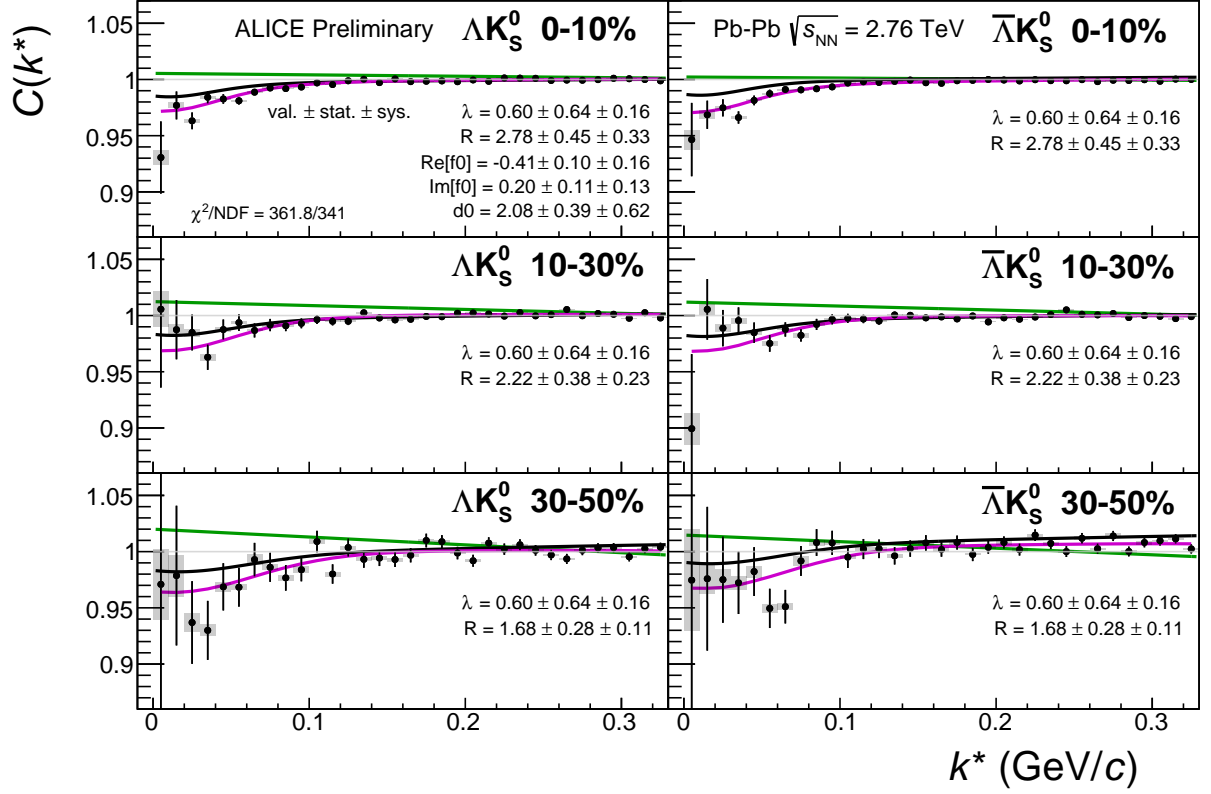


**0.0.1 Results:  $\Lambda K_S^0$  and  $\bar{\Lambda} K_S^0$ : 3 Residual Correlations Included in Fit**



**Fig. 1:** Fits, with 3 residual correlations included, to the  $\Lambda K_S^0$  (left) and  $\bar{\Lambda} K_S^0$  (right) data for the centralities 0-10% (top), 10-30% (middle), and 30-50% (bottom). The lines represent the statistical errors, while the boxes represent the systematic errors. Each has unique  $\lambda$  and normalization parameters. The radii are shared amongst like centralities; the scattering parameters ( $\text{Re}[f_0]$ ,  $\text{Im}[f_0]$ ,  $d_0$ ) are shared amongst all. The black solid line represents the “raw” fit, i.e. not corrected for momentum resolution effects nor non-flat background. The green line shows the fit to the non-flat background. The purple points show the fit after momentum resolution and non-flat background corrections have been applied. The initial values of the parameters is listed, as well as the final fit values with uncertainties. Here,  $R$  was restricted to  $[2., 10.]$  and  $\lambda$  was restricted to  $[0.1, 0.8]$ .

