June 2003 ITTF Review

StSecondaryVertex Evaluation: *The new V0Finder*

For the StV0Finder Team

Betty Bezverkhny, Yale University

1. Analysis Method
2. V0 Yields
3. Field Comparison
4. K^0_S and Λ^0 Yields
5. Yields Comparison
6. Conclusion

The VOFinder Crew:

Gene Van Buren, Lee Barnby, Helen Caines, Julien Faivre

The New V0 Finder Progress

A Word From the Previous Testers

Where we were last review:

- Lee tested the last time
- Signal loss for Lambda (22% Lambda, 30% Anti-Lambda)
- Signal loss for K^0_S's for all P_T

- RFF field/charge problems (Anti-Lambda/Lambda ratios were swapped for one field was 1.3 not 0.7)

Where we are now:

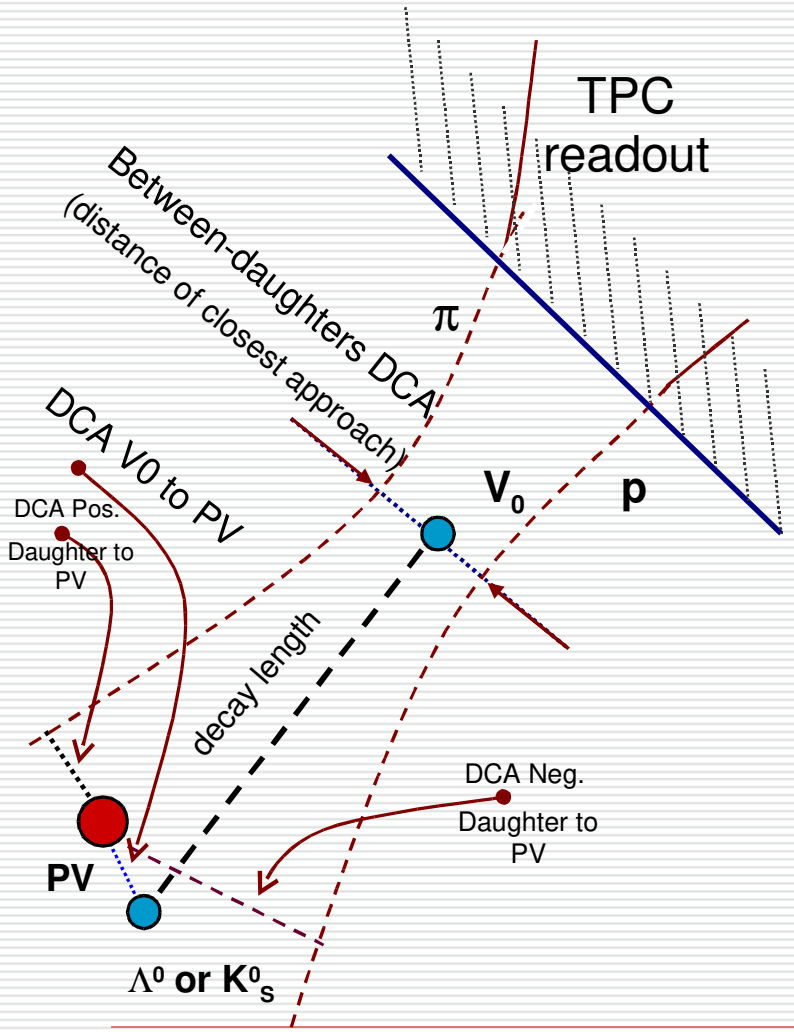
- C++ V0 and Xi codes are now user-friendly and are checked in CVS. Close to being accepted as official code for STAR.

- V0 finder can also run using SVT tracks if a switch is turned on

- C++ Kink finder being worked on - nearly there (Re: Julien)

V0 Finding:

Topology, Analysis Method



Primary Vertex Z Cut:		25cm
Rapidity Cut:		±0.5
Decay Length Cut:	>6cm	
K^0_S DCA: π to Prim. Vertex Cut:		>1.5cm
Λ^0 DCA: π to Prim. Vertex Cut:		>2.5cm
DCA ***p*** to Prim. Vertex Cut:	>1.05cm	
V0 DCA to Primary Vertex Cut:		>0.6cm
DCA of V0 Daughters Cut:		>1.0cm
Number of Hits for K^0_S π's:		15
Number of Hits for Λ^0 π's:		15
Number of Hits for all ***p***'s:		15

V0 Finding:
Analysis Cuts applied

Reco cuts

TPC-only cuts:

DCA between the two tracks : **1.2** cm
DCA of V0 from PV: **1000** cm
Decay from prim. vertex: **2** cm

$||\alpha_{Amr}||_{Max}$, only first entry used: **1.2**
$(P_{TArm})_{Max}$, only first entry used: **0.3**

Min. value of tracks at interaction: **0**

Execution flow,
i.e., evaluate done now or not: **0**

Min. number of points on track: **11**;

- *Method:*

AuAu Central event.root files.

Tracks fit with both ITTF and TPT

↓

StV0Finder ran in

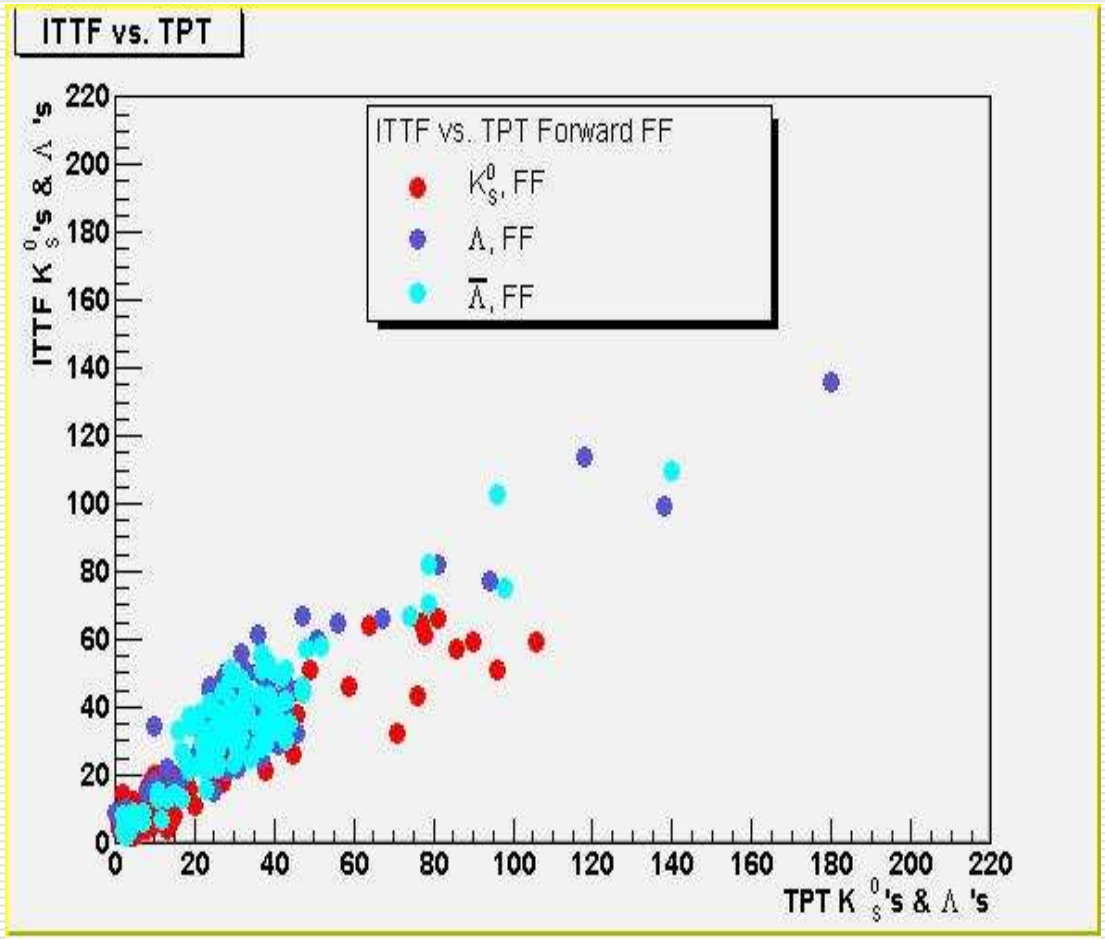
"Both ITTF & TPT" Mode

(both sets of fits saved in a StrMuDstTree)

