TPC Reconstruction Update

Jonathan M. Paley

Indiana University

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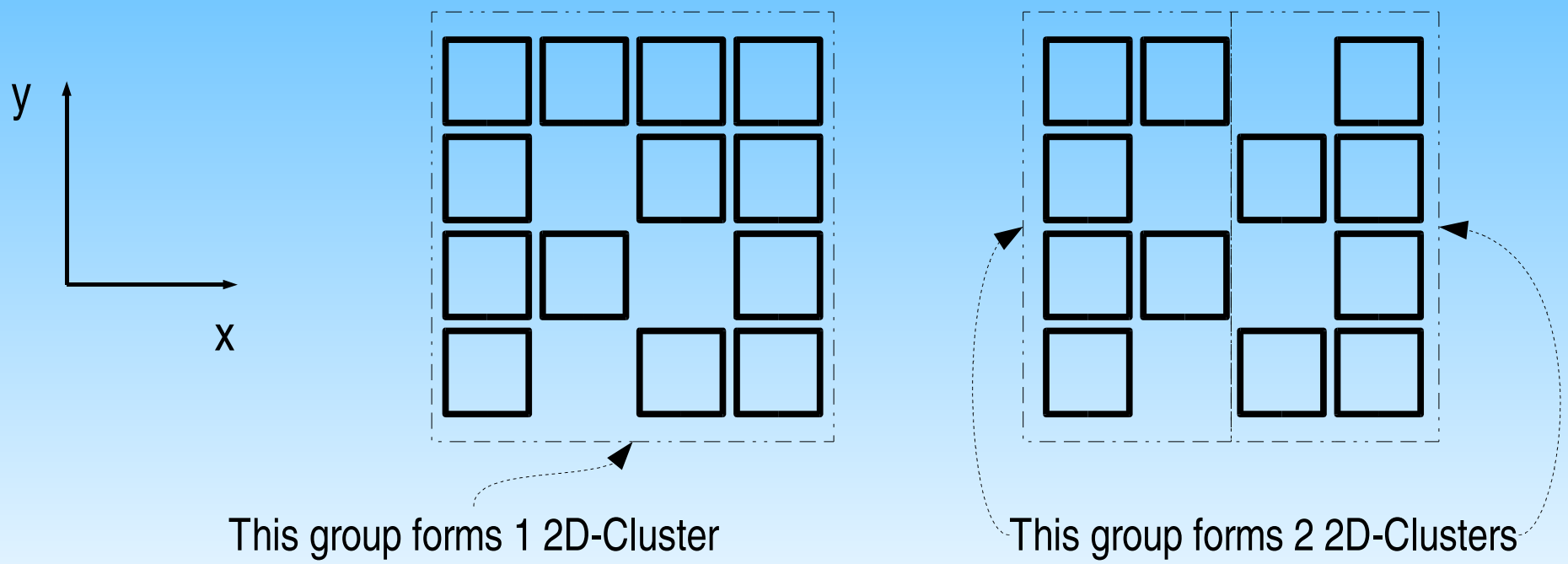
Outline of TPC Reconstruction Algorithm:

1) Build TPCR2DClusters (in the x-y plane) from the raw TPCDigits in each pad row (along the z-direction).



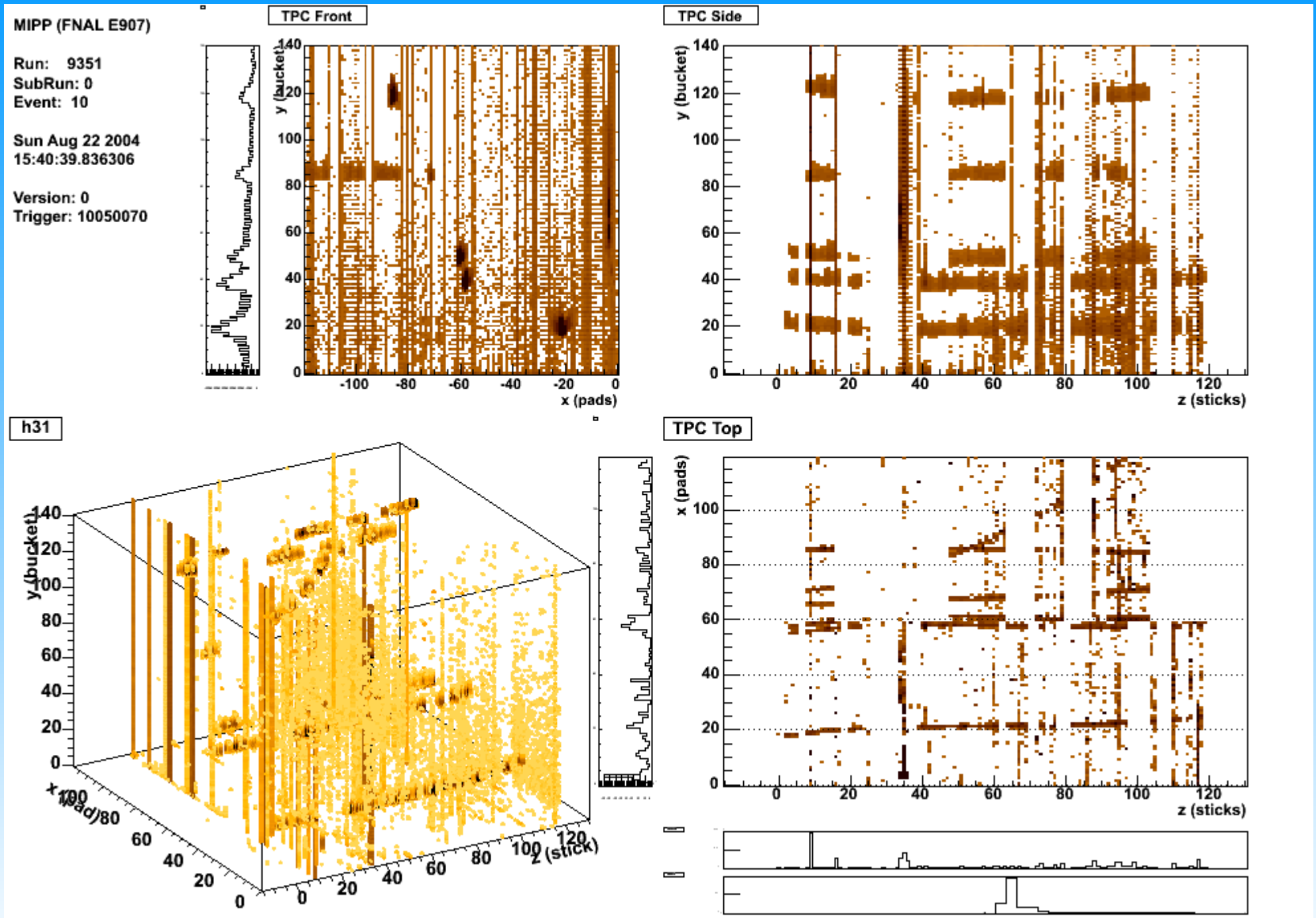
2) A TPCRHit is (at the moment) simply the center of gravity of each TPCR2DCluster.

