

K_s^0 reconstruction in ALICE

Giuseppe Lo Re

INFN, Sezione di Catania, and Dipartimento di Fisica e Astronomia,

Università di Catania, Italy,

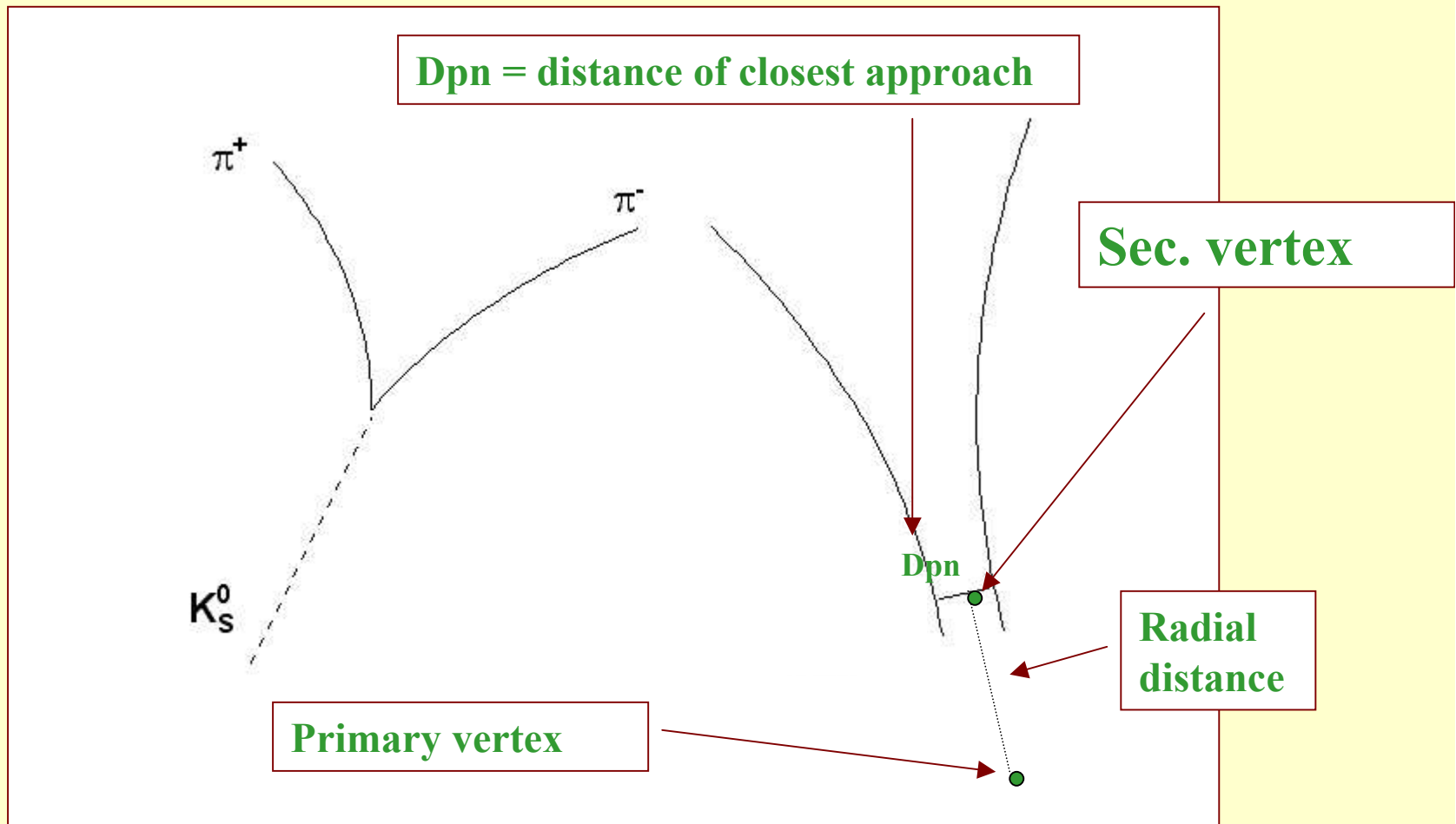
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Summary

- Introduction
- Simulation
- Optimization of cuts
- Results
- Conclusions

Introduction

V0 position = middle point between the two tracks at the distance of closest approach