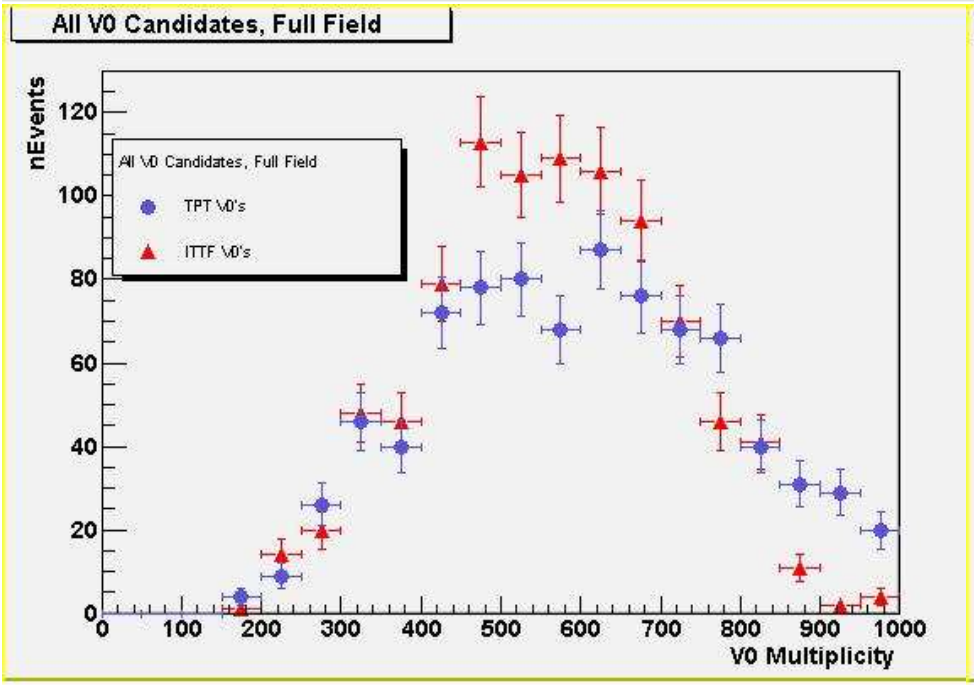
↓

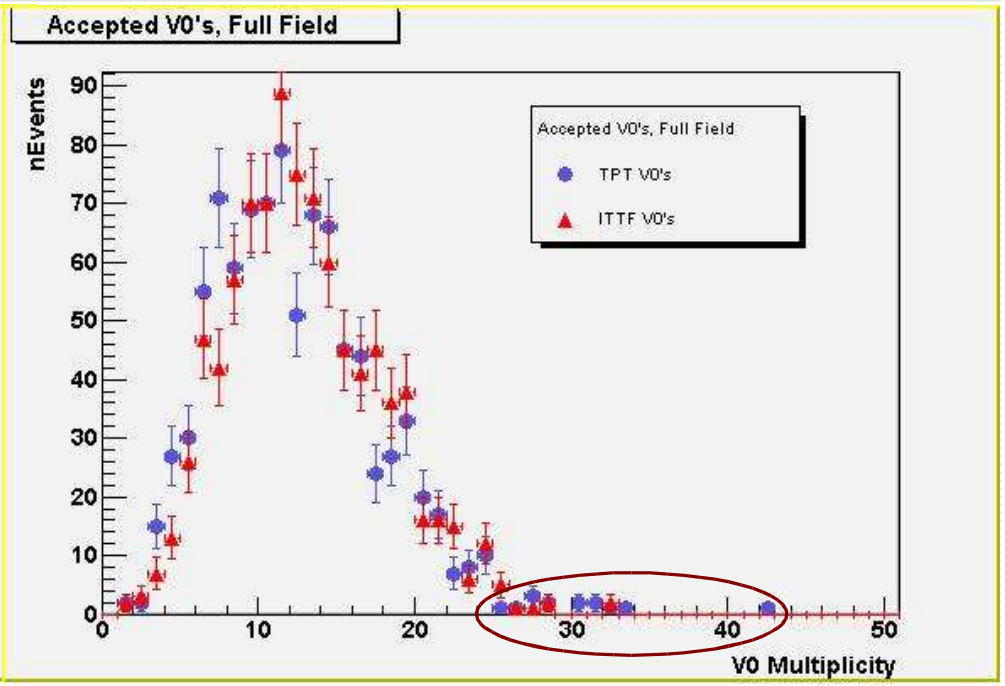
Same but separate analysis performed on ITTF and TPT tracks