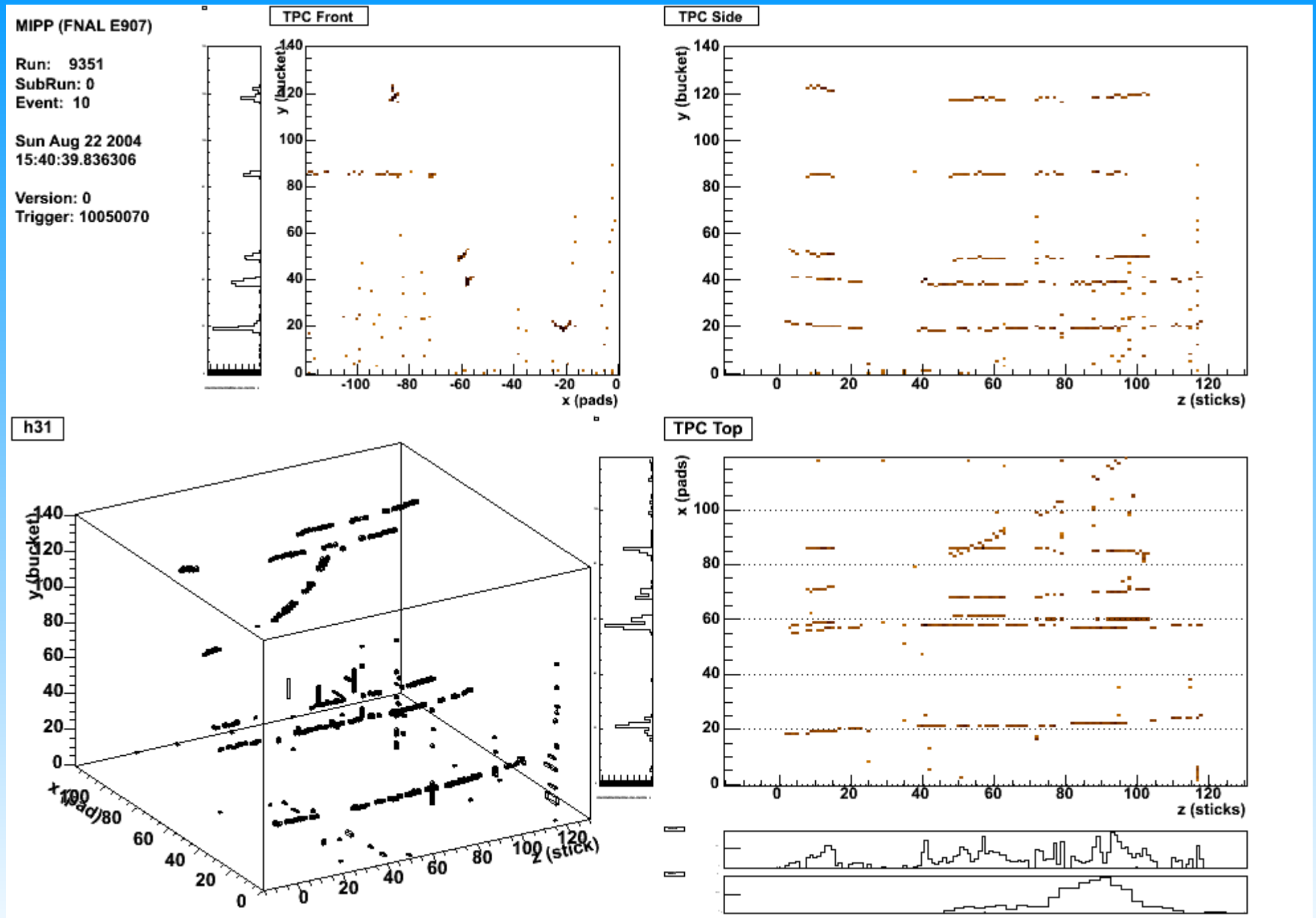
- TPCRHit inherits from the RecoBase RBTrackPoint class.
- The (padCol,bucket,padRow) is converted to a (x,y,z) position.
- The uncertainties in the positions are taken as the RMS widths in each direction.

3) A TPCRTrack consists of a list of TPCRHits, the track fit parameters (there are five) and their uncertainties.

- TPCRTrack *does not* inherit from the RecoBase RBTrack class (yet).
- The track finding algorithm is still under development... the track fitting code works.
- Both algorithms are based on Xihong Yang's E910 work, described in his thesis.