Simulation

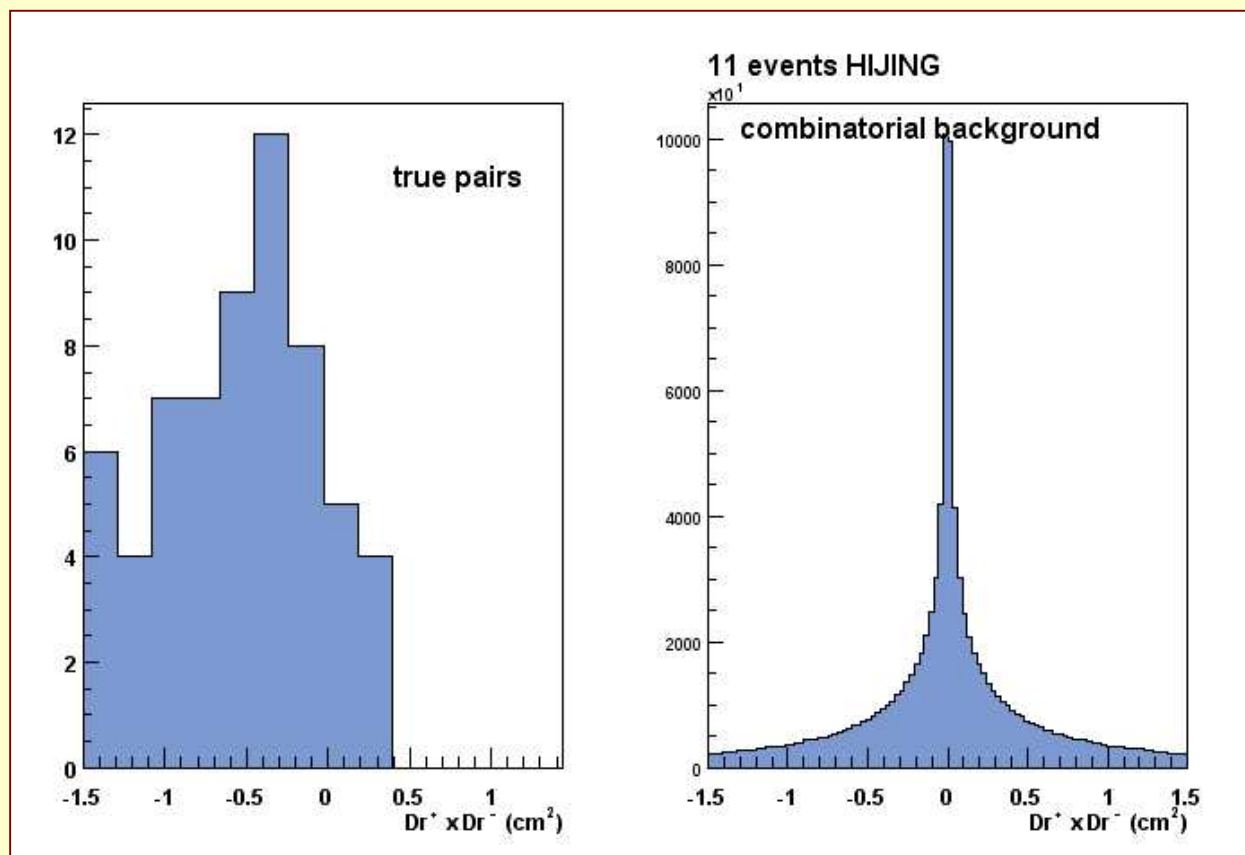
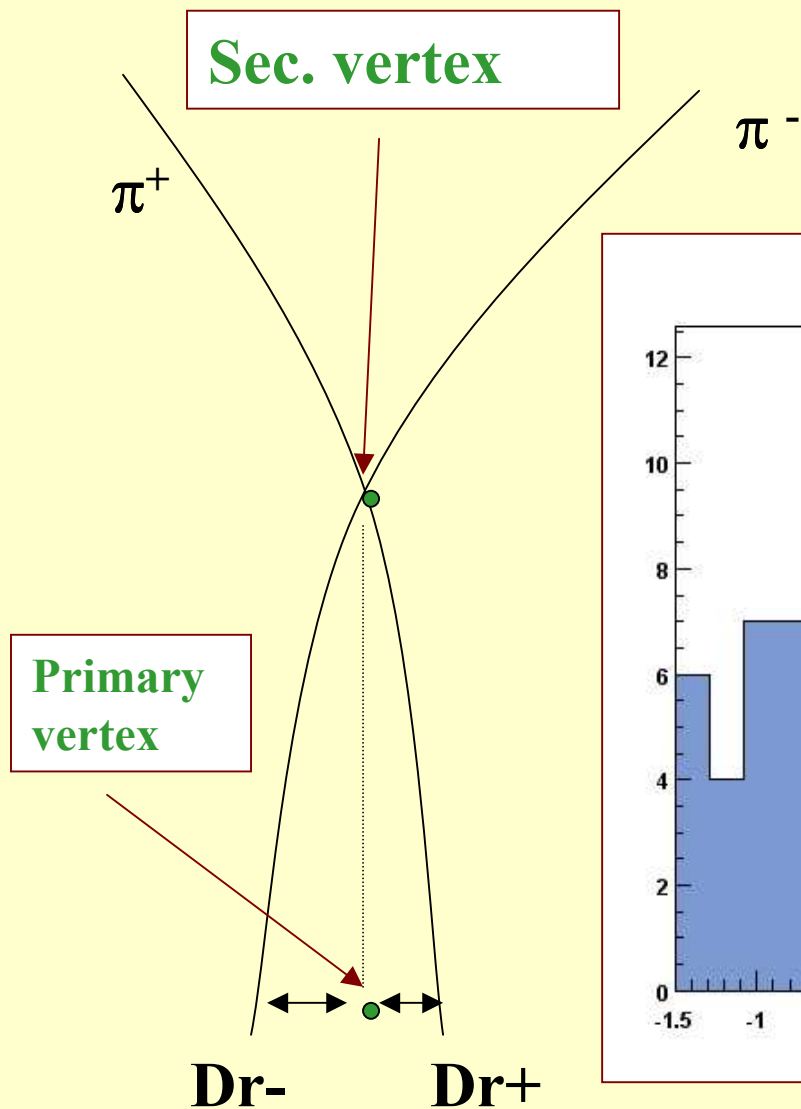
- **B = 0.2 T**
- **Aliroot v 3.06**
- **Event generator: HIJING (full)**
 - **generated 31 events with $b = 3$ fm**
- **“Slow” simulation of the ITS**
- **Tracking V1 in the ITS (with 6 points)**
 - **step 1: with vertex constraint**
 - **rejection of the “primary tracks”**
 - **step 2: without vertex constraint**
- **Straight line approximation from the beam pipe backwards to the primary vertex**
- **Combination of π^+ and π^- tracks and application of the cuts**
 - **search of K_S^0 within a fiducial region ($R=0.5-2.5$ cm)**

List of the cuts used

- **Cut 1:** product of the radial impact parameter ($D_{r-} * D_{r+}$)
- **Cut 2:** distance of closest approach (D_{pn})
- **Cut 3:** angle between the K_s^0 position vector and the K_s^0 momentum (β)
- **Cut 4:** impact parameter of the daughters (D)
- **Cut 5:** χ^2 of the daughters