ITTF vs. TPT Multiplicity



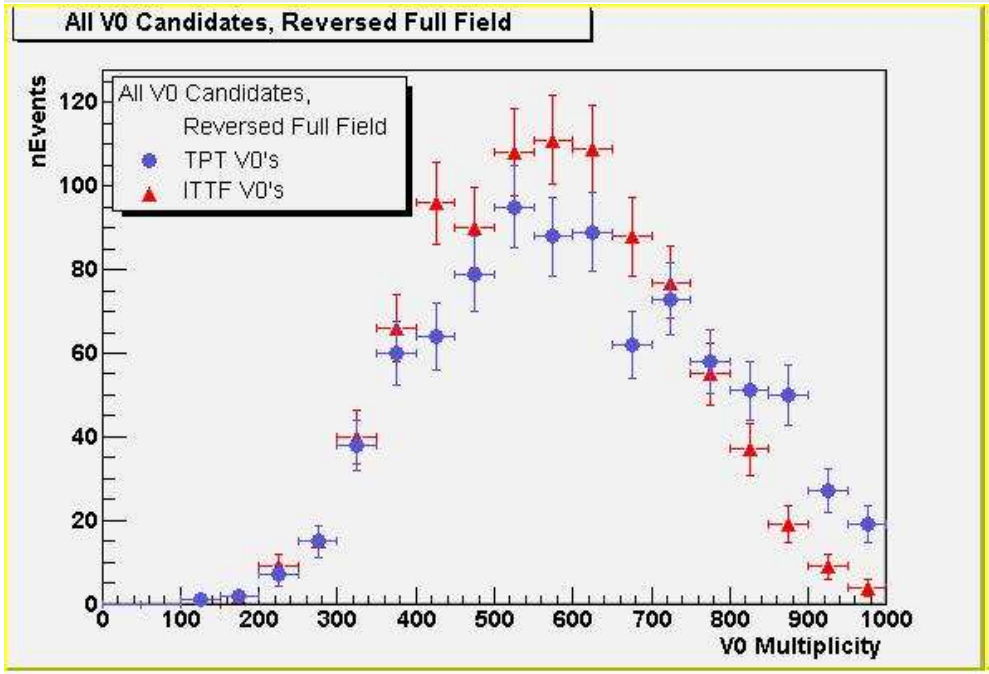
V0 Yields:
Forward Full Field

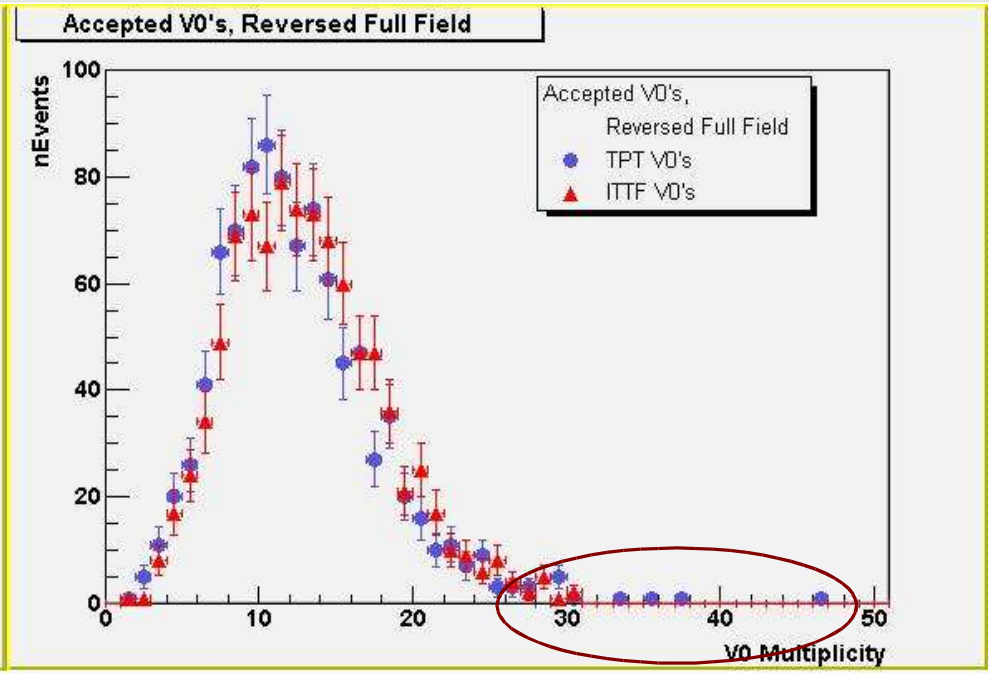




- More ITTF-found raw V0's at mid-multiplicities
- Fewer ITTF-found raw V0's at high multiplicities

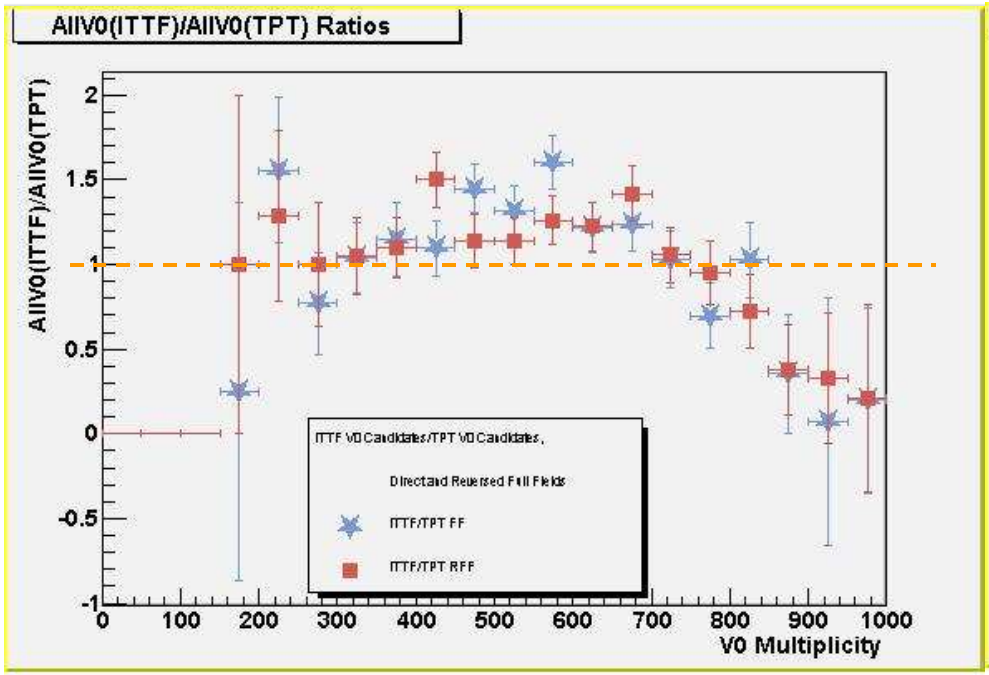
V0 Yields: *Reversed Full Field*

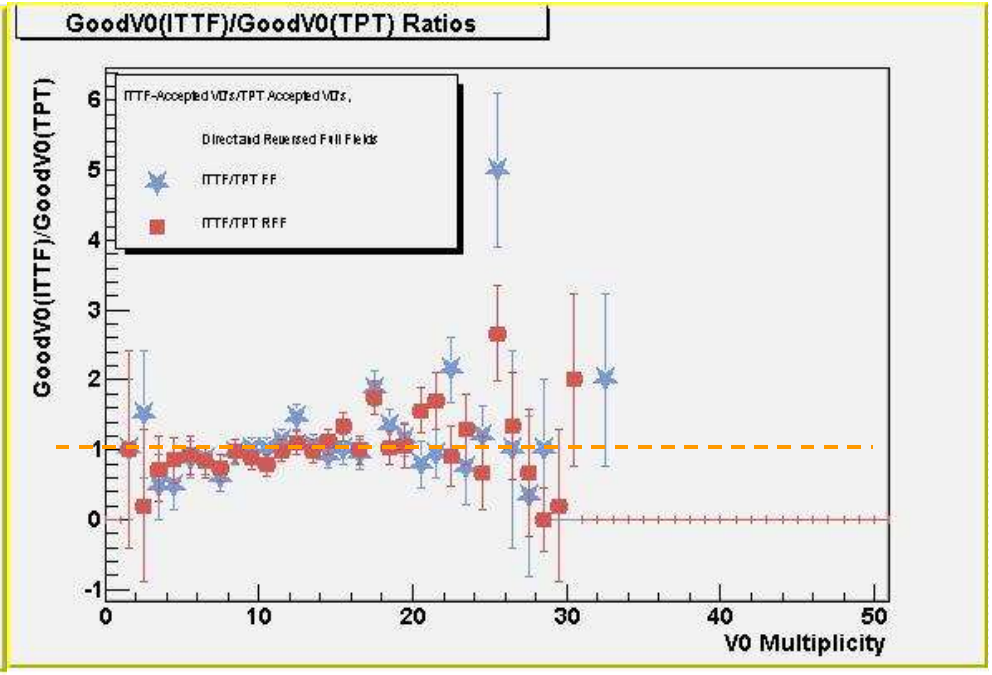




- *Same signal/noise at Reversed Full Field*

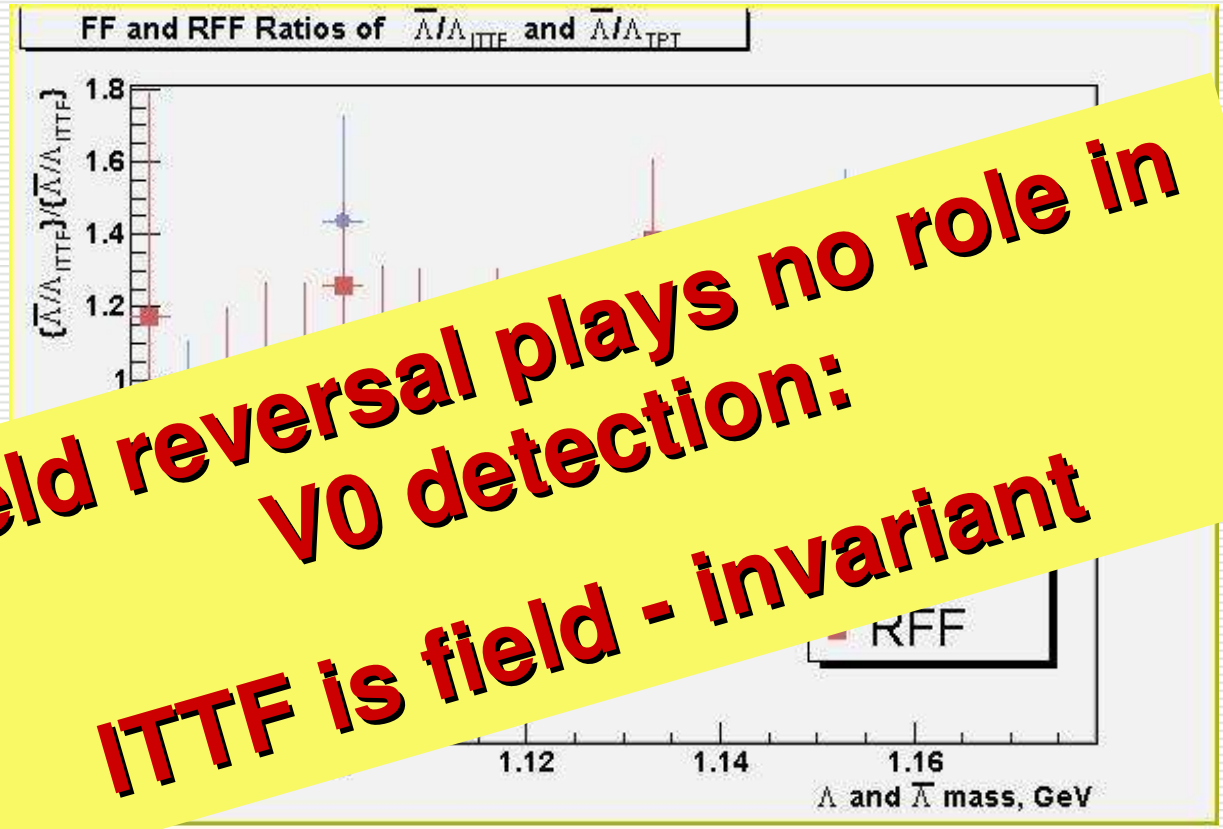
V0 Yields:
Between-the-fields Comparison