Note: All TPCR2DClusters, TPCRHits, and TPCRTracks are saved to the “tpc” directory in evt.Reco()


MIPP (FNAL E907)
Run: 9351
SubRun: 0
Event: 10
Sun Aug 22 2004
15:40:39.836306
Version: 0
Trigger: 10050070
TPC Front
y (bucket)
x (pads)
TPC Side
y (bucket)
z (sticks)
h31
y (bucket)
x (pad)
z (stick)
TPC Top
x (pads)
z (sticks)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SubRun: 0
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Sun Aug 22 2004
15:40:39.836306
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TPC Front
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TPC Side
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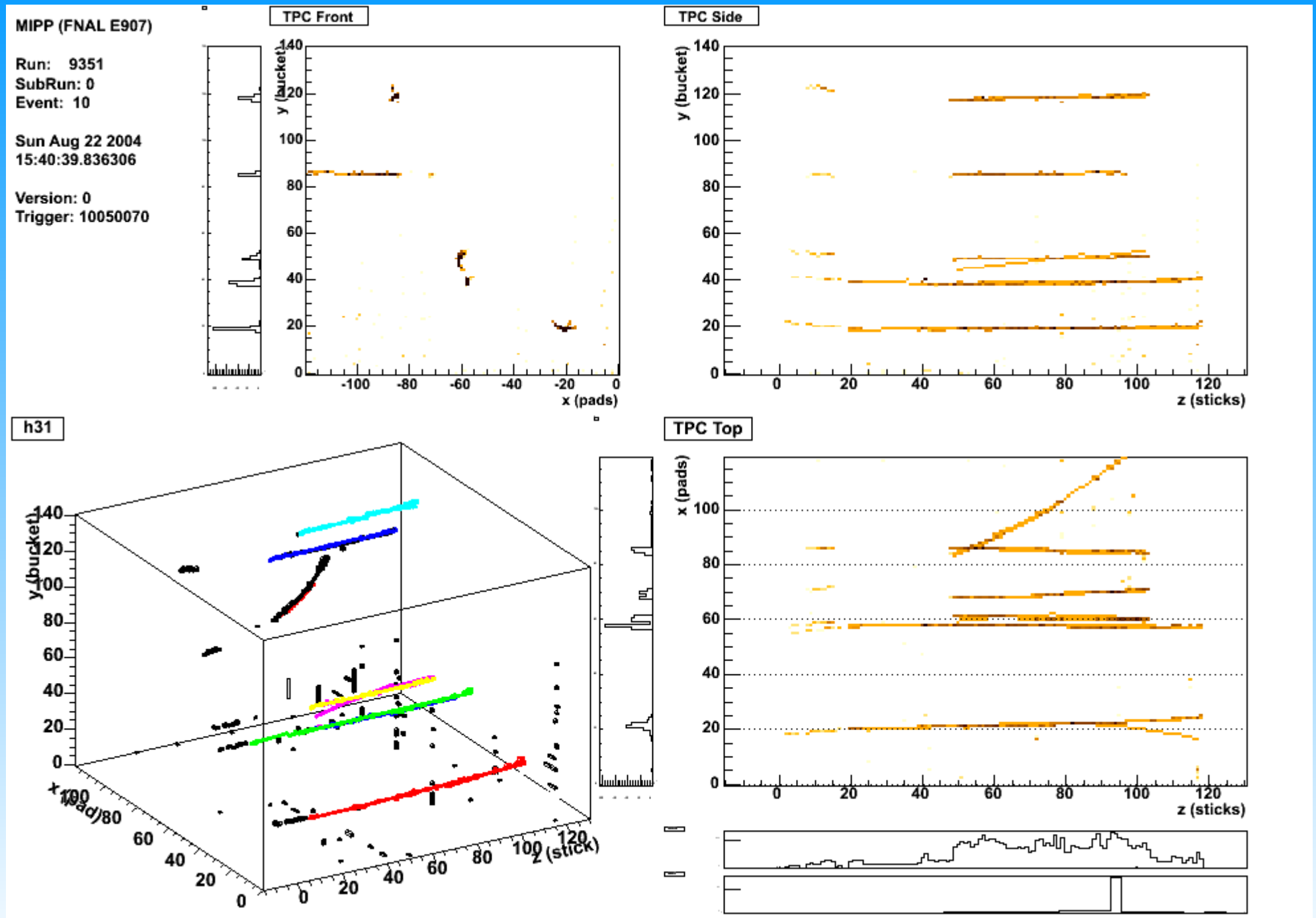
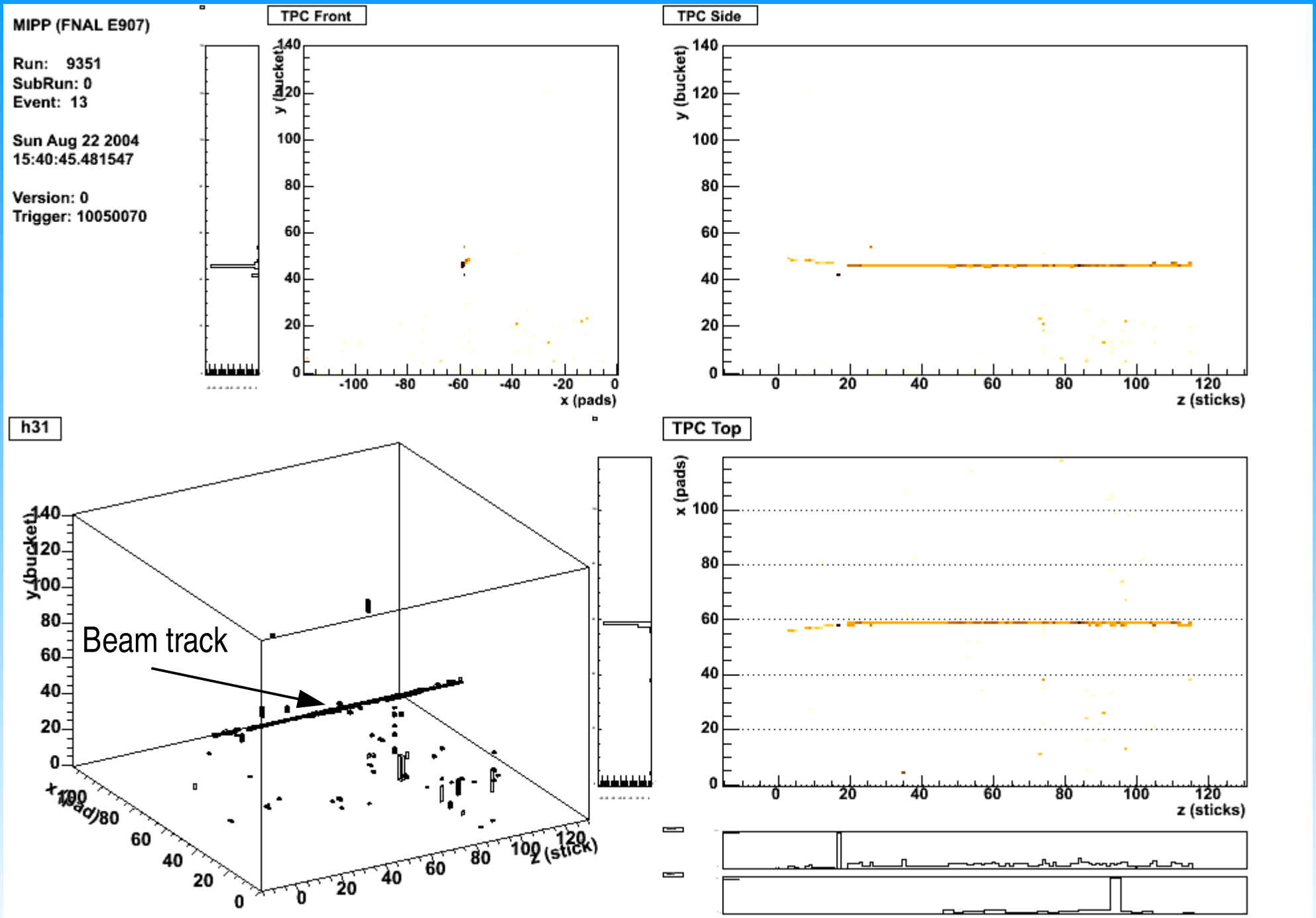
h31
y (bucket)
x (pad)
z (stick)
TPC Top
x (pads)
z (sticks)