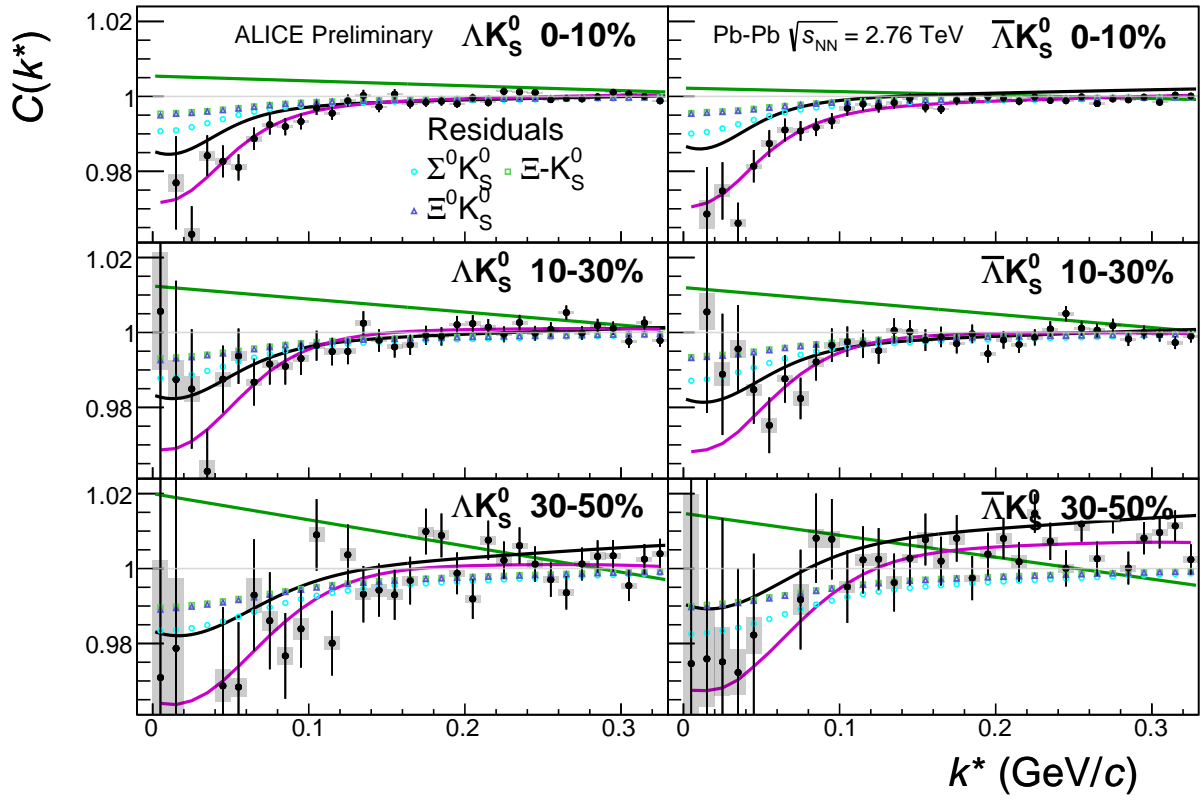
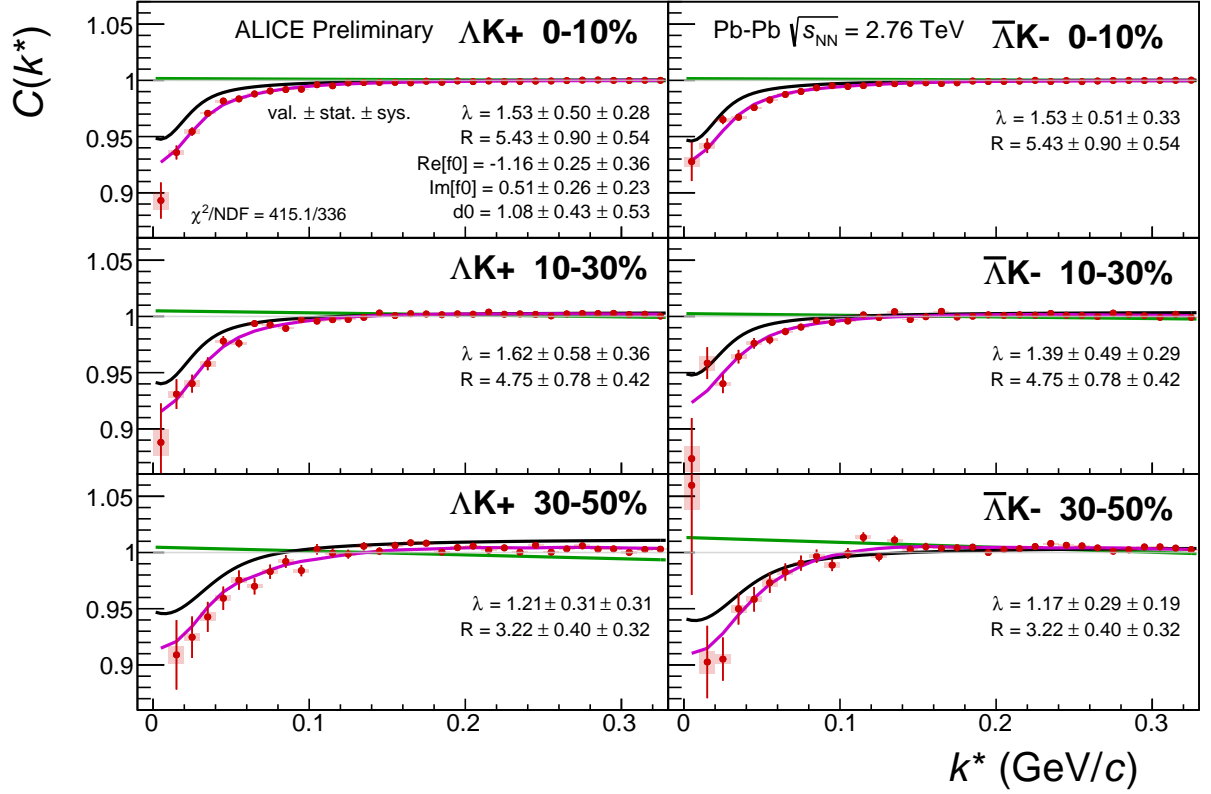
