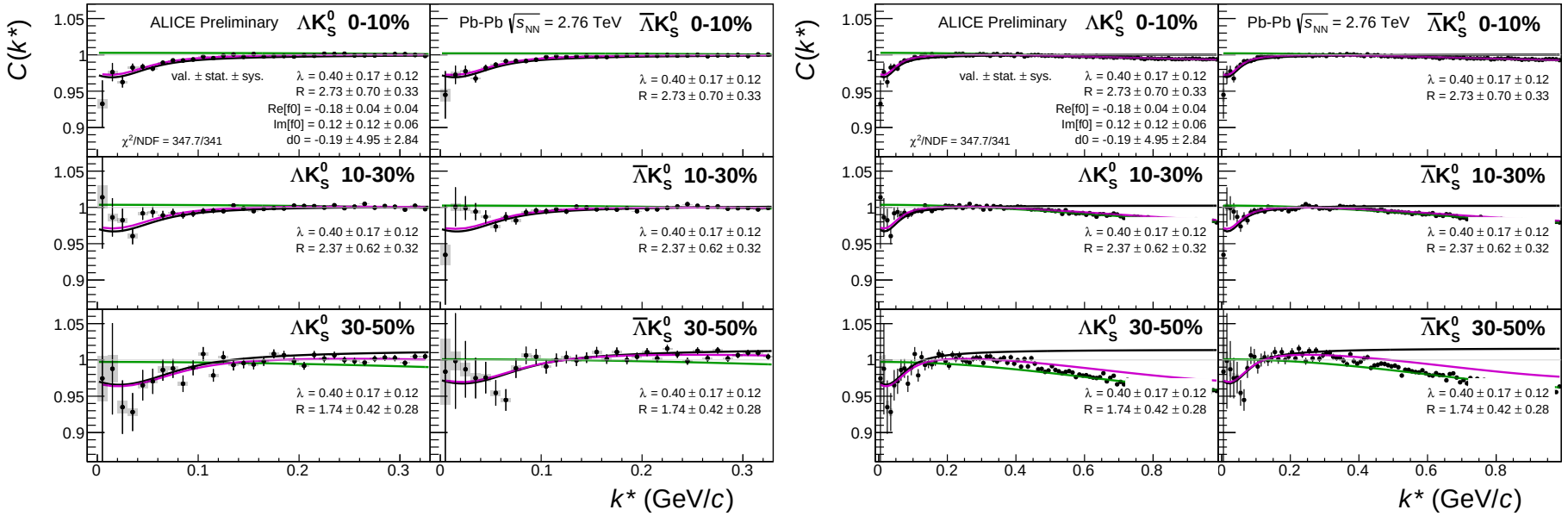
0.0.1 Results: ΛK^0_S and $\Lambda K^{\pm}$: No Residual Correlations Included in Fit

Figures 1, 2, and 3 (Section **??**) show experimental data with fits for all studied centralities for ΛK^0_S with $\bar{\Lambda}K^0_S$, ΛK^+ with $\bar{\Lambda}K^-$, and ΛK^- with $\bar{\Lambda}K^+$, respectively. The parameter sets extracted from the fits can be found in Tables 1 and 2. All correlation functions were normalized in the range $0.32 < k^* < 0.40$ GeV/c, and fit in the range $0.0 < k^* < 0.30$ GeV/c. For the ΛK^- and $\bar{\Lambda}K^+$ analyses, the region $0.19 < k^* < 0.23$ GeV/c was excluded from the fit to exclude the bump caused by the Ω^- resonance. The non-flat background was fit with a linear form from $0.6 < k^* < 0.9$ GeV/c. The theoretical fit function was then multiplied by this background during the fitting process.

In the figures (1, 2, and 3), 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.

