

Tracking: TPC and Chambers Combined

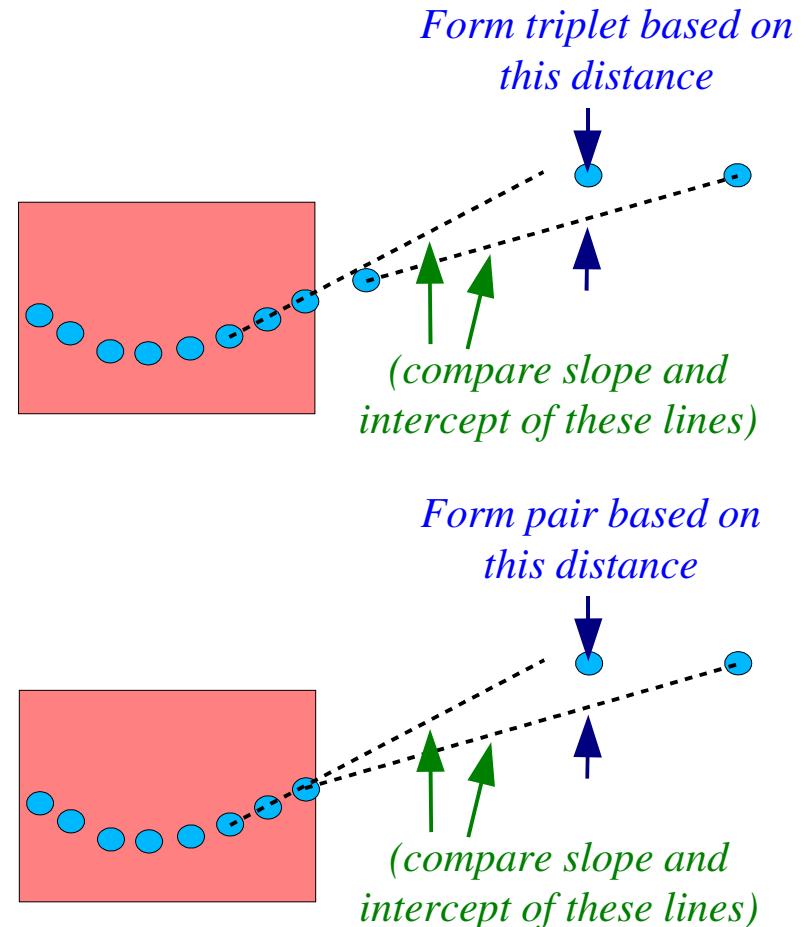
Mark Messier
Indiana University
MIPP@FNAL
22 July 2005

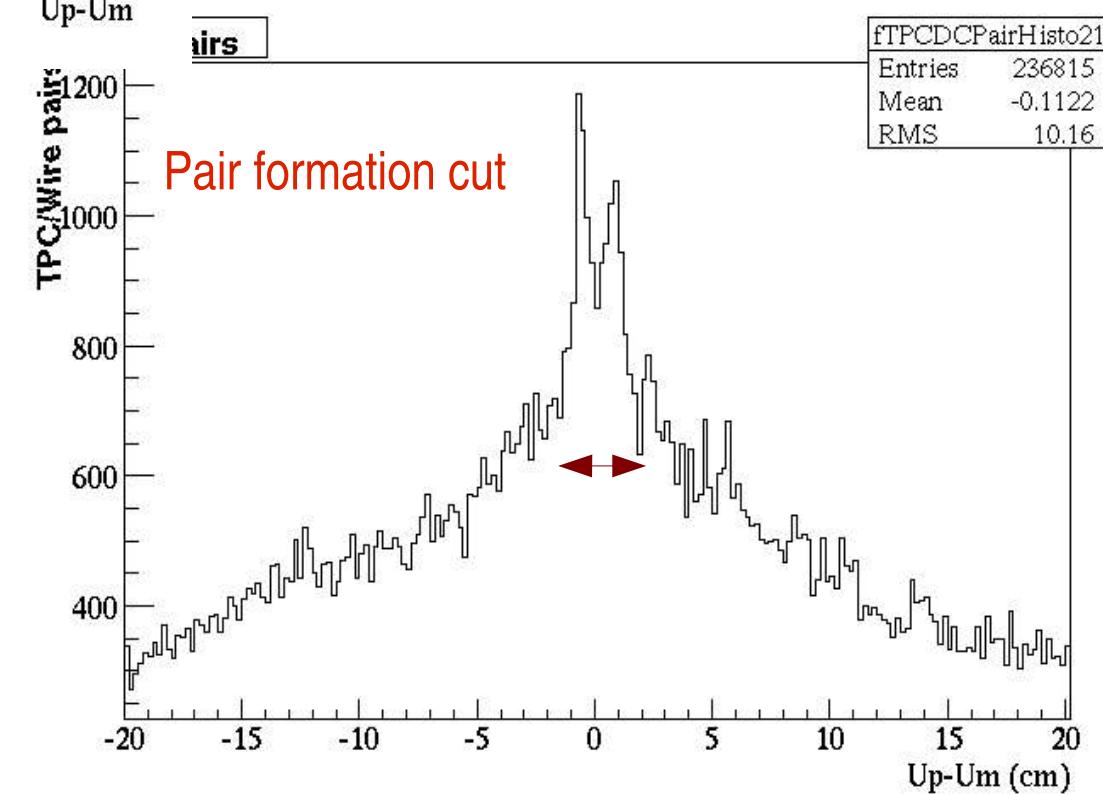
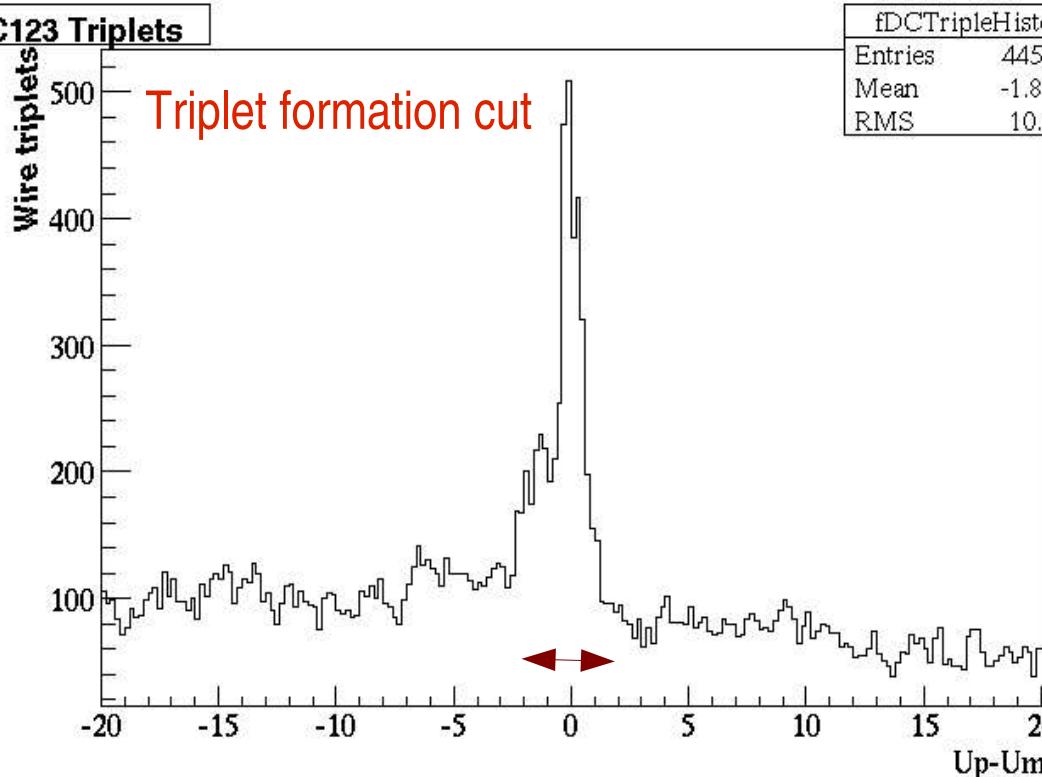
A “proto-type” global tracker: SPFit (“SPitz Fit”)