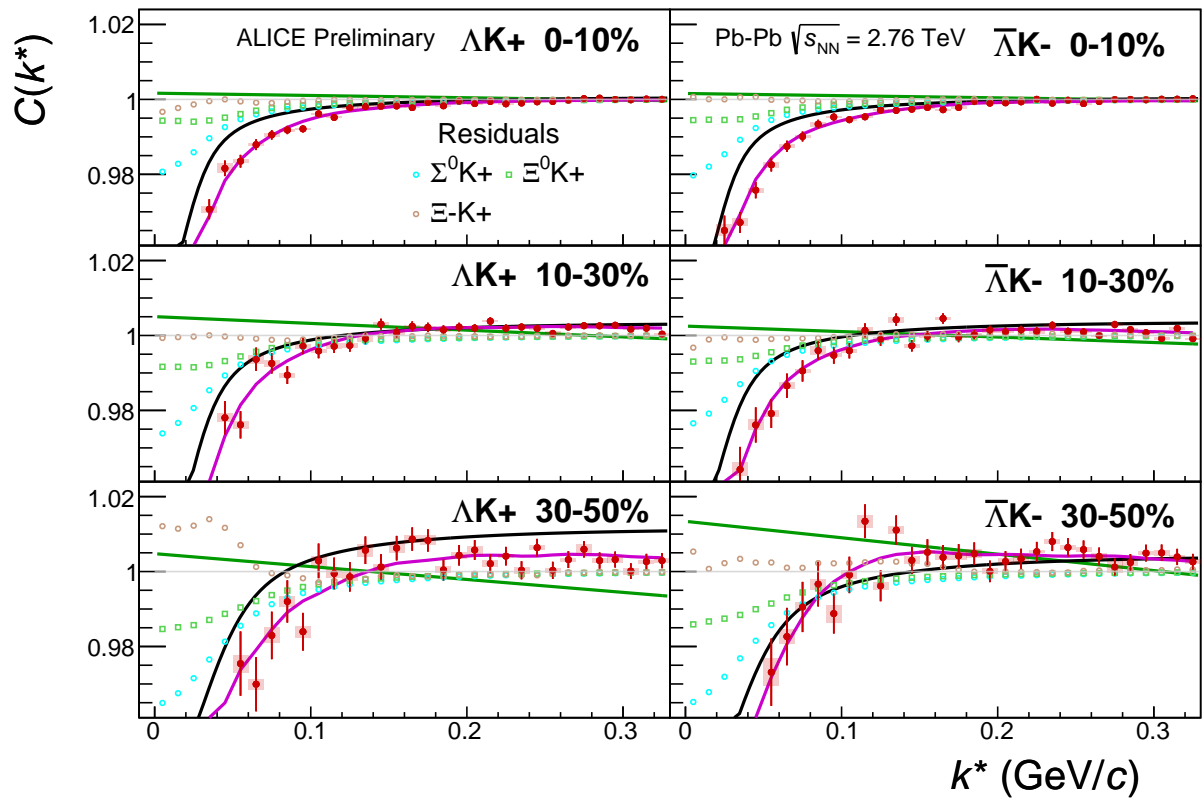