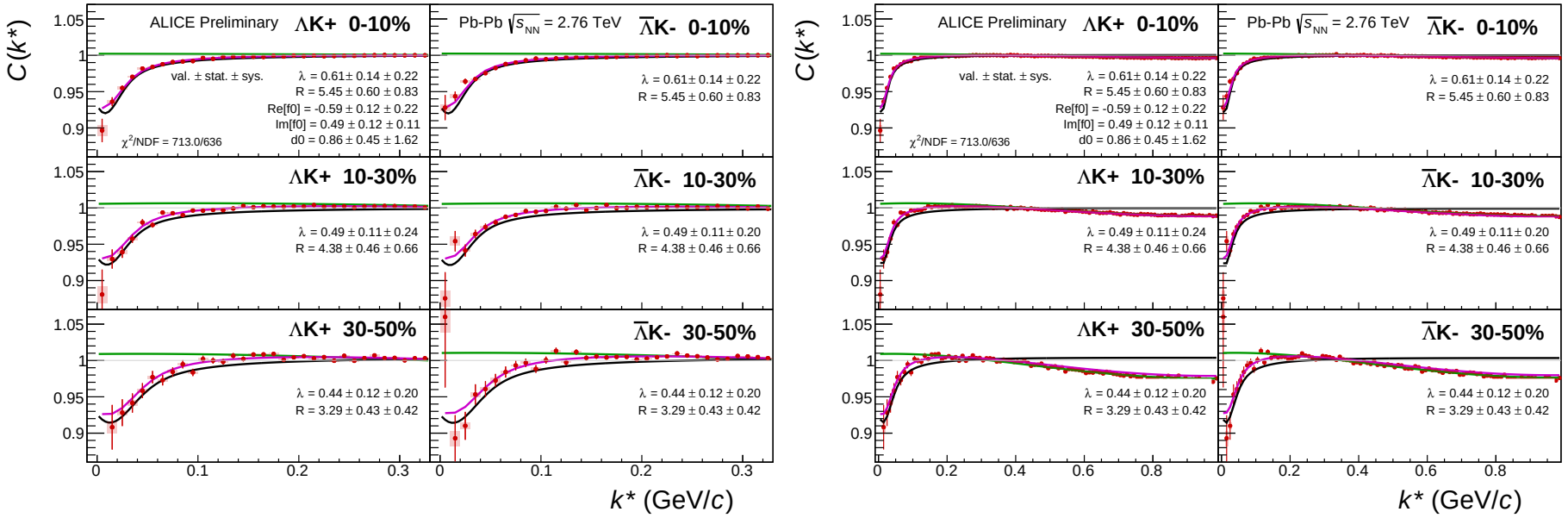
For the ΛK^0_S fits without residuals, λ was restricted to [0.4, 0.6].



(a) Signal region view ($k^* \lesssim 0.3$ GeV/c)

(b) Wide view ($k^* \lesssim 1.0$ GeV/c)

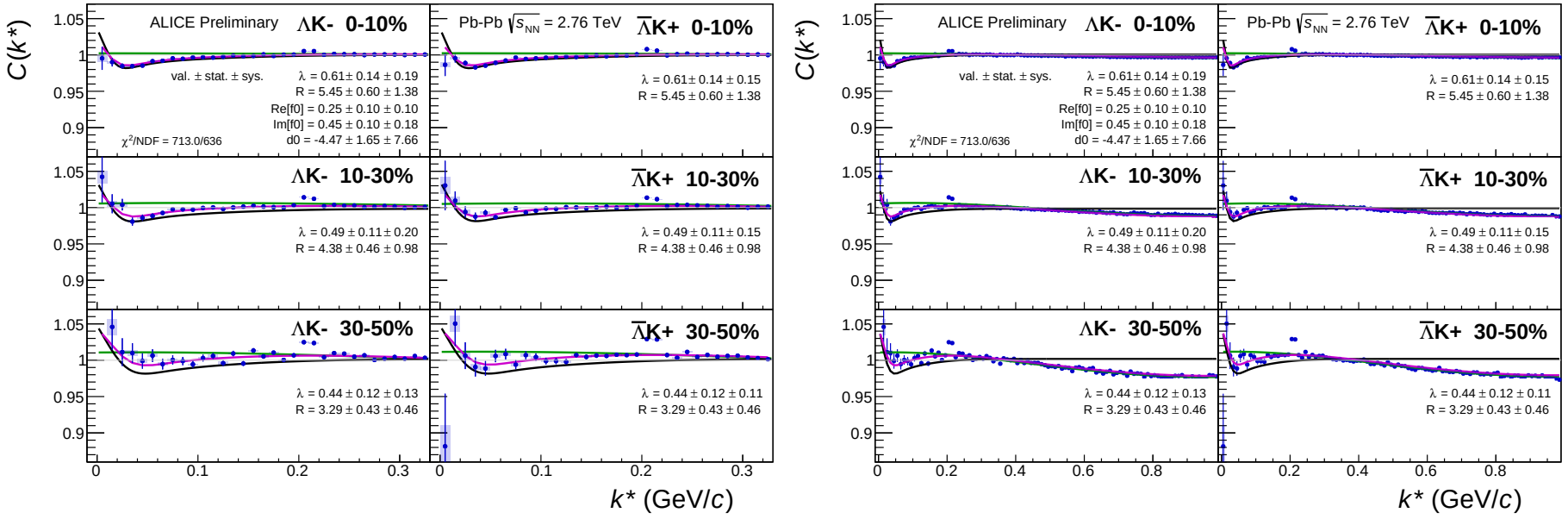
Fig. 1: Fits, with NO residual correlations included, to the ΛK^0_S (left) and $\bar{\Lambda} K^0_S$ (right) data for the centralities 0-10% (top), 10-30% (middle), and 30-50% (bottom). The lines represent the statistical errors, while the boxes represent the systematic errors. Each has unique λ and normalization parameters. The radii are shared amongst like centralities; the scattering parameters ($\mathbb{R}f_0$, $\mathbb{I}f_0$, 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 Λ was restricted to [0.1,0.8].