MIPP (FNAL E907)
Run: 9351
SubRun: 0
Event: 10
Sun Aug 22 2004
15:40:39.836306
Version: 0
Trigger: 10050070
TPC Front
y (bucket)
x (pads)
TPC Side
y (bucket)
z (sticks)
h31
y (bucket)
x (pad)/80
z (stick)
TPC Top
x (pads)
z (sticks)

Some Good Fits



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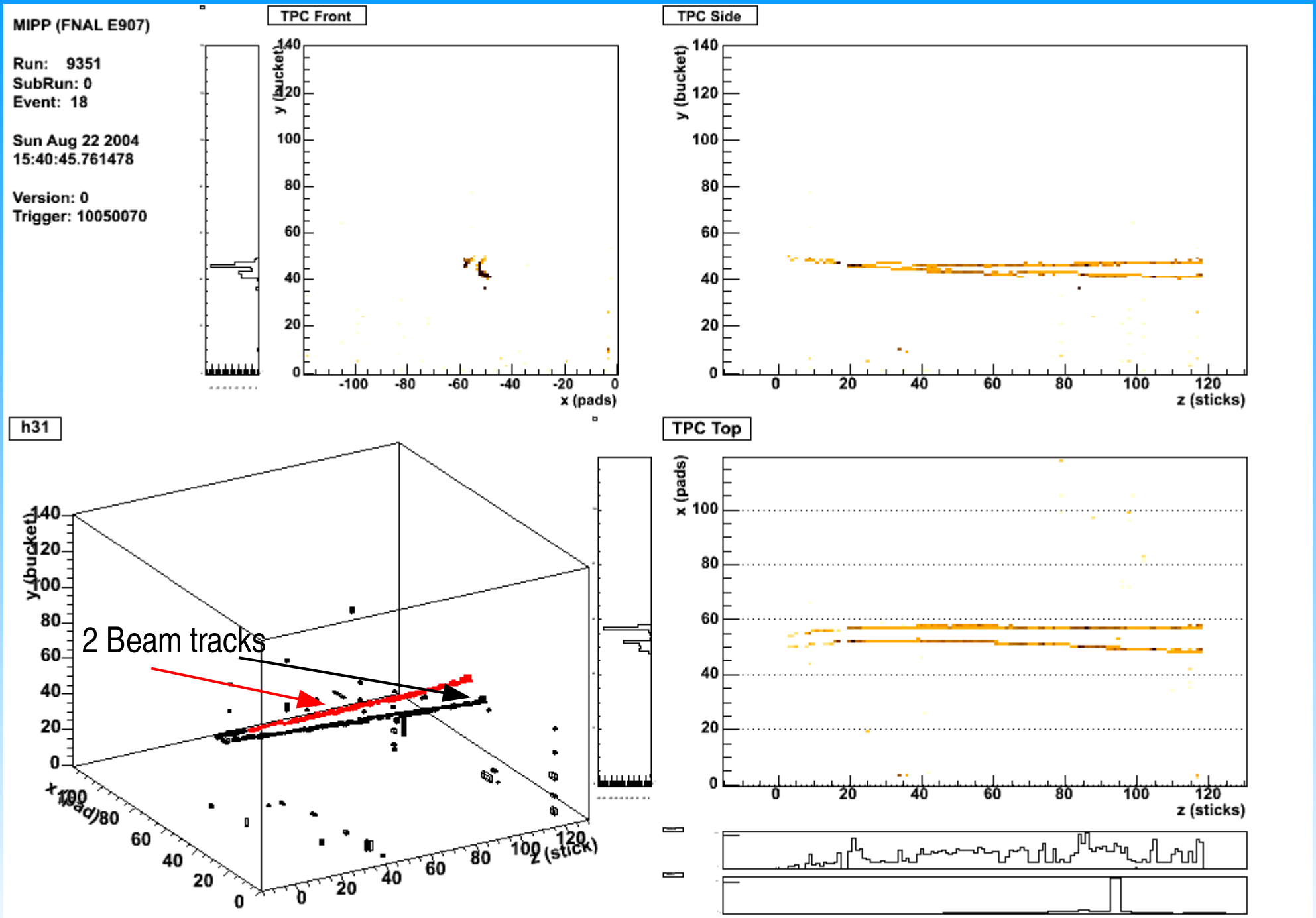

