

Polynomial Bgds, THERM Bgds fit together

| Centrality | System                                      | Parameter       | Methods          |                               |                  |                               |                        |
|------------|---|-----------------|------------------|-------------------------------|------------------|-------------------------------|------------------------|
|            |   |                 | Separate Radii   |                               | Shared Radii     |                               |                        |
|            |   |                 | Unique $\lambda$ | Share $\lambda_{\text{Conj}}$ | Unique $\lambda$ | Share $\lambda_{\text{Conj}}$ | Share Single $\lambda$ |
| 0-10%      | $\Lambda K^+$                               | $\lambda$       | 1.37             | 1.37                          | 1.97             | 1.91                          | 1.83                   |
|            | $\bar{\Lambda} K^-$                         | $\lambda$       | 1.39             |                               | 2.00             |                               |                        |
|            | $\Lambda K^-$                               | $\lambda$       | 1.58             | 1.87                          | 2.04             | 1.83                          |                        |
|            | $\bar{\Lambda} K^+$                         | $\lambda$       | 1.60             |                               | 2.07             |                               |                        |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | R               | 4.90             | 4.89                          | 6.18             | 5.83                          | 5.81                   |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 4.11             | 5.75                          |                  |                               |                        |
| 10-30%     | $\Lambda K^+$                               | $\lambda$       | 1.70             | 1.54                          | 1.50             | 1.39                          | 1.31                   |
|            | $\bar{\Lambda} K^-$                         | $\lambda$       | 1.51             |                               | 1.33             |                               |                        |
|            | $\Lambda K^-$                               | $\lambda$       | 1.08             | 1.18                          | 1.43             | 1.31                          |                        |
|            | $\bar{\Lambda} K^+$                         | $\lambda$       | 1.10             |                               | 1.48             |                               |                        |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | R               | 4.78             | 4.68                          | 4.75             | 4.53                          | 4.50                   |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 3.05             | 4.05                          |                  |                               |                        |
| 30-50%     | $\Lambda K^+$                               | $\lambda$       | 1.30             | 1.23                          | 1.16             | 1.02                          | 1.07                   |
|            | $\bar{\Lambda} K^-$                         | $\lambda$       | 1.18             |                               | 1.06             |                               |                        |
|            | $\Lambda K^-$                               | $\lambda$       | 1.27             | 0.91                          | 2.07             | 1.11                          |                        |
|            | $\bar{\Lambda} K^+$                         | $\lambda$       | 0.83             |                               | 1.06             |                               |                        |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | R               | 3.24             | 3.23                          | 3.21             | 2.99                          | 3.09                   |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 1.98             | 2.47                          |                  |                               |                        |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | $\mathbb{R}f_0$ | -1.13            | -1.13                         | -1.13            | -1.09                         | -1.12                  |
|            |   | $\mathbb{I}f_0$ | 0.36             | 0.36                          | 0.53             | 0.44                          | 0.48                   |
|            |   | $d_0$           | 1.09             | 1.11                          | 1.02             | 0.99                          | 1.01                   |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | $\mathbb{R}f_0$ | 0.15             | 0.30                          | 0.40             | 0.40                          | 0.39                   |
|            |   | $\mathbb{I}f_0$ | 0.30             | 0.40                          | 0.41             | 0.45                          | 0.45                   |
|            |   | $d_0$           | 2.07             | -5.15                         | -4.81            | -4.37                         | -4.35                  |

Table 1: Comparison: Polynomial non-flat background, THERMINATOR backgrounds fit together

Polynomial Bgds, THERM Bgds fit together(v2)

