
| $\Lambda K_S^0$                                      | 0-10%      | 0.14      | 9.6e-4    |
|  | 10-30%     | 0.07      | 0.86      |
|  | 30-50%     | 0.93      | 0.11      |
| $\bar{\Lambda} K_S^0$                                | 0-10%      | 0.06      | 0.17      |
|  | 10-30%     | 0.11      | 0.69      |
|  | 30-50%     | 2.0e-14   | 0.51      |

**Table 11:**  $\Lambda(\bar{\Lambda})K_S^0$  Analyses: DCA to Primary Vertex of  $\pi^+$  Daughter of  $K_S^0$

| DCA to Primary Vertex of $\pi^-$ Daughter of $K_S^0$ |            |           |           |
|--|------------|-----------|-----------|
| Pair Type  | Centrality | p-value   |           |
|  |            | 2 vs 3 mm | 3 vs 4 mm |
| $\Lambda K_S^0$                                      | 0-10%      | 0.15      | 0.16      |
|  | 10-30%     | 0.31      | 0.12      |
|  | 30-50%     | 0.66      | 0.22      |
| $\bar{\Lambda} K_S^0$                                | 0-10%      | 1.1e-4    | 1.7e-14   |
|  | 10-30%     | 0.01      | 0.82      |
|  | 30-50%     | 0.44      | 0.05      |

**Table 12:**  $\Lambda(\bar{\Lambda})K_S^0$  Analyses: DCA to Primary Vertex of  $\pi^-$  Daughter of  $K_S^0$

| Average Separation of Like-Charge Daughters |                            |                |            |               |               |
|---|----------------------------|----------------|------------|---------------|---------------|
| Pair Type                                   | Daughters                  |                | Centrality | p-value       |               |
|   |                            |                |            | 5.0 vs 6.0 cm | 6.0 vs 7.0 cm |
| $\Lambda K_S^0$                             | $p(\Lambda)$               | $\pi^+(K_S^0)$ | 0-10%      | 0.00          | 6.7e-276      |
|   |                            |                | 10-30%     | 1.5e-64       | 2.0e-10       |
|   |                            |                | 30-50%     | 5.9e-22       | 9.6e-29       |
| $\Lambda K_S^0$                             | $\pi^-(\Lambda)$           | $\pi^-(K_S^0)$ | 0-10%      | 3.3e-84       | 1.6e-10       |
|   |                            |                | 10-30%     | 0.52          | 5.0e-14       |
|   |                            |                | 30-50%     | 1.1e-8        | 0.00          |
| $\bar{\Lambda} K_S^0$                       | $\pi^+(\bar{\Lambda})$     | $\pi^+(K_S^0)$ | 0-10%      | 1.7e-81       | 0.88          |
|   |                            |                | 10-30%     | 2.5e-7        | 4.1e-39       |
|   |                            |                | 30-50%     | 2.2e-16       | 1.9e-26       |
| $\bar{\Lambda} K_S^0$                       | $\bar{p}^-(\bar{\Lambda})$ | $\pi^-(K_S^0)$ | 0-10%      | 0.00          | 4.3e-17       |
|   |                            |                | 10-30%     | 0.00          | 8.0e-62       |
|   |                            |                | 30-50%     | 9.3e-112      | 0.11          |

**Table 13:**  $\Lambda(\bar{\Lambda})K_S^0$  Analyses: Average Separation of Positive Daughters

| DCA $\Lambda(\bar{\Lambda})$ |            |           |           |
|------------------------------|------------|-----------|-----------|
| Pair Type                    | Centrality | p-value   |           |
|                              |            | 4 vs 5 mm | 5 vs 6 mm |
| $\Lambda K^+$                | 0-10%      | 0.01      | 3.2e-5    |
|                              | 10-30%     | 5.9e-3    | 0.22      |
|                              | 30-50%     | 0.85      | 0.84      |
| $\bar{\Lambda} K^-$          | 0-10%      | 0.15      | 0.03      |
|                              | 10-30%     | 3.1e-4    | 0.42      |
|                              | 30-50%     | 7.2e-3    | 0.42      |
| $\Lambda K^-$                | 0-10%      | 0.35      | 0.05      |
|                              | 10-30%     | 1.4e-5    | 5.6e-3    |
|                              | 30-50%     | 0.05      | 0.70      |
| $\bar{\Lambda} K^+$          | 0-10%      | 0.84      | 0.16      |
|                              | 10-30%     | 0.16      | 3.3e-3    |
|                              | 30-50%     | 2.5e-4    | 0.20      |