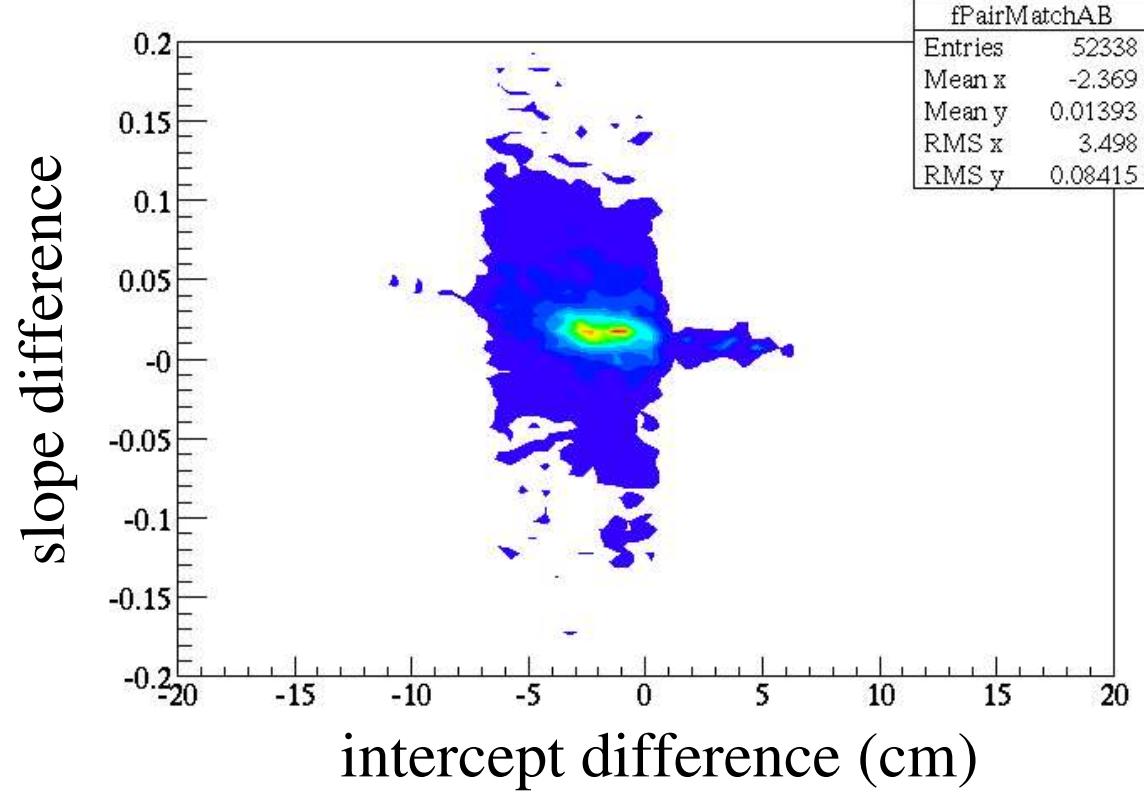
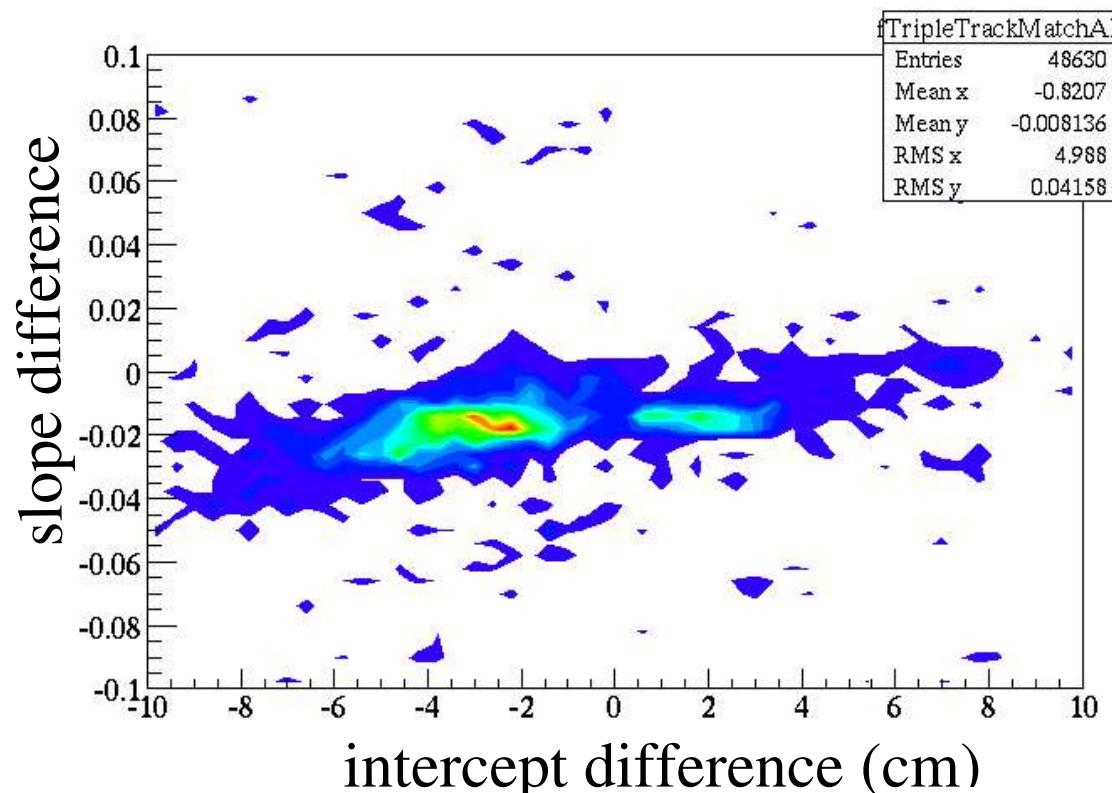
- To understand issues related to tracking I started writing a global track fitting package
- Skipped the hard work of TPC drift velocity calibration, TPC distortion corrections, wire time calibration, etc. etc.
- Useful for tuning up the Swimmer (charged particle tracking through Bfield) code
- Perhaps even useful for physics (still remains to be seen...)

SPFit algorithm

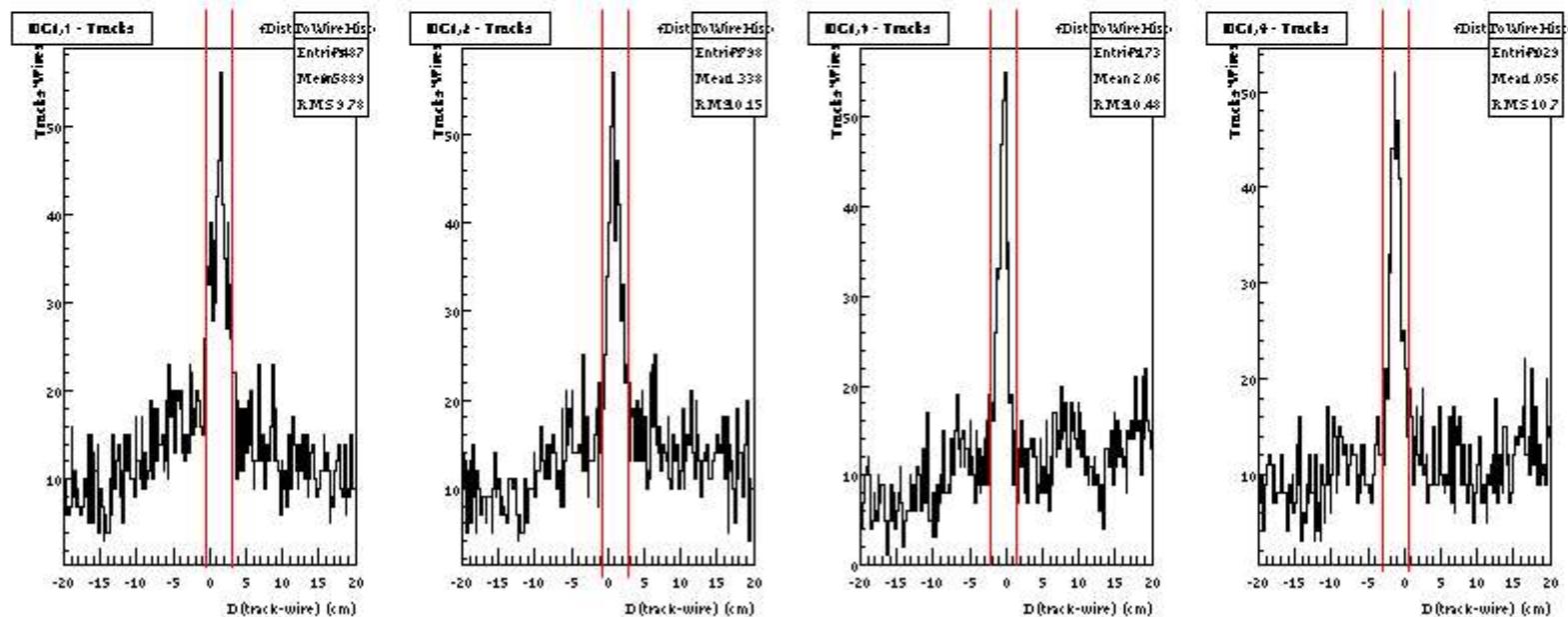
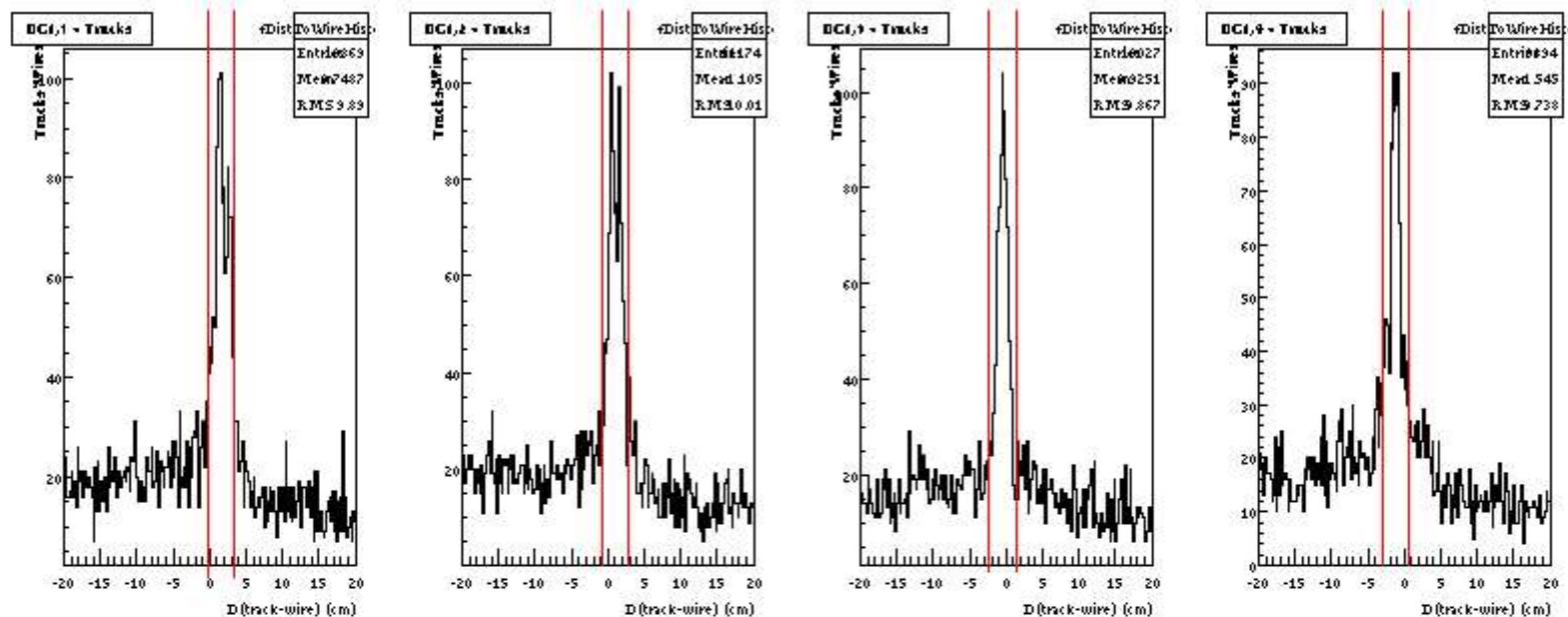
- Use TPCRTracks as input seeds
- Attempt to cluster hit wires in chambers 1, 2, 3 and associate them with TPC tracks.
- Association based on matching slopes and intercepts of ends of TPCTracks with the line formed by the wire hits.
- During first iteration fit TPC hits plus associated wire hits
- Second iterations use only wire hits in chambers 1,2,3 are are within set distance of track
- Third iteration, pick up wire hits in chambers 4 and 5 based on distance between wire and extrapolated track
- Fourth final fit to track with final cuts on distances from track to wire
- All minimizations assume a linearized χ^2