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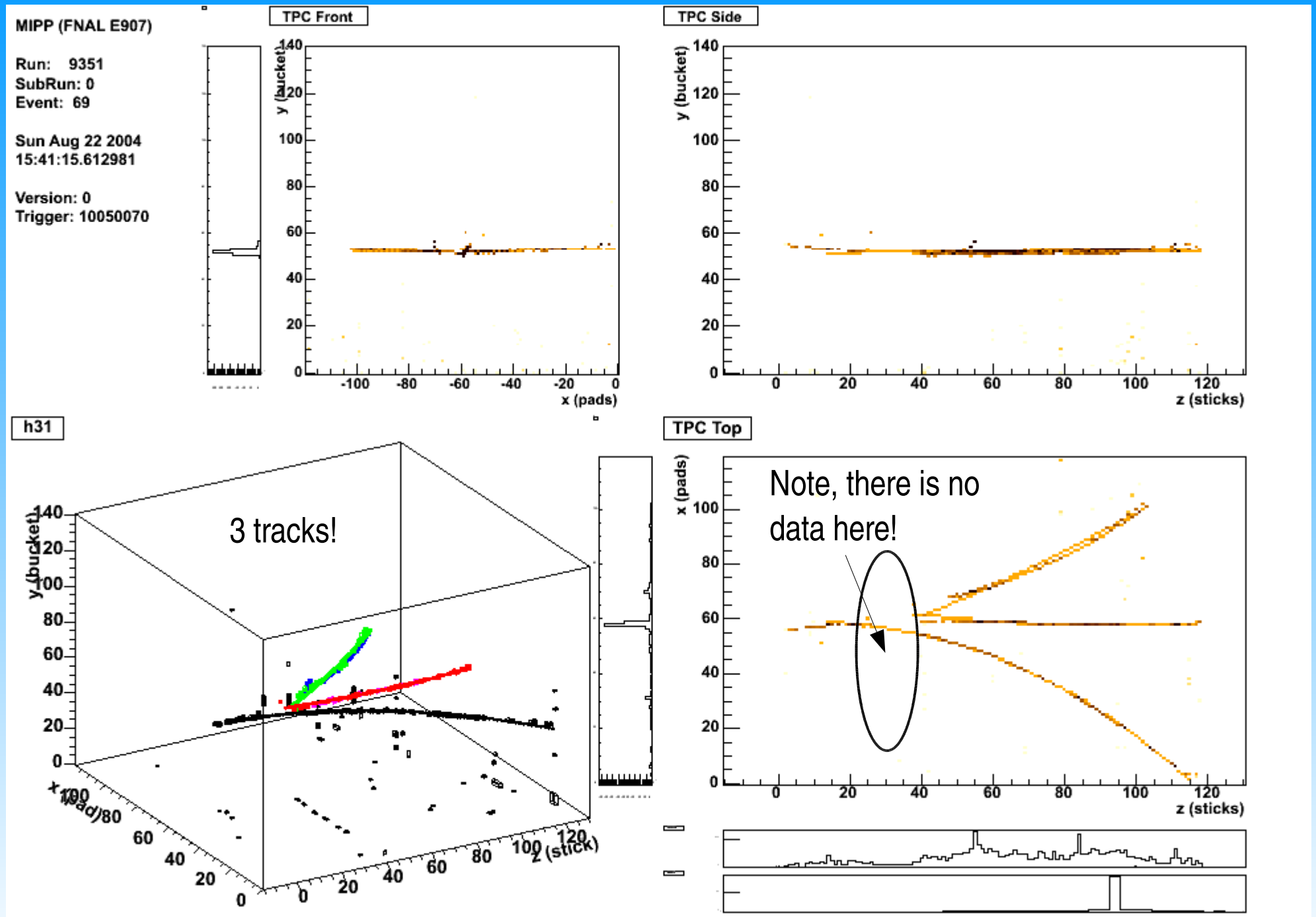