**Table 14:**  $\Lambda(\bar{\Lambda})K^\pm$  Analyses: DCA  $\Lambda(\bar{\Lambda})$

| DCA $\Lambda(\bar{\Lambda})$ Daughters |            |           |           |
|--|------------|-----------|-----------|
| Pair Type                              | Centrality | p-value   |           |
|  |            | 3 vs 4 mm | 4 vs 5 mm |
| $\Lambda K^+$                          | 0-10%      | 0.79      | 0.06      |
|  | 10-30%     | 0.10      | 0.60      |
|  | 30-50%     | 8.4e-3    | 0.25      |
| $\bar{\Lambda} K^-$                    | 0-10%      | 2.4e-4    | 0.63      |
|  | 10-30%     | 0.06      | 3.3e-4    |
|  | 30-50%     | 0.03      | 0.04      |
| $\Lambda K^-$                          | 0-10%      | 0.70      | 0.40      |
|  | 10-30%     | 0.94      | 0.04      |
|  | 30-50%     | 0.05      | 9.5e-5    |
| $\bar{\Lambda} K^+$                    | 0-10%      | 0.09      | 0.04      |
|  | 10-30%     | 0.10      | 0.17      |
|  | 30-50%     | 0.10      | 0.43      |

**Table 15:**  $\Lambda(\bar{\Lambda})K^\pm$  Analyses: DCA  $\Lambda(\bar{\Lambda})$  Daughters

## 1.2 Systematic Errors: $\Lambda K^\pm$

Talk about stuff

| $\Lambda(\bar{\Lambda})$ Cosine of Pointing Angle |            |                  |                  |
|---|------------|------------------|------------------|
| Pair Type   | Centrality | p-value          |                  |
|   |            | 0.9992 vs 0.9993 | 0.9993 vs 0.9994 |
| $\Lambda K^+$                                     | 0-10%      | 0.08             | 6.2e-3           |
|   | 10-30%     | 8.7e-4           | 0.06             |
|   | 30-50%     | 0.31             | 1.1e-3           |
| $\bar{\Lambda} K^-$                               | 0-10%      | 0.98             | 0.92             |
|   | 10-30%     | 0.06             | 1.4e-16          |
|   | 30-50%     | 0.47             | 0.40             |
| $\Lambda K^-$                                     | 0-10%      | 1.0e-4           | 6.3e-3           |
|   | 10-30%     | 5.7e-5           | 2.3e-3           |
|   | 30-50%     | 1.9e-3           | 6.5e-3           |
| $\bar{\Lambda} K^+$                               | 0-10%      | 0.08             | 0.01             |
|   | 10-30%     | 0.09             | 0.04             |
|   | 30-50%     | 0.39             | 0.34             |

**Table 16:**  $\Lambda(\bar{\Lambda})K^\pm$  Analyses:  $\Lambda(\bar{\Lambda})$  Cosine of Pointing Angle

| DCA to Primary Vertex of $p^+(\bar{p}^-)$ Daughter of $\Lambda(\bar{\Lambda})$ |            |               |               |
|--|------------|---------------|---------------|
| Pair Type  | Centrality | p-value       |               |
|  |            | 0.5 vs 1.0 mm | 1.0 vs 2.0 mm |
| $\Lambda K^+$  | 0-10%      | 1             | 5.5e-3        |
|  | 10-30%     | 1             | 0.15          |
|  | 30-50%     | 1             | 0.13          |
| $\bar{\Lambda} K^-$  | 0-10%      | 1             | 0.16          |
|  | 10-30%     | 1             | 0.55          |
|  | 30-50%     | 1             | 0.03          |
| $\Lambda K^-$  | 0-10%      | 1             | 0.30          |
|  | 10-30%     | 1             | 0.70          |
|  | 30-50%     | 1             | 0.44          |
| $\bar{\Lambda} K^+$  | 0-10%      | 1             | 0.40          |
|  | 10-30%     | 1             | 0.67          |
|  | 30-50%     | 1             | 0.03          |