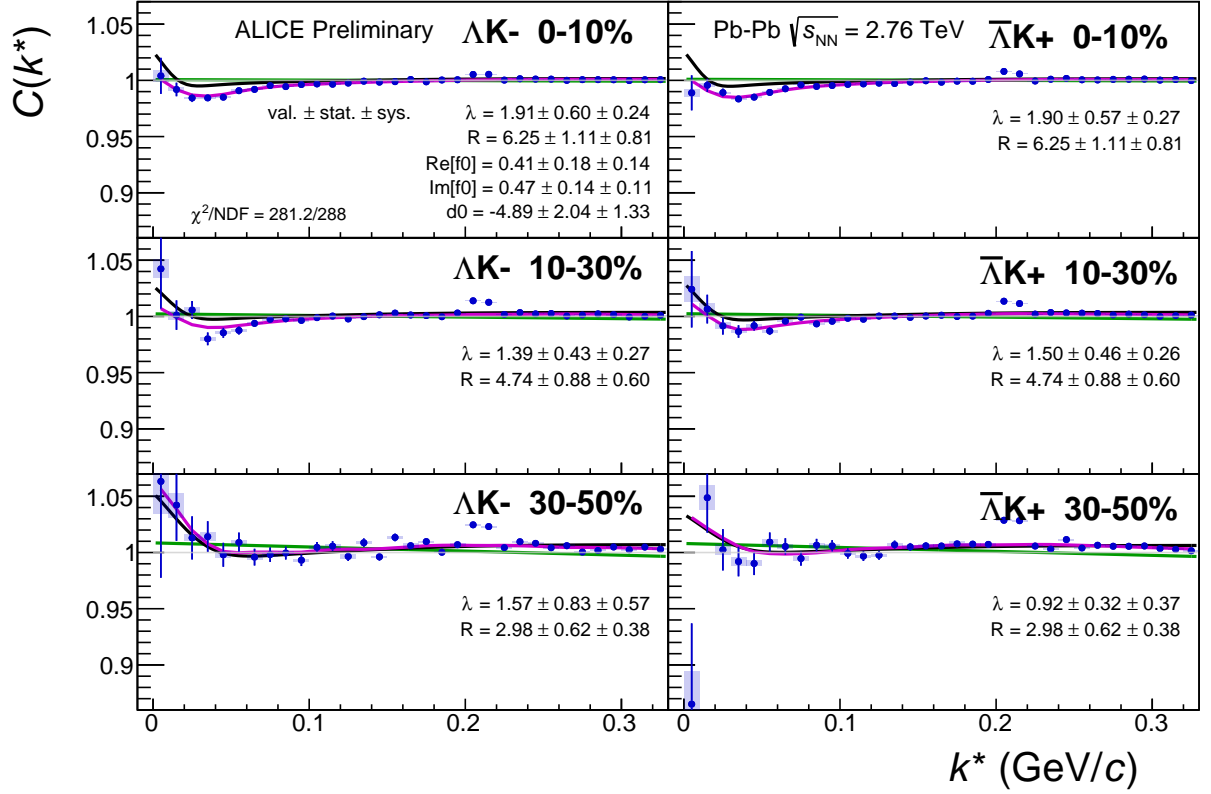
Fig. 2: Caption



**Fig. 3:** Fits, with 3 residual correlations included, to the  $\Lambda K^+$  (left) and  $\bar{\Lambda} K^-$  (right) data for the centralities 0-10% (top), 10-30% (middle), and 30-50% (bottom). The lines represent the statistical errors, while the boxes represent the systematic errors. Each has unique  $\lambda$  and normalization parameters. The radii are shared amongst like centralities; the scattering parameters ( $\text{Re}[f_0]$ ,  $\text{Im}[f_0]$ ,  $d_0$ ) are shared amongst all. The black solid line represents the “raw” fit, i.e. not corrected for momentum resolution effects nor non-flat background. The green line shows the fit to the non-flat background. The purple points show the fit after momentum resolution and non-flat background corrections have been applied. The initial values of the parameters is listed, as well as the final fit values with uncertainties.



**Fig. 4:** Caption



**Fig. 5:** Fits, with 3 residual correlations included, to the  $\Delta K^-$  (left) with  $\bar{\Delta K}^+$  (right) data for the centralities 0-10% (top), 10-30% (middle), and 30-50% (bottom). The lines represent the statistical errors, while the boxes represent the systematic errors. Each has unique  $\lambda$  and normalization parameters. The radii are shared amongst like centralities; the scattering parameters ( $\text{Re}f_0$ ,  $\text{Im}f_0$ ,  $d_0$ ) are shared amongst all. The black solid line represents the “raw” fit, i.e. not corrected for momentum resolution effects nor non-flat background. The green line shows the fit to the non-flat background. The purple points show the fit after momentum resolution and non-flat background corrections have been applied. The initial values of the parameters is listed, as well as the final fit values with uncertainties.