| Centrality                                  | System                                      | Parameter       | Methods          |                               |                  |                               |                        |
|---|---|-----------------|------------------|-------------------------------|------------------|-------------------------------|------------------------|
|   |   |                 | Separate Radii   |                               | Shared Radii     |                               |                        |
|   |   |                 | Unique $\lambda$ | Share $\lambda_{\text{Conj}}$ | Unique $\lambda$ | Share $\lambda_{\text{Conj}}$ | Share Single $\lambda$ |
| 0-10%                                       | $\Lambda K^+$                               | $\lambda$       | 1.37             | 1.37                          | 1.97             | 1.91                          | 1.83                   |
|   | $\bar{\Lambda} K^-$                         |                 | 1.39             |                               | 2.00             |                               |                        |
|   | $\Lambda K^-$                               |                 | 1.58             | 1.87                          | 2.04             | 1.83                          |                        |
|   | $\bar{\Lambda} K^+$                         |                 | 1.60             |                               | 2.07             |                               |                        |
|   | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | R               | 4.90             | 4.89                          | 6.18             | 5.83                          | 5.81                   |
| $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | 4.11  |                 | 5.75             |                               |                  |                               |                        |
| 10-30%                                      | $\Lambda K^+$                               | $\lambda$       | 1.70             | 1.54                          | 1.50             | 1.39                          | 1.31                   |
|   | $\bar{\Lambda} K^-$                         |                 | 1.51             |                               | 1.33             |                               |                        |
|   | $\Lambda K^-$                               |                 | 1.08             | 1.18                          | 1.43             | 1.31                          |                        |
|   | $\bar{\Lambda} K^+$                         |                 | 1.10             |                               | 1.48             |                               |                        |
|   | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | R               | 4.78             | 4.68                          | 4.75             | 4.53                          | 4.50                   |
| $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | 3.05  |                 | 4.05             |                               |                  |                               |                        |
| 30-50%                                      | $\Lambda K^+$                               | $\lambda$       | 1.30             | 1.23                          | 1.16             | 1.02                          | 1.07                   |
|   | $\bar{\Lambda} K^-$                         |                 | 1.18             |                               | 1.06             |                               |                        |
|   | $\Lambda K^-$                               |                 | 1.27             | 0.91                          | 2.07             | 1.11                          |                        |
|   | $\bar{\Lambda} K^+$                         |                 | 0.83             |                               | 1.06             |                               |                        |
|   | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | R               | 3.24             | 3.23                          | 3.21             | 2.99                          | 3.09                   |
| $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | 1.98  |                 | 2.47             |                               |                  |                               |                        |
|   | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | $\mathbb{R}f_0$ | -1.13            | -1.13                         | -1.13            | -1.09                         | -1.12                  |
|   |   | $\mathbb{I}f_0$ | 0.36             | 0.36                          | 0.53             | 0.44                          | 0.48                   |
|   |   | $d_0$           | 1.09             | 1.11                          | 1.02             | 0.99                          | 1.01                   |
|   | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | $\mathbb{R}f_0$ | 0.15             | 0.30                          | 0.40             | 0.40                          | 0.39                   |
|   |   | $\mathbb{I}f_0$ | 0.30             | 0.40                          | 0.41             | 0.45                          | 0.45                   |
|   |   | $d_0$           | 2.07             | -5.15                         | -4.81            | -4.37                         | -4.35                  |

Table 2: Comparison: Polynomial non-flat background, THERMINATOR backgrounds fit together(v2)

Linear Bgds

| Centrality | System                                      | Parameter       | Methods          |                               |                  |                               |                        |
|------------|---|-----------------|------------------|-------------------------------|------------------|-------------------------------|------------------------|
|            |   |                 | Separate Radii   |                               | Shared Radii     |                               |                        |
|            |   |                 | Unique $\lambda$ | Share $\lambda_{\text{Conj}}$ | Unique $\lambda$ | Share $\lambda_{\text{Conj}}$ | Share Single $\lambda$ |
| 0-10%      | $\Lambda K^+$                               | $\lambda$       | 1.38             | 1.37                          | 1.85             | 1.75                          | 1.65                   |
|            | $\bar{\Lambda} K^-$                         | $\lambda$       | 1.39             |                               | 1.87             |                               |                        |
|            | $\Lambda K^-$                               | $\lambda$       | 2.04             | 1.63                          | 1.87             | 1.64                          |                        |
|            | $\bar{\Lambda} K^+$                         | $\lambda$       | 2.07             |                               | 1.91             |                               |                        |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | R               | 5.27             | 5.25                          | 6.22             | 5.83                          | 5.81                   |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 6.51             | 5.67                          |                  |                               |                        |
| 10-30%     | $\Lambda K^+$                               | $\lambda$       | 1.68             | 1.49                          | 1.56             | 1.39                          | 1.31                   |
|            | $\bar{\Lambda} K^-$                         | $\lambda$       | 1.46             |                               | 1.36             |                               |                        |
|            | $\Lambda K^-$                               | $\lambda$       | 1.43             | 1.16                          | 1.46             | 1.30                          |                        |
|            | $\bar{\Lambda} K^+$                         | $\lambda$       | 1.47             |                               | 1.50             |                               |                        |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | R               | 4.94             | 4.81                          | 4.86             | 4.59                          | 4.57                   |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 4.70             | 4.14                          |                  |                               |                        |
| 30-50%     | $\Lambda K^+$                               | $\lambda$       | 1.19             | 1.16                          | 1.13             | 1.01                          | 1.04                   |
|            | $\bar{\Lambda} K^-$                         | $\lambda$       | 1.15             |                               | 1.09             |                               |                        |
|            | $\Lambda K^-$                               | $\lambda$       | 1.92             | 0.88                          | 2.00             | 1.07                          |                        |
|            | $\bar{\Lambda} K^+$                         | $\lambda$       | 1.01             |                               | 1.03             |                               |                        |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | R               | 3.28             | 3.28                          | 3.24             | 3.03                          | 3.11                   |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 3.11             | 2.54                          |                  |                               |                        |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | $\mathbb{R}f_0$ | -1.22            | -1.23                         | -1.18            | -1.16                         | -1.20                  |
|            |   | $\mathbb{I}f_0$ | 0.53             | 0.52                          | 0.64             | 0.53                          | 0.59                   |
|            |   | $d_0$           | 1.12             | 1.14                          | 1.07             | 1.01                          | 1.07                   |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | $\mathbb{R}f_0$ | 0.40             | 0.33                          | 0.43             | 0.43                          | 0.42                   |
|            |   | $\mathbb{I}f_0$ | 0.44             | 0.47                          | 0.46             | 0.52                          | 0.51                   |
|            |   | $d_0$           | -5.20            | -4.85                         | -4.78            | -4.20                         | -4.22                  |