- V0's lost for high V0 multiplicity events

Anti-Λ^0/Λ^0 Yields:
Between-the-Fields Comparison

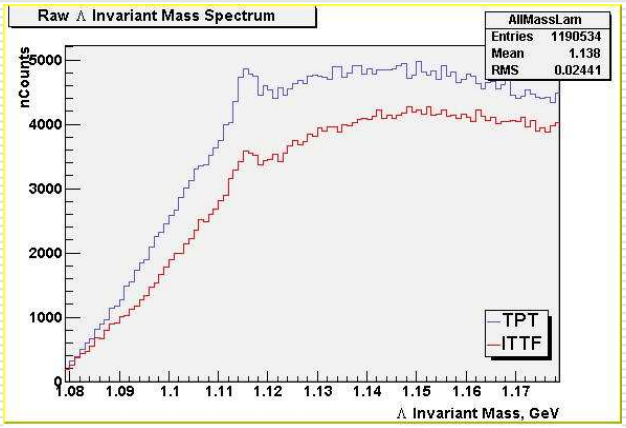


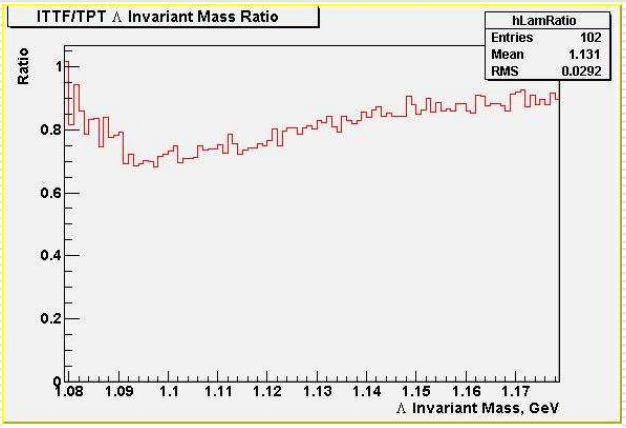
Field reversal plays no role in V0 detection:

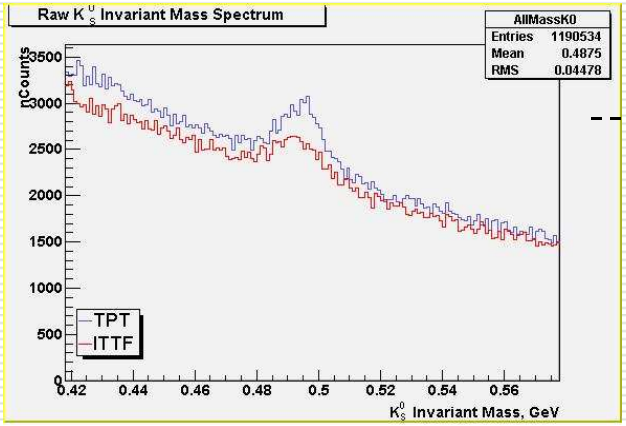
ITTF is field - invariant

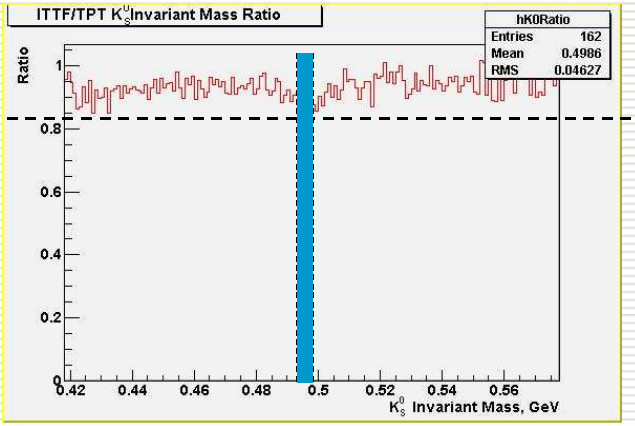
- Last Year: RFF and FFF were switched.
- This year: clearly not a problem (consistent yields)