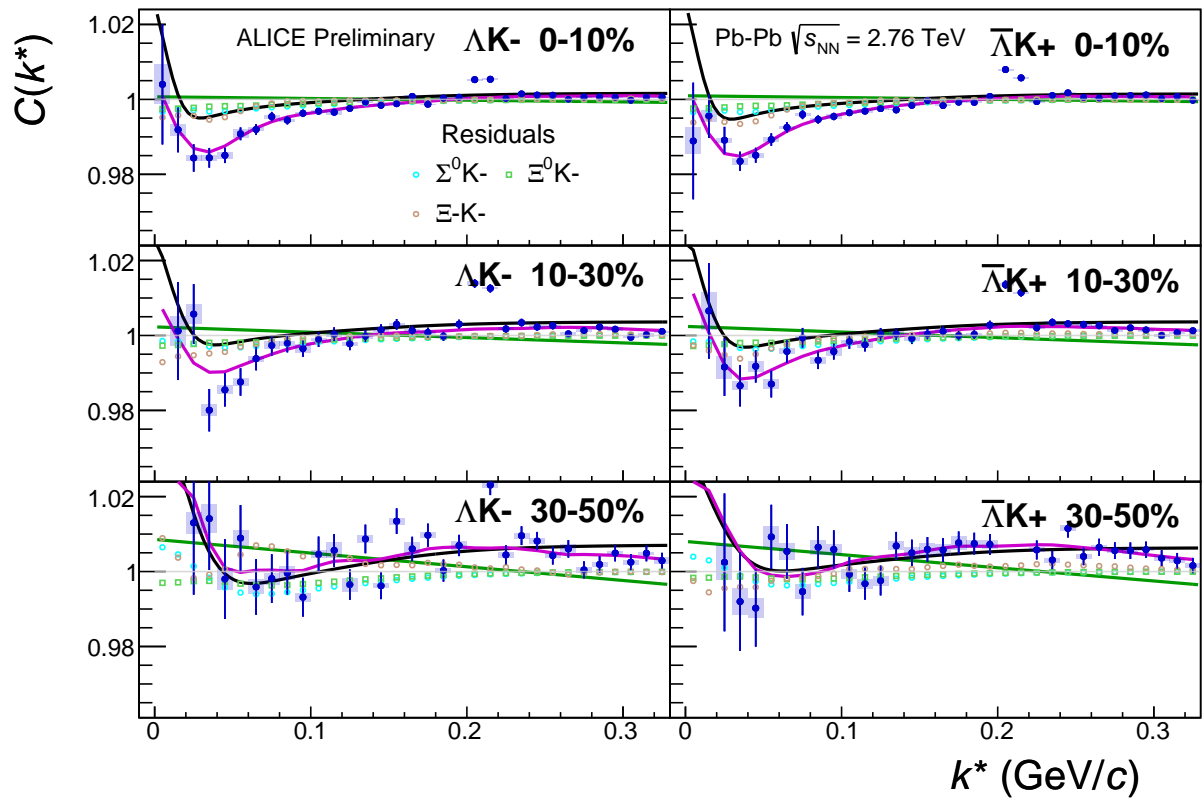


Fig. 6: Caption

Fit Results $\Lambda(\bar{\Lambda})K_S^0$						
System	Centrality	Fit Parameters				
		$\lambda$	$R$	$\Re f_0$	$\Im f_0$	$d_0$
$\Lambda K_S^0$ & $\bar{\Lambda} K_S^0$	0-10%		$2.78 \pm 0.45$ (stat.) $\pm 0.33$ (sys.)			
	10-30%	$0.60 \pm 0.63$ (stat.) $\pm 0.16$ (sys.)	$2.22 \pm 0.37$ (stat.) $\pm 0.23$ (sys.)	$-0.41 \pm 0.10$ (stat.) $\pm 0.16$ (sys.)	$0.20 \pm 0.10$ (stat.) $\pm 0.13$ (sys.)	$2.08 \pm 0.39$ (stat.) $\pm 0.62$ (sys.)
	30-50%		$1.68 \pm 0.28$ (stat.) $\pm 0.11$ (sys.)			

**Table 1:** Fit Results  $\Lambda(\bar{\Lambda})K_S^0$ , with 3 residual correlations included. Each pair is fit simultaneously with its conjugate (ie.  $\Lambda K_S^0$  with  $\bar{\Lambda} K_S^0$ ) across all centralities (0-10%, 10-30%, 30-50%), for a total of 6 simultaneous analyses in the fit. Each analysis has a unique  $\lambda$  and normalization parameter. The radii are shared between analyses of like centrality, as these should have similar source sizes. The scattering parameters ( $\Re f_0$ ,  $\Im f_0$ ,  $d_0$ ) are shared amongst all. The fit is done on the data with only statistical error bars. The errors marked as “stat.” are those returned by MINUIT. The errors marked as “sys.” are those which result from my systematic analysis (as outlined in Section ??).