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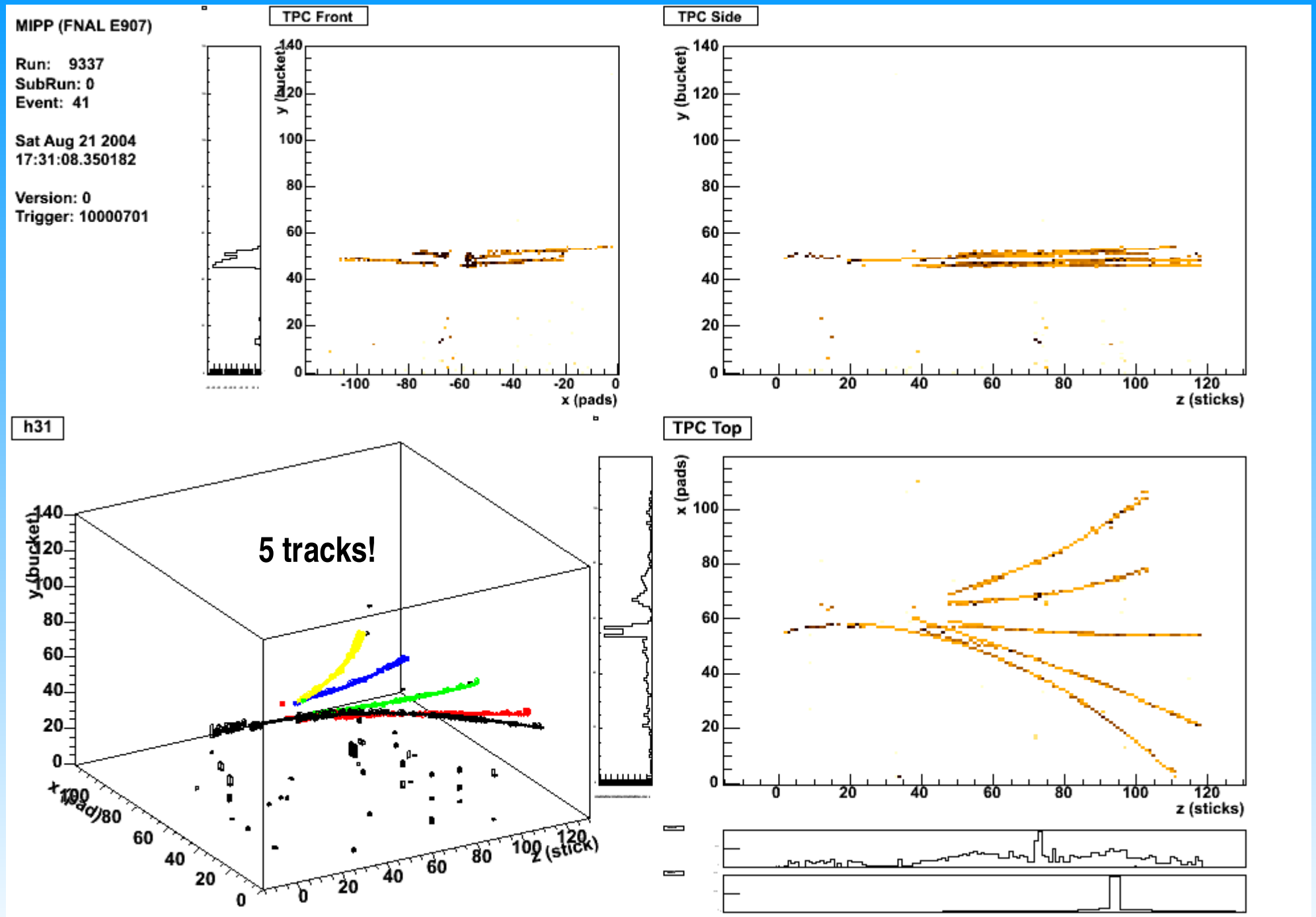
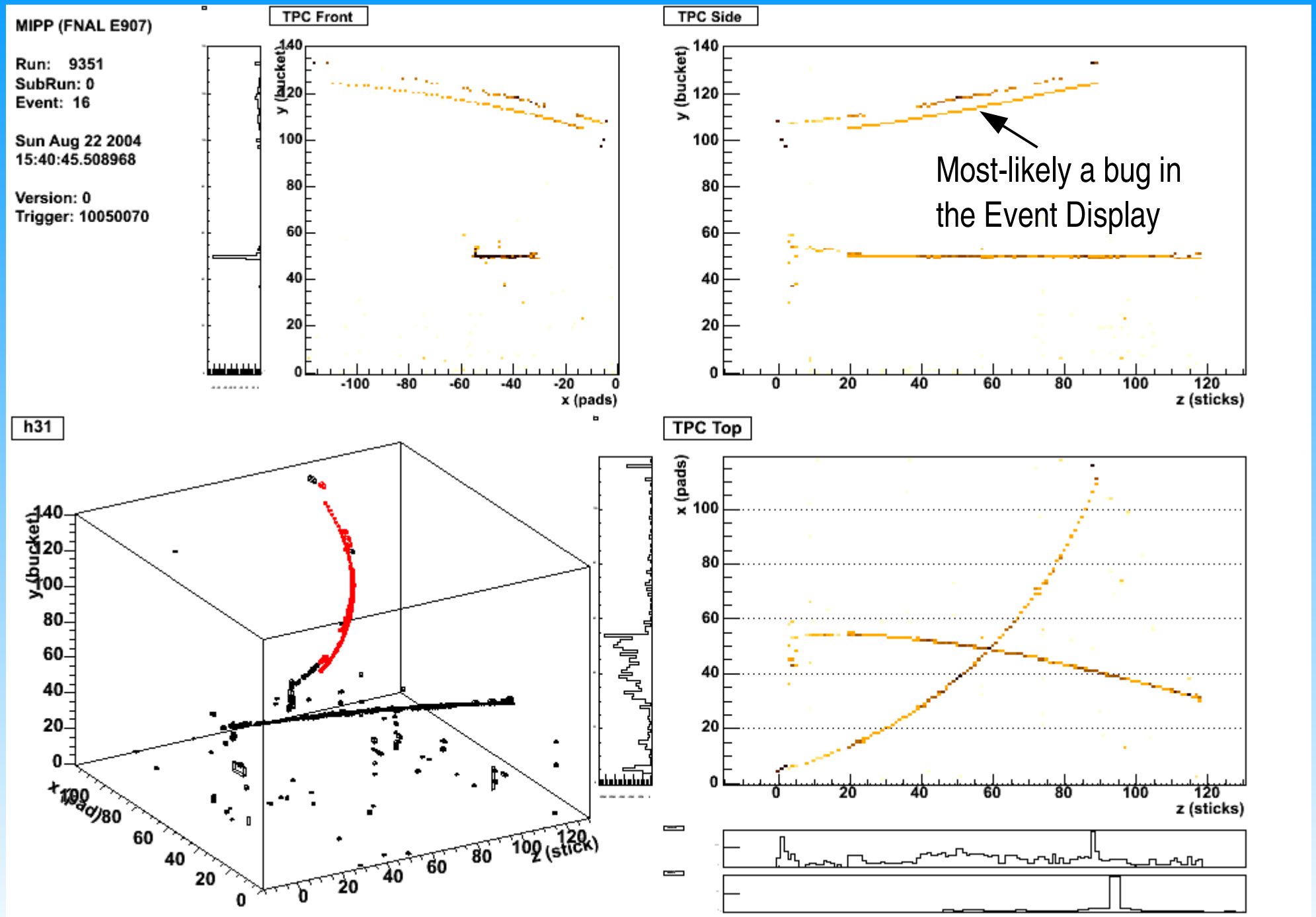