Invariant Mass Plots:
Direct comparison



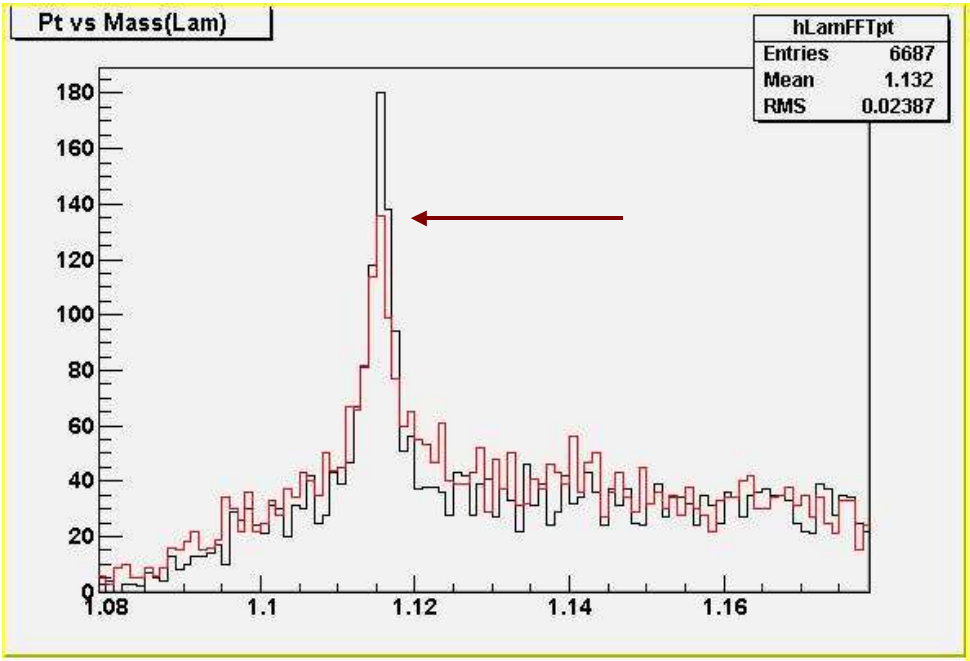


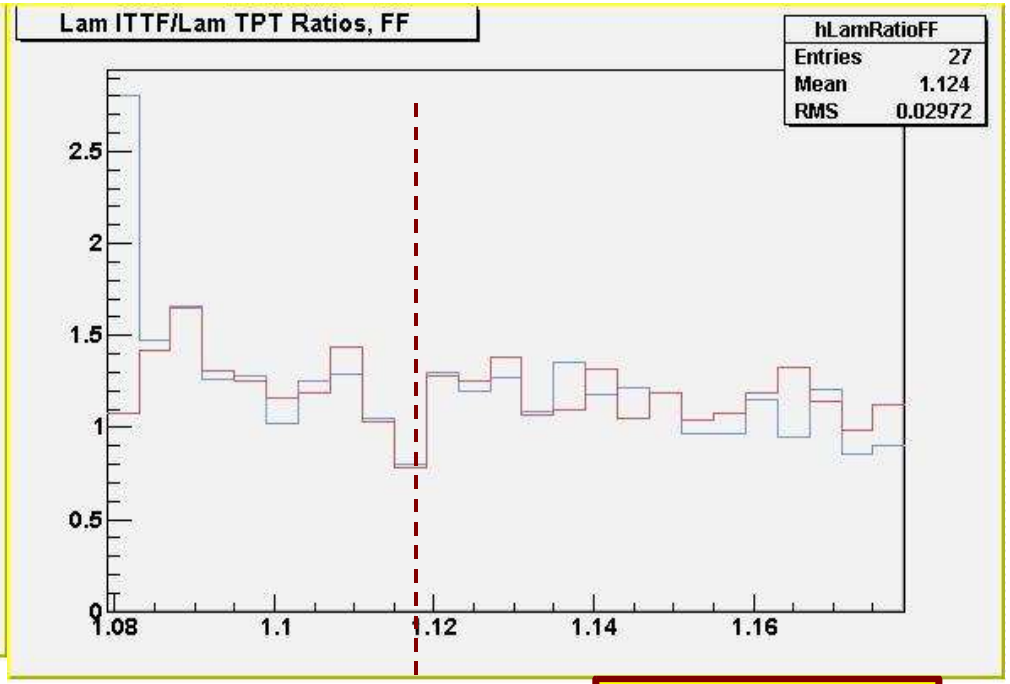




Λ^0 Yields

ITTF/TPT Ratios





33% Λ's

Fewer in ITTF

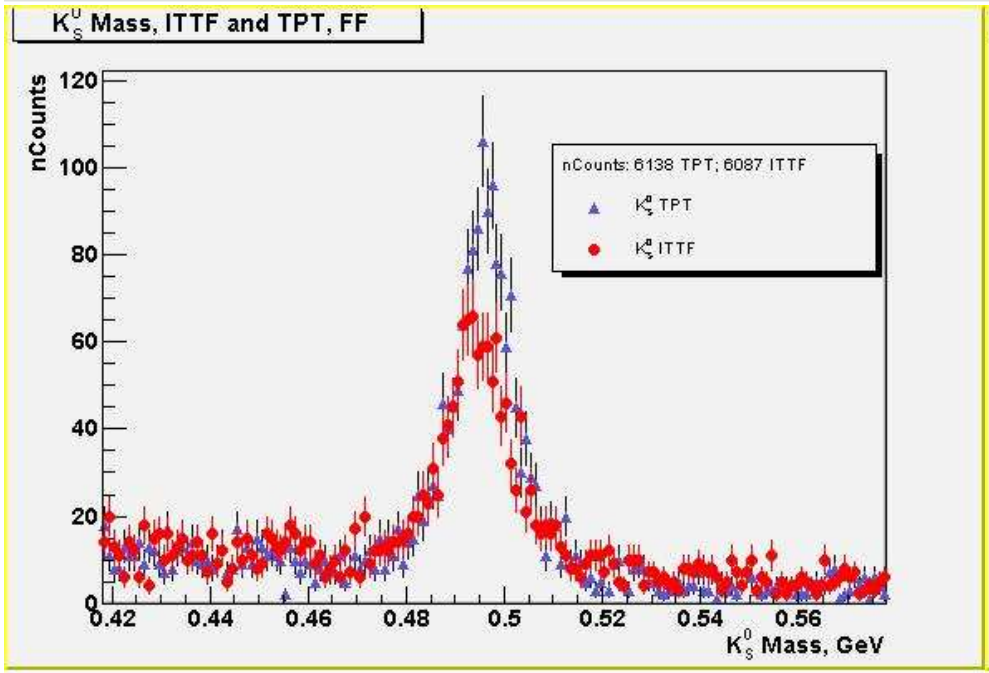
Background subtracted Yields (Anti-Lambda/Lambda):

