



SPRACE

V^0 Cut Based studies

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UNESP-SPRACE

Codes and Samples

CMSSW_10_3_3_patch1

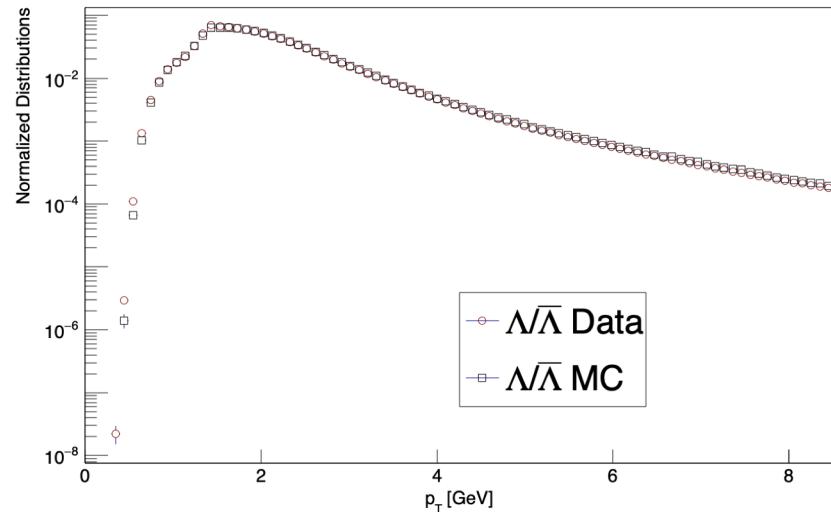
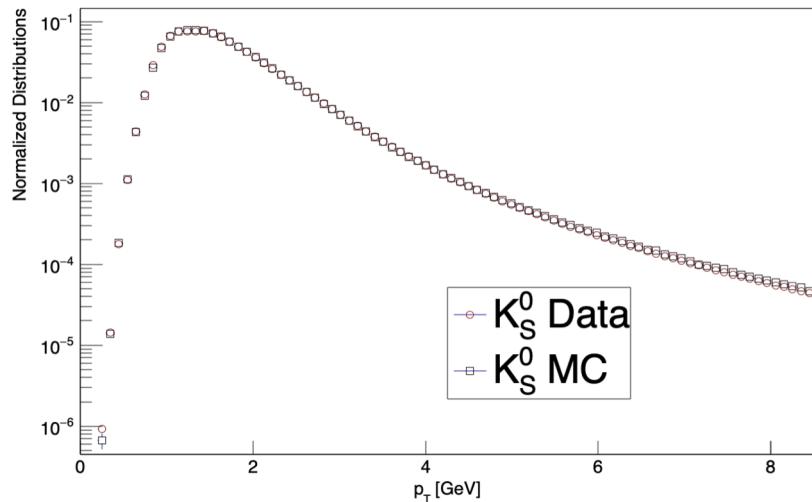
Samples

- ❑ MB Data
 - /HIMinimumBias4/HIRun2018A-04Apr2019-v1/AOD
- ❑ MB Hydjet MC
 - /MinBias_Hydjet_Drum5F_2018_5p02TeV/clindsey-RECODEBUG_20190625-5db5dfa073297cb96791f14c622e83e2/USER

V⁰ Skims

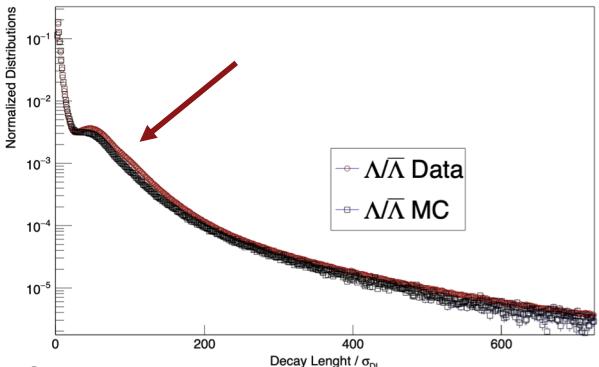
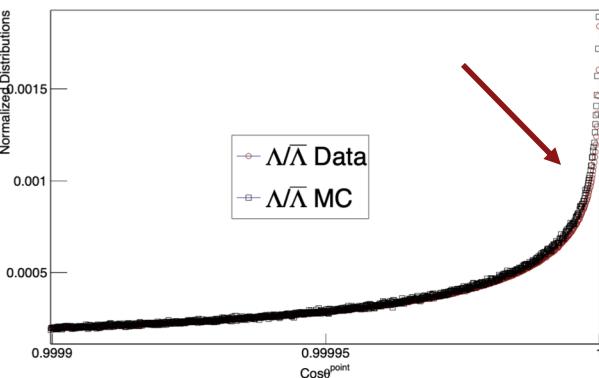
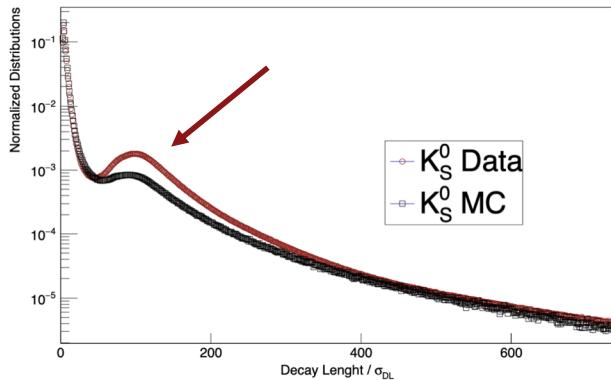
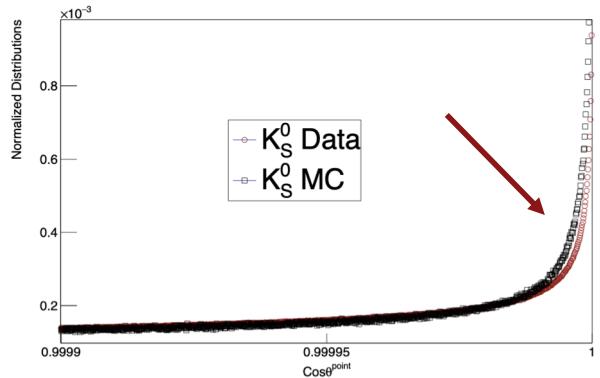
- ❑ Data
 - /HIMinimumBias4/qwang-V0Skim_v3-9d53152409b8a9b6fb15042030d9bf69/USER
(8.5 million events with at least one V⁰)
- ❑ MC
 - /MinBias_Hydjet_Drum5F_2018_5p02TeV/qwang-crab_HydjetDrum5F_RECDEBUG_V0Skim_v2-4fb2a1ba2f6b043399c08fb9db565e25/USER (Full)

