

K_S^0 analysis

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Event and track selection for the V^0 analysis

Event sample

Generation: Pythia 8, (p+p) at $\sqrt{S}=27$ GeV, SoftQCD(MB).
4 000 000 events (1 sec of data taking)

PV and V0 selection:

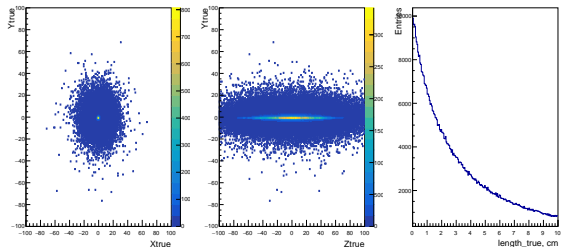
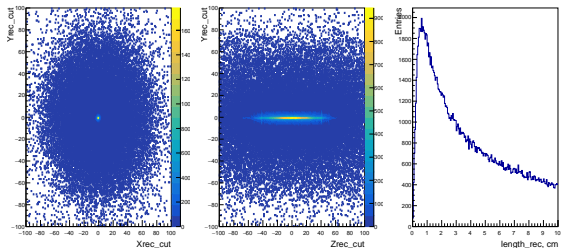
- 1 The primary vertex coordinates has a gaussian smearing with $\sigma_z = 30$ cm, $\sigma_x = \sigma_y = 0.1$ cm.
- 2 fMinItsHists = 0 - minimum Its hits for track selection
- 3 fDaughters = $K^0(-211, 211), \Lambda(2212, -211), \bar{\Lambda}(-2212, 211);$
Bg = (321,-321), (-321,211), (321,-211).
- 4 fMinChi2PV = 2.0 - minimum chi2 track to PV (primary selection)
- 5 fMaxChi2Part = 2.0 - maximum chi2 between 2 tracks (primary selection)
- 6 Chi2overNDF > 6 and isgood==1.
The track candidates were required to be well-fitted and to have a track fit χ^2 over the number of degrees of freedom less than 6.

Kinematical cuts:

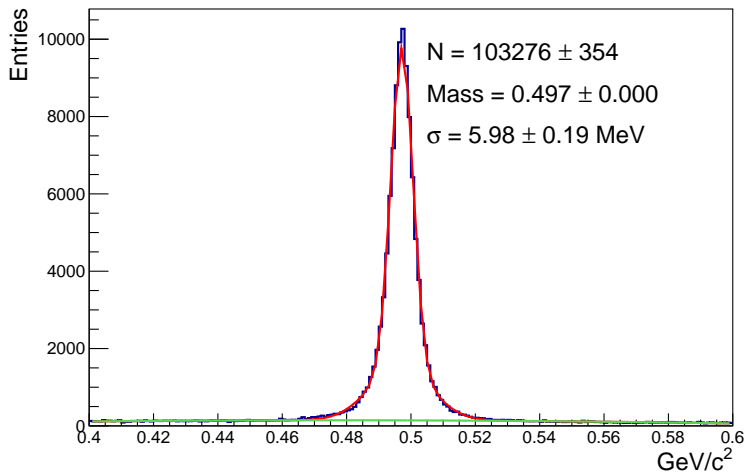
- 1 $Dist = \sqrt{(x_{SV} - x_{PV})^2 + (y_{SV} - y_{PV})^2 + (z_{SV} - z_{PV})^2}$.
This cut selects V^0 which decay close to PV. $Dist > 0.7$ cm for K^0 .
- 2 $\theta_{coll} < 0.03$ rad for K^0 . This cut selects V^0 events the momentum looking at the PV.

Spatial distribution (x,y), (z,y) for decay vertex of K^0 and Length

$$\text{Length} = \sqrt{(x_{\text{decay}} - x_{PV})^2 + (y_{\text{decay}} - y_{PV})^2 + (z_{\text{decay}} - z_{PV})^2}.$$