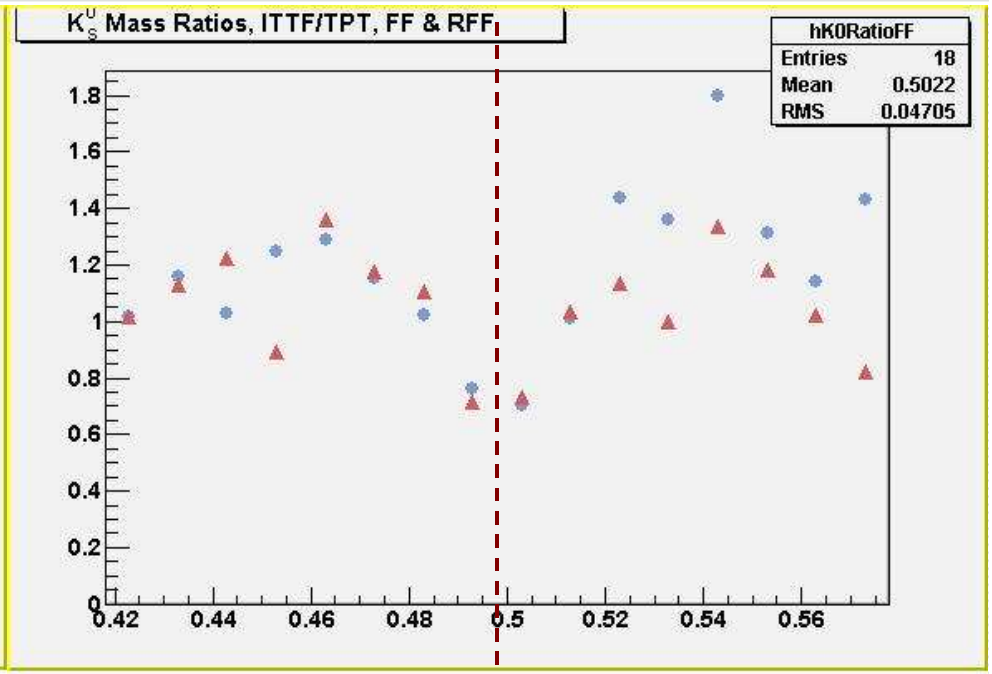
FF: **TPT**: 381/526; **ITTF**: 290/343

RFF: **TPT**: 481/534; **ITTF**: 270/369

K^0_S Yields

ITTF/TPT Ratios





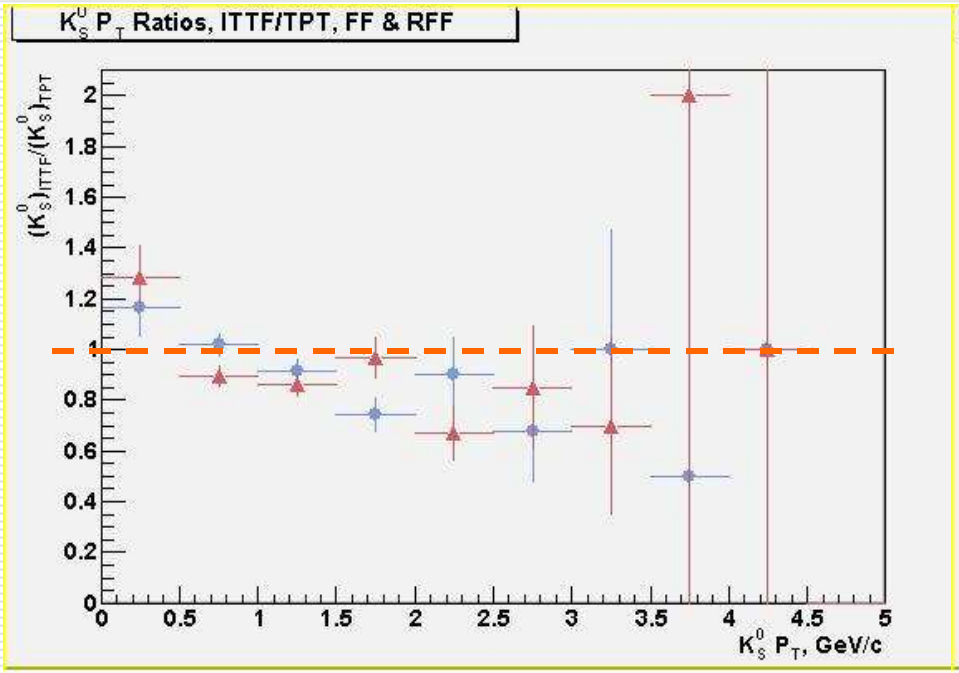
30% K^0_S's

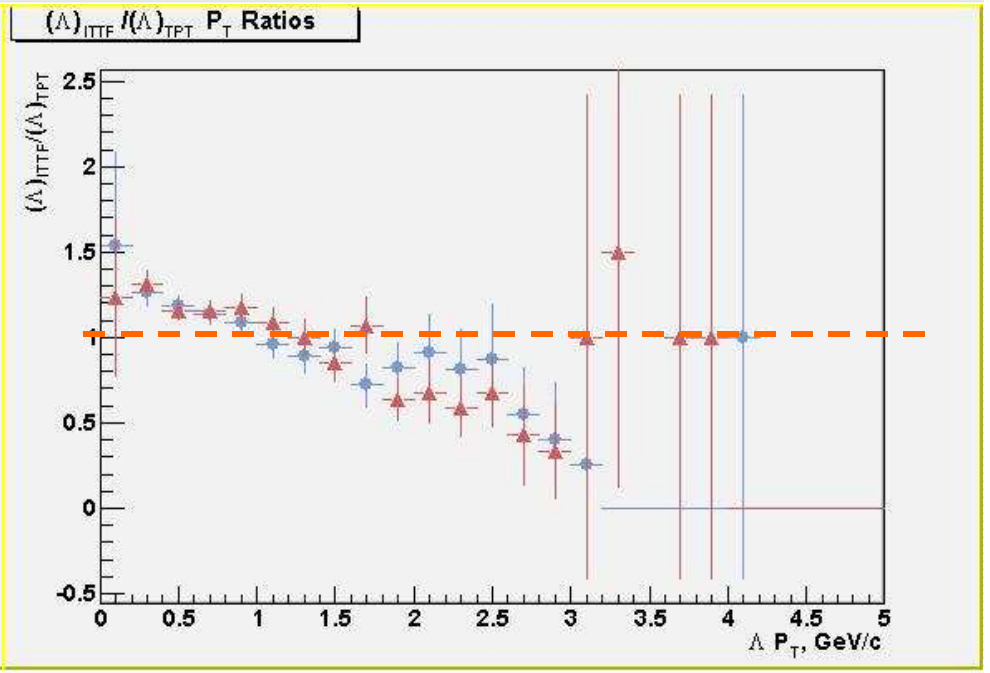
Fewer in ITTF

Background subtracted Yields for K^0_S's

FF: **TPT**: 1151; **ITTF**: 804; **RFF:** **TPT**: 1247; **ITTF**: 869

Looking at P_T distributions

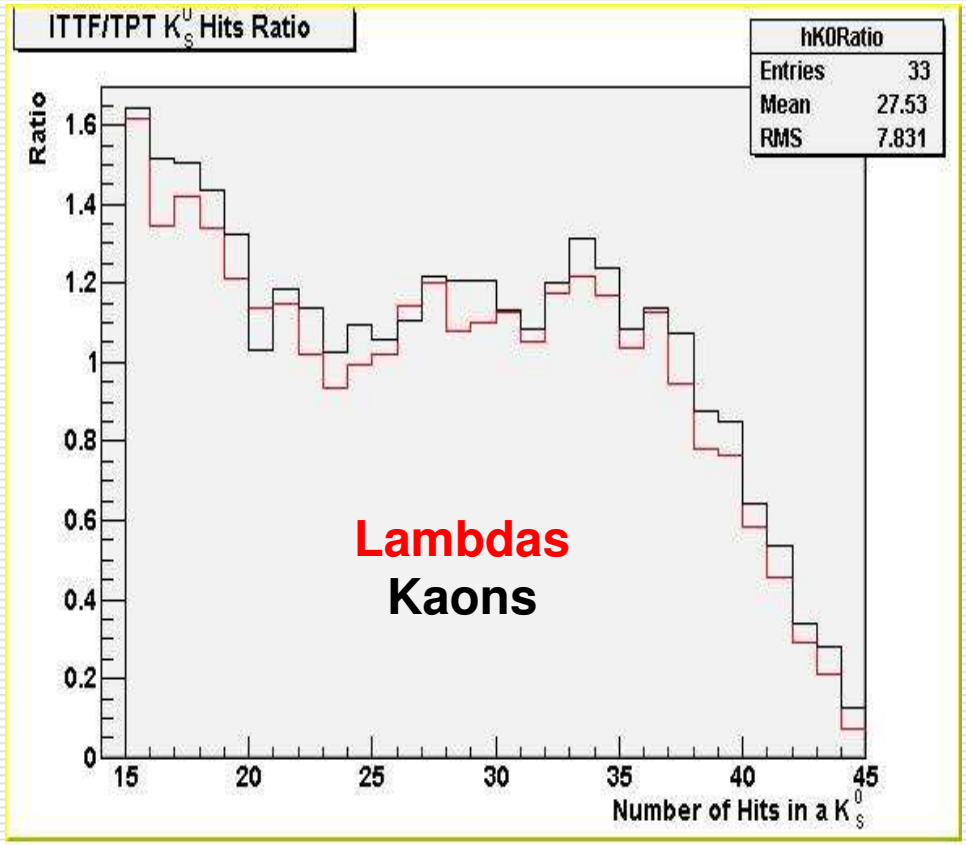


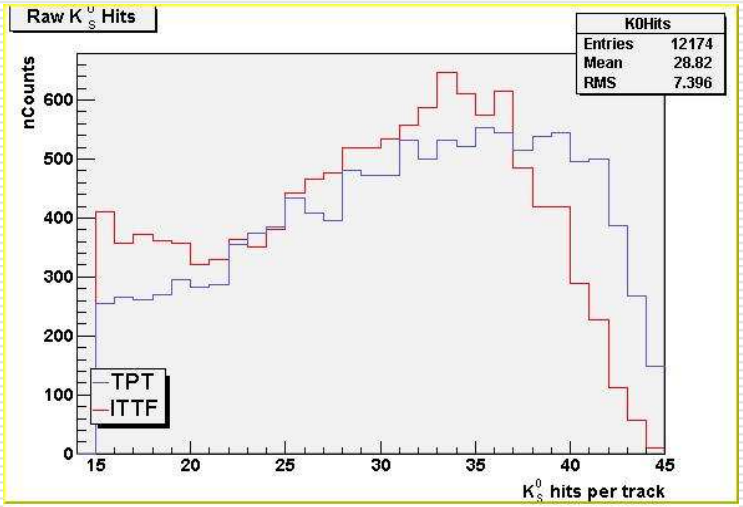


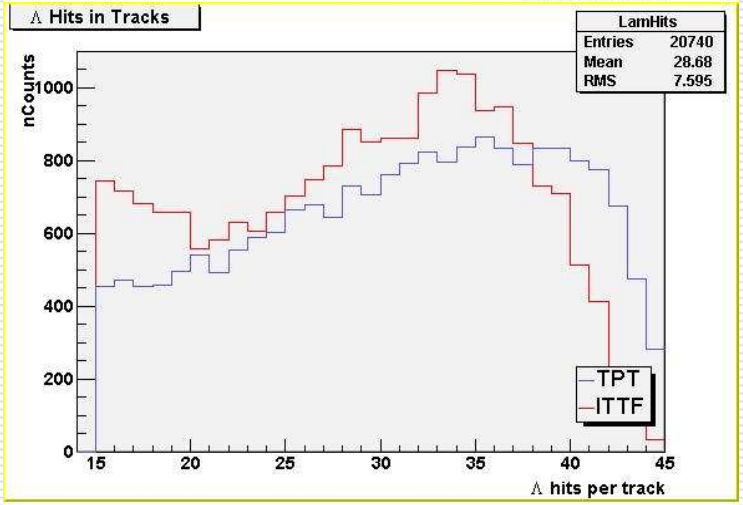
Not enough statistics for K^0_S, Λ plot shows strong PT dependence