Some Not-So-Bad Fits



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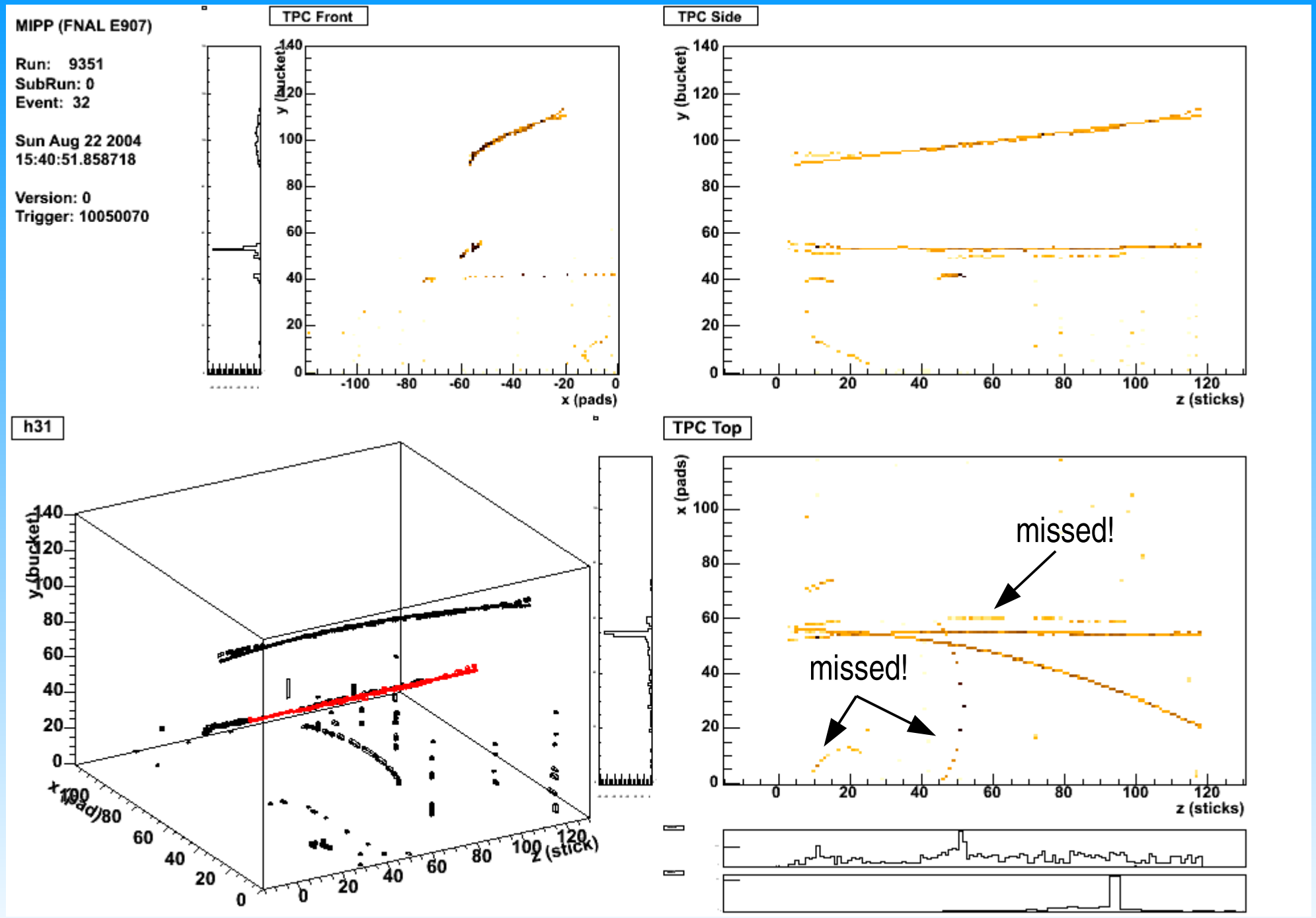
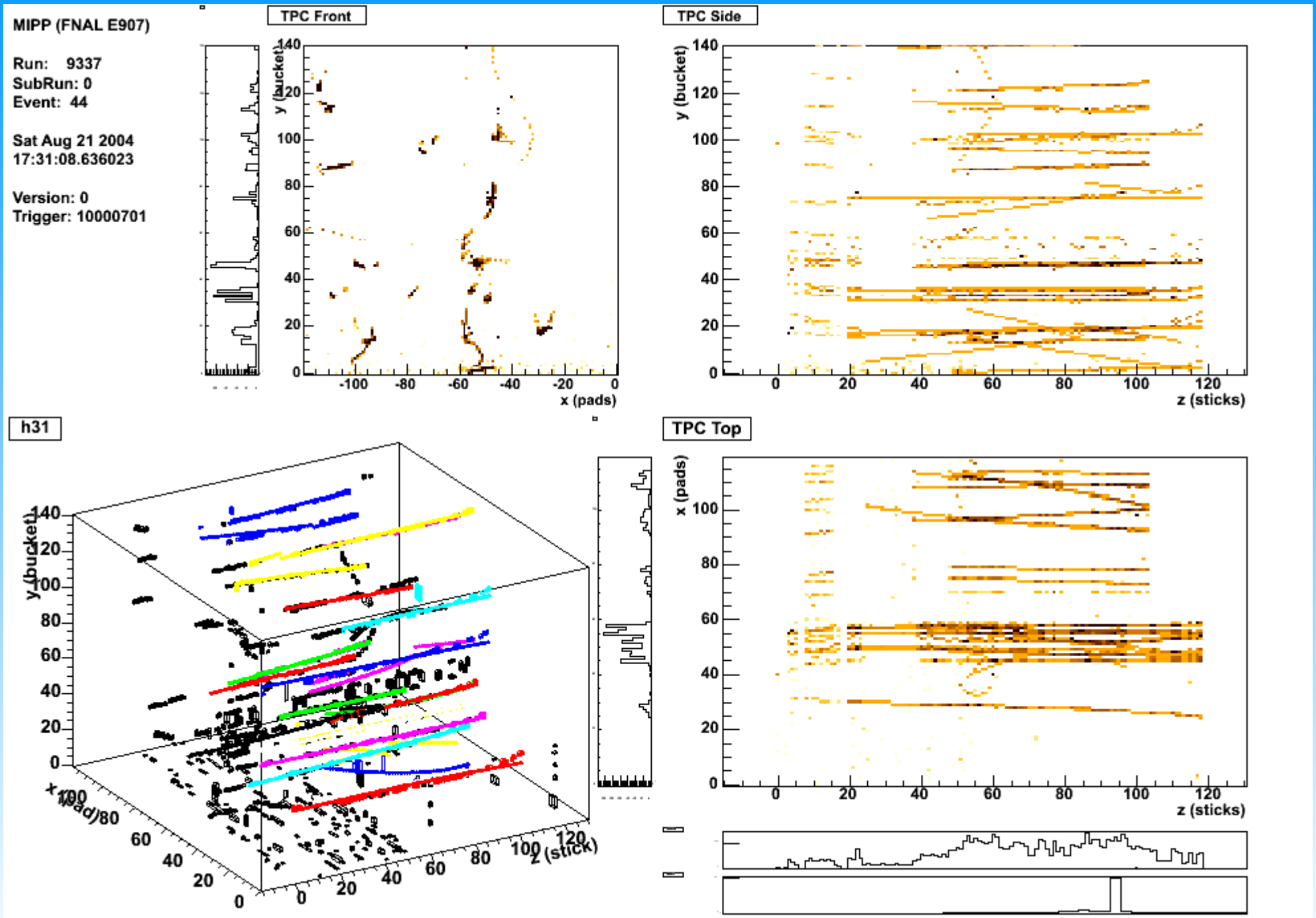