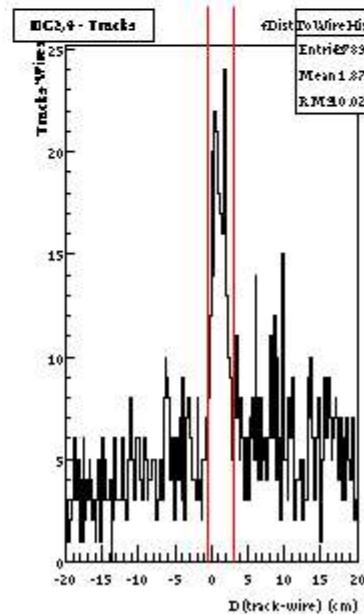
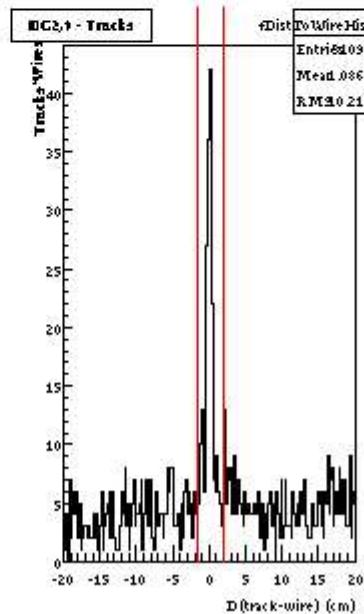
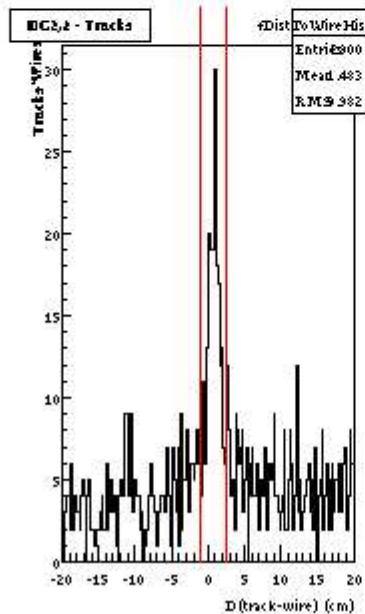
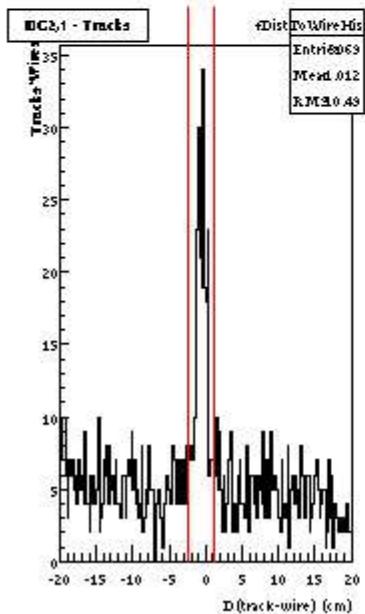
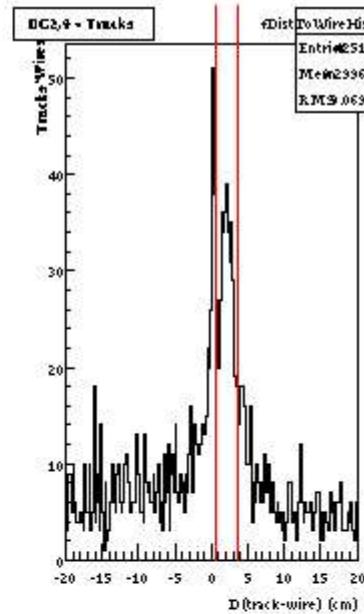
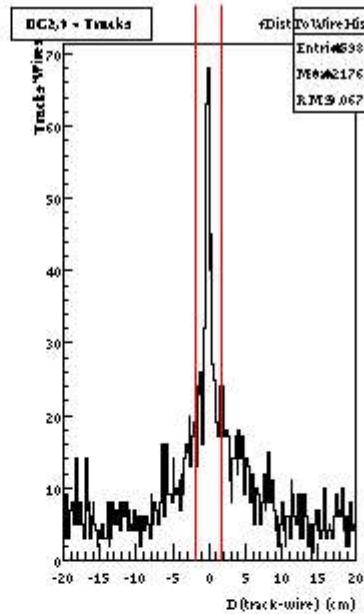
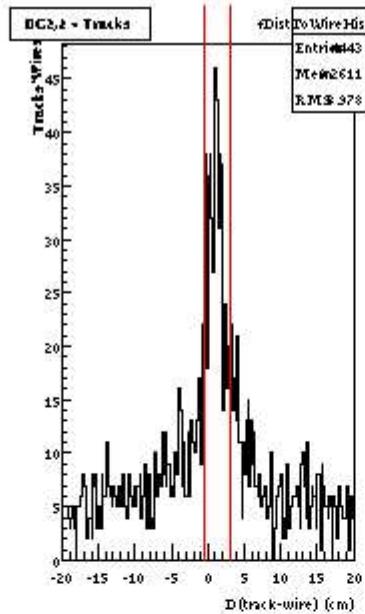
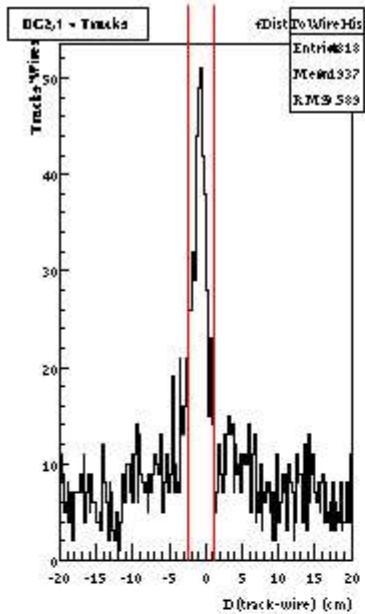
DC123 Triplets