Control plots



No cut applied

V^0 cut variables



No cut applied

V^0 cut based in 2018 PbPb@5.02TeV

2018 PbPb cuts tunned using MC and 2015 PbPb cuts from HIN-17-003

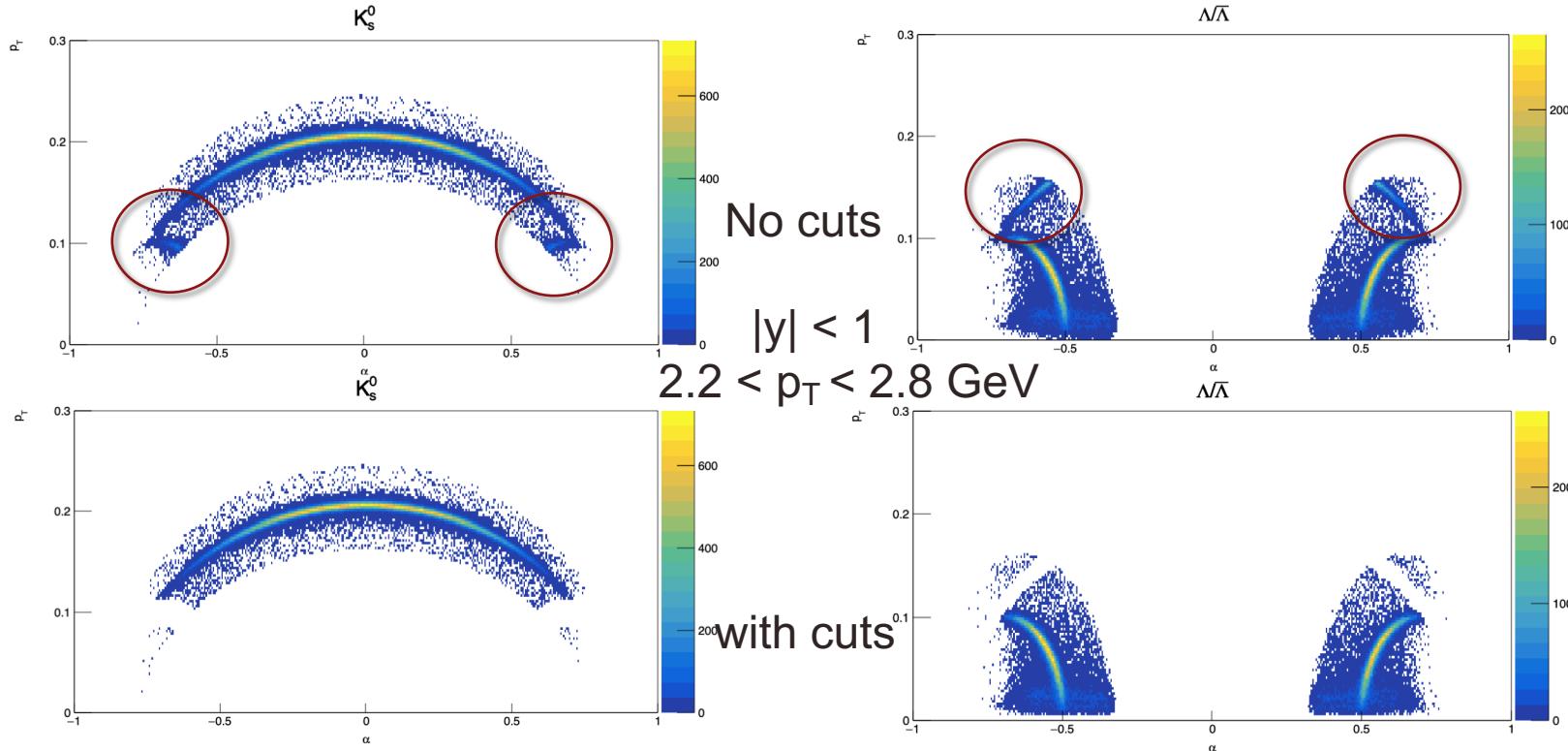
Variable	Standard	Loose	Tight	2015 PbPb (std)
$\cos \theta^{\text{point}}$	> 0.99995	> 0.9999	> 0.99999	> 0.9999
$\text{DL}/\sigma_{\text{DL}}$	> 5.0	> 4.0	> 7.5	Similar (loose > 2.5)
$V^0 \chi^2/\text{NDF}$	< 7.0	< 7.0	< 7.0	Same
Daughter N _{hits}	≥ 4	≥ 4	≥ 4	Same
$ \mathbf{d}_z/\sigma_z \& \mathbf{d}_{xy}/\sigma_{xy} $	> 1.0	> 1.0	> 1.25	Same
DCA between daughters	< 1.0	< 1.0	< 0.5	< 0.5

Daughter Kinematics: $p_T > 0.2 \text{ GeV}$ and $|\eta| < 2.4$

Kinematics Recommended: $|y| < 1.0$ and $p_T(K_s^0) > 1.0 \text{ GeV}$ and $p_T(\Lambda/\bar{\Lambda}) > 1.8 \text{ GeV}$

For full $|y|$ and/or lower $p_T (> 0.6 \text{ for } K_s^0 \text{ and } > 1.4 \text{ for } \Lambda/\bar{\Lambda})$ remove 0-10% central events for K_s^0 and/or 0-20% central events for $\Lambda/\bar{\Lambda}$