(a) Signal region view ($k^* \lesssim 0.3$ GeV/c)

(b) Wide view ($k^* \lesssim 1.0$ GeV/c)

Fig. 2: Fits to the ΛK^+ (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 λ and normalization parameters. The radii are shared amongst like centralities; the scattering parameters ($\mathbb{R}f_0$, $\mathbb{I}f_0$, 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.



(a) Signal region view ($k^* \lesssim 0.3$ GeV/c)

(b) Wide view ($k^* \lesssim 1.0$ GeV/c)

Fig. 3: Fits, with NO residual correlations included, to the ΛK^-(left) with $\bar{\Lambda}K^+$ (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 λ and normalization parameters. The radii are shared amongst like centralities; the scattering parameters ($\mathbb{R}f_0$, $\mathbb{I}f_0$, 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.

Fit Results $\Lambda(\bar{\Lambda})K^0_S$

System	Centrality	Fit Parameters				
		λ	R	$\mathbb{R}f_0$	$\mathbb{I}f_0$	d_0
ΛK^0_S & $\bar{\Lambda}K^0_S$	0-10%	0.40 ± 0.17 (stat.) ± 0.16 (sys.)	2.73 ± 0.70 (stat.) ± 0.33 (sys.)	-0.18 ± 0.04 (stat.) ± 0.16 (sys.)	0.12 ± 0.12 (stat.) ± 0.13 (sys.)	-0.19 ± 4.95 (stat.) ± 0.62 (sys.)
	10-30%		2.37 ± 0.62 (stat.) ± 0.23 (sys.)			
	30-50%		1.74 ± 0.42 (stat.) ± 0.11 (sys.)			

Table 1: Fit Results $\Lambda(\bar{\Lambda})K^0_S$, with no residual correlations included. Each pair is fit simultaneously with its conjugate (ie. ΛK^0_S with $\bar{\Lambda}K^0_S$) across all centralities (0-10%, 10-30%, 30-50%), for a total of 6 simultaneous analyses in the fit. A single λ parameter is shared amongst all. Each analysis has a unique normalization parameter. The radii are shared between analyses of like centrality, as these should have similar source sizes. The scattering parameters ($\mathbb{R}f_0$, $\mathbb{I}f_0$, d_0) are shared amongst all. The background is modeled by a (6^{th}-)degree polynomial fit to THERMINATOR simulation. 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	Fit Parameters				
		λ	R	$\mathbb{R}f_0$	$\mathbb{I}f_0$	d_0
ΛK^+ & $\bar{\Lambda}K^-$	0-10%	0.61 ± 0.14 (stat.) ± 0.28 (sys.)	5.45 ± 0.60 (stat.) ± 0.54 (sys.)	-0.59 ± 0.12 (stat.) ± 0.36 (sys.)	0.49 ± 0.12 (stat.) ± 0.23 (sys.)	0.86 ± 0.45 (stat.) ± 0.53 (sys.)
	10-30%	0.49 ± 0.11 (stat.) ± 0.36 (sys.)	4.38 ± 0.46 (stat.) ± 0.42 (sys.)			
ΛK^+ & $\bar{\Lambda}K^-$	30-50%	0.44 ± 0.12 (stat.) ± 0.31 (sys.)	3.29 ± 0.43 (stat.) ± 0.32 (sys.)	0.25 ± 0.10 (stat.) ± 0.14 (sys.)	0.45 ± 0.10 (stat.) ± 0.11 (sys.)	-4.47 ± 1.65 (stat.) ± 1.33 (sys.)

Table 2: Fit Results $\Lambda(\bar{\Lambda})K^{\pm}$, with no residual correlations included. All $\Lambda K^{\pm}$ analyses are fit simultaneously across all centralities (0-10%, 10-30%, 30-50%). Scattering parameters ($\mathbb{R}f_0$, $\mathbb{I}f_0$, d_0) are shared between pair-conjugate systems (i.e. a parameter set describing the ΛK^+ & $\bar{\Lambda}K^-$ system, and a separate set describing the ΛK^- & $\bar{\Lambda}K^+$ system). For each centrality, a radius and λ parameters are shared between all pairs (ΛK^+, $\bar{\Lambda}K^-$, ΛK^-, $\bar{\Lambda}K^+$). Each analysis has a unique normalization parameter. The background is modeled by a (6^{th}-)degree polynomial fit to THERMINATOR simulation. 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 **??**).