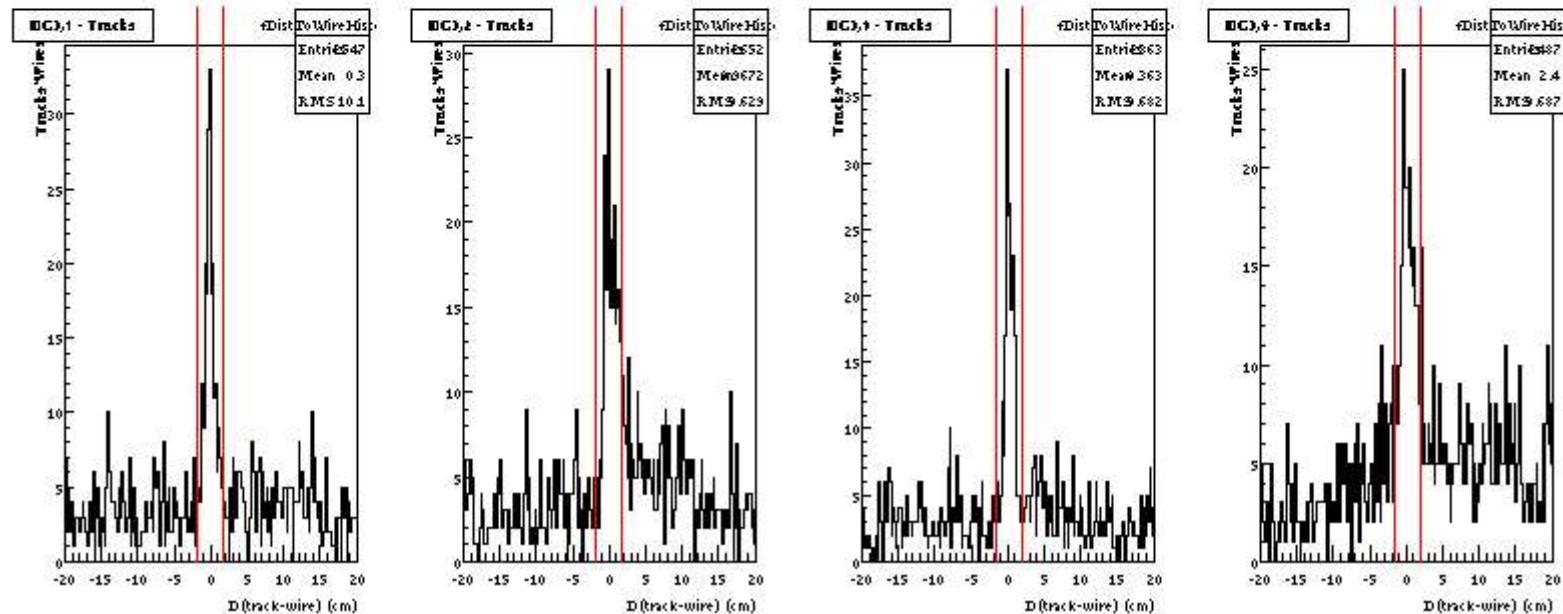
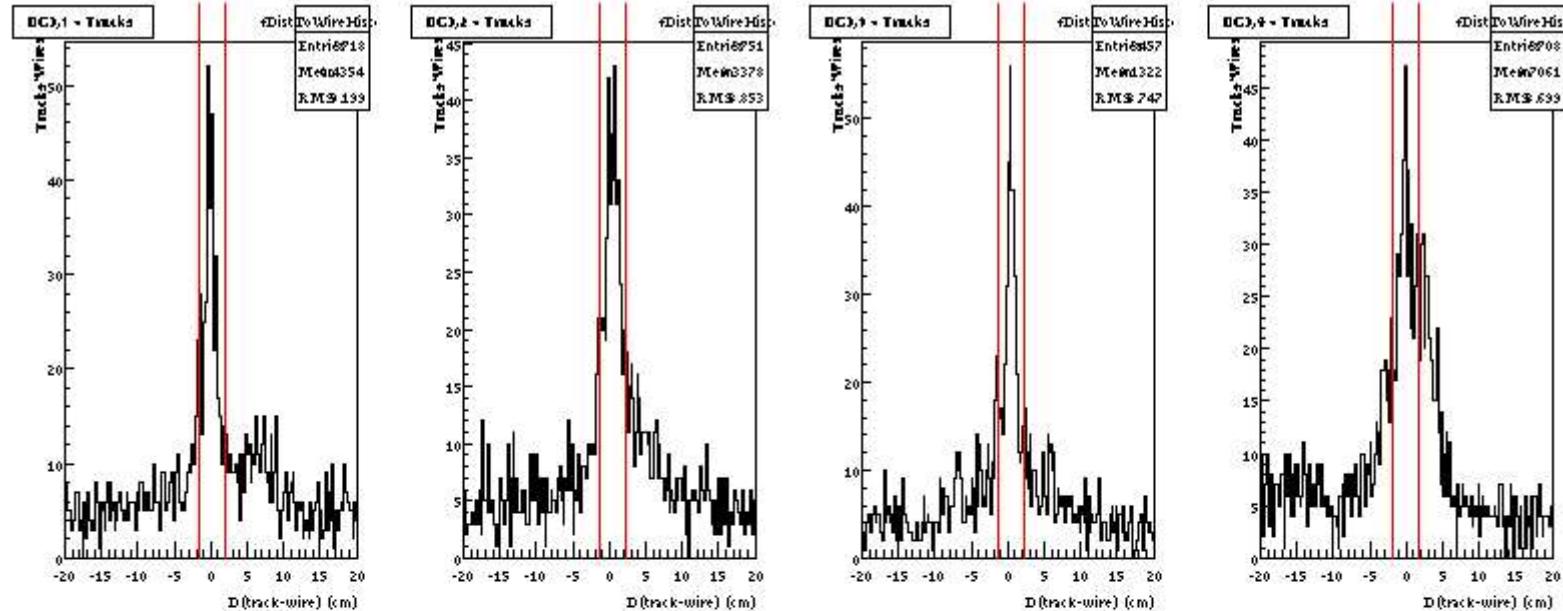
Track-Wire distances DC1



Track-Wire distances DC2

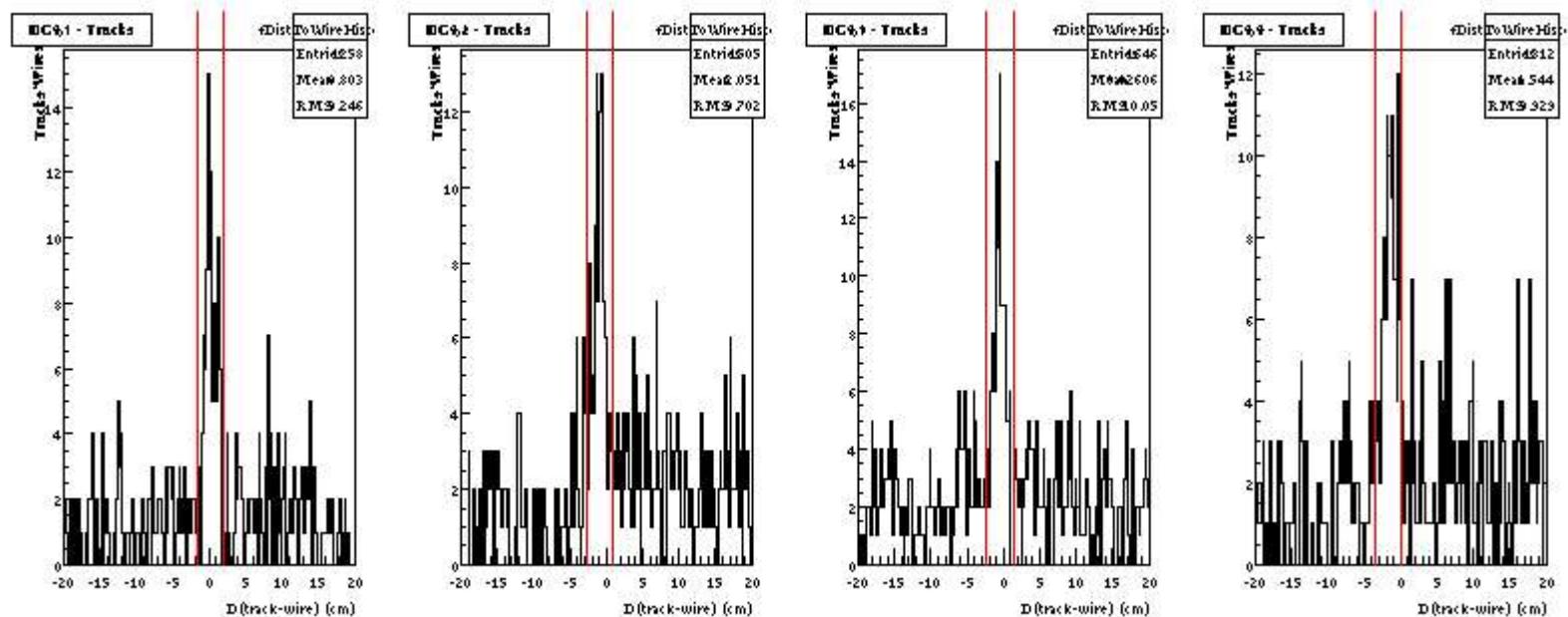
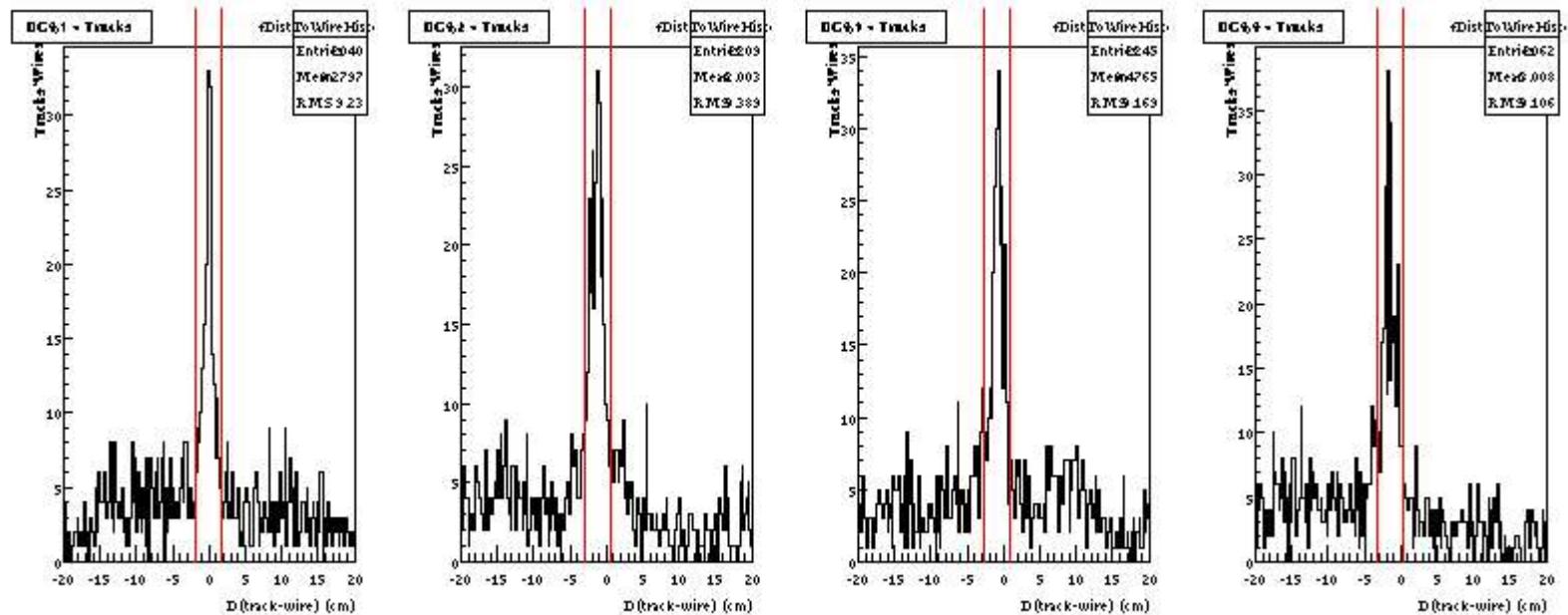