Fit Results $\Lambda(\bar{\Lambda})K^\pm$							
System	Centrality	Pair Type	Fit Parameters				
			$\lambda$	$R$	$\Re f_0$	$\Im f_0$	$d_0$
$\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$	0-10%	$\Lambda K^+$	$1.53 \pm 0.56 \text{ (stat.)} \pm 0.28 \text{ (sys.)}$	$5.43 \pm 1.09 \text{ (stat.)} \pm 0.54 \text{ (sys.)}$	$-1.16 \pm 0.25 \text{ (stat.)} \pm 0.36 \text{ (sys.)}$	$0.51 \pm 0.28 \text{ (stat.)} \pm 0.23 \text{ (sys.)}$	$1.08 \pm 0.43 \text{ (stat.)} \pm 0.53 \text{ (sys.)}$
		$\bar{\Lambda} K^-$	$1.53 \pm 0.57 \text{ (stat.)} \pm 0.33 \text{ (sys.)}$				
	10-30%	$\Lambda K^+$	$1.62 \pm 0.58 \text{ (stat.)} \pm 0.36 \text{ (sys.)}$	$4.75 \pm 0.82 \text{ (stat.)} \pm 0.42 \text{ (sys.)}$			
		$\bar{\Lambda} K^-$	$1.39 \pm 0.49 \text{ (stat.)} \pm 0.29 \text{ (sys.)}$				
	30-50%	$\Lambda K^+$	$1.21 \pm 0.31 \text{ (stat.)} \pm 0.31 \text{ (sys.)}$	$3.22 \pm 0.41 \text{ (stat.)} \pm 0.32 \text{ (sys.)}$			
		$\bar{\Lambda} K^-$	$1.17 \pm 0.30 \text{ (stat.)} \pm 0.19 \text{ (sys.)}$				
$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$	0-10%	$\Lambda K^-$	$1.91 \pm 0.60 \text{ (stat.)} \pm 0.24 \text{ (sys.)}$	$6.25 \pm 1.08 \text{ (stat.)} \pm 0.81 \text{ (sys.)}$	$0.41 \pm 0.18 \text{ (stat.)} \pm 0.14 \text{ (sys.)}$	$0.47 \pm 0.15 \text{ (stat.)} \pm 0.11 \text{ (sys.)}$	$-4.89 \pm 2.16 \text{ (stat.)} \pm 1.33 \text{ (sys.)}$
		$\bar{\Lambda} K^+$	$1.90 \pm 0.57 \text{ (stat.)} \pm 0.27 \text{ (sys.)}$				
	10-30%	$\Lambda K^-$	$1.39 \pm 0.43 \text{ (stat.)} \pm 0.27 \text{ (sys.)}$	$4.74 \pm 0.86 \text{ (stat.)} \pm 0.60 \text{ (sys.)}$			
		$\bar{\Lambda} K^+$	$1.50 \pm 0.46 \text{ (stat.)} \pm 0.26 \text{ (sys.)}$				
	30-50%	$\Lambda K^-$	$1.57 \pm 0.82 \text{ (stat.)} \pm 0.57 \text{ (sys.)}$	$2.98 \pm 0.61 \text{ (stat.)} \pm 0.38 \text{ (sys.)}$			
		$\bar{\Lambda} K^+$	$0.92 \pm 0.31 \text{ (stat.)} \pm 0.37 \text{ (sys.)}$				

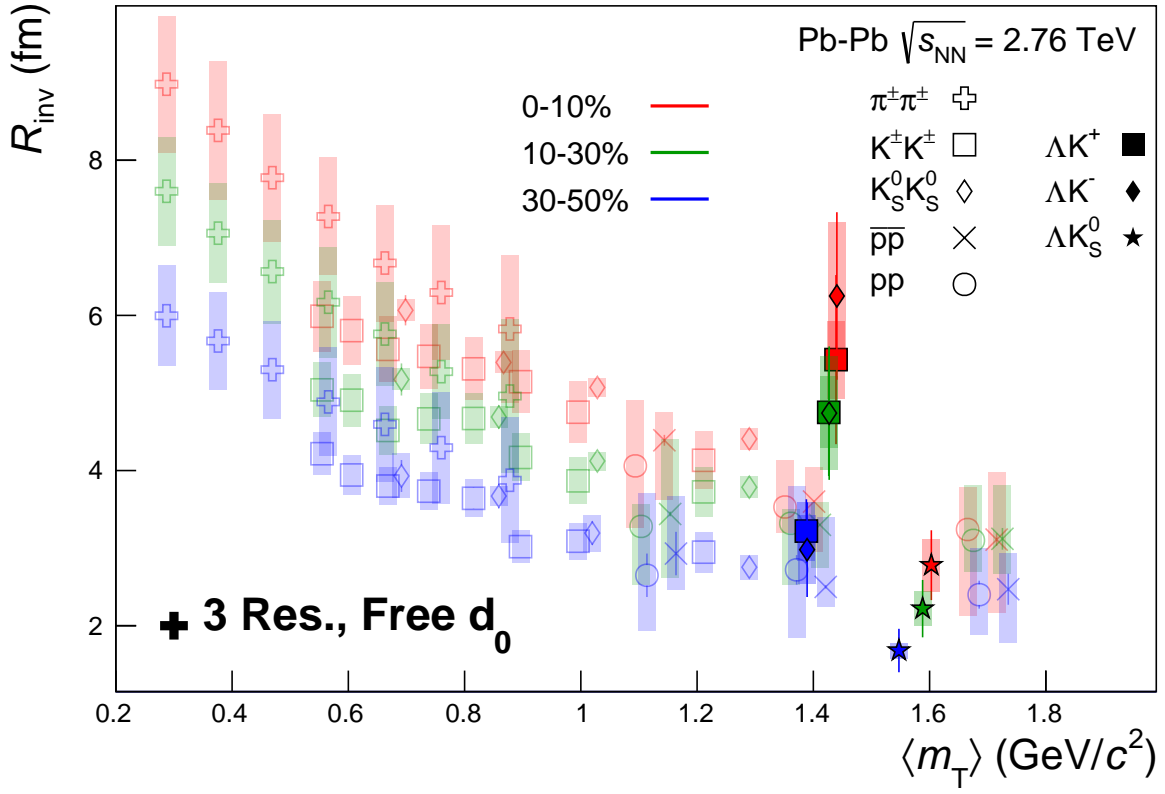
**Table 2:** Fit Results  $\Lambda(\bar{\Lambda})K^\pm$ , with 3 residual correlations included. Each pair is fit simultaneously with its conjugate (ie.  $\Lambda K^+$  with  $\bar{\Lambda} K^-$  and  $\Lambda K^-$  with  $\bar{\Lambda} K^+$ ) across all centralities (0-10%, 10-30%, 30-50%), for a total of 6 simultaneous analyses in the fit. Each analysis has a unique  $\lambda$  and normalization parameter. The radii are shared between analyses of like centrality, as these should have similar source sizes. The scattering parameters ( $\Re f_0$ ,  $\Im f_0$ ,  $d_0$ ) are shared amongst all. The fit is done on the data with only statistical error bars. The errors marked as “stat.” are those returned by MINUIT. The errors marked as “sys.” are those which result from my systematic analysis (as outlined in Section ??).



