Strangeness analysis with $|\eta| < 0.5$

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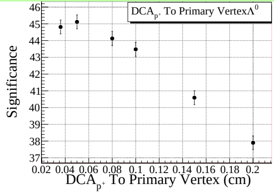
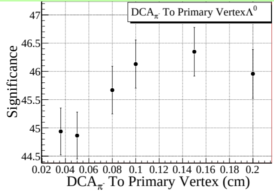
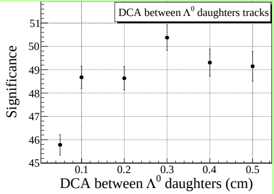
Outline

- Optimized cuts with $|\eta| < 0.5$
- Invariant Mass Distributions
- Armenteros Podolanski-Plot with substraction of K_s^0 mass
- Measurement of $c\tau$
- Distibution of polarization

Significance Λ^0





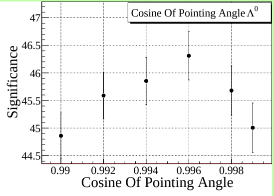


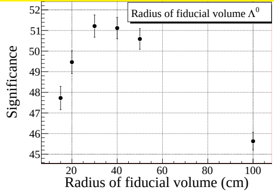
$$\frac{s}{\sqrt{s+b}}\left(1\pm\sqrt{\left(\frac{\delta s}{s}\right)^2+\left(\frac{\delta(s+b)}{2(s+b)}\right)^2}\right)$$

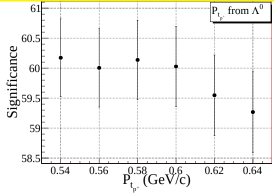
where:

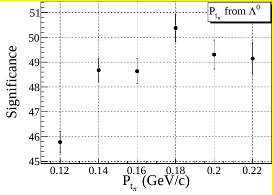
s — signal,

b — background.

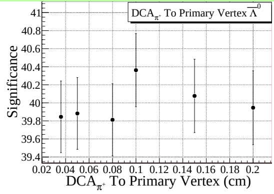


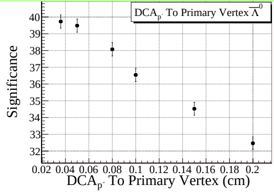


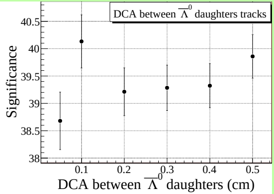




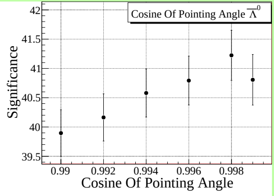
Significance $\bar{\Lambda}^0$

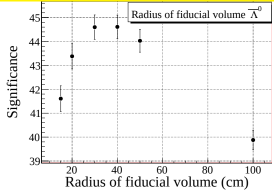


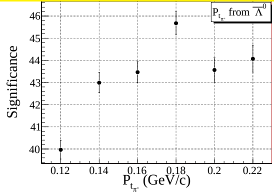


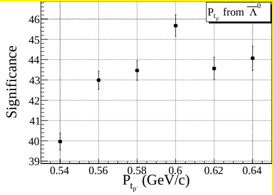


In the same way for $\bar{\Lambda}^0$ and K_s^0





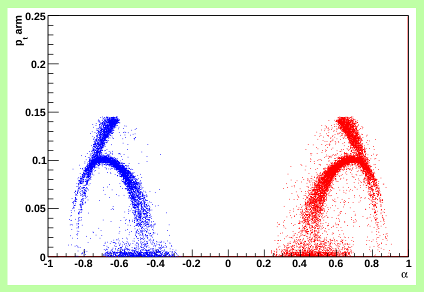




Optimized cuts

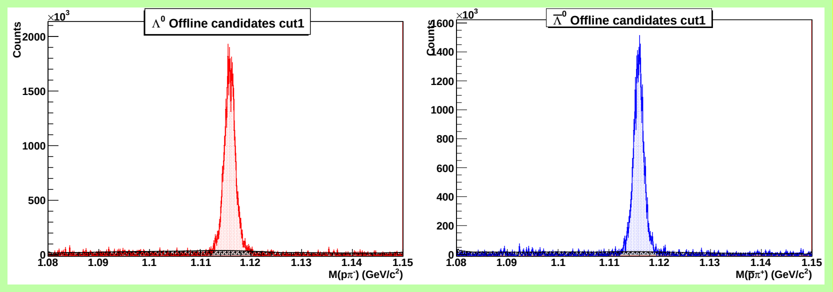
The cuts that maximize the significance are shown in the next table and are compared with the cuts obtained for $|\eta| < 1$.