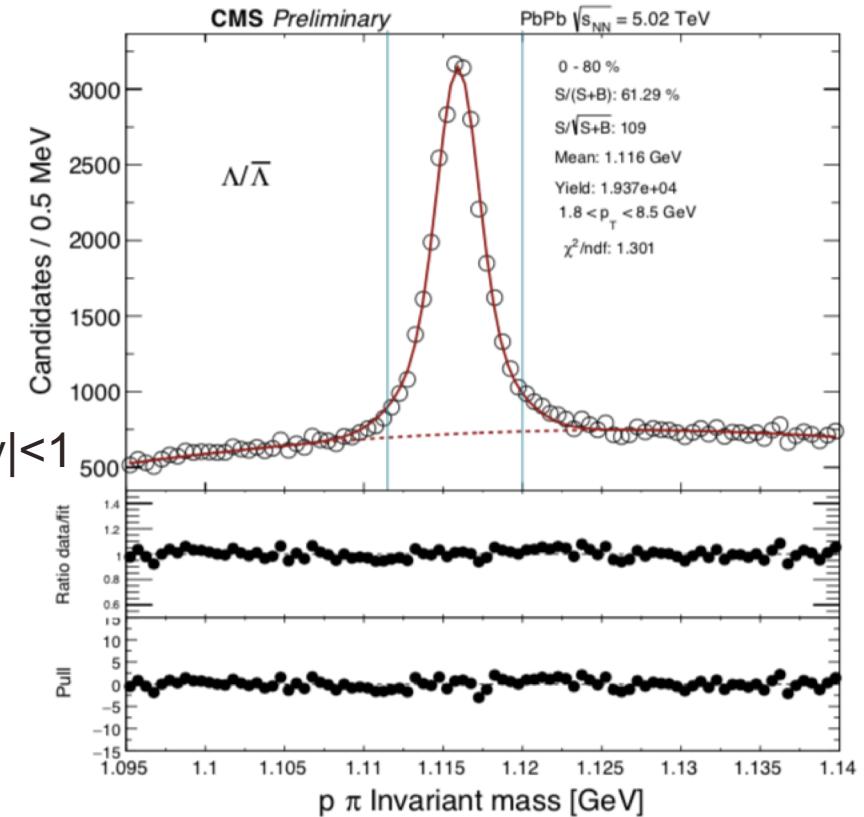
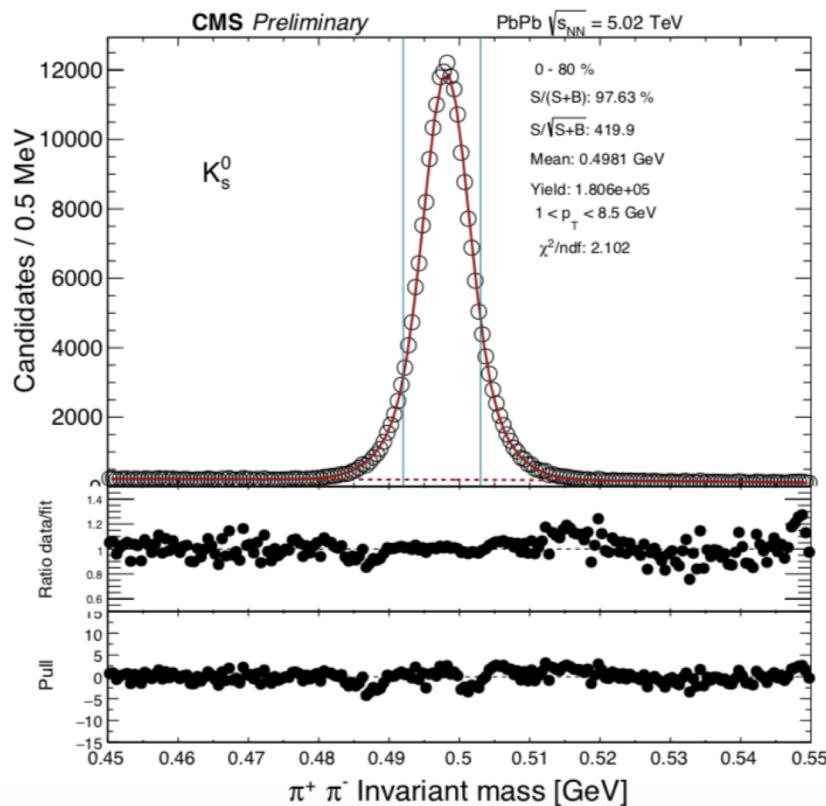
Armenteros-Podolanski plot



To remove K^0_s misidentified as $\Lambda/\bar{\Lambda}$ particles and vice versa, the $\Lambda/\bar{\Lambda}$ (K^0_s) must have a corresponding $\pi^+\pi^-$ ($p\pi^-$) mass more than 20 (10) MeV away from the PDG value of the mass.