**Fit Parameters (value  $\pm$  statistical error  $\pm$  systematic error)**

<b>Pair Type</b>	<b>Centrality</b>	<b>R</b>		
$\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$	<b>0-10%</b>	<b><math>5.43 \pm 1.09 \pm 0.54</math></b>		
	<b>10-30%</b>	<b><math>4.75 \pm 0.82 \pm 0.42</math></b>		
	<b>30-50%</b>	<b><math>3.22 \pm 0.41 \pm 0.32</math></b>		
		$\Re f_0$	$\Im f_0$	$d_0$
		<b><math>-1.16 \pm 0.25 \pm 0.36</math></b>	<b><math>0.51 \pm 0.28 \pm 0.23</math></b>	<b><math>1.08 \pm 0.43 \pm 0.53</math></b>
$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$	<b>0-10%</b>	<b><math>6.25 \pm 1.08 \pm 0.81</math></b>		
	<b>10-30%</b>	<b><math>4.74 \pm 0.86 \pm 0.60</math></b>		
	<b>30-50%</b>	<b><math>2.98 \pm 0.61 \pm 0.38</math></b>		
		$\Re f_0$	$\Im f_0$	$d_0$
		<b><math>0.41 \pm 0.18 \pm 0.14</math></b>	<b><math>0.47 \pm 0.15 \pm 0.11</math></b>	<b><math>-4.89 \pm 2.16 \pm 1.33</math></b>
$\Lambda K_S^0 \text{ \& } \bar{\Lambda} K_S^0$	<b>0-10%</b>	<b><math>2.78 \pm 0.45 \pm 0.33</math></b>		
	<b>10-30%</b>	<b><math>2.22 \pm 0.37 \pm 0.23</math></b>		
	<b>30-50%</b>	<b><math>1.68 \pm 0.28 \pm 0.11</math></b>		
		$\Re f_0$	$\Im f_0$	$d_0$
		<b><math>-0.41 \pm 0.10 \pm 0.16</math></b>	<b><math>0.20 \pm 0.10 \pm 0.13</math></b>	<b><math>2.08 \pm 0.39 \pm 0.62</math></b>

**Table 3:** Fit Results  $\Lambda(\bar{\Lambda})K^\pm$  and  $\Lambda(\bar{\Lambda})K_S^0$ , with 3 residual correlations included ( $\lambda$  parameters not shown). This table is a condensed version of Tables 1 and 2



**Fig. 7:** 3 residual correlations in  $\Lambda K$  fits. Extracted fit  $R_{inv}$  parameters as a function of pair transverse mass ( $m_T$ ) for various pair systems over several centralities. The ALICE published data [?] is shown with transparent, open symbols. The new  $\Lambda K$  results are shown with opaque, filled symbols. In the left, the  $\Lambda K^+$  (with its conjugate pair) results are shown separately from the  $\Lambda K^-$  (with its conjugate pair) results. In the right, all  $\Lambda K^\pm$  results are averaged.

Polynomial Bgds, THERM Bgds fit together

Centrality	System	Parameter	Methods			
			Separate	Share R	Share $\lambda_{\text{Conj}}$	Share Single $\lambda$
0-10%	$\Lambda K^+$	$\lambda$	1.70	2.18	2.16	1.92
	$\bar{\Lambda} K^-$	$\lambda$	1.72	2.21		
	$\Lambda K^-$	$\lambda$	2.20	2.10	1.91	
	$\bar{\Lambda} K^+$	$\lambda$	2.19	2.10		
	$\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$	R	4.81	5.53	5.31	5.25
	$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$	R	5.61			
10-30%	$\Lambda K^+$	$\lambda$	1.88	1.78	1.67	1.57
	$\bar{\Lambda} K^-$	$\lambda$	1.66	1.58		
	$\Lambda K^-$	$\lambda$	1.58	1.62	1.53	
	$\bar{\Lambda} K^+$	$\lambda$	1.67	1.71		
	$\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$	R	4.38	4.37	4.22	4.26
	$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$	R	4.20			
30-50%	$\Lambda K^+$	$\lambda$	1.44	1.30	1.18	1.20
	$\bar{\Lambda} K^-$	$\lambda$	1.33	1.21		
	$\Lambda K^-$	$\lambda$	1.80	2.05	1.22	
	$\bar{\Lambda} K^+$	$\lambda$	1.10	1.17		
	$\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$	R	3.01	2.92	2.77	2.87
	$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$	R	2.70			
	$\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$	$\mathbb{R}f_0$	-0.88	-0.87	-0.83	-0.89
		$\mathbb{I}f_0$	0.28	0.33	0.29	0.34
		$d_0$	1.32	1.27	1.28	1.29
	$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$	$\mathbb{R}f_0$	0.28	0.31	0.31	0.30
		$\mathbb{I}f_0$	0.35	0.37	0.40	0.39
		$d_0$	-5.75	-5.32	-4.81	-4.92