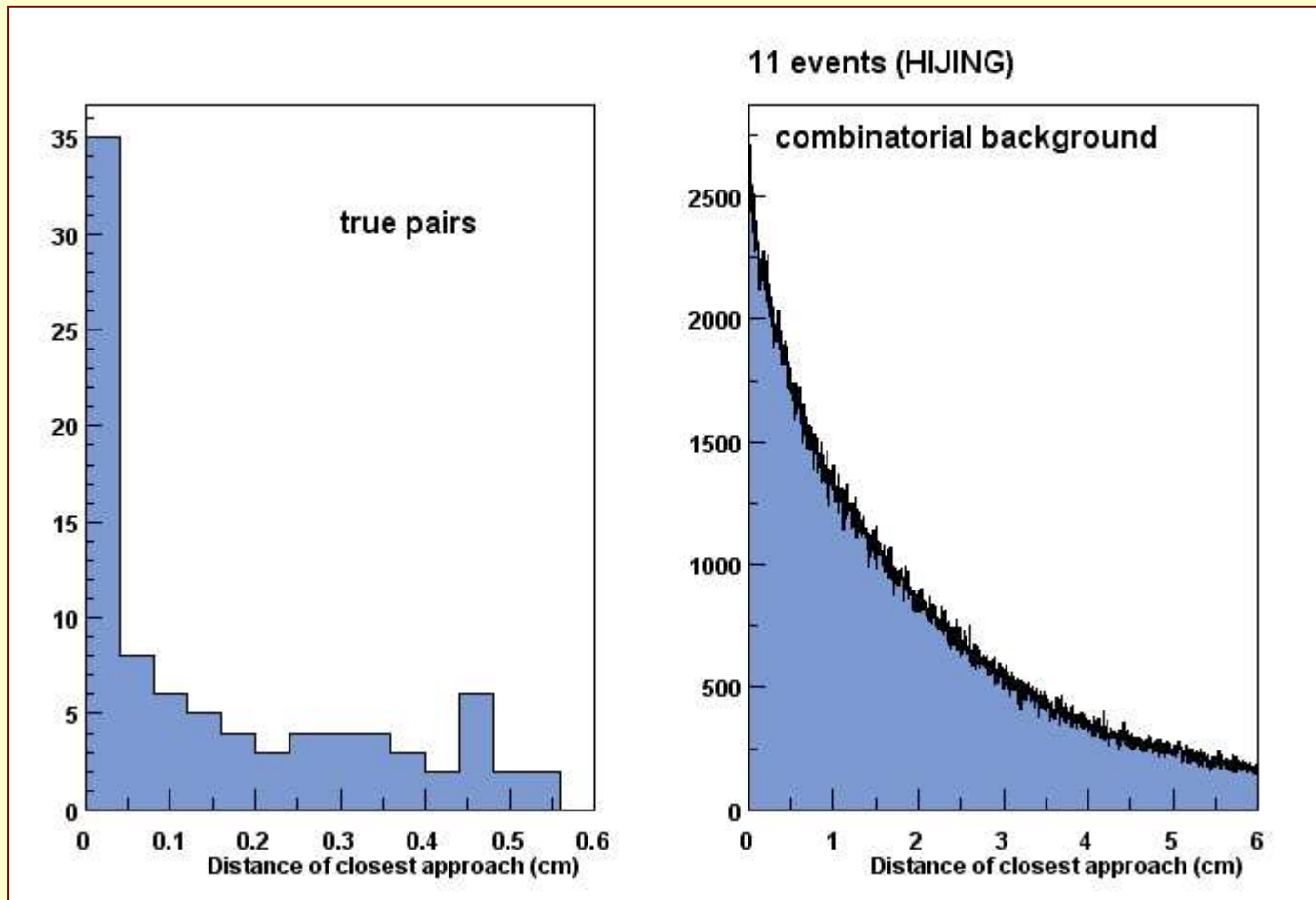
Cut 1: product of the radial impact parameter

$$Dr^- * Dr^+ < 0$$

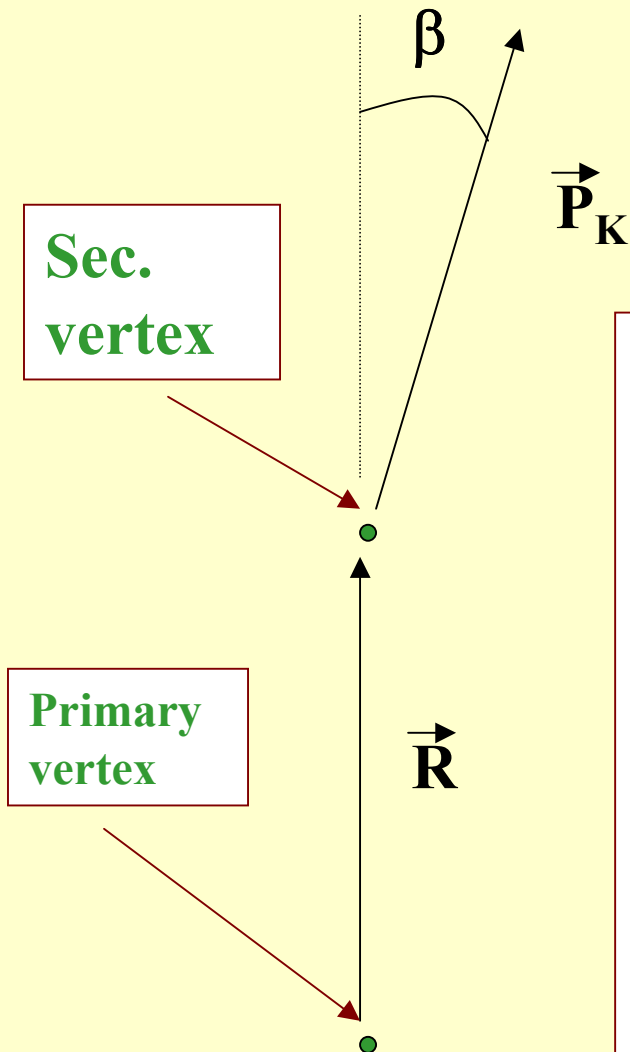


Cut 2: distance of closest approach (D_{pn})