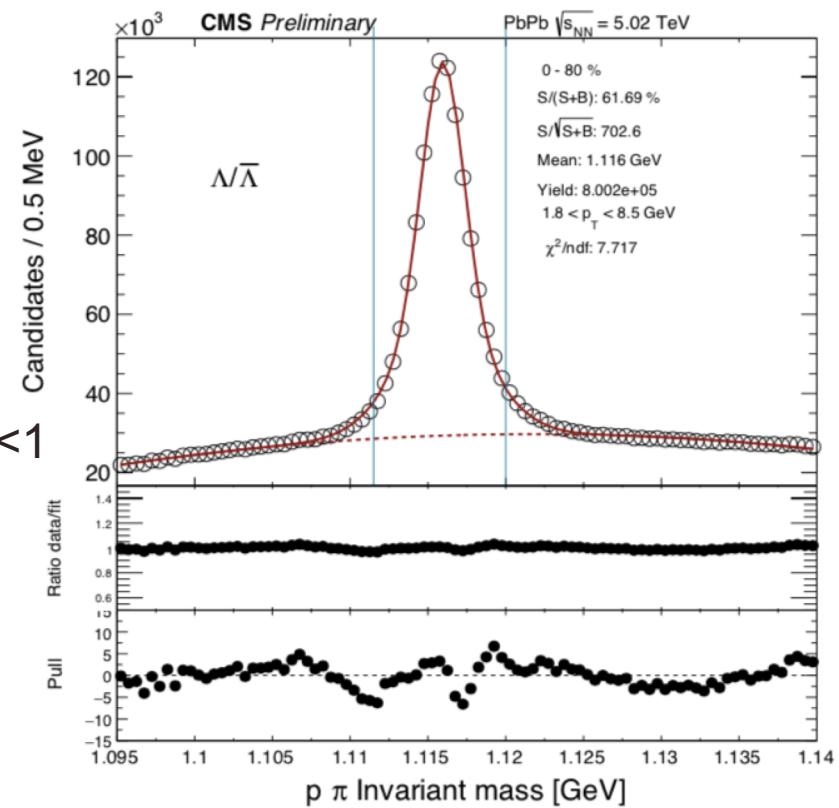
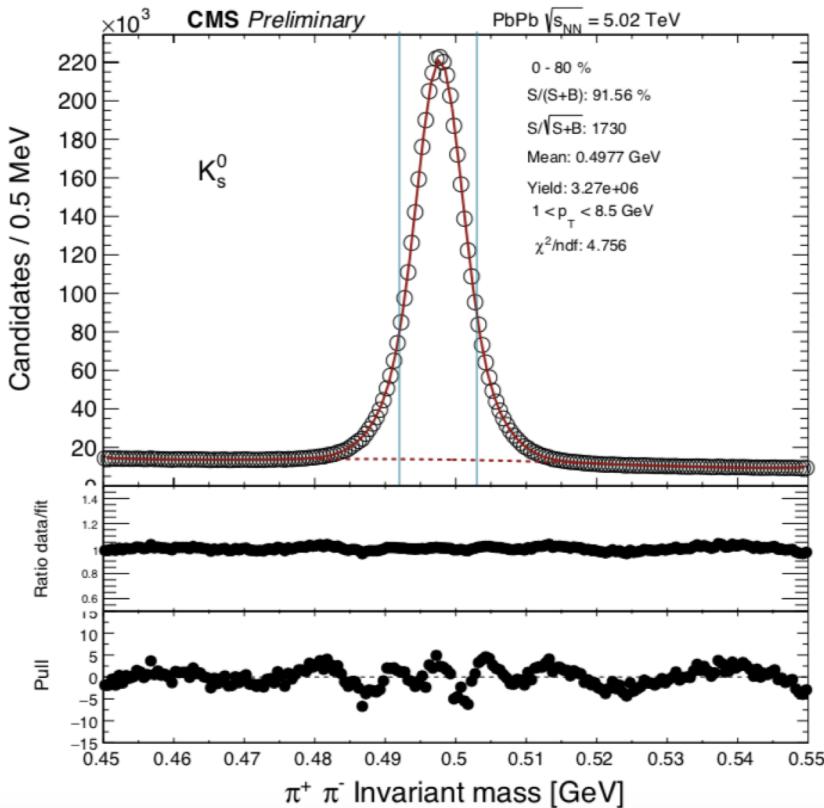
For the photon contamination is applied a cut of 15 MeV.

Invariant Mass (Hydjet MC)

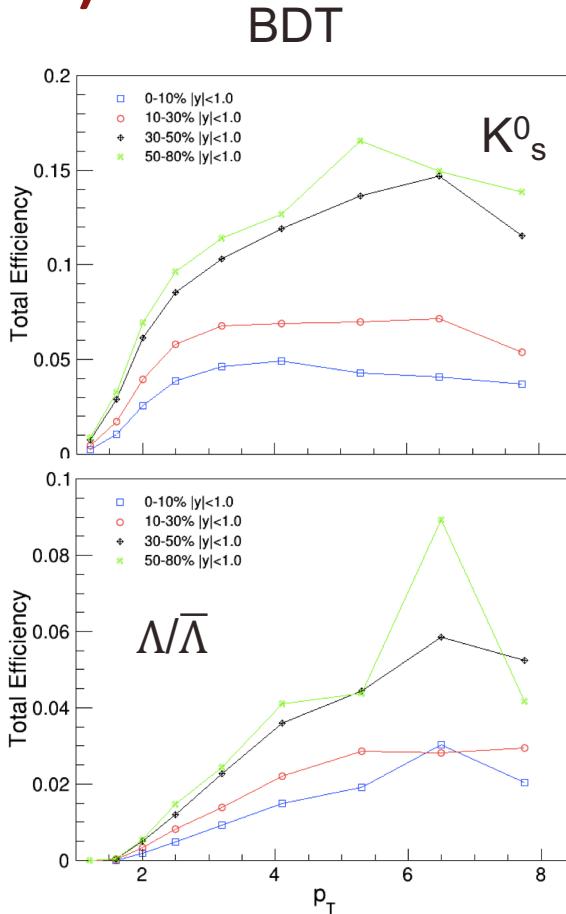
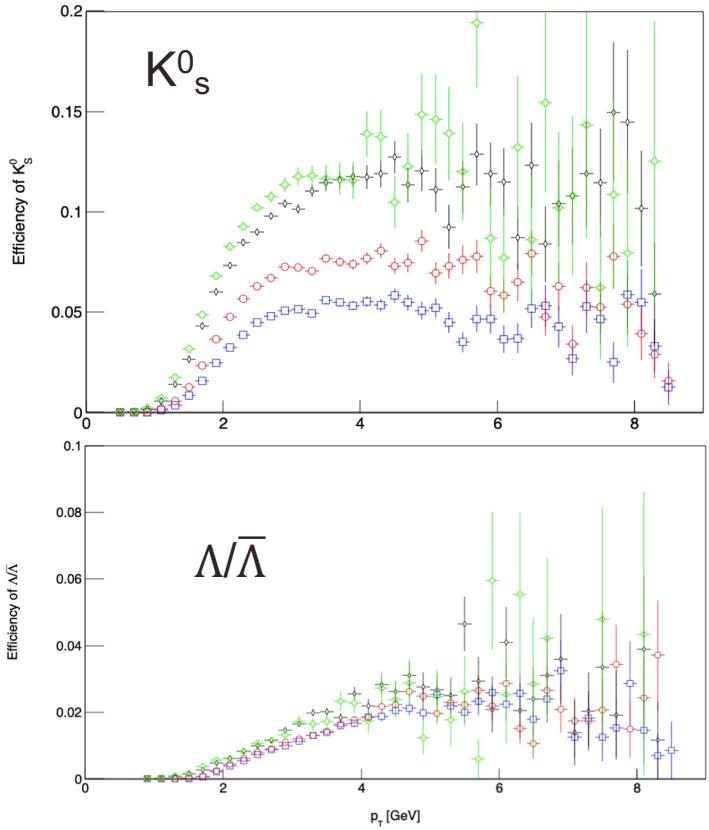