Track-Wire distances DC3

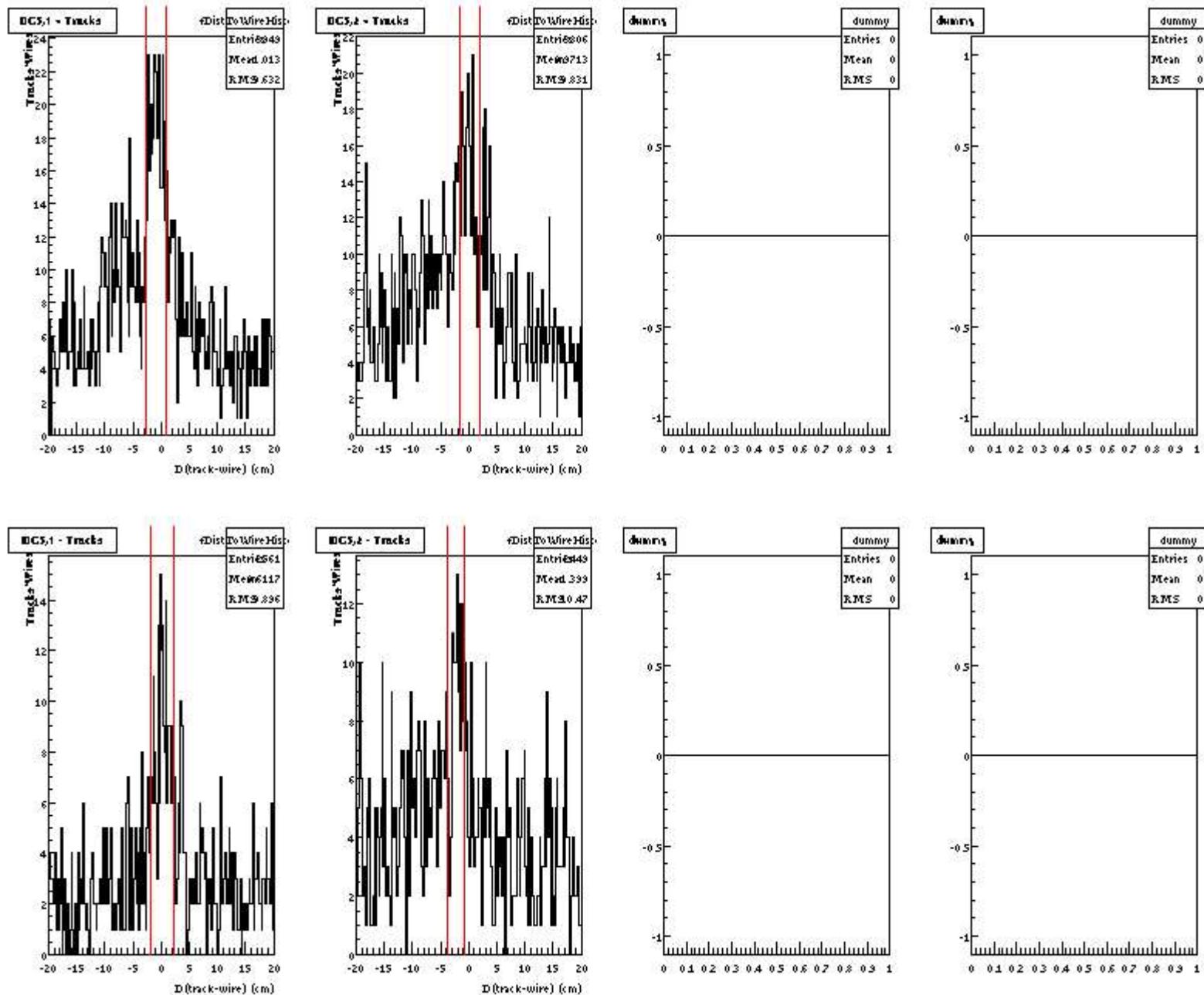


Track-Wire distances DC3

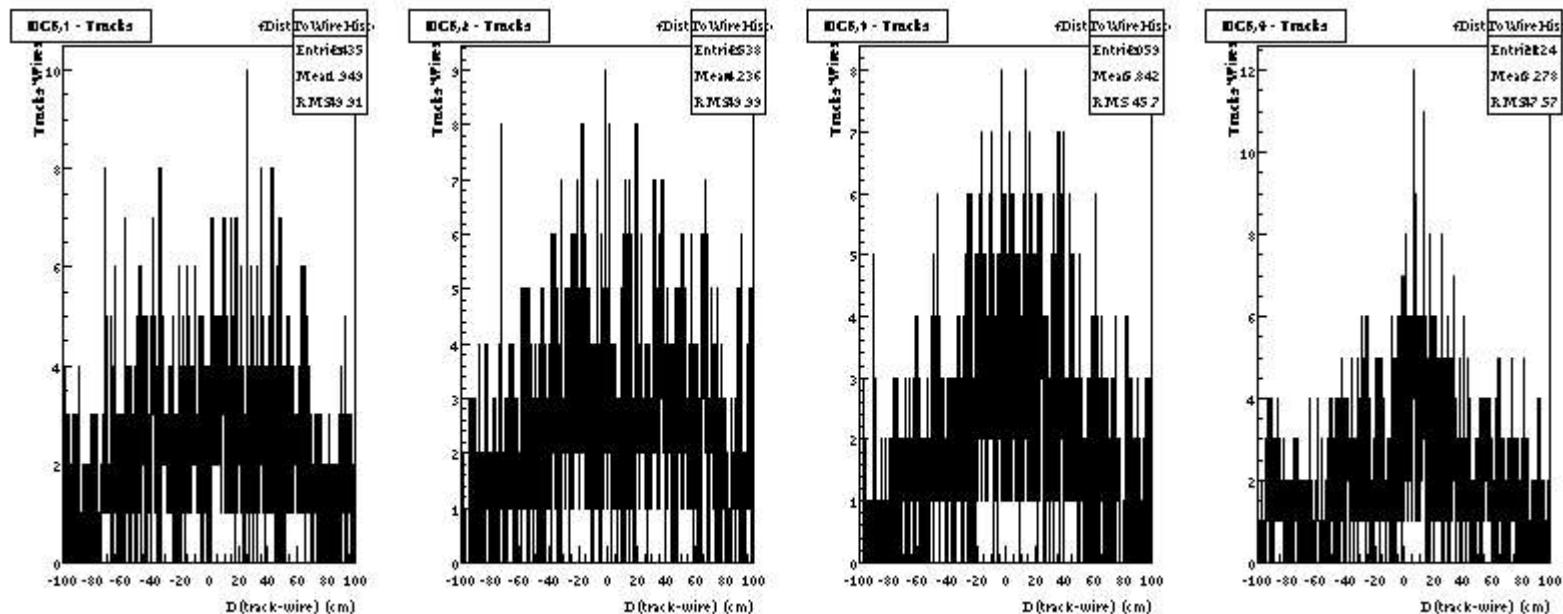
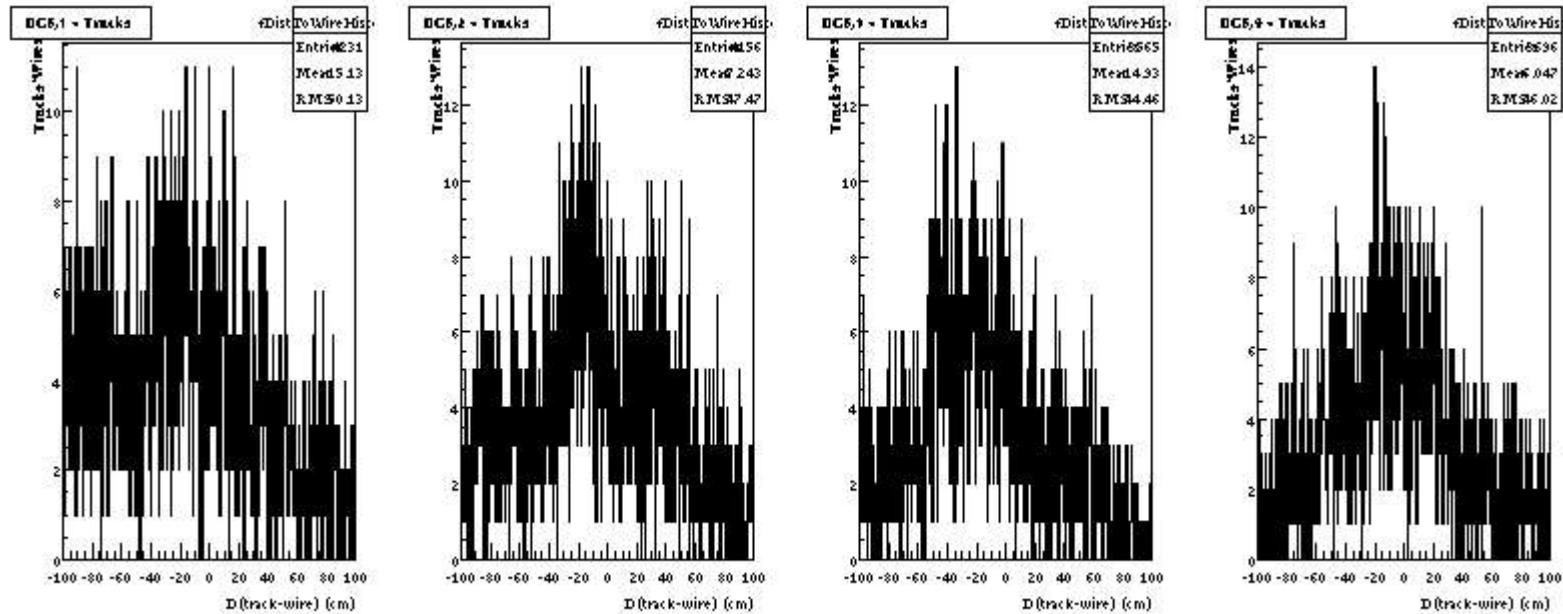
Track-Wire distances DC4