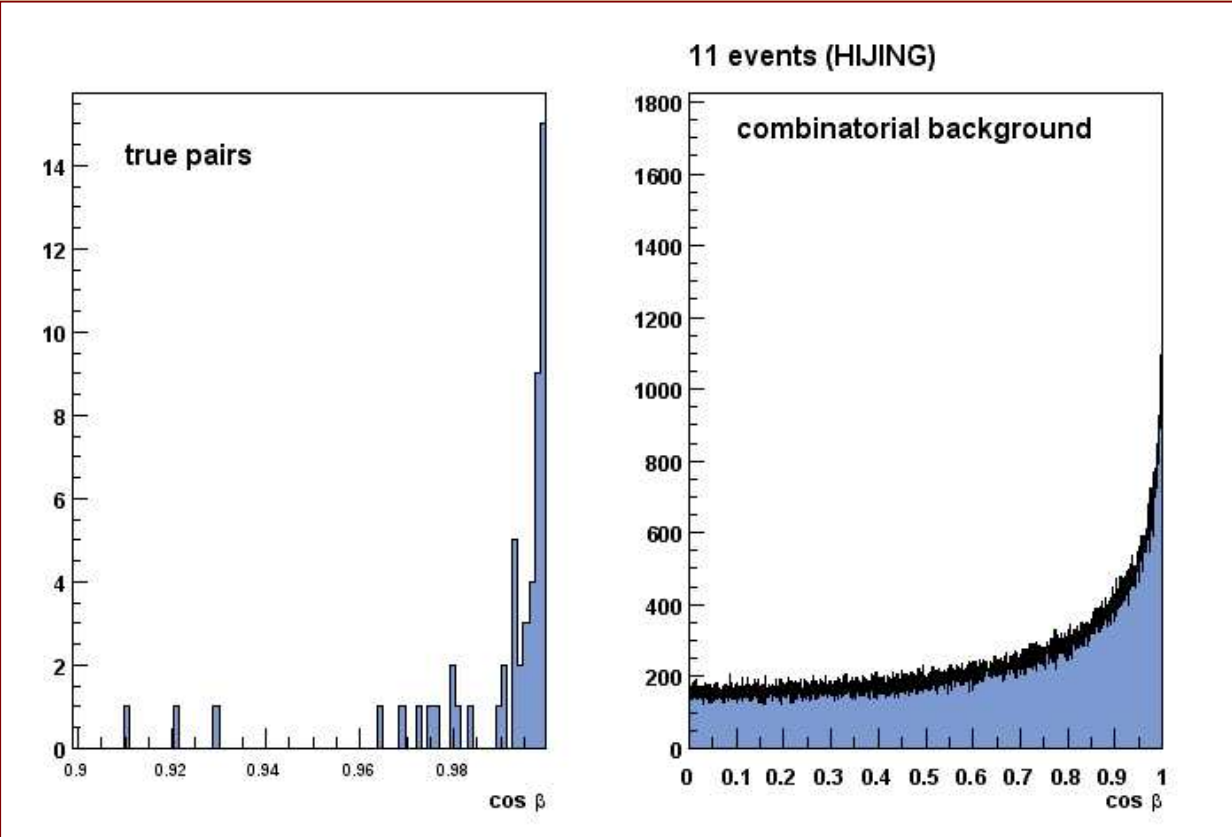
$$D_{pn} < 0.14 \text{ cm}$$



Cut 3: angle between the K^0_s position vector (\vec{R}) and the K^0_s momentum (\vec{P}_K)