Signal Mass range - K^0_S : [0.492, 0.503] and $\Lambda/\bar{\Lambda}$: [1.1115, 1.1200]

Invariant Mass (Data)

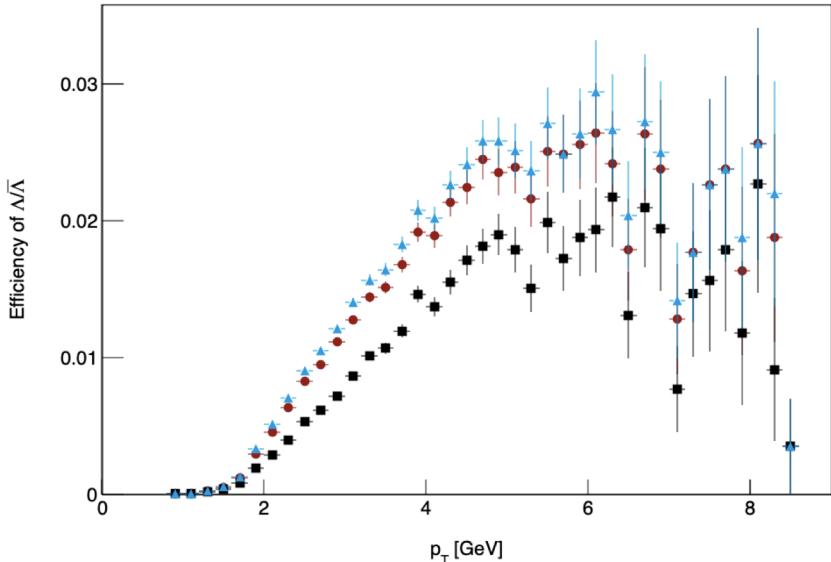
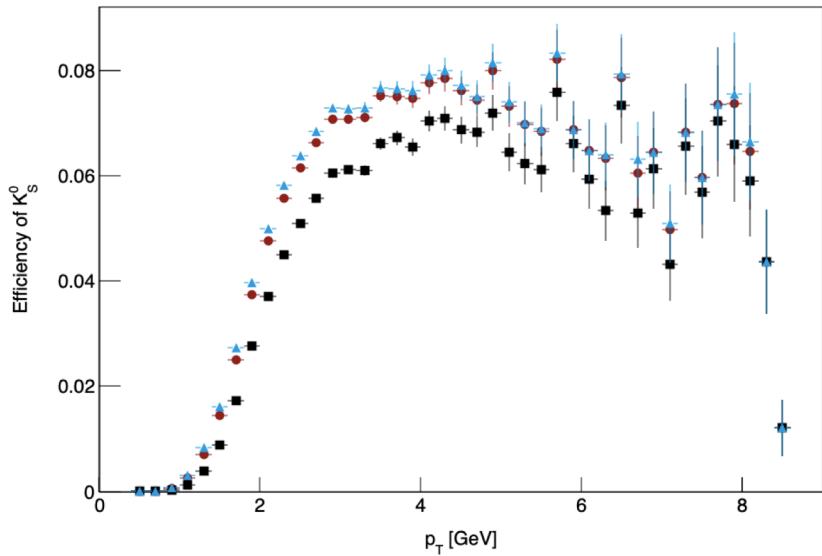


Efficiency (compared to BDT)