Track-Wire distances PC5

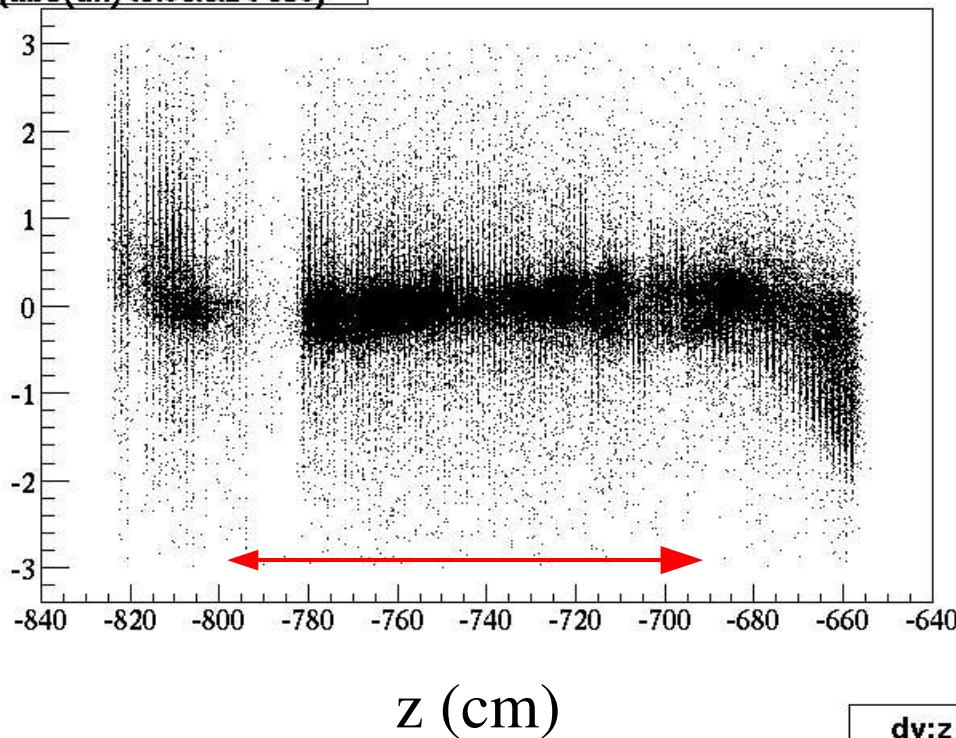


Track-Wire distances PC6



`dx:z {abs(dx)<3.0&&z<-650}`

x residuals (cm)

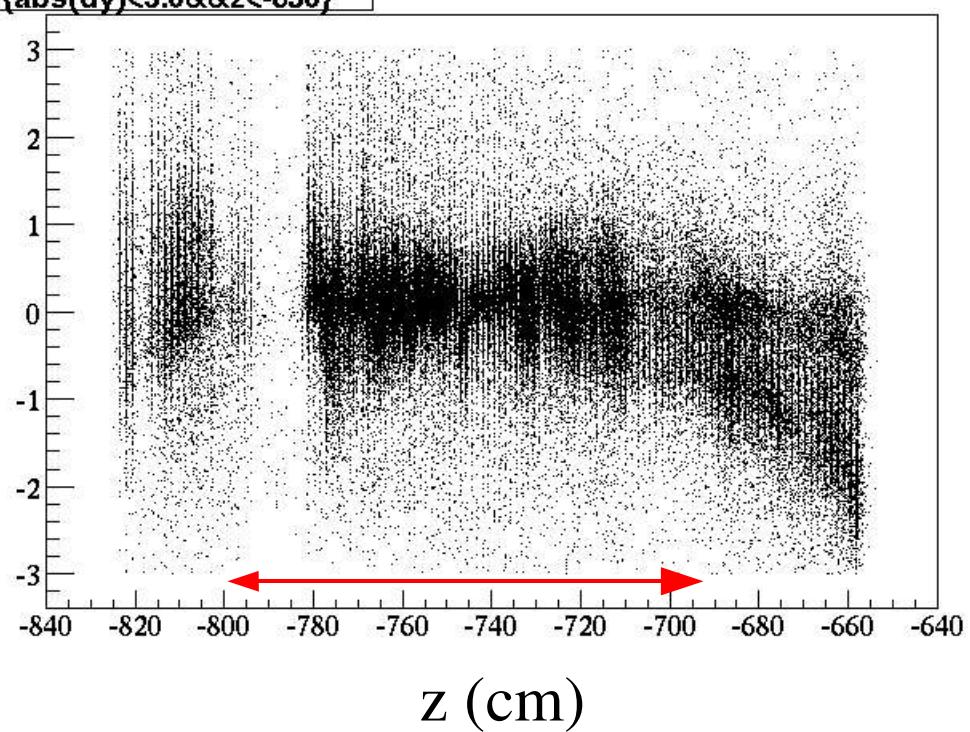


In fit I drop range
 $z < -800$ cm, $z > -670$ cm

TPC Residuals

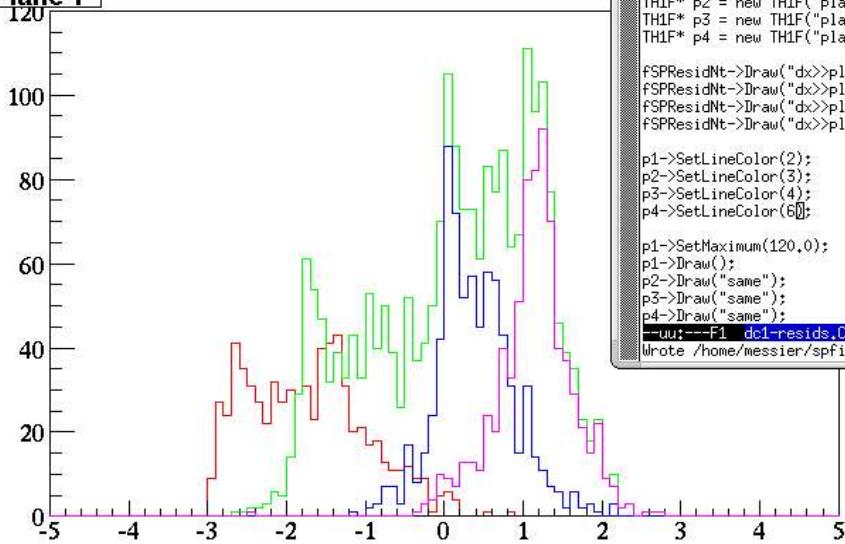
`dy:z {abs(dy)<3.0&&z<-650}`

y residuals (cm)