**Table 3:** Comparison: Linear non-flat background

Stavinsky method, no non-flat background in fit

| Centrality | System                                 | Parameter       | Methods          |                               |                  |                               |                        |
|------------|--|-----------------|------------------|-------------------------------|------------------|-------------------------------|------------------------|
|            |  |                 | Separate Radii   |                               | Shared Radii     |                               |                        |
|            |  |                 | Unique $\lambda$ | Share $\lambda_{\text{Conj}}$ | Unique $\lambda$ | Share $\lambda_{\text{Conj}}$ | Share Single $\lambda$ |
| 0-10%      | $\Lambda K^+$                          | $\lambda$       | 0.95             | 0.93                          | 1.34             | 1.21                          | 1.05                   |
|            | $\bar{\Lambda} K^-$                    | $\lambda$       | 0.90             |                               | 1.27             |                               |                        |
|            | $\Lambda K^-$                          | $\lambda$       | 2.38             | 1.28                          | 2.15             | 1.15                          |                        |
|            | $\bar{\Lambda} K^+$                    | $\lambda$       | 2.26             |                               | 2.06             |                               |                        |
|            | $\Lambda K^+ \ \& \ \bar{\Lambda} K^-$ | R               | 5.44             | 5.43                          | 5.75             | 5.25                          | 5.04                   |
|            | $\Lambda K^- \ \& \ \bar{\Lambda} K^+$ | R               | 5.54             | 5.06                          |                  |                               |                        |
| 10-30%     | $\Lambda K^+$                          | $\lambda$       | 0.71             | 0.68                          | 0.87             | 0.80                          | 0.82                   |
|            | $\bar{\Lambda} K^-$                    | $\lambda$       | 0.67             |                               | 0.81             |                               |                        |
|            | $\Lambda K^-$                          | $\lambda$       | 1.56             | 0.90                          | 1.47             | 0.88                          |                        |
|            | $\bar{\Lambda} K^+$                    | $\lambda$       | 1.77             |                               | 1.66             |                               |                        |
|            | $\Lambda K^+ \ \& \ \bar{\Lambda} K^-$ | R               | 4.21             | 4.17                          | 4.16             | 3.90                          | 3.99                   |
|            | $\Lambda K^- \ \& \ \bar{\Lambda} K^+$ | R               | 3.89             | 3.57                          |                  |                               |                        |
| 30-50%     | $\Lambda K^+$                          | $\lambda$       | 0.98             | 1.11                          | 0.70             | 0.82                          | 0.88                   |
|            | $\bar{\Lambda} K^-$                    | $\lambda$       | 1.14             |                               | 0.82             |                               |                        |
|            | $\Lambda K^-$                          | $\lambda$       | 4.14             | 0.84                          | 3.99             | 0.98                          |                        |
|            | $\bar{\Lambda} K^+$                    | $\lambda$       | 1.38             |                               | 1.36             |                               |                        |
|            | $\Lambda K^+ \ \& \ \bar{\Lambda} K^-$ | R               | 4.01             | 4.07                          | 3.03             | 3.03                          | 3.17                   |
|            | $\Lambda K^- \ \& \ \bar{\Lambda} K^+$ | R               | 2.65             | 2.36                          |                  |                               |                        |
|            | $\Lambda K^+ \ \& \ \bar{\Lambda} K^-$ | $\mathbb{R}f_0$ | -1.96            | -1.92                         | -1.51            | -1.46                         | -1.52                  |
|            |  | $\mathbb{I}f_0$ | 1.13             | 1.12                          | 0.77             | 0.57                          | 0.65                   |
|            |  | $d_0$           | 0.58             | 0.51                          | -0.47            | -0.42                         | -0.44                  |
|            | $\Lambda K^- \ \& \ \bar{\Lambda} K^+$ | $\mathbb{R}f_0$ | 0.24             | 0.32                          | 0.34             | 0.53                          | 0.55                   |
|            |  | $\mathbb{I}f_0$ | 0.27             | 0.54                          | 0.36             | 0.75                          | 0.82                   |
|            |  | $d_0$           | 6.28             | 4.36                          | 4.13             | 2.35                          | 2.14                   |