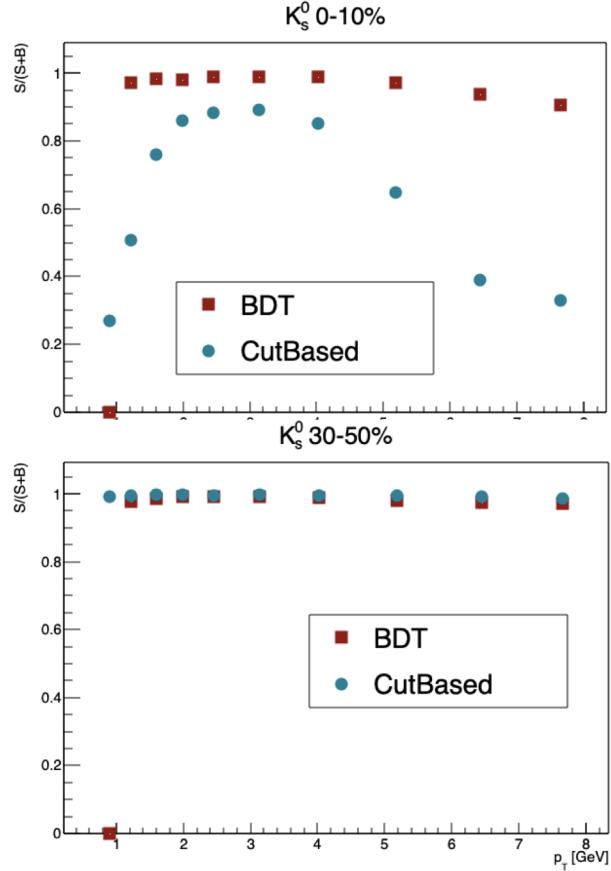
Efficiency of the cuts

$|y| < 1$
0-80%

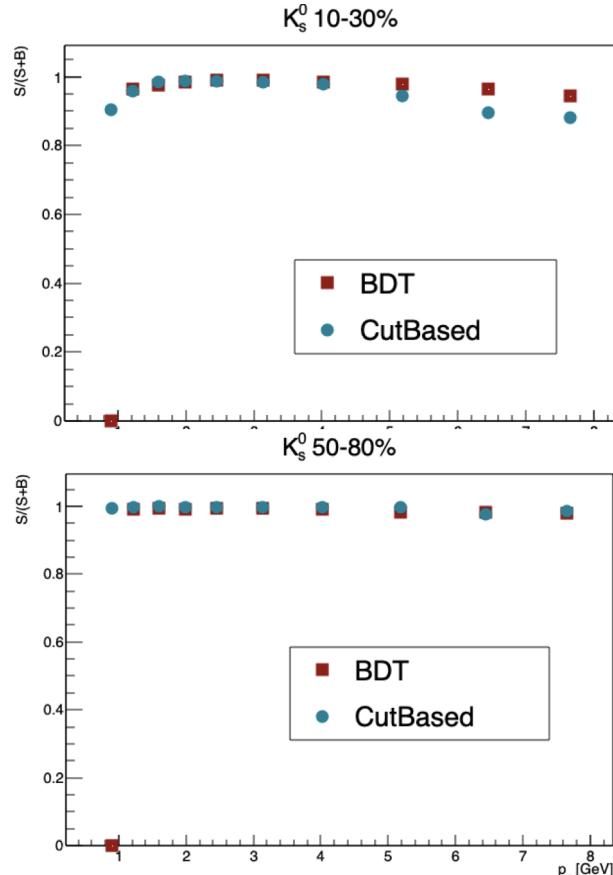


Loose
Standard
Tight

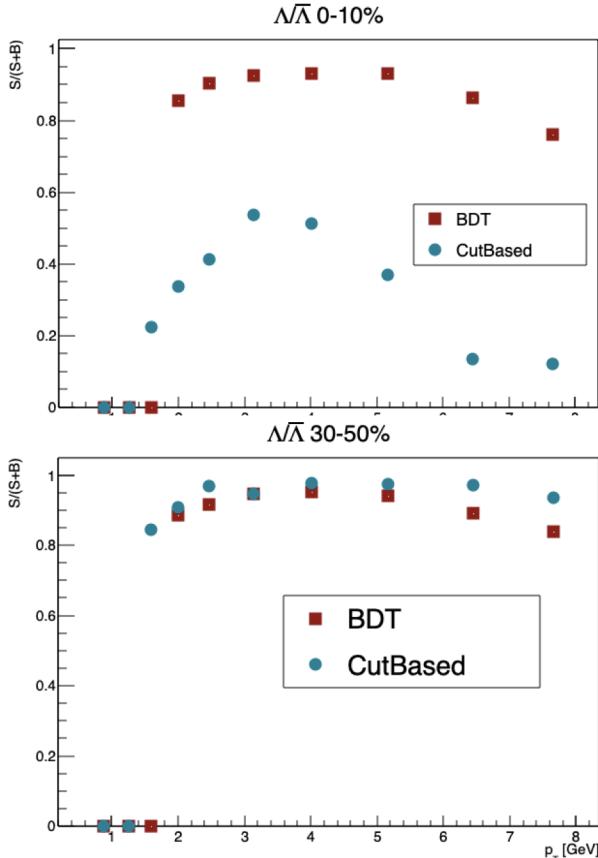
K_s^0 Signal fraction



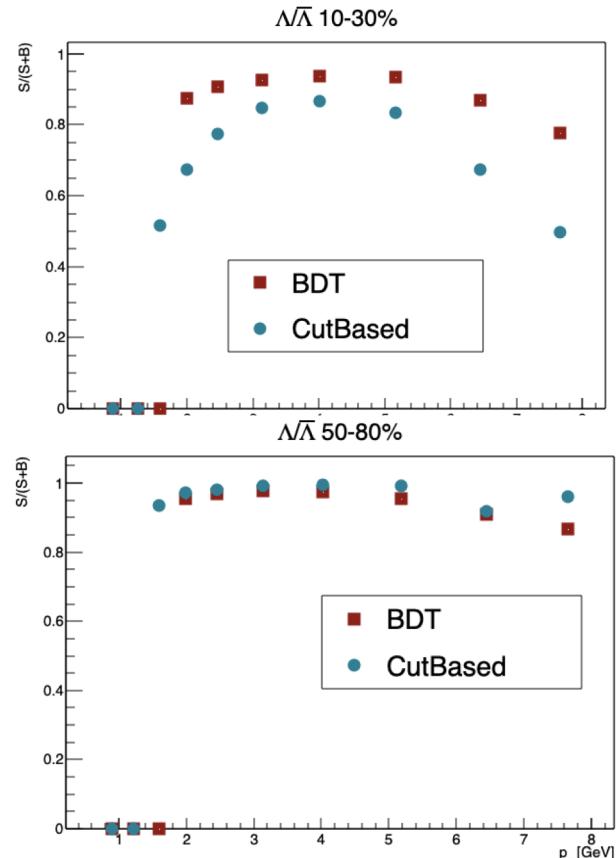
$|y| < 1$



$\Lambda/\bar{\Lambda}$ Signal fraction



$|y| < 1$



Conclusions

The cut based study for V^0 's was optimized

- ❑ The small gain in lower p_T and full $|y|$ range, excluding centrality bins, probably also can be optimized/checked by using BDT

In comparison with BDT, is possible to see a good agreement, in events with more than 30% (20%) centrality for $\Lambda/\bar{\Lambda}$ and 10% centrality for K_s^0

- ❑ For $\Lambda/\bar{\Lambda}$, and more central events, the BDT shows a better performance