**Table 17:**  $\Lambda(\bar{\Lambda})K^\pm$  Analyses: DCA to Primary Vertex of  $p^+(\bar{p}^-)$  Daughter of  $\Lambda(\bar{\Lambda})$

DCA to Primary Vertex of  $\pi^-(\pi^+)$  Daughter of  $\Lambda(\bar{\Lambda})$ 

| Pair Type           | Centrality | p-value       |               |
|---------------------|------------|---------------|---------------|
|                     |            | 2.0 vs 3.0 mm | 3.0 vs 4.0 mm |
| $\Lambda K^+$       | 0-10%      | 0.01          | 0.15          |
|                     | 10-30%     | 0.28          | 0.08          |
|                     | 30-50%     | 1.9e-8        | 6.1e-4        |
| $\bar{\Lambda} K^-$ | 0-10%      | 0.55          | 0.36          |
|                     | 10-30%     | 0.38          | 0.31          |
|                     | 30-50%     | 8.4e-4        | 0.03          |
| $\Lambda K^-$       | 0-10%      | 7.7e-3        | 0.35          |
|                     | 10-30%     | 0.01          | 4.0e-3        |
|                     | 30-50%     | 0.02          | 0.06          |
| $\bar{\Lambda} K^+$ | 0-10%      | 0.12          | 0.01          |
|                     | 10-30%     | 0.63          | 4.1e-3        |
|                     | 30-50%     | 6.2e-11       | 0.44          |

**Table 18:**  $\Lambda(\bar{\Lambda})K^\pm$  Analyses: DCA to Primary Vertex of  $\pi^-(\pi^+)$  Daughter of  $\Lambda(\bar{\Lambda})$ Average Separation of  $\Lambda(\bar{\Lambda})$  Daughter With Same Charge as  $K^\pm$ 

| Pair Type           | Daughter                 | Track | Centrality | p-value       |               |
|---------------------|--------------------------|-------|------------|---------------|---------------|
|                     |                          |       |            | 7.0 vs 8.0 cm | 8.0 vs 9.0 cm |
| $\Lambda K^+$       | $p(\Lambda)$             | $K^+$ | 0-10%      | 2.1e-41       | 1.9e-186      |
|                     |                          |       | 10-30%     | 0.86          | 0.61          |
|                     |                          |       | 30-50%     | 0.999         | 0.10          |
| $\bar{\Lambda} K^-$ | $\bar{p}(\bar{\Lambda})$ | $K^-$ | 0-10%      | 3.7e-78       | 0.00          |
|                     |                          |       | 10-30%     | 1.4e-27       | 9.6e-62       |
|                     |                          |       | 30-50%     | 0.00          | 4.4e-3        |
| $\Lambda K^-$       | $\pi^-(\Lambda)$         | $K^-$ | 0-10%      | 1.0e-236      | 5.1e-243      |
|                     |                          |       | 10-30%     | 6.2e-17       | 4.6e-43       |
|                     |                          |       | 30-50%     | 0.09          | 0.99          |
| $\bar{\Lambda} K^+$ | $\pi^+(\bar{\Lambda})$   | $K^+$ | 0-10%      | 1.4e-76       | 6.9e-46       |
|                     |                          |       | 10-30%     | 4.7e-14       | 0.61          |
|                     |                          |       | 30-50%     | 3.0e-14       | 3.3e-4        |

**Table 19:**  $\Lambda(\bar{\Lambda})K_S^0$  Analyses: Average Separation of  $\Lambda(\bar{\Lambda})$  Daughter With Same Charge as  $K^\pm$