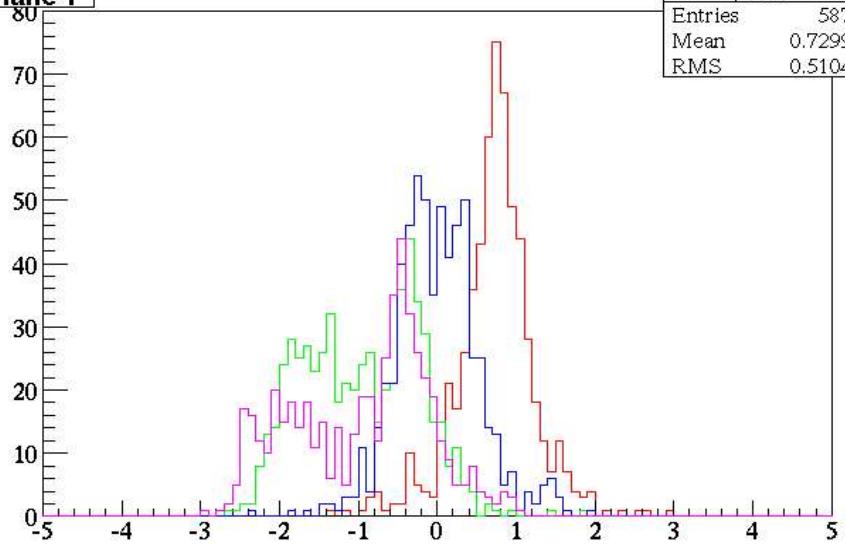


Wire Residuals (plane 1, 2, 3, 4)

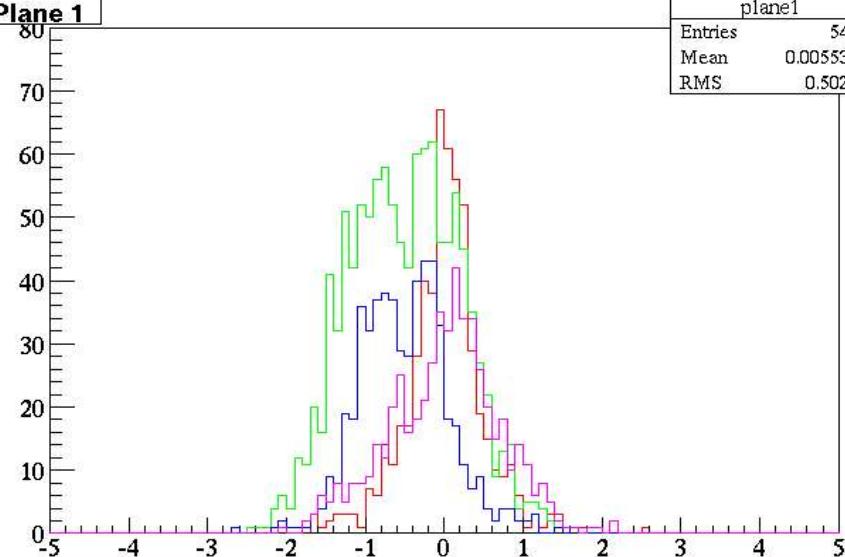
DC1 Plane 1



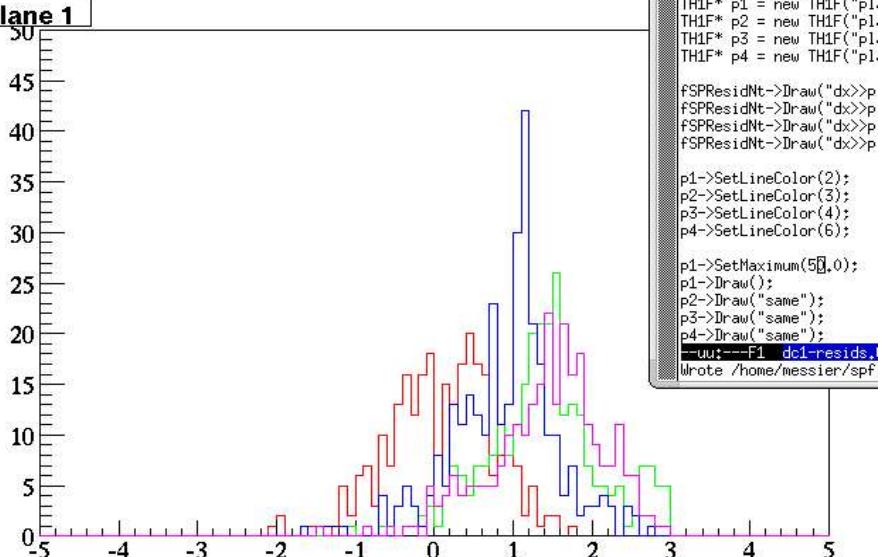
DC2 Plane 1

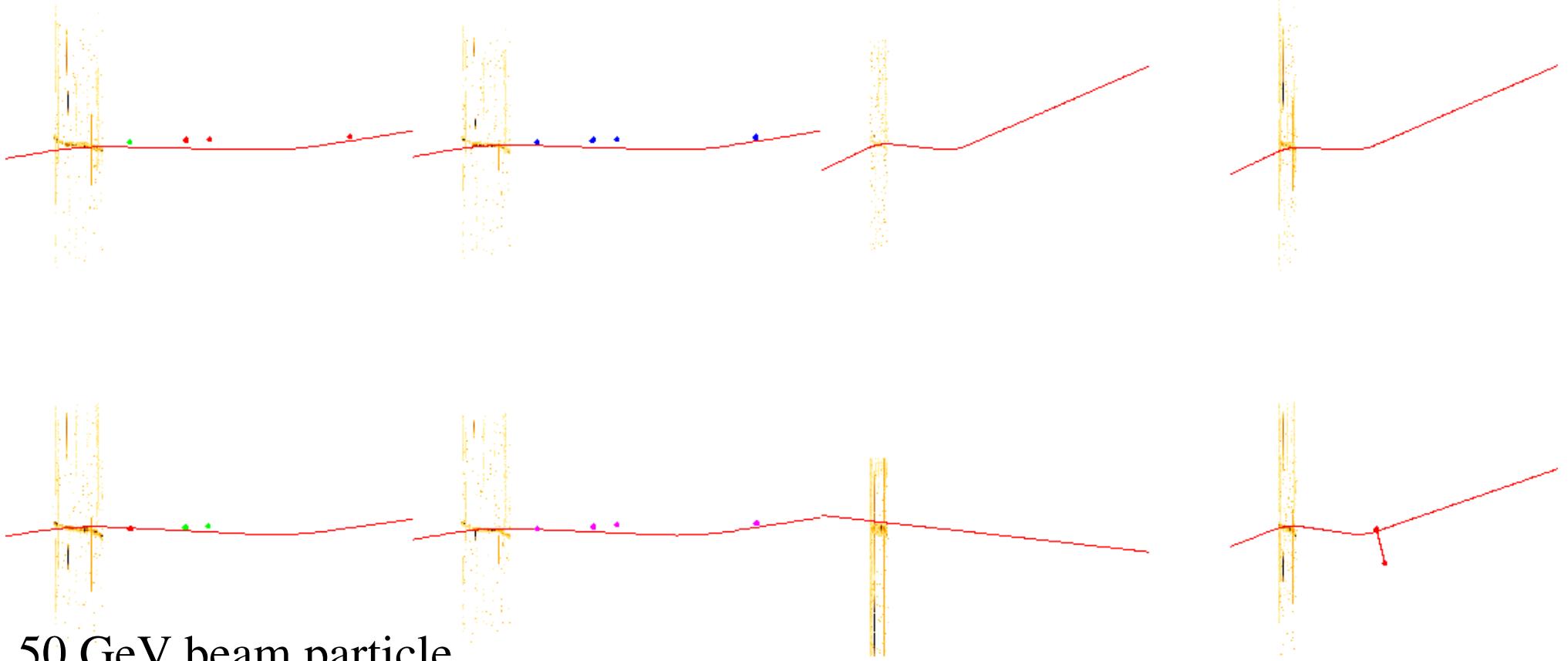


DC3 Plane 1



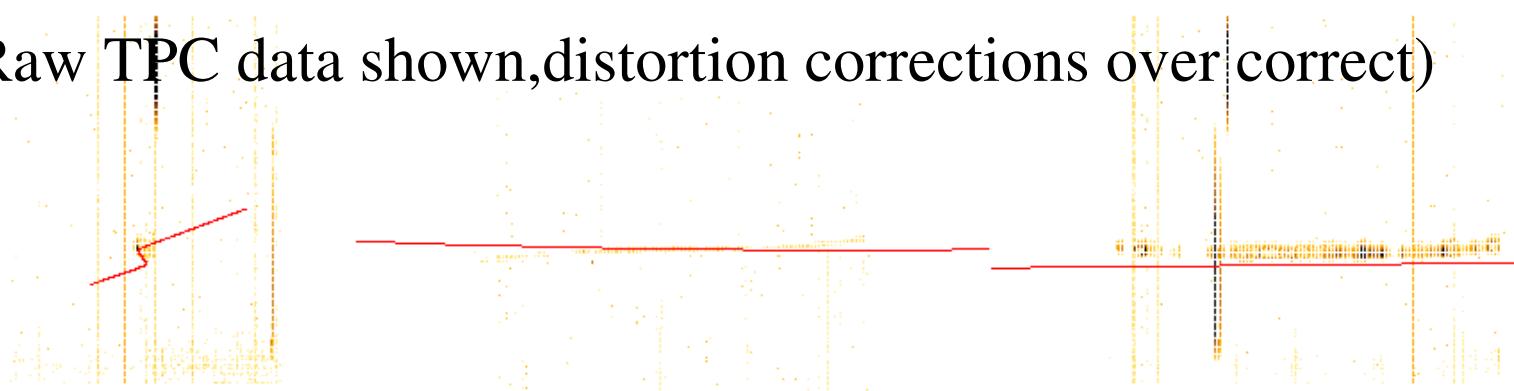
DC4 Plane 1





50 GeV beam particle

(Raw TPC data shown,distortion corrections over|correct)