Table 4: Comparison: Stavinsky method, no non-flat background in fit

Separate radii, unique  $\lambda$

| Centrality | System                                      | Parameter       | Methods   |          |               |                 |          |
|------------|---|-----------------|-----------|----------|---------------|-----------------|----------|
|            |   |                 | Poly. Bgd | Lin. Bgd | Stav.(No Bgd) | Stav.(Lin. Bgd) | Method 5 |
| 0-10%      | $\Lambda K^+$                               | $\lambda$       | 1.37      | 1.38     | 0.95          | 0.00            | 0.00     |
|            | $\bar{\Lambda} K^-$                         | $\lambda$       | 1.39      | 1.39     | 0.90          | 0.00            | 0.00     |
|            | $\Lambda K^-$                               | $\lambda$       | 1.58      | 2.04     | 2.38          | 0.00            | 0.00     |
|            | $\bar{\Lambda} K^+$                         | $\lambda$       | 1.60      | 2.07     | 2.26          | 0.00            | 0.00     |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | R               | 4.90      | 5.27     | 5.44          | 0.00            | 0.00     |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 4.11      | 6.51     | 5.54          | 0.00            | 0.00     |
| 10-30%     | $\Lambda K^+$                               | $\lambda$       | 1.70      | 1.68     | 0.71          | 0.00            | 0.00     |
|            | $\bar{\Lambda} K^-$                         | $\lambda$       | 1.51      | 1.46     | 0.67          | 0.00            | 0.00     |
|            | $\Lambda K^-$                               | $\lambda$       | 1.08      | 1.43     | 1.56          | 0.00            | 0.00     |
|            | $\bar{\Lambda} K^+$                         | $\lambda$       | 1.10      | 1.47     | 1.77          | 0.00            | 0.00     |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | R               | 4.78      | 4.94     | 4.21          | 0.00            | 0.00     |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 3.05      | 4.70     | 3.89          | 0.00            | 0.00     |
| 30-50%     | $\Lambda K^+$                               | $\lambda$       | 1.30      | 1.19     | 0.98          | 0.00            | 0.00     |
|            | $\bar{\Lambda} K^-$                         | $\lambda$       | 1.18      | 1.15     | 1.14          | 0.00            | 0.00     |
|            | $\Lambda K^-$                               | $\lambda$       | 1.27      | 1.92     | 4.14          | 0.00            | 0.00     |
|            | $\bar{\Lambda} K^+$                         | $\lambda$       | 0.83      | 1.01     | 1.38          | 0.00            | 0.00     |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | R               | 3.24      | 3.28     | 4.01          | 0.00            | 0.00     |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 1.98      | 3.11     | 2.65          | 0.00            | 0.00     |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | $\mathbb{R}f_0$ | -1.13     | -1.22    | -1.96         | 0.00            | 0.00     |
|            |   | $\mathbb{I}f_0$ | 0.36      | 0.53     | 1.13          | 0.00            | 0.00     |
|            |   | $d_0$           | 1.09      | 1.12     | 0.58          | 0.00            | 0.00     |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | $\mathbb{R}f_0$ | 0.15      | 0.40     | 0.24          | 0.00            | 0.00     |
|            |   | $\mathbb{I}f_0$ | 0.30      | 0.44     | 0.27          | 0.00            | 0.00     |
|            |   | $d_0$           | 2.07      | -5.20    | 6.28          | 0.00            | 0.00     |