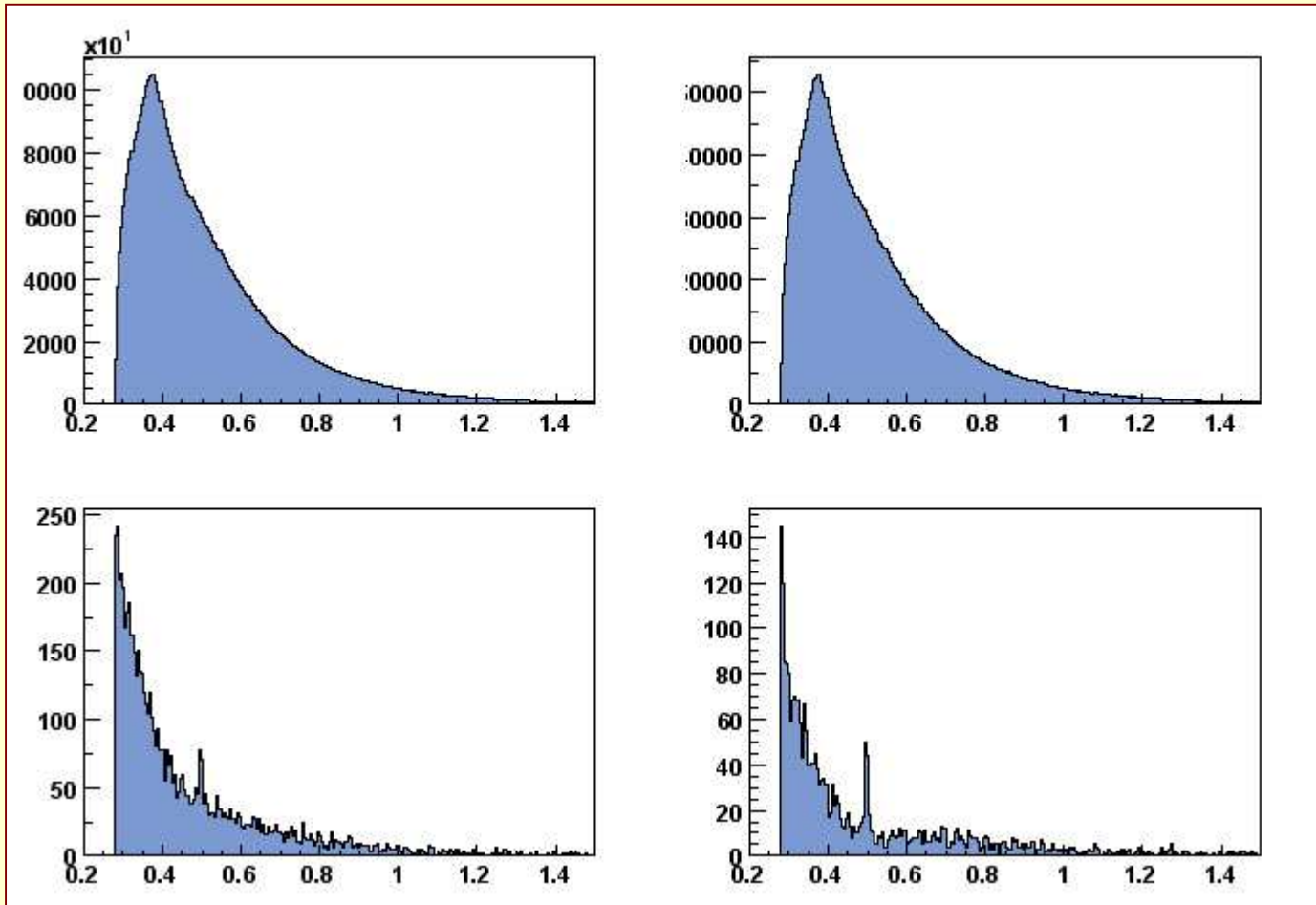
$\text{Cos } \beta > 0.9985$



Effect of cuts

Without any cut

$D_{r-} * D_{r+} < 0$

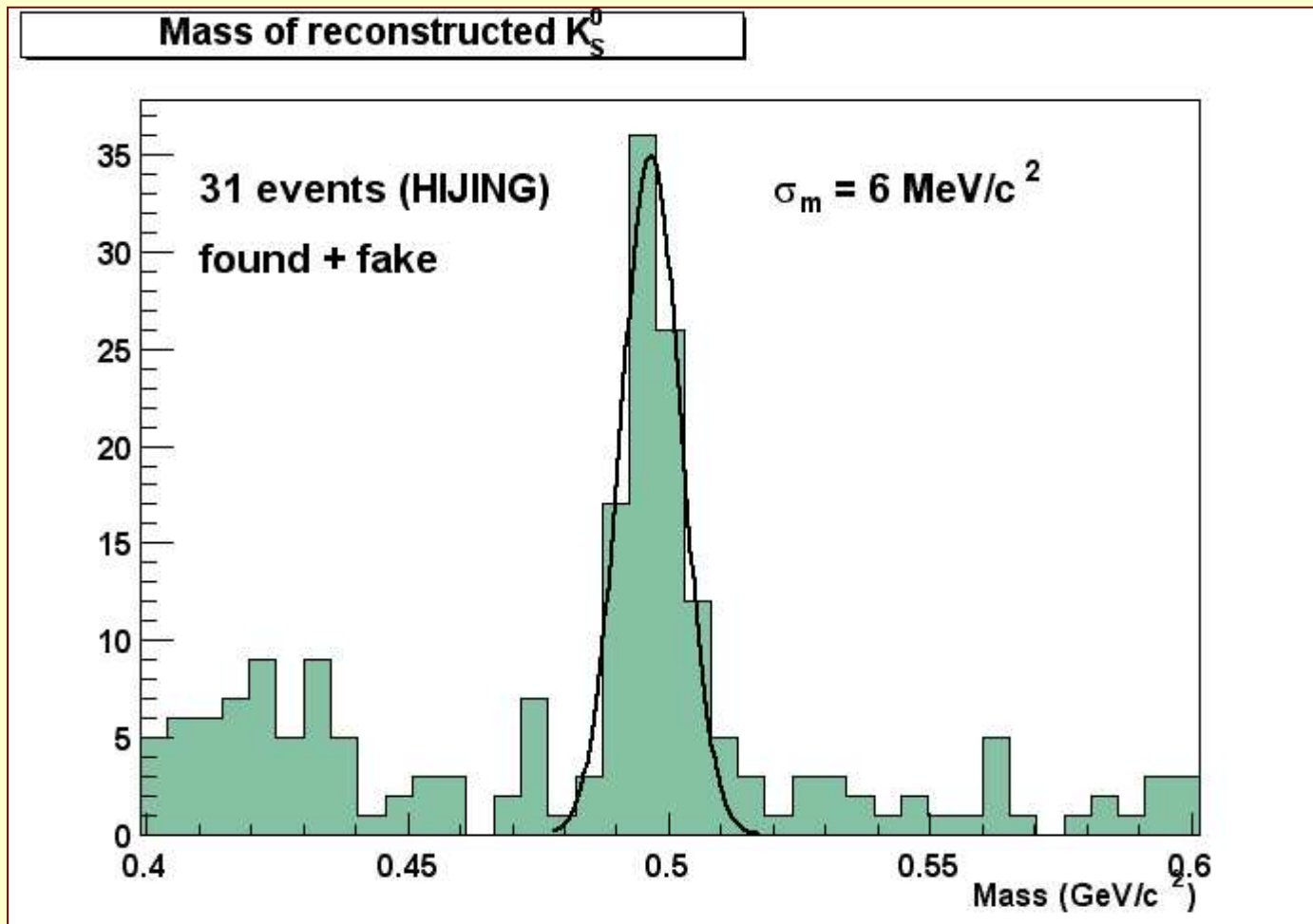


$\text{Cos } \beta > 0.9985$

Mass (GeV/c²)