Number of Hits per Track

ITTF/TPT Hits Ratio



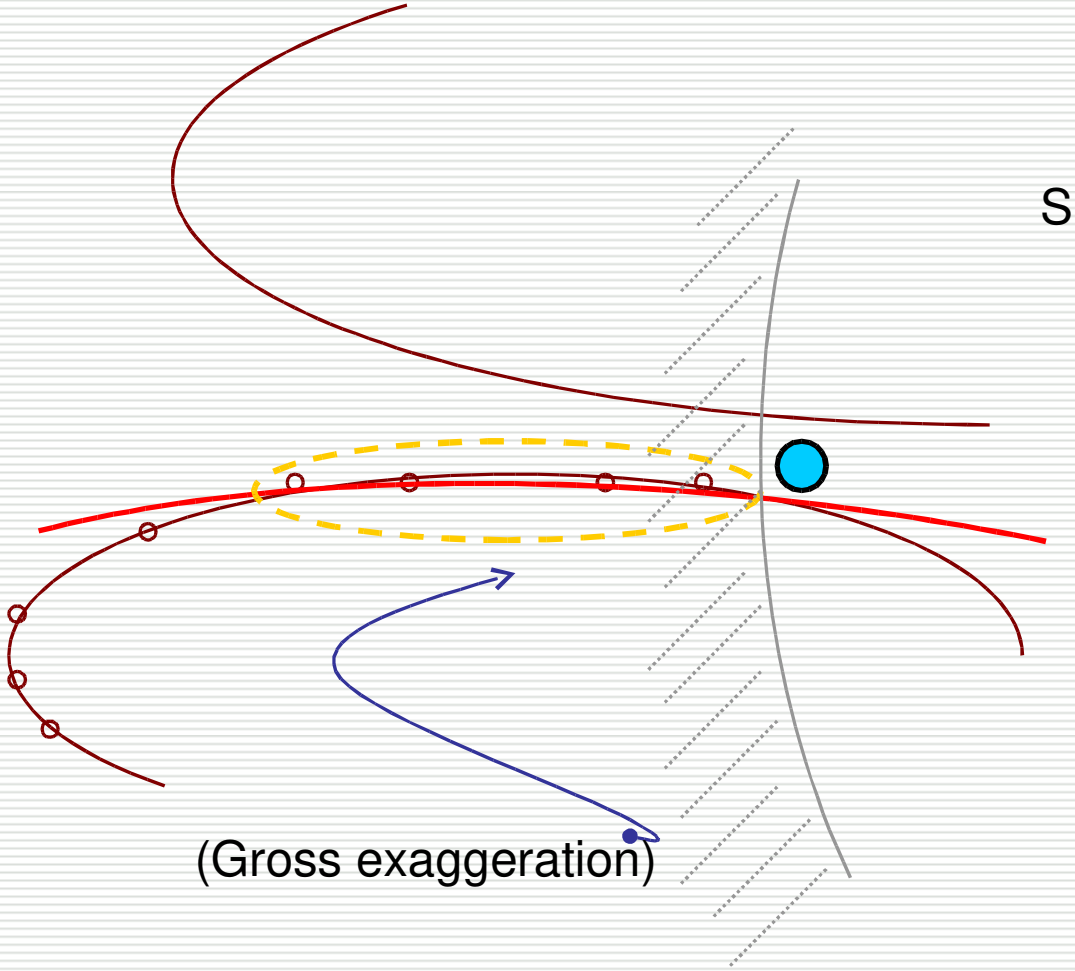




Conclusions

- The new V0 Finder is up and running
- Reverse Full Field and Forward Full Field V0's look the same
- ITTF noise has been significantly reduced
- ITTF finds 30% fewer Good V0's than TPT
- ITTF still loses signal and accepts more noise than TPT. Tuning?..

Decay topology



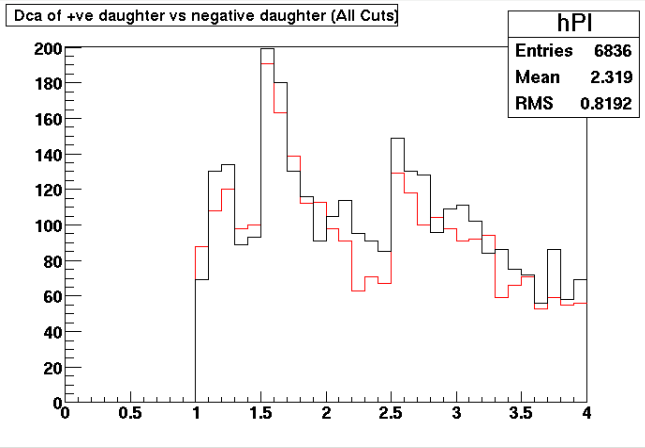
(Gross exaggeration)

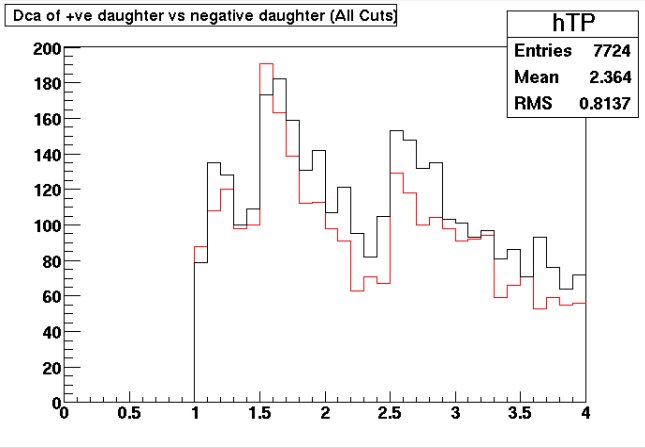
If missing hits:

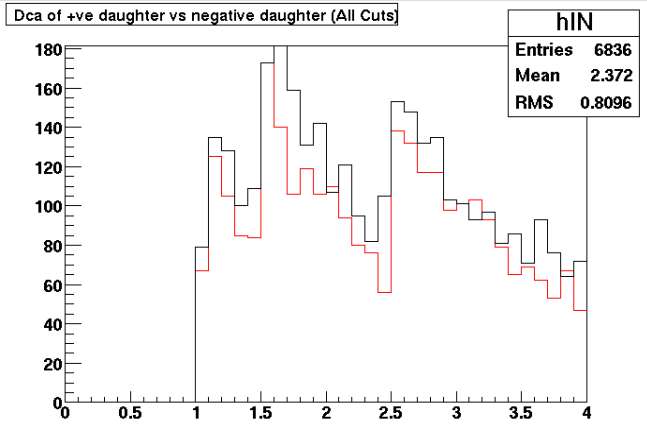
Should lose low P_T tracks

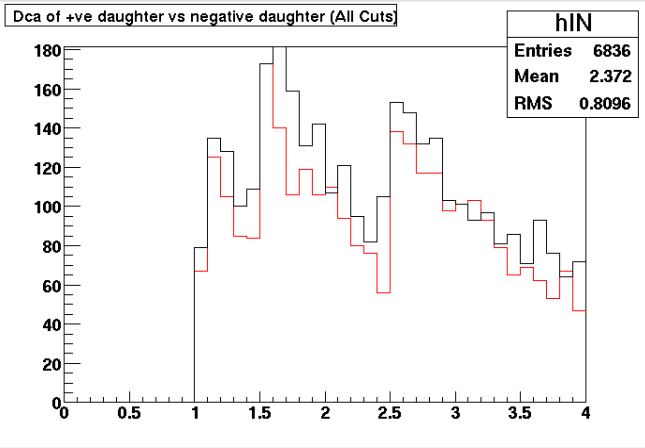
Not the case: High P_T tracks are lost.