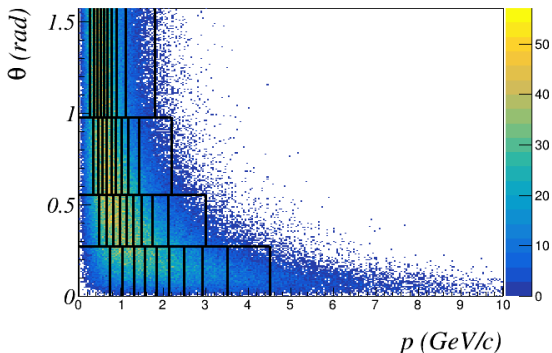


Invariant mass of K_S^0 after all cuts



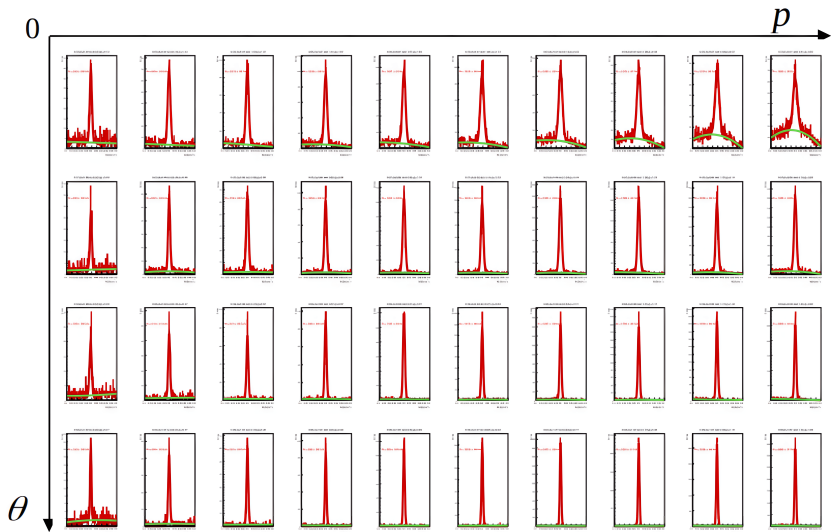
The shape of the K_S^0 signal was parametrized by double Gaussian and background was parametrized by the second order polynomial.

Binning

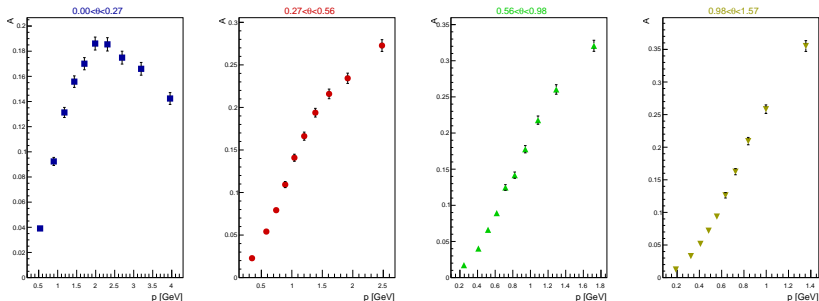


The choice of the binning scheme is obtained from distribution of K^0 simulated in Pythia 8. It was done to have the similar number of K^0 in bins ($n_{bin}^\theta = 4, n_{bin}^p = 10$).

Distributions of the K_S^0 candidates with all cuts



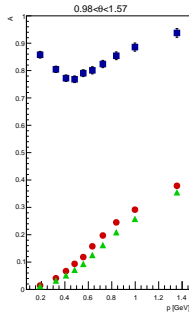
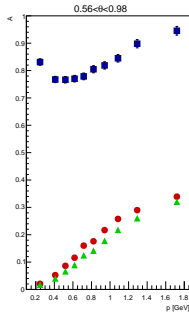
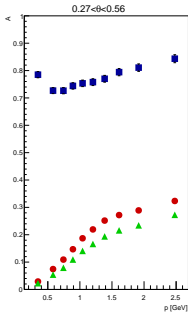
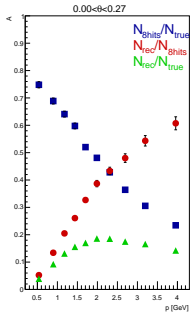
K_S^0 reconstruction efficiency with all corrections included ($A = N_{Rec}^{MC} / N_{true}^{MC}$)



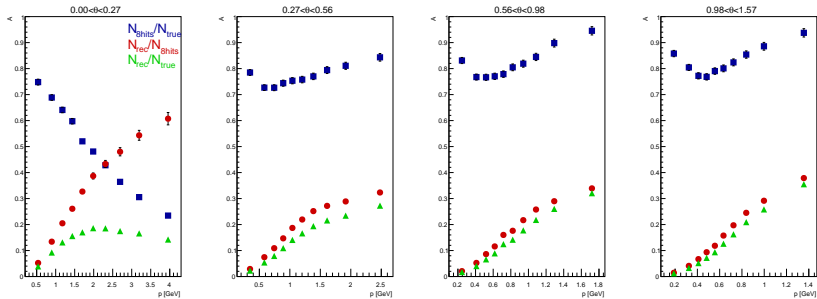
Total correction factor includes: geometrical acceptance, track and vertex reconstructed efficiency and feed down contribution.

Geometrical acceptance

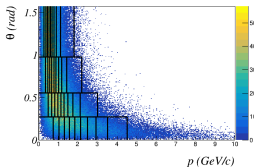
$$\frac{N_{Rec}}{N_{true}} = \frac{N_{Rec}}{N_{8hits}} * \frac{N_{8hits}}{N_{true}}$$



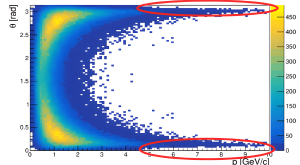
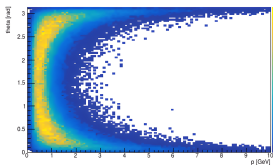
Geometrical acceptance



Pure Pythia 8, K_S^0 :



Reconstruction data:



Conclusion and TODO

- 1 Analysis of various factors affecting the K_S^0 reconstruction efficiency was performed.
- 2 The contribution of the geometrical acceptance is determined.
- 3 The next step is to separate out the other contributions.