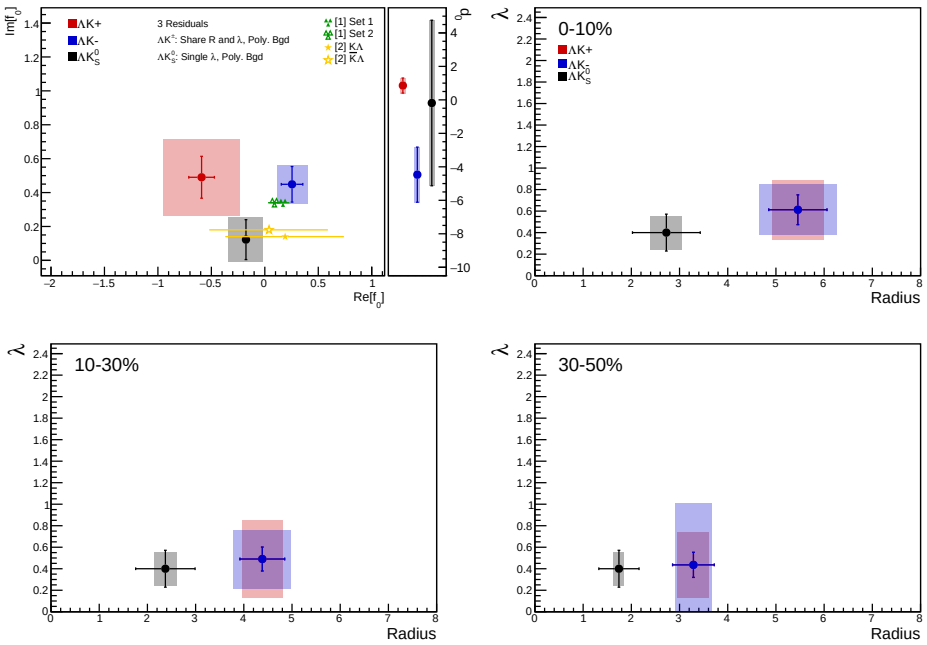


Fig. 4: Extracted scattering parameters for the case of NO residual contributors for all of our ΛK systems. [Top Left]: $\mathbb{I}f_0$ vs. $\mathbb{R}f_0$, together with d_0 to the right. [Top Right (Bottom Left, Bottom Right)]: λ vs. Radius for the 0-10% (10-30%, 30-50%) bin. The green [**?**] and yellow [**?**] points show theoretical predictions made using chiral perturbation theory.

Figure 5 shows extracted R_{inv} parameters as a function of tranverse mass (m_{T}) for various pair systems over several centralities. The published ALICE data [**?**] is shown with transparent, open symbols. The new ΛK results are shown with opaque, filled symbols. The radii shown an increasing size with increasing centrality, as is expected from the simple geometric picture of the collisions. The radii decrease in size with increasing m_{T}, and we see an approximate scaling of the radii with transverse mass, as is expected in the presence of collective flow in the system.

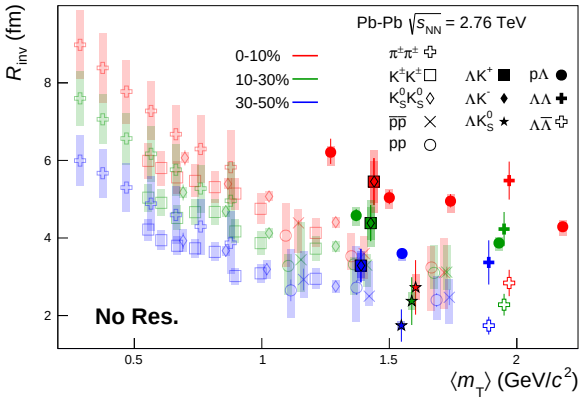


Fig. 5: No residual correlations in ΛK fits. Extracted fit R_{inv} parameters as a function of pair transverse mass (m_{T}) for various pair systems over several centralities. The ALICE published data [**?**] is shown with transparent, open symbols. The new ΛK results are shown with opaque, filled symbols. In the left, the ΛK^+ (with it's conjugate pair) results are shown separately from the ΛK^- (with it's conjugate pair) results. In the right, all $\Lambda K^{\pm}$ results are averaged.