Efficiency and Uncertainty

PC members

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1 Efficiency

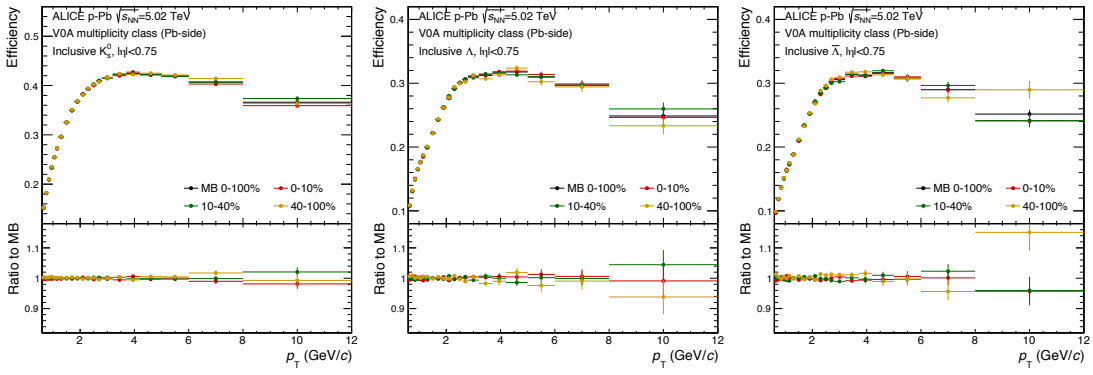

Figure 1: Efficiency of inclusive V^0s in three event activities and MB events.

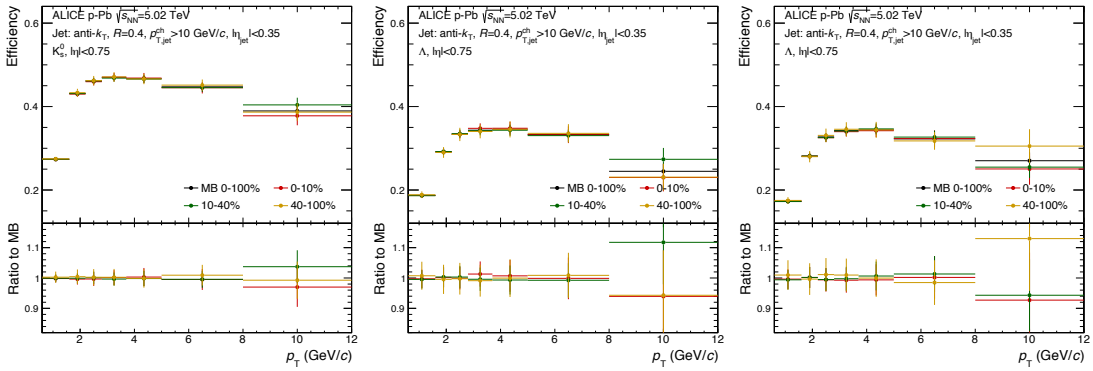

Figure 2: Efficiency of the V^0 in jets in three event activities and MB events.

The efficiency of inclusive V^0s and that of the V^0 in jets are shown in figure 1 and figure 2, respectively. The results are shown in three event activities and

compared to that in MB events. It shows that these two kind of efficiencies are insensitive to event multiplicity.

In paper, we used the efficiency in 0–10% event activity estimated by V0A. But these choice does not change any physics information, since:

- Efficiency is insensitive to event multiplicity.
- Results in MB events should close to that 0–10% event activity due to the most central collisions have the largest (multiplicity) weight.

2 Systematic uncertainty

2.1 Uncertainty source of inclusive V^0s

The source of systematic uncertainty of inclusive V^0s is concluded in [1] see also [2] for details. It includes:

- Uncertainty on V^0 yields
- Uncertainty on material budget
- Uncertainty on feeddown correction (for Λ and $\overline{\Lambda}$)

The first one is obtained in this analysis and the other two are taken from [3] since these two analyses used the same data and MC samples. The uncertainty on V^0 yields contains:

1. Topological selections
2. Proper lifetime selection
3. Competing V^0 rejection
4. Track selection in TPC
5. Track PID in TPC
6. Signal extraction

in which

- The uncertainty on topological selections is obtained by varying five kind of cuts defined in table 5 (p. 32) in [1], results are shown in figure 42 (p. 33) in [1].