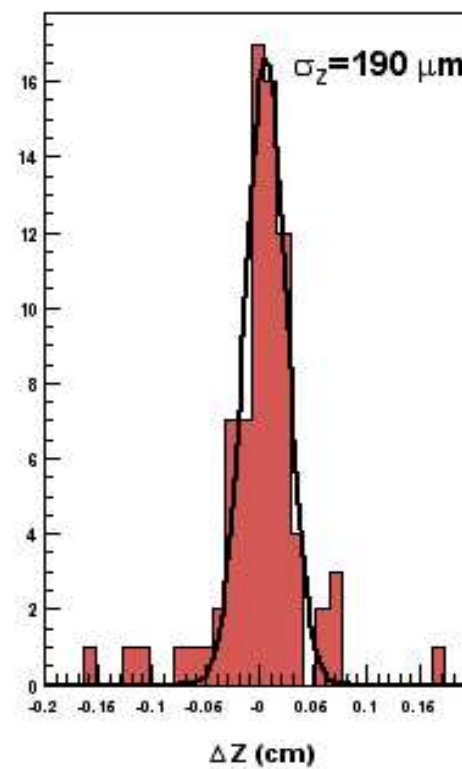
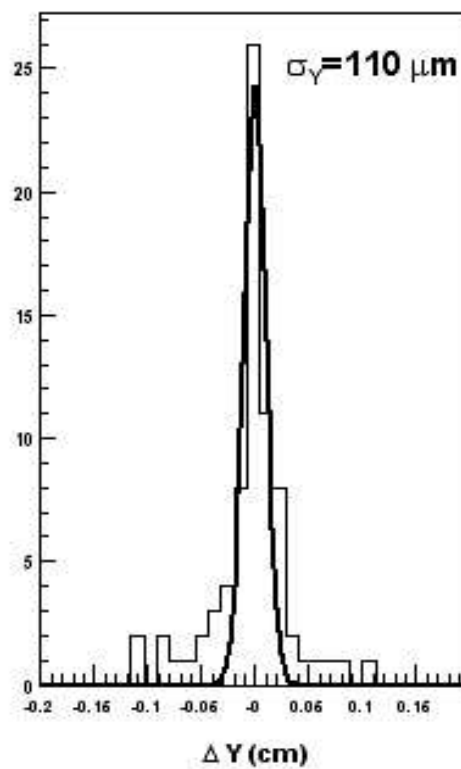
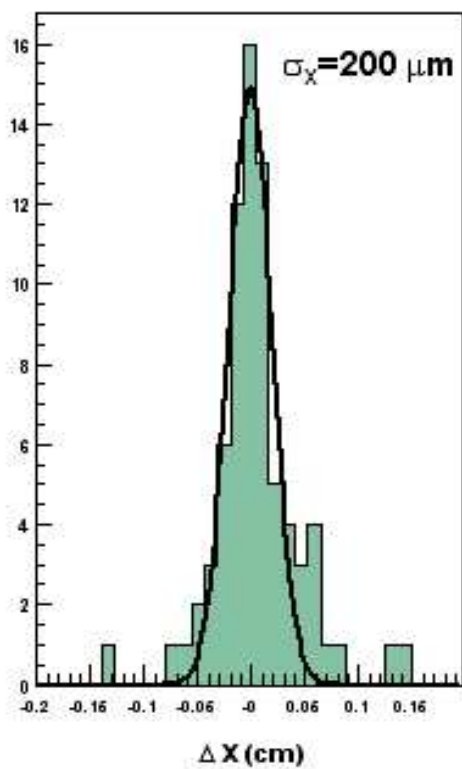
$D_{pn} < 0.14$ cm