**Table 5:** Compare non-flat background treatment methods: Separate radii, unique  $\lambda$

Separate radii, unique  $\lambda$  (v2)

| Centrality | System                                      | Parameter       | Methods   |          |               |
|------------|---|-----------------|-----------|----------|---------------|
|            |   |                 | Poly. Bgd | Lin. Bgd | Stav.(No Bgd) |
| 0-10%      | $\Lambda K^+$                               | $\lambda$       | 1.37      | 1.38     | 0.95          |
|            | $\bar{\Lambda} K^-$                         | $\lambda$       | 1.39      | 1.39     | 0.90          |
|            | $\Lambda K^-$                               | $\lambda$       | 1.58      | 2.04     | 2.38          |
|            | $\bar{\Lambda} K^+$                         | $\lambda$       | 1.60      | 2.07     | 2.26          |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | R               | 4.90      | 5.27     | 5.44          |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 4.11      | 6.51     | 5.54          |
| 10-30%     | $\Lambda K^+$                               | $\lambda$       | 1.70      | 1.68     | 0.71          |
|            | $\bar{\Lambda} K^-$                         | $\lambda$       | 1.51      | 1.46     | 0.67          |
|            | $\Lambda K^-$                               | $\lambda$       | 1.08      | 1.43     | 1.56          |
|            | $\bar{\Lambda} K^+$                         | $\lambda$       | 1.10      | 1.47     | 1.77          |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | R               | 4.78      | 4.94     | 4.21          |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 3.05      | 4.70     | 3.89          |
| 30-50%     | $\Lambda K^+$                               | $\lambda$       | 1.30      | 1.19     | 0.98          |
|            | $\bar{\Lambda} K^-$                         | $\lambda$       | 1.18      | 1.15     | 1.14          |
|            | $\Lambda K^-$                               | $\lambda$       | 1.27      | 1.92     | 4.14          |
|            | $\bar{\Lambda} K^+$                         | $\lambda$       | 0.83      | 1.01     | 1.38          |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | R               | 3.24      | 3.28     | 4.01          |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 1.98      | 3.11     | 2.65          |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$ | $\mathbb{R}f_0$ | -1.13     | -1.22    | -1.96         |
|            |   | $\mathbb{I}f_0$ | 0.36      | 0.53     | 1.13          |
|            |   | $d_0$           | 1.09      | 1.12     | 0.58          |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | $\mathbb{R}f_0$ | 0.15      | 0.40     | 0.24          |
|            |   | $\mathbb{I}f_0$ | 0.30      | 0.44     | 0.27          |
|            |   | $d_0$           | 2.07      | -5.20    | 6.28          |

**Table 6:** Compare non-flat background treatment methods: Separate radii, unique  $\lambda$  (v2)

Separate radii, share  $\lambda_{\text{Conj}}$

| Centrality | System                               | Parameter       | Methods   |          |               |                 |          |
|------------|--------------------------------------|-----------------|-----------|----------|---------------|-----------------|----------|
|            |                                      |                 | Poly. Bgd | Lin. Bgd | Stav.(No Bgd) | Stav.(Lin. Bgd) | Method 5 |
| 0-10%      | $\Lambda K^+$<br>$\bar{\Lambda} K^-$ | $\lambda$       | 1.37      | 1.37     | 0.93          | 0.00            | 0.00     |
|            | $\Lambda K^-$<br>$\bar{\Lambda} K^+$ | $\lambda$       | 1.87      | 1.63     | 1.28          | 0.00            | 0.00     |
|            | $\Lambda K^+ \& \bar{\Lambda} K^-$   | R               | 4.89      | 5.25     | 5.43          | 0.00            | 0.00     |
|            | $\Lambda K^- \& \bar{\Lambda} K^+$   | R               | 5.75      | 5.67     | 5.06          | 0.00            | 0.00     |
| 10-30%     | $\Lambda K^+$<br>$\bar{\Lambda} K^-$ | $\lambda$       | 1.54      | 1.49     | 0.68          | 0.00            | 0.00     |
|            | $\Lambda K^-$<br>$\bar{\Lambda} K^+$ | $\lambda$       | 1.18      | 1.16     | 0.90          | 0.00            | 0.00     |
|            | $\Lambda K^+ \& \bar{\Lambda} K^-$   | R               | 4.68      | 4.81     | 4.17          | 0.00            | 0.00     |
|            | $\Lambda K^- \& \bar{\Lambda} K^+$   | R               | 4.05      | 4.14     | 3.57          | 0.00            | 0.00     |
| 30-50%     | $\Lambda K^+$<br>$\bar{\Lambda} K^-$ | $\lambda$       | 1.23      | 1.16     | 1.11          | 0.00            | 0.00     |
|            | $\Lambda K^-$<br>$\bar{\Lambda} K^+$ | $\lambda$       | 0.91      | 0.88     | 0.84          | 0.00            | 0.00     |
|            | $\Lambda K^+ \& \bar{\Lambda} K^-$   | R               | 3.23      | 3.28     | 4.07          | 0.00            | 0.00     |
|            | $\Lambda K^- \& \bar{\Lambda} K^+$   | R               | 2.47      | 2.54     | 2.36          | 0.00            | 0.00     |
|            | $\Lambda K^+ \& \bar{\Lambda} K^-$   | $\mathbb{R}f_0$ | -1.13     | -1.23    | -1.92         | 0.00            | 0.00     |
|            |                                      | $\mathbb{I}f_0$ | 0.36      | 0.52     | 1.12          | 0.00            | 0.00     |
|            |                                      | $d_0$           | 1.11      | 1.14     | 0.51          | 0.00            | 0.00     |
|            | $\Lambda K^- \& \bar{\Lambda} K^+$   | $\mathbb{R}f_0$ | 0.30      | 0.33     | 0.32          | 0.00            | 0.00     |
|            |                                      | $\mathbb{I}f_0$ | 0.40      | 0.47     | 0.54          | 0.00            | 0.00     |
|            |                                      | $d_0$           | -5.15     | -4.85    | 4.36          | 0.00            | 0.00     |