MIPP (FNAL E907)

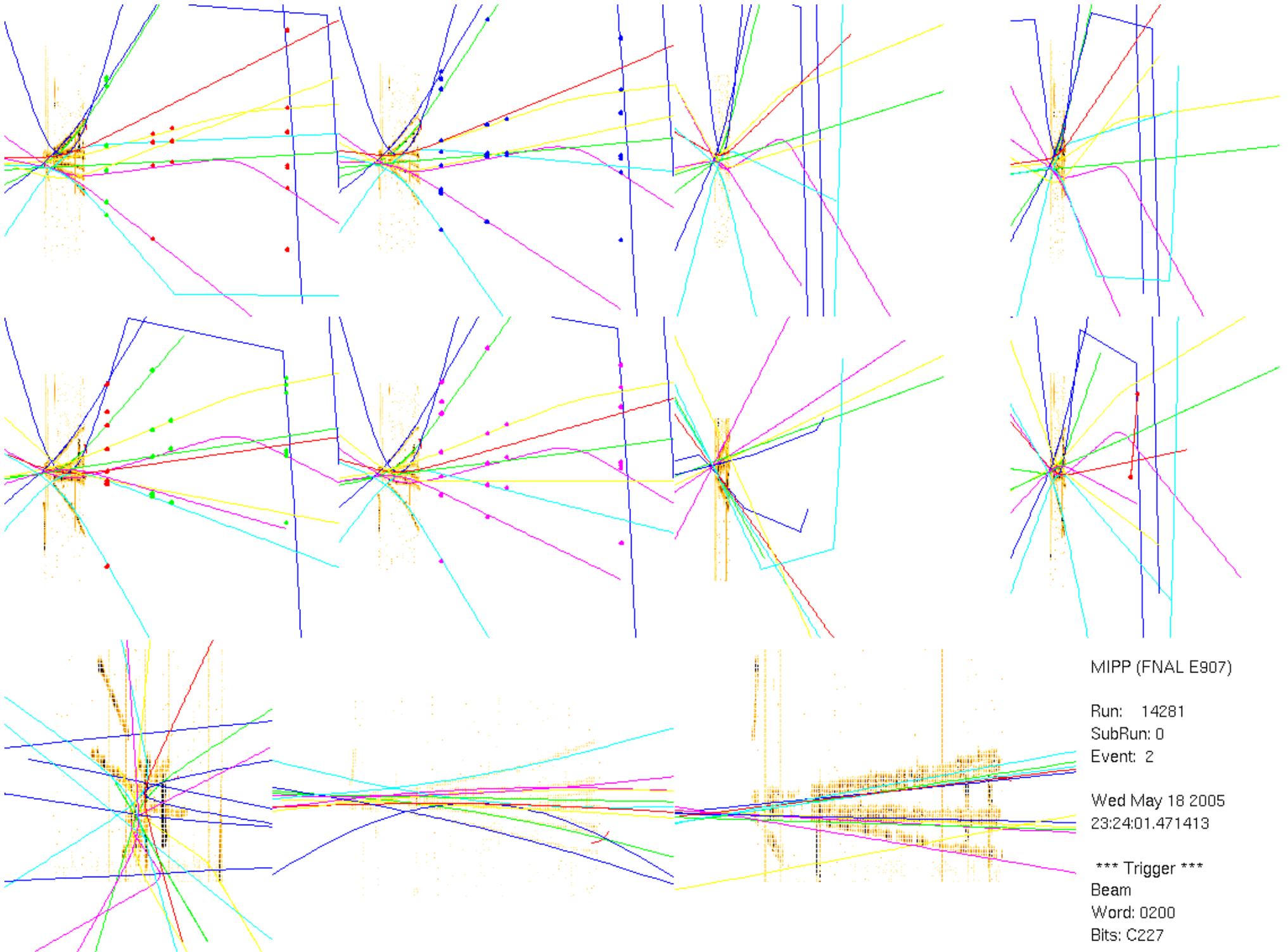
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SubRun: 0

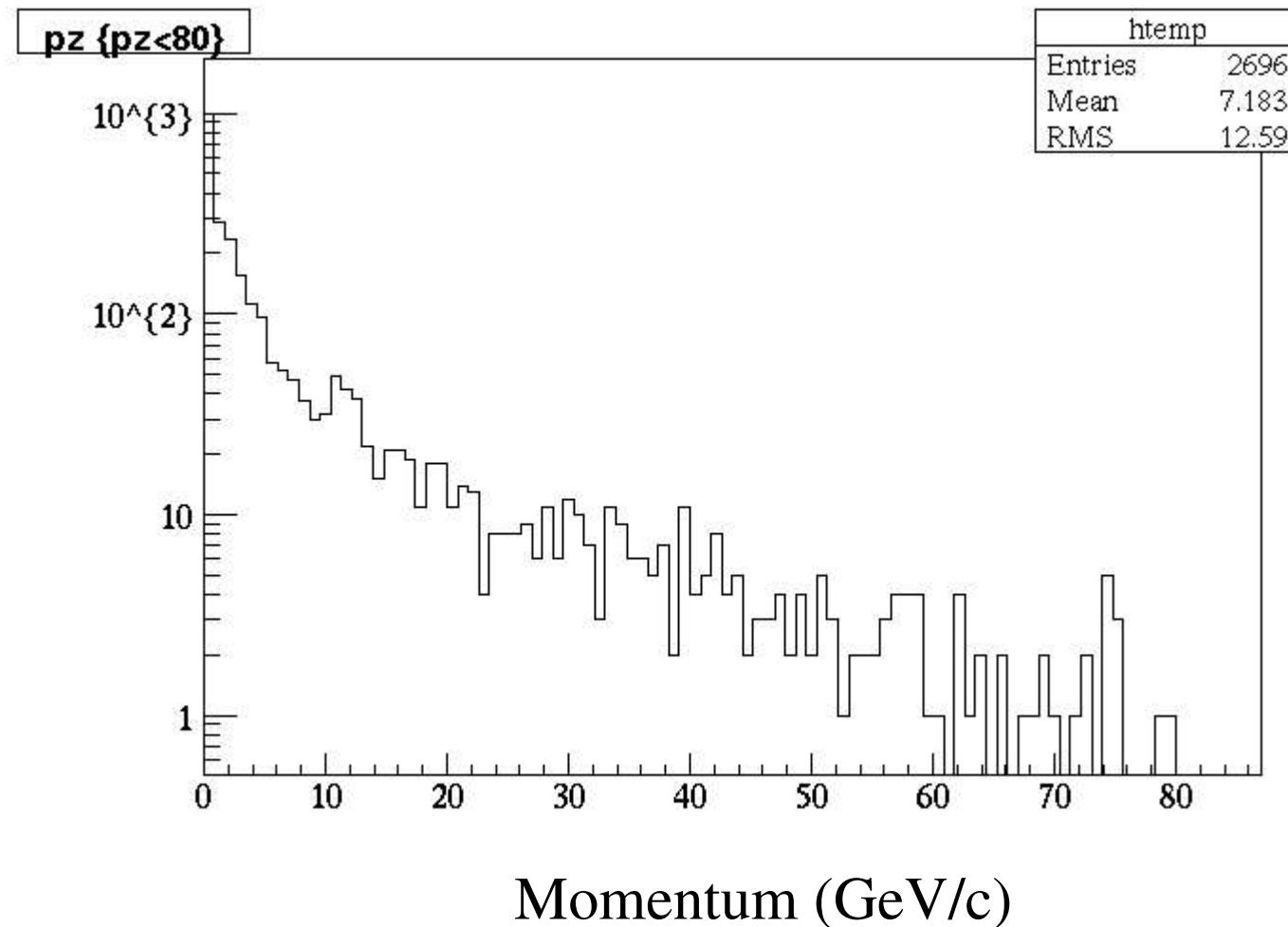
Event: 1

Wed May 18 2005
23:24:01.464435

*** Trigger ***
Beam
Word: 0021
Bits: 0027



Track Momentum Distribution (+50 GeV beam...)



Work in progress...

- For downstream chambers (esp. chamber 6) “dead reckoning” is a bit off
- Smarter method:
 - Form track clusters in chambers 1,2,3 (Andre)
 1. Form track clusters in chambers 4,5,6 (Dmitry)
 2. Merge these clusters with TPC tracks