Results



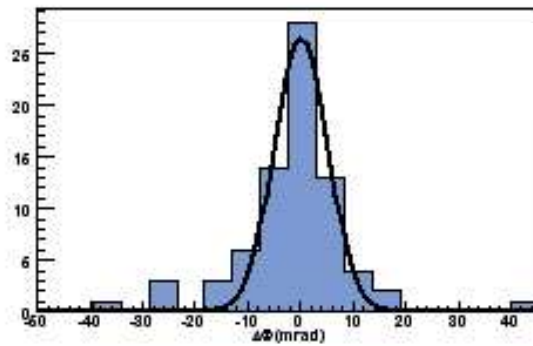
N. found $K_S^0 \approx 2.5$ per event

x, y and z resolution of secondary vertices

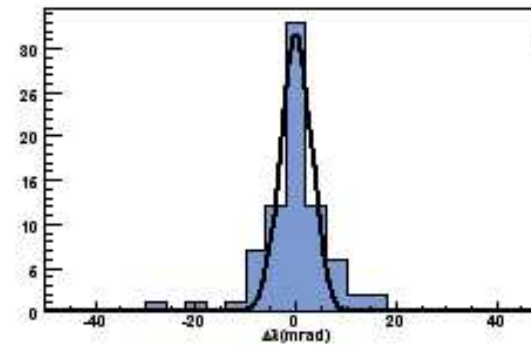


ϕ , λ and Pt resolution

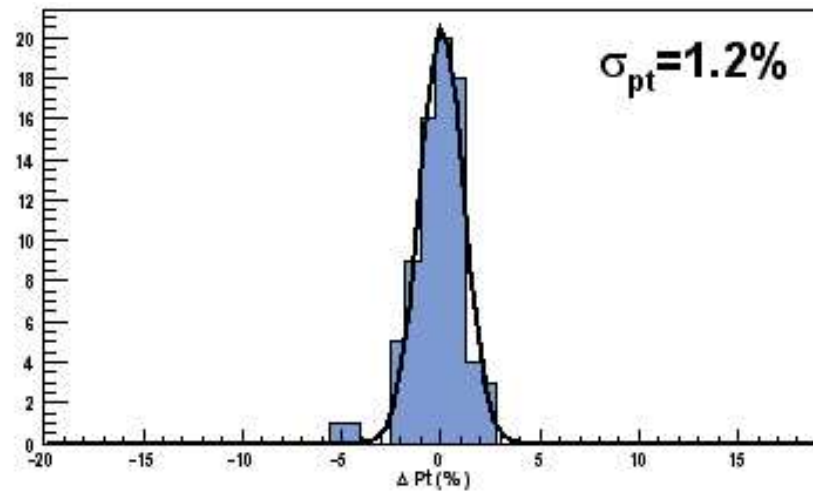
$\sigma_{\phi} = 5 \text{ mrad}$



$\sigma_{\lambda} = 3 \text{ mrad}$

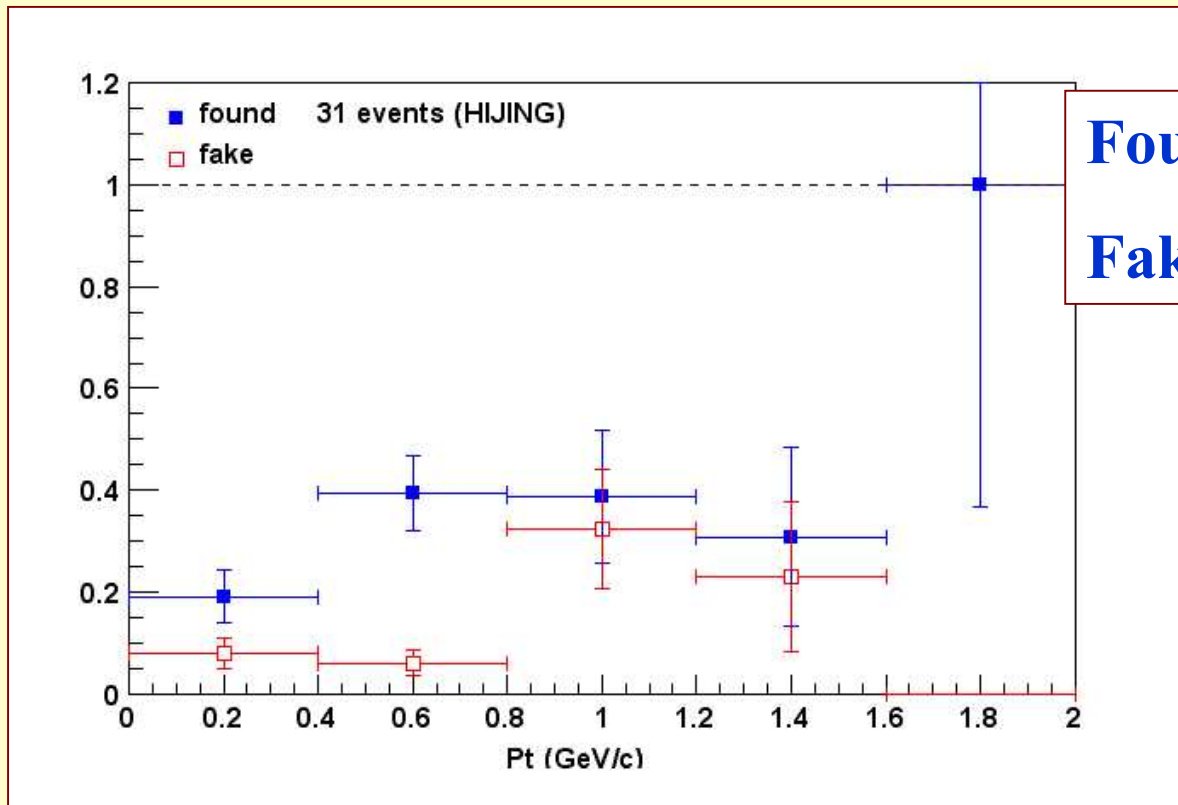


$\sigma_{pt} = 1.2\%$



Efficiency of algorithm and cuts

Eff = no. of found K_s^0 / no. of findable K_s^0 after the TPC-ITS tracking

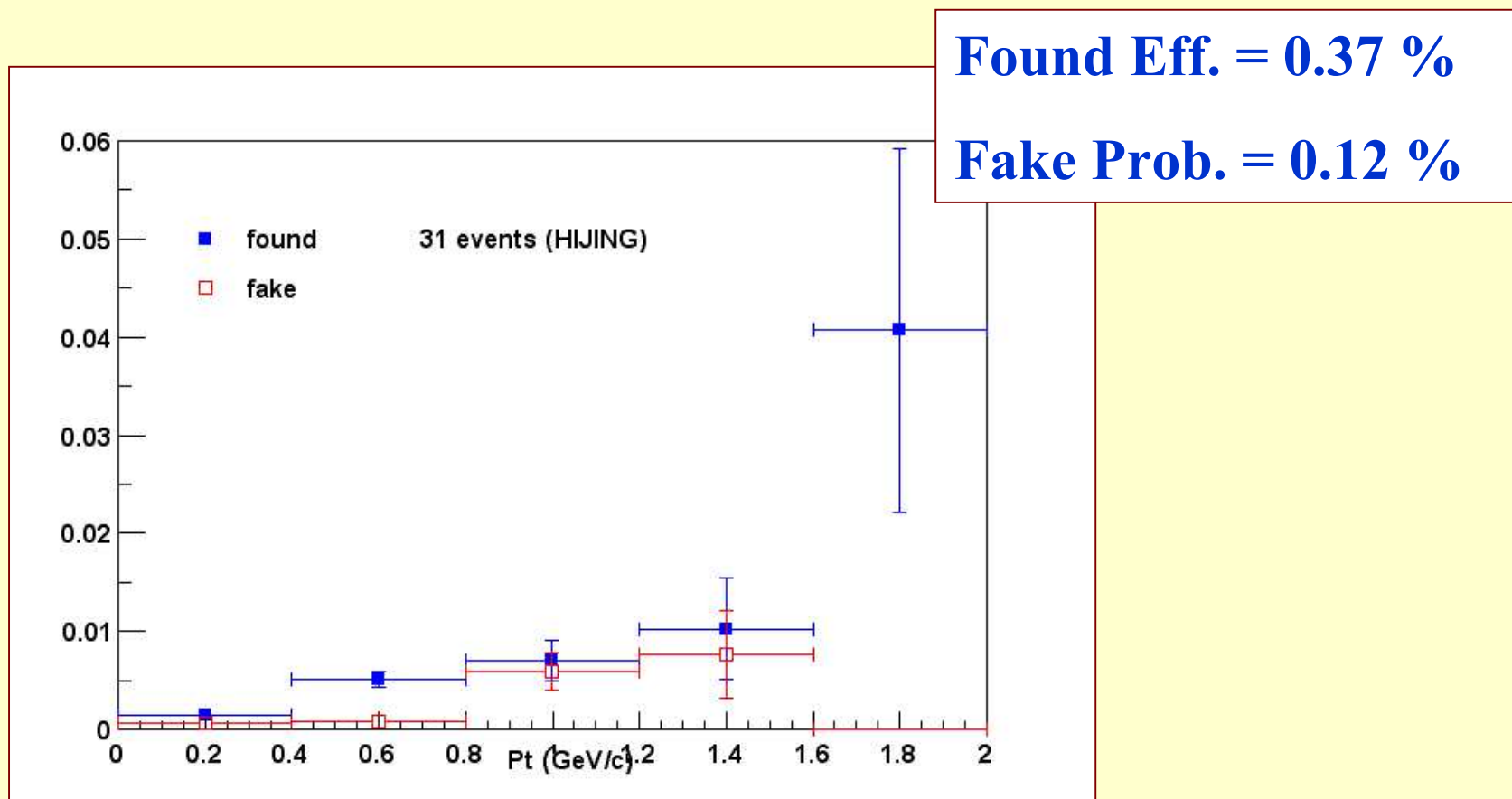


Found Eff. = 32 %

Fake Prob. = 11 %

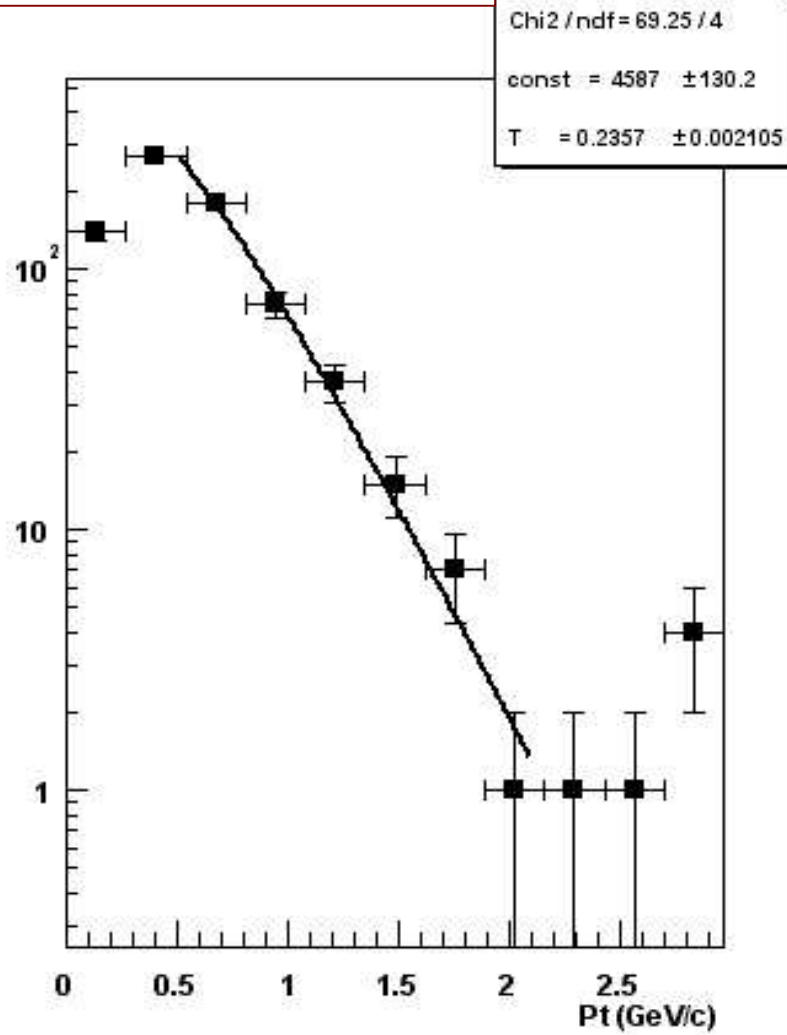
Total found efficiency