**Table 7:** Compare non-flat background treatment methods: Separate radii, share  $\lambda_{\text{Conj}}$

Separate radii, share  $\lambda_{\text{Conj}}(v2)$

| Centrality | System   | Parameter       | Methods   |          |               |
|------------|--|-----------------|-----------|----------|---------------|
|            |  |                 | Poly. Bgd | Lin. Bgd | Stav.(No Bgd) |
| 0-10%      | $\Lambda K^+$<br>$\bar{\Lambda} K^-$   | $\lambda$       | 1.37      | 1.37     | 0.93          |
|            |  | $\lambda$       | 1.87      | 1.63     | 1.28          |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$<br>$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 4.89      | 5.25     | 5.43          |
|            |  | R               | 5.75      | 5.67     | 5.06          |
| 10-30%     | $\Lambda K^+$<br>$\bar{\Lambda} K^-$   | $\lambda$       | 1.54      | 1.49     | 0.68          |
|            |  | $\lambda$       | 1.18      | 1.16     | 0.90          |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$<br>$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 4.68      | 4.81     | 4.17          |
|            |  | R               | 4.05      | 4.14     | 3.57          |
| 30-50%     | $\Lambda K^+$<br>$\bar{\Lambda} K^-$   | $\lambda$       | 1.23      | 1.16     | 1.11          |
|            |  | $\lambda$       | 0.91      | 0.88     | 0.84          |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$<br>$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 3.23      | 3.28     | 4.07          |
|            |  | R               | 2.47      | 2.54     | 2.36          |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$  | $\mathbb{R}f_0$ | -1.13     | -1.23    | -1.92         |
|            |  | $\mathbb{I}f_0$ | 0.36      | 0.52     | 1.12          |
|            |  | $d_0$           | 1.11      | 1.14     | 0.51          |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$  | $\mathbb{R}f_0$ | 0.30      | 0.33     | 0.32          |
|            |  | $\mathbb{I}f_0$ | 0.40      | 0.47     | 0.54          |
|            |  | $d_0$           | -5.15     | -4.85    | 4.36          |