Variable	Λ^0		$\bar{\Lambda}^0$		K_s^0	
	$\|\eta\| < 1$	$\|\eta\| < 0.5$	$\|\eta\| < 1$	$\|\eta\| < 0.5$	$\|\eta\| < 1$	$\|\eta\| < 0.5$
DCA of neg (cm)	> 0.1	> 0.15	> 0.036	> 0.036	> 0.036	> 0.036
DCA of pos (cm)	> 0.05	> 0.05	> 0.05	> 0.1	> 0.036	> 0.036
DCA V0 (cm)	< 0.2	< 0.3	< 0.1	< 0.1	< 0.5	< 0.5
Cosine	> 0.999	> 0.996	> 0.998	> 0.998	> 0.99	> 0.994
P_t pos (GeV/c)	> 0.6	> 0.54	> 0.14	> 0.18	0.14	0.12
P_t neg (GeV/c)	> 0.14	> 0.18	> 0.64	> 0.6	0.14	0.12
R. Fid. vol. (cm)	< 30	< 30	< 30	< 30	< 50	< 40

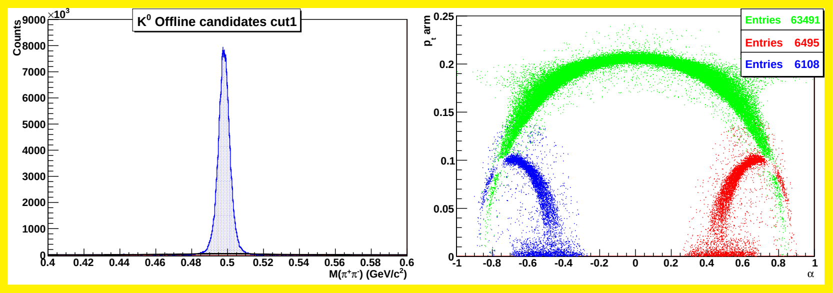


For select Λ^0 and $\bar{\Lambda}^0$ also implement a cut in the Armenteros-Podolanski variable $\alpha > 0$ and $\alpha < 0$ respectively.
From the figure, we saw it is necessary to remove the K_s^0

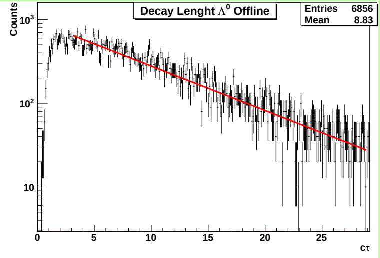
Results: Invariant Mass distributions

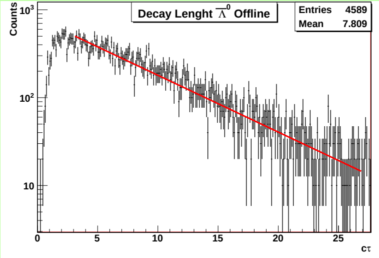


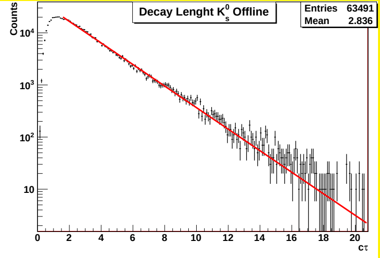
Implementing the optimized cuts the background diminishes for invariant mass distribution and the Armenteros podolanski plot.