$$\text{Eff} = \text{no. of found } K_s^0 / \text{no. of generated } K_s^0$$

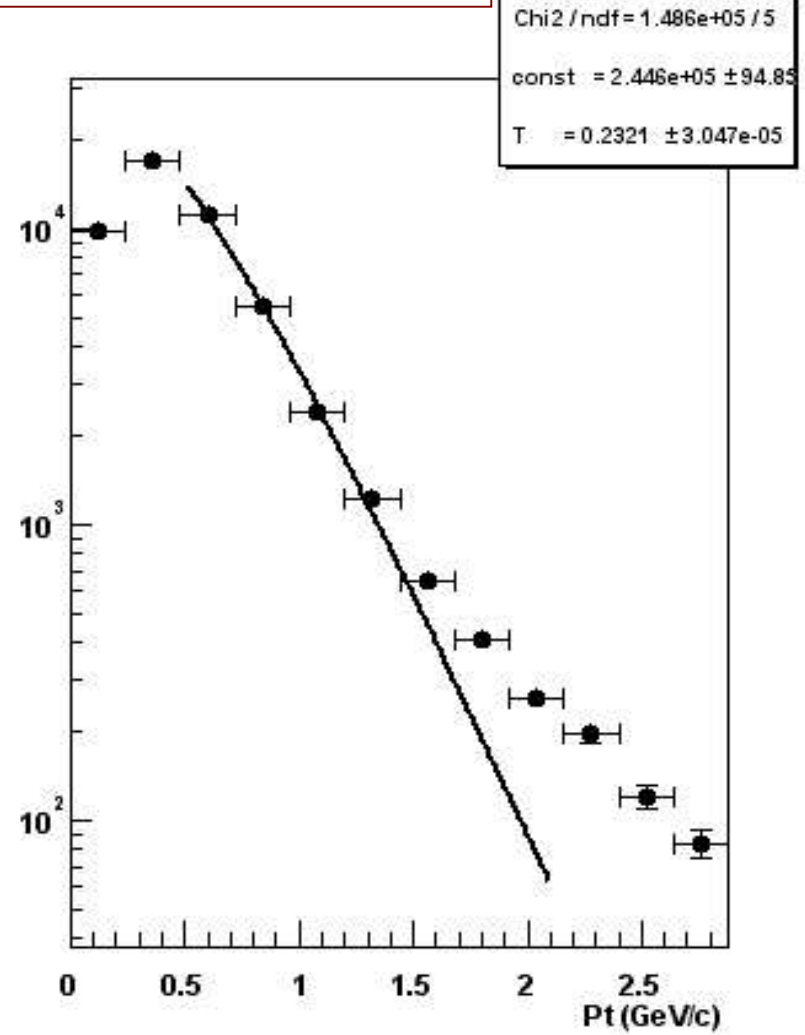


Reconstructed Pt spectrum

Reconstructed spectrum



Generated spectrum



Conclusions and future work

- **The problem of reconstructing K^0_S in ALICE is under investigation in a realistic simulation framework**
- **An algorithm for Aliroot has been written and its resolution and efficiency have been evaluated**
- **Evaluation of the effect of a different choice of the fiducial region**
- **Simulations with a magnetic field of 0.4 T**
- **Studies for reconstructing the Λ s are already started**