Checking the fits:
DCA between-daughters



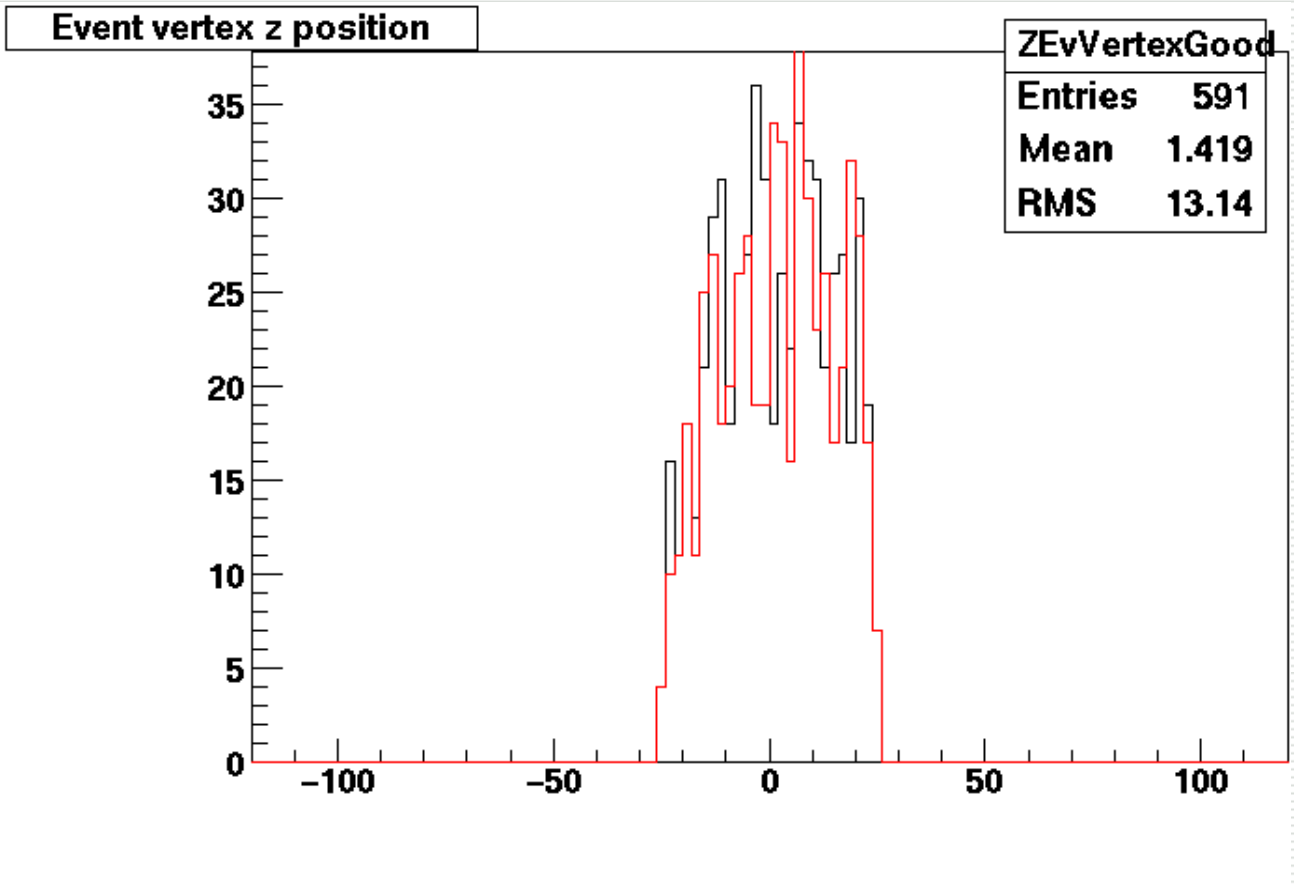




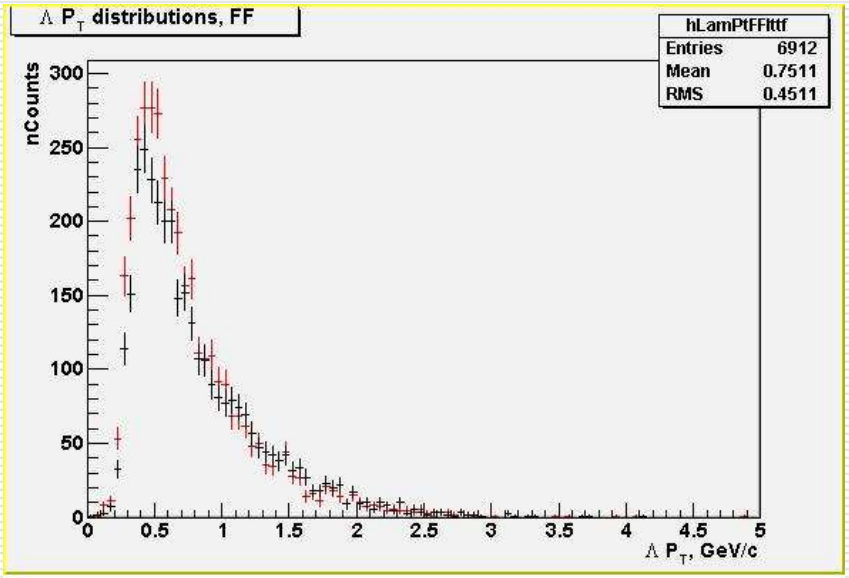


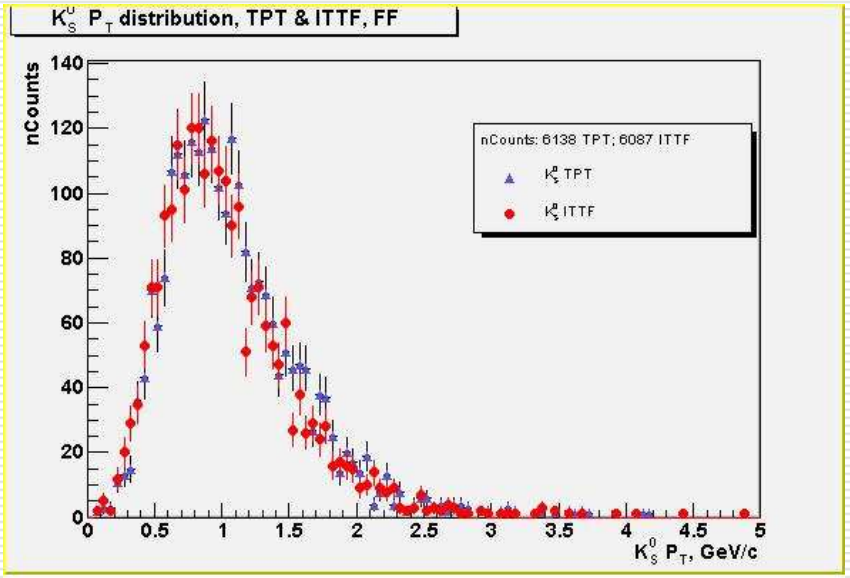
Event Vertex Selections

Full Field Z-Vertex Selections



PT distributions





Checking the fits:
DCA to the primary vertex

K^0_S and Λ^0: p_T comparisons

The Pt Plots are over ALL Range (NOT bg subtracted)