Some Not-So-Bad Fits



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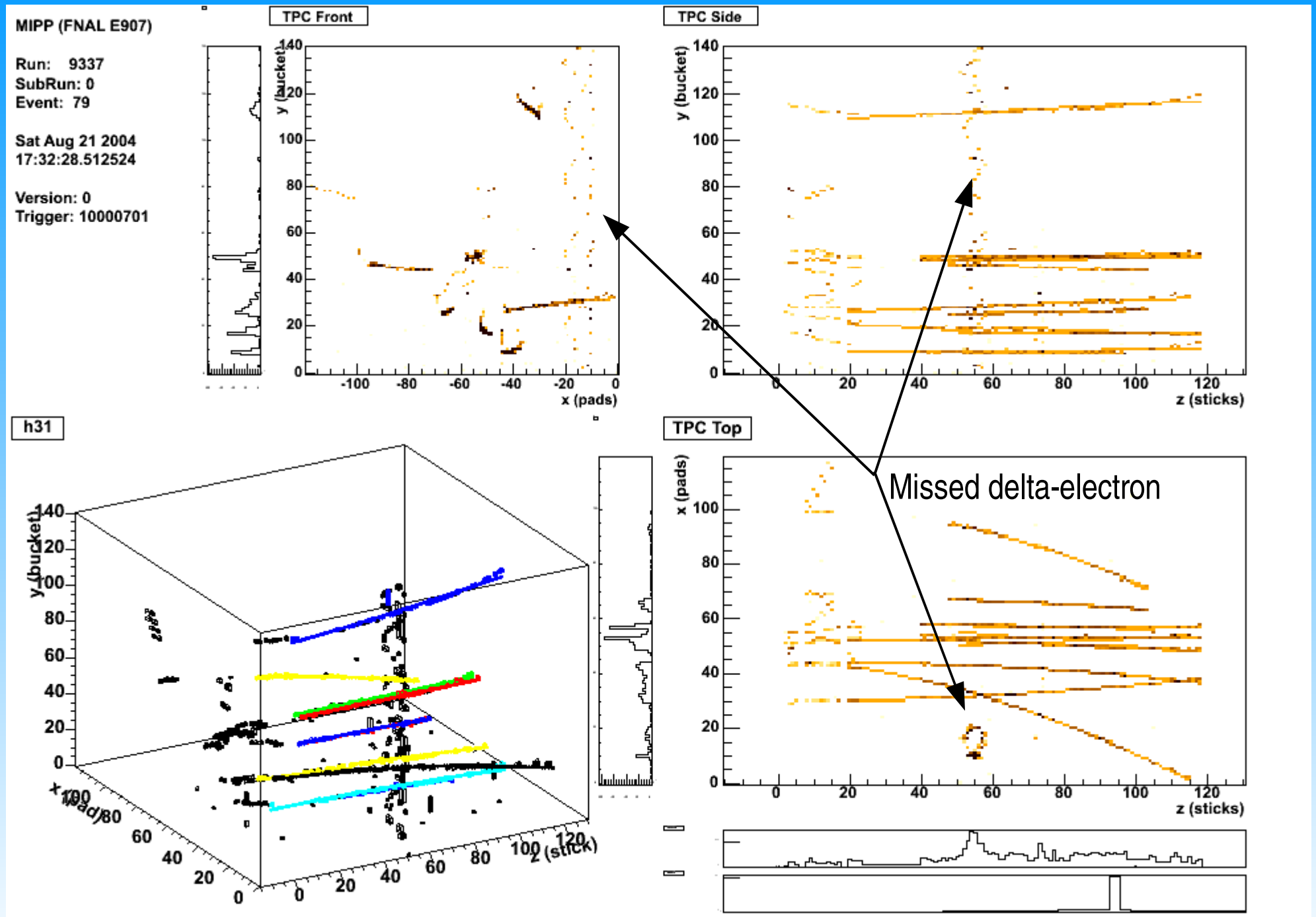