**Table 8:** Compare non-flat background treatment methods: Separate radii, share  $\lambda_{\text{Conj}}(v2)$



Shared radii, unique  $\lambda$

| Centrality | System   | Parameter       | Methods   |          |               |                 |          |
|------------|--|-----------------|-----------|----------|---------------|-----------------|----------|
|            |  |                 | Poly. Bgd | Lin. Bgd | Stav.(No Bgd) | Stav.(Lin. Bgd) | Method 5 |
| 0-10%      | $\Lambda K^+$  | $\lambda$       | 1.97      | 1.85     | 1.34          | 0.00            | 0.00     |
|            | $\bar{\Lambda} K^-$  | $\lambda$       | 2.00      | 1.87     | 1.27          | 0.00            | 0.00     |
|            | $\Lambda K^-$  | $\lambda$       | 2.04      | 1.87     | 2.15          | 0.00            | 0.00     |
|            | $\bar{\Lambda} K^+$  | $\lambda$       | 2.07      | 1.91     | 2.06          | 0.00            | 0.00     |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$<br>$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 6.18      | 6.22     | 5.75          | 0.00            | 0.00     |
| 10-30%     | $\Lambda K^+$  | $\lambda$       | 1.50      | 1.56     | 0.87          | 0.00            | 0.00     |
|            | $\bar{\Lambda} K^-$  | $\lambda$       | 1.33      | 1.36     | 0.81          | 0.00            | 0.00     |
|            | $\Lambda K^-$  | $\lambda$       | 1.43      | 1.46     | 1.47          | 0.00            | 0.00     |
|            | $\bar{\Lambda} K^+$  | $\lambda$       | 1.48      | 1.50     | 1.66          | 0.00            | 0.00     |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$<br>$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 4.75      | 4.86     | 4.16          | 0.00            | 0.00     |
| 30-50%     | $\Lambda K^+$  | $\lambda$       | 1.16      | 1.13     | 0.70          | 0.00            | 0.00     |
|            | $\bar{\Lambda} K^-$  | $\lambda$       | 1.06      | 1.09     | 0.82          | 0.00            | 0.00     |
|            | $\Lambda K^-$  | $\lambda$       | 2.07      | 2.00     | 3.99          | 0.00            | 0.00     |
|            | $\bar{\Lambda} K^+$  | $\lambda$       | 1.06      | 1.03     | 1.36          | 0.00            | 0.00     |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$<br>$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 3.21      | 3.24     | 3.03          | 0.00            | 0.00     |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$  | $\mathbb{R}f_0$ | -1.13     | -1.18    | -1.51         | 0.00            | 0.00     |
|            |  | $\mathbb{I}f_0$ | 0.53      | 0.64     | 0.77          | 0.00            | 0.00     |
|            |  | $d_0$           | 1.02      | 1.07     | -0.47         | 0.00            | 0.00     |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$  | $\mathbb{R}f_0$ | 0.40      | 0.43     | 0.34          | 0.00            | 0.00     |
|            |  | $\mathbb{I}f_0$ | 0.41      | 0.46     | 0.36          | 0.00            | 0.00     |
|            |  | $d_0$           | -4.81     | -4.78    | 4.13          | 0.00            | 0.00     |

**Table 9:** Compare non-flat background treatment methods: Shared radii, unique  $\lambda$

Shared radii, share  $\lambda_{\text{Conj}}$ 

| Centrality | System   | Parameter       | Methods   |          |               |                 |          |
|------------|--|-----------------|-----------|----------|---------------|-----------------|----------|
|            |  |                 | Poly. Bgd | Lin. Bgd | Stav.(No Bgd) | Stav.(Lin. Bgd) | Method 5 |
| 0-10%      | $\Lambda K^+$<br>$\bar{\Lambda} K^-$                                     | $\lambda$       | 1.91      | 1.75     | 1.21          | 0.00            | 0.00     |
|            | $\Lambda K^-$<br>$\bar{\Lambda} K^+$                                     | $\lambda$       | 1.83      | 1.64     | 1.15          | 0.00            | 0.00     |
|            | $\Lambda K^+ \& \bar{\Lambda} K^-$<br>$\Lambda K^- \& \bar{\Lambda} K^+$ | R               | 5.83      | 5.83     | 5.25          | 0.00            | 0.00     |
| 10-30%     | $\Lambda K^+$<br>$\bar{\Lambda} K^-$                                     | $\lambda$       | 1.39      | 1.39     | 0.80          | 0.00            | 0.00     |
|            | $\Lambda K^-$<br>$\bar{\Lambda} K^+$                                     | $\lambda$       | 1.31      | 1.30     | 0.88          | 0.00            | 0.00     |
|            | $\Lambda K^+ \& \bar{\Lambda} K^-$<br>$\Lambda K^- \& \bar{\Lambda} K^+$ | R               | 4.53      | 4.59     | 3.90          | 0.00            | 0.00     |
| 30-50%     | $\Lambda K^+$<br>$\bar{\Lambda} K^-$                                     | $\lambda$       | 1.02      | 1.01     | 0.82          | 0.00            | 0.00     |
|            | $\Lambda K^-$<br>$\bar{\Lambda} K^+$                                     | $\lambda$       | 1.11      | 1.07     | 0.98          | 0.00            | 0.00     |
|            | $\Lambda K^+ \& \bar{\Lambda} K^-$<br>$\Lambda K^- \& \bar{\Lambda} K^+$ | R               | 2.99      | 3.03     | 3.03          | 0.00            | 0.00     |
|            | $\Lambda K^+ \& \bar{\Lambda} K^-$                                       | $\mathbb{R}f_0$ | -1.09     | -1.16    | -1.46         | 0.00            | 0.00     |
|            |  | $\mathbb{I}f_0$ | 0.44      | 0.53     | 0.57          | 0.00            | 0.00     |
|            |  | $d_0$           | 0.99      | 1.01     | -0.42         | 0.00            | 0.00     |
|            | $\Lambda K^- \& \bar{\Lambda} K^+$                                       | $\mathbb{R}f_0$ | 0.40      | 0.43     | 0.53          | 0.00            | 0.00     |
|            |  | $\mathbb{I}f_0$ | 0.45      | 0.52     | 0.75          | 0.00            | 0.00     |
|            |  | $d_0$           | -4.37     | -4.20    | 2.35          | 0.00            | 0.00     |