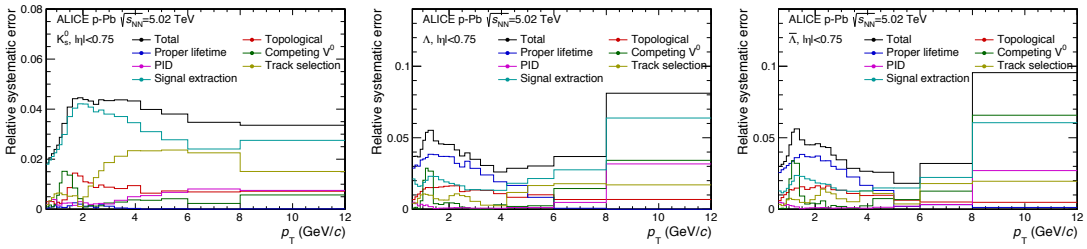

Figure 3: Systematic uncertainty of inclusive V^0s.

- The uncertainty on track selection in TPC is dependent on two variables defined in table 7 (p. 32) in [1], results are shown in figure 43 (p. 34)in [1].
- Other uncertainties on V^0 yields are obtained by following the same criteria defined in [2].

The sources of systematic uncertainty on V^0 yields are shown in figure 3.

2.2 Systematic uncertainty of V^0s in jets

The uncertainty source of V^0s in jets includes:

- Uncertainty on V^0 yields
- Uncertainty on material budget
- Uncertainty on feeddown correction
- Uncertainty on jet p_T scale
- Uncertainty on UE estimation

in which the uncertainty on material budget is taken from [3] and the same as inclusive V^0s.

For V^0s in jets, the uncertainty on V^0 yields has the same sources as inclusive V^0s. But they are separated into two catalogs:

- Uncertainty independent on statistics (the first five uncertainty sources)
- Uncertainty depend on statistics (the last one uncertainty on signal extraction)

The uncertainties in the first catalog is taken from the inclusive analysis directly. The last uncertainty is estimated by using V^0s matched to the jet with the same criteria as inclusive V^0s. The uncertainty on signal extraction is sensitive to statistic fluctuations a constant value of 6% (10%) is aligned to V^0s in jets in $p_T > 10$ GeV/c (> 20 GeV/c).

By considering the feeddown contribution for inclusive V^0s and V^0s in jets may be different, based on PYTHIA simulations, an additional 5% uncertainty is added in uncertainty on feeddown correction to cover the difference.

Uncertainty on jet p_T scale is estimated by varying the jet p_T within 10%: 2 GeV/c (4 GeV/c) for $p_{T,jet} = 10$ GeV/c (20 GeV/c).

Uncertainty on UE estimation is obtained via different estimators. The default value is given by PC estimator. The uncertainty is estimated via the OC and NJ estimators.

2.3 Uncertainty propagation

The uncertainty of Λ/K^0_S ratio is obtained via the following approach:

1. The uncertainties on V^0 yields, material budget and feeddown correction are propagated to the ratio quadratically (the standard way). Note: according to ref [2] and [3] the uncertainty on material budget should NOT been cancelled in the ratio.

2. For the uncertainties on jet p_T scale and UE estimation, they are obtained by calculating the deviation of ratios between the default value and various selections.

2.4 Discussion

To be added

References

[1] X. Zhang, "Λ to K^0_S ratio inside and outside Jets in p–Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV with ALICE." ALICE-ANA-1595, Apr, 2014. `https://aliceinfo.cern.ch/Notes/node/306`.

[2] D. Dobrigkeit Chinellato, "K^0_S, Λ and $\overline{\Lambda}$ Spectra in pp at 7 TeV." ALICE-ANA-501, May, 2012. `https://aliceinfo.cern.ch/Notes/node/32`.

[3] **ALICE** Collaboration, B. B. Abelev *et al.*, "Multiplicity Dependence of Pion, Kaon, Proton and Lambda Production in p–Pb Collisions at $\sqrt{s_{\rm NN}} = 5.02$ TeV," *Phys. Lett.* **B728** (2014) 25–38, arXiv:1307.6796 [nucl-ex].