**Table 4:** Comparison: Polynomial non-flat background, THERMINATOR backgrounds fit together

Polynomial Bgds, THERM Bgds fit separate

Centrality	System	Parameter	Methods			
			Separate	Share R	Share $\lambda_{\text{Conj}}$	Share Single $\lambda$
0-10%	$\Lambda K^+$	$\lambda$	1.58	1.90	1.91	1.95
	$\bar{\Lambda} K^-$	$\lambda$	1.59	1.92		
	$\Lambda K^-$	$\lambda$	2.31	2.33	2.08	
	$\bar{\Lambda} K^+$	$\lambda$	2.29	2.31		
	$\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$	R	4.93	5.37	5.12	4.97
$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$	R	5.20				
10-30%	$\Lambda K^+$	$\lambda$	1.70	1.59	1.52	1.57
	$\bar{\Lambda} K^-$	$\lambda$	1.50	1.41		
	$\Lambda K^-$	$\lambda$	1.67	1.77	1.65	
	$\bar{\Lambda} K^+$	$\lambda$	1.76	1.87		
	$\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$	R	4.42	4.28	4.11	4.02
$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$	R	3.99				
30-50%	$\Lambda K^+$	$\lambda$	1.35	1.20	1.07	1.31
	$\bar{\Lambda} K^-$	$\lambda$	1.24	1.10		
	$\Lambda K^-$	$\lambda$	2.14	2.53	1.44	
	$\bar{\Lambda} K^+$	$\lambda$	1.29	1.41		
	$\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$	R	3.10	2.93	2.73	2.83
$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$	R	2.64				
	$\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$	$\mathbb{R}f_0$	-0.99	-0.96	-0.90	-0.83
		$\mathbb{I}f_0$	0.30	0.32	0.26	0.23
		$d_0$	1.14	1.09	1.10	1.08
	$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$	$\mathbb{R}f_0$	0.23	0.27	0.27	0.28
		$\mathbb{I}f_0$	0.32	0.34	0.37	0.39
		$d_0$	-6.26	-5.79	-5.17	-4.87

**Table 5:** Comparison: Polynomial non-flat background, THERMINATOR backgrounds fit separately

Linear Bgds

Centrality	System	Parameter	Methods			
			Separate	Share R	Share $\lambda_{\text{Conj}}$	Share Single $\lambda$
0-10%	$\Lambda K^+$	$\lambda$	1.53	1.88	1.78	1.66
	$\bar{\Lambda} K^-$	$\lambda$	1.54	1.89		
	$\Lambda K^-$	$\lambda$	1.91	1.81	1.60	
	$\bar{\Lambda} K^+$	$\lambda$	1.90	1.81		
	$\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$	R	5.43	6.10	5.76	5.81
	$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$	R	6.26			
10-30%	$\Lambda K^+$	$\lambda$	1.62	1.61	1.44	1.34
	$\bar{\Lambda} K^-$	$\lambda$	1.39	1.39		
	$\Lambda K^-$	$\lambda$	1.39	1.40	1.30	
	$\bar{\Lambda} K^+$	$\lambda$	1.50	1.50		
	$\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$	R	4.75	4.82	4.58	4.61
	$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$	R	4.74			
30-50%	$\Lambda K^+$	$\lambda$	1.21	1.13	1.04	1.02
	$\bar{\Lambda} K^-$	$\lambda$	1.17	1.10		
	$\Lambda K^-$	$\lambda$	1.57	1.70	1.00	
	$\bar{\Lambda} K^+$	$\lambda$	0.92	0.96		
	$\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$	R	3.22	3.15	2.98	3.06
	$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$	R	2.98			
	$\Lambda K^+ \text{ \& } \bar{\Lambda} K^-$	$\mathbb{R}f_0$	-1.16	-1.13	-1.12	-1.19
		$\mathbb{I}f_0$	0.50	0.58	0.50	0.58
		$d_0$	1.08	1.04	1.00	1.11
	$\Lambda K^- \text{ \& } \bar{\Lambda} K^+$	$\mathbb{R}f_0$	0.41	0.44	0.44	0.43
		$\mathbb{I}f_0$	0.47	0.49	0.54	0.52
		$d_0$	-4.89	-4.49	-4.04	-4.21

**Table 6:** Comparison: Linear non-flat background