Results: decay lenght







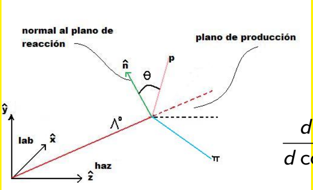
we get:

- $c\tau = 8.17 \pm 0.14$ cm para Λ^0 $\in (3, 29)$ cm
- $c\tau = 6.72 \pm 0.14$ cm para $\bar{\Lambda}^0$ $\in (3, 27)$ cm
- $c\tau = 2.10 \pm 0.01$ cm para $K_s^0 \in (1.5, 21)$ cm

$c\tau$			
V^0	$\|\eta\| < 1$	$\|\eta\| < 0.5$	PDG value
Λ^0	6.34 ± 0.08 cm	8.17 ± 0.14 cm	7.89 cm
$\bar{\Lambda}^0$	5.60 ± 0.07 cm	6.72 ± 0.14 cm	7.89 cm
K_s^0	3.08 ± 0.06 cm	2.10 ± 0.01	2.6842 cm

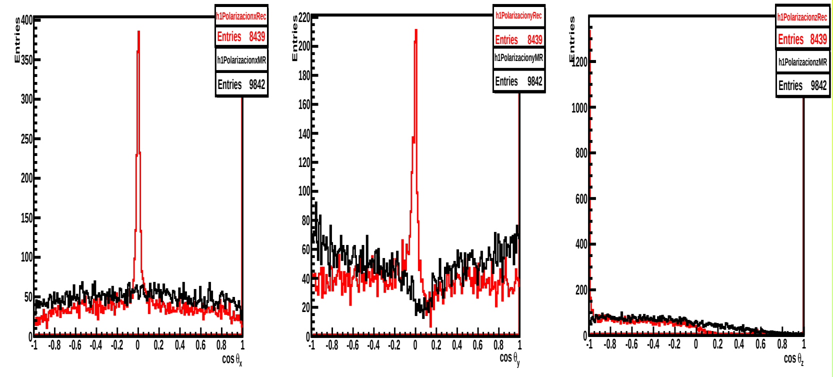
Results: Polarization

To measure certain quantities requires a clean signal, as $c\tau$ or things like polarization.

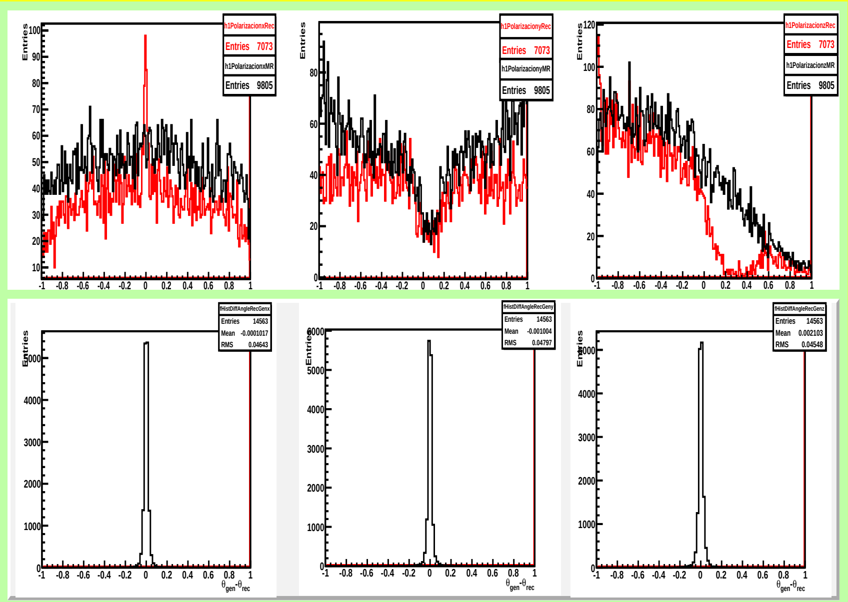


$$\hat{n} = \frac{\overrightarrow{P}_p \times \overrightarrow{P}_{\Lambda^0}}{|\overrightarrow{P}_p \times \overrightarrow{P}_{\Lambda^0}|}$$

$$\frac{dN}{d\cos\theta} = A(\cos\theta)(1 - \alpha P \cos\theta)$$



Adding a cut



h1PolarizacionxRec
Entries 7073
h1PolarizacionxMR
Entries 9805
h1PolarizacionyRec
Entries 7073
h1PolarizacionyMR
Entries 9805
h1PolarizacionzRec
Entries 7073
h1PolarizacionzMR
Entries 9805
Entries
fHistDiffAngleRecGenx
Entries 14563
Mean -0.0001017
RMS 0.04643
fHistDiffAngleRecGeny
Entries 14563
Mean -0.001004
RMS 0.04797
fHistDiffAngleRecGenz
Entries 14563
Mean 0.002103
RMS 0.04548
θgen-θrec