**Table 10:** Compare non-flat background treatment methods: Shared radii, share  $\lambda_{\text{Conj}}$

Shared radii, share single  $\lambda$

| Centrality | System   | Parameter       | Methods   |          |               |                 |          |
|------------|--|-----------------|-----------|----------|---------------|-----------------|----------|
|            |  |                 | Poly. Bgd | Lin. Bgd | Stav.(No Bgd) | Stav.(Lin. Bgd) | Method 5 |
| 0-10%      | $\Lambda K^+$<br>$\bar{\Lambda} K^-$<br>$\Lambda K^-$<br>$\bar{\Lambda} K^+$               | $\lambda$       | 1.83      | 1.65     | 1.05          | 0.00            | 0.00     |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$<br>$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 5.81      | 5.81     | 5.04          | 0.00            | 0.00     |
| 10-30%     | $\Lambda K^+$<br>$\bar{\Lambda} K^-$<br>$\Lambda K^-$<br>$\bar{\Lambda} K^+$               | $\lambda$       | 1.31      | 1.31     | 0.82          | 0.00            | 0.00     |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$<br>$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 4.50      | 4.57     | 3.99          | 0.00            | 0.00     |
| 30-50%     | $\Lambda K^+$<br>$\bar{\Lambda} K^-$<br>$\Lambda K^-$<br>$\bar{\Lambda} K^+$               | $\lambda$       | 1.07      | 1.04     | 0.88          | 0.00            | 0.00     |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$<br>$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 3.09      | 3.11     | 3.17          | 0.00            | 0.00     |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$  | $\mathbb{R}f_0$ | -1.12     | -1.20    | -1.52         | 0.00            | 0.00     |
|            |  | $\mathbb{I}f_0$ | 0.48      | 0.59     | 0.65          | 0.00            | 0.00     |
|            |  | $d_0$           | 1.01      | 1.07     | -0.44         | 0.00            | 0.00     |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$  | $\mathbb{R}f_0$ | 0.39      | 0.42     | 0.55          | 0.00            | 0.00     |
|            |  | $\mathbb{I}f_0$ | 0.45      | 0.51     | 0.82          | 0.00            | 0.00     |
|            |  | $d_0$           | -4.35     | -4.22    | 2.14          | 0.00            | 0.00     |

**Table 11:** Compare non-flat background treatment methods: Shared radii, share single  $\lambda$

Shared radii, share single  $\lambda(v_2)$ 

| Centrality | System   | Parameter       | Methods   |          |               |
|------------|--|-----------------|-----------|----------|---------------|
|            |  |                 | Poly. Bgd | Lin. Bgd | Stav.(No Bgd) |
| 0-10%      | $\Lambda K^+$<br>$\bar{\Lambda} K^-$<br>$\Lambda K^-$<br>$\bar{\Lambda} K^+$               | $\lambda$       | 1.83      | 1.65     | 1.05          |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$<br>$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 5.81      | 5.81     | 5.04          |
| 10-30%     | $\Lambda K^+$<br>$\bar{\Lambda} K^-$<br>$\Lambda K^-$<br>$\bar{\Lambda} K^+$               | $\lambda$       | 1.31      | 1.31     | 0.82          |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$<br>$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 4.50      | 4.57     | 3.99          |
| 30-50%     | $\Lambda K^+$<br>$\bar{\Lambda} K^-$<br>$\Lambda K^-$<br>$\bar{\Lambda} K^+$               | $\lambda$       | 1.07      | 1.04     | 0.88          |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$<br>$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$ | R               | 3.09      | 3.11     | 3.17          |
|            | $\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$  | $\mathbb{R}f_0$ | -1.12     | -1.20    | -1.52         |
|            |  | $\mathbb{I}f_0$ | 0.48      | 0.59     | 0.65          |
|            |  | $d_0$           | 1.01      | 1.07     | -0.44         |
|            | $\Lambda K^- \text{ \& } \bar{\Lambda} K^+$  | $\mathbb{R}f_0$ | 0.39      | 0.42     | 0.55          |
|            |  | $\mathbb{I}f_0$ | 0.45      | 0.51     | 0.82          |
|            |  | $d_0$           | -4.35     | -4.22    | 2.14          |

**Table 12:** Compare non-flat background treatment methods: Shared radii, share single  $\lambda(v_2)$