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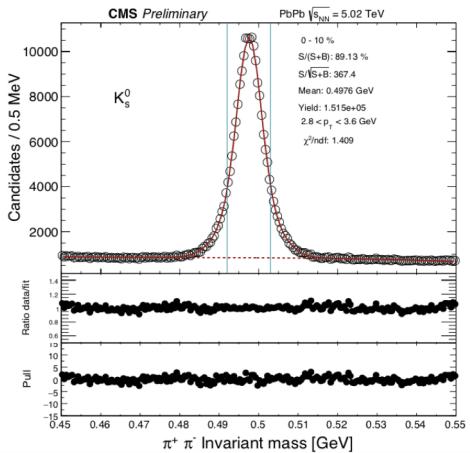
Backup



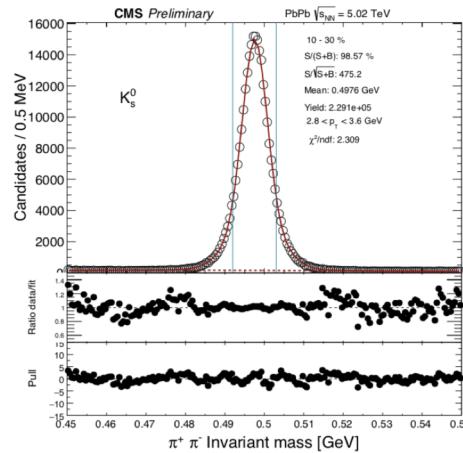
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p_T and centrality dependence

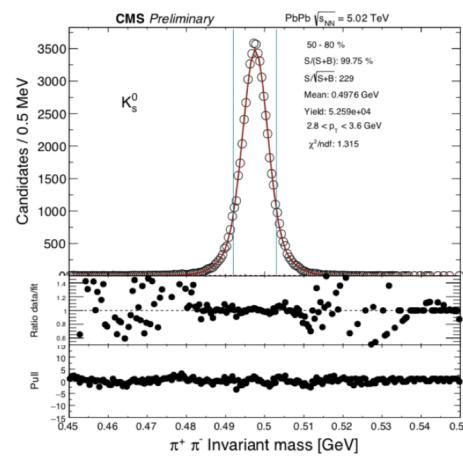
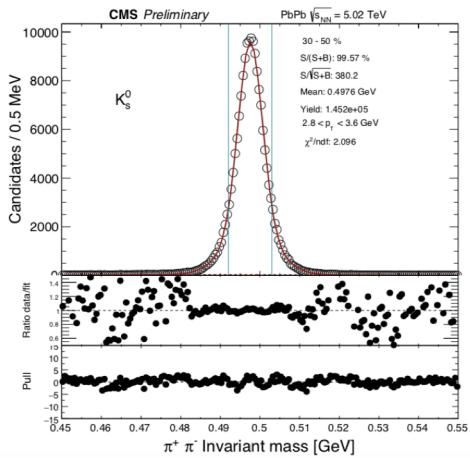
EXAMPLES: WITH $|Y| < 1.0$

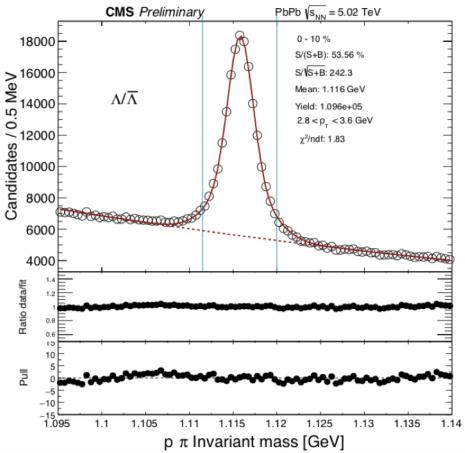


K_s^0

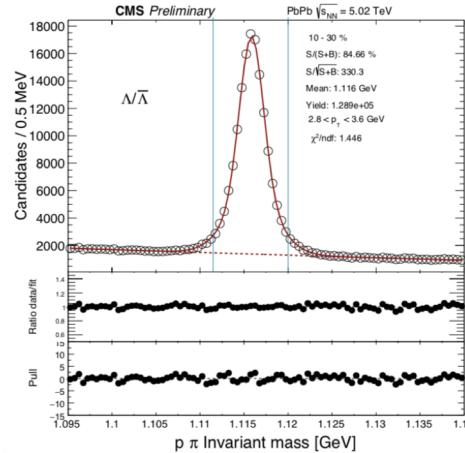


$2.8 < p_T < 3.6 \text{ GeV}$

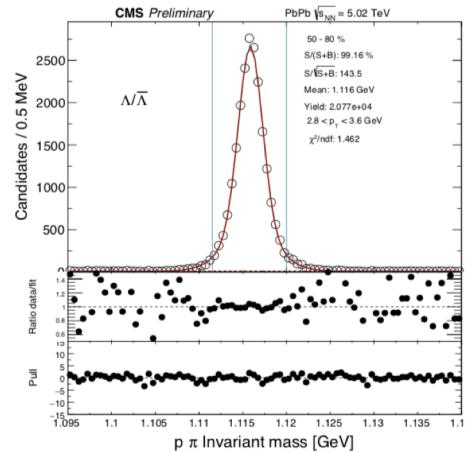
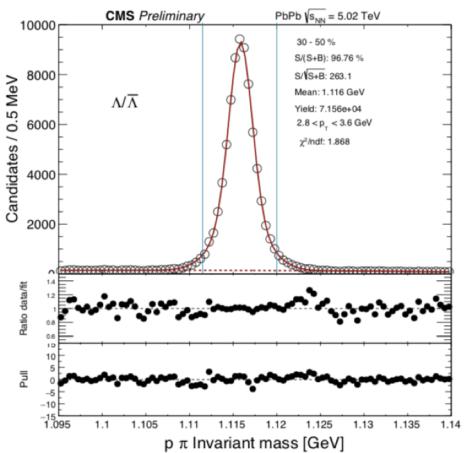




$\Lambda/\bar{\Lambda}$



$2.8 < p_T < 3.6 \text{ GeV}$

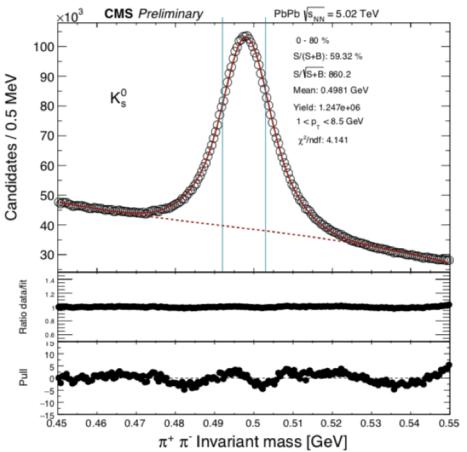




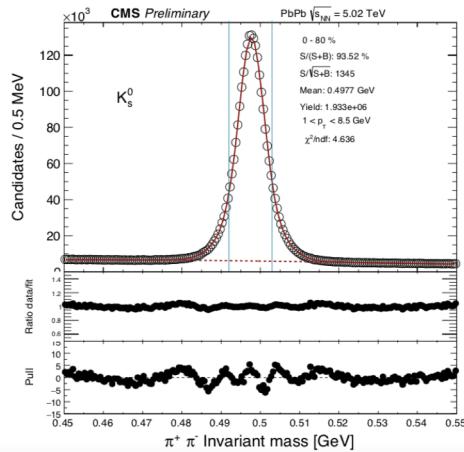
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y dependence

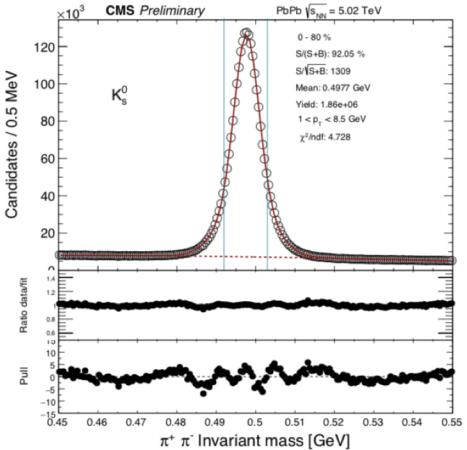
$y < -1$



K_0^S

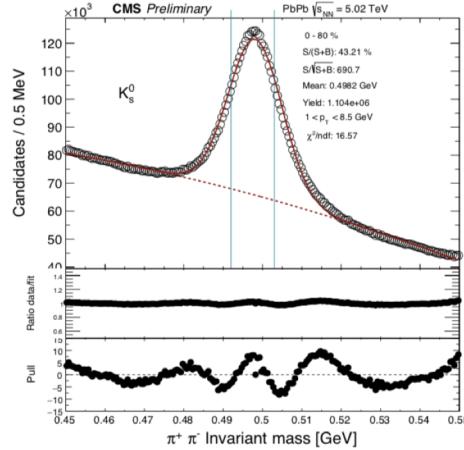


$0 < y < 1$



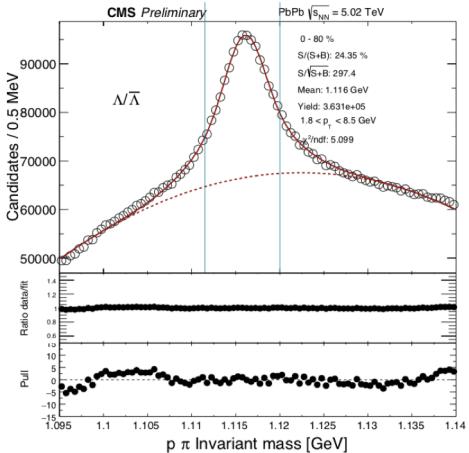
$1.0 < p_T < 8.5 \text{ GeV}$
0-80%

$-1 < y < 0$

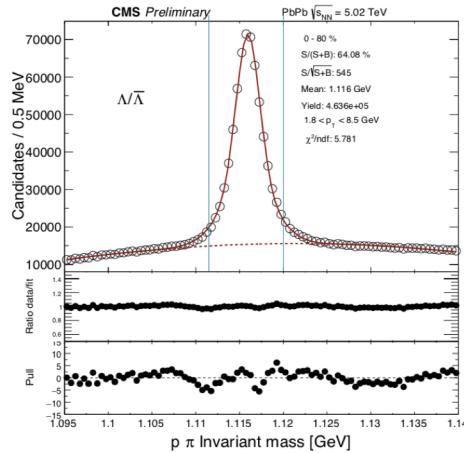


$y > 1$

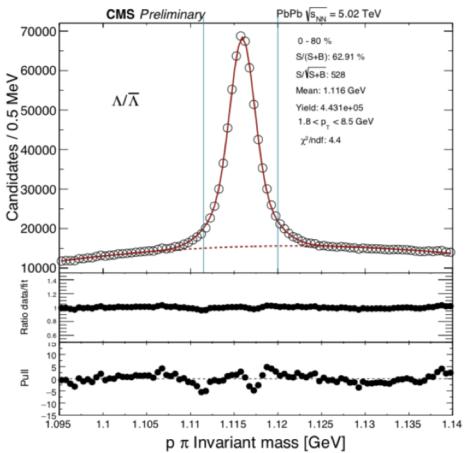
$y < -1$



$\Lambda/\bar{\Lambda}$

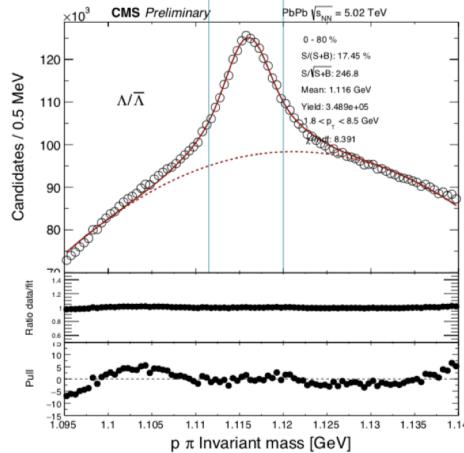


$0 < y < 1$



$1.8 < p_T < 8.5 \text{ GeV}$
0-80%

$-1 < y < 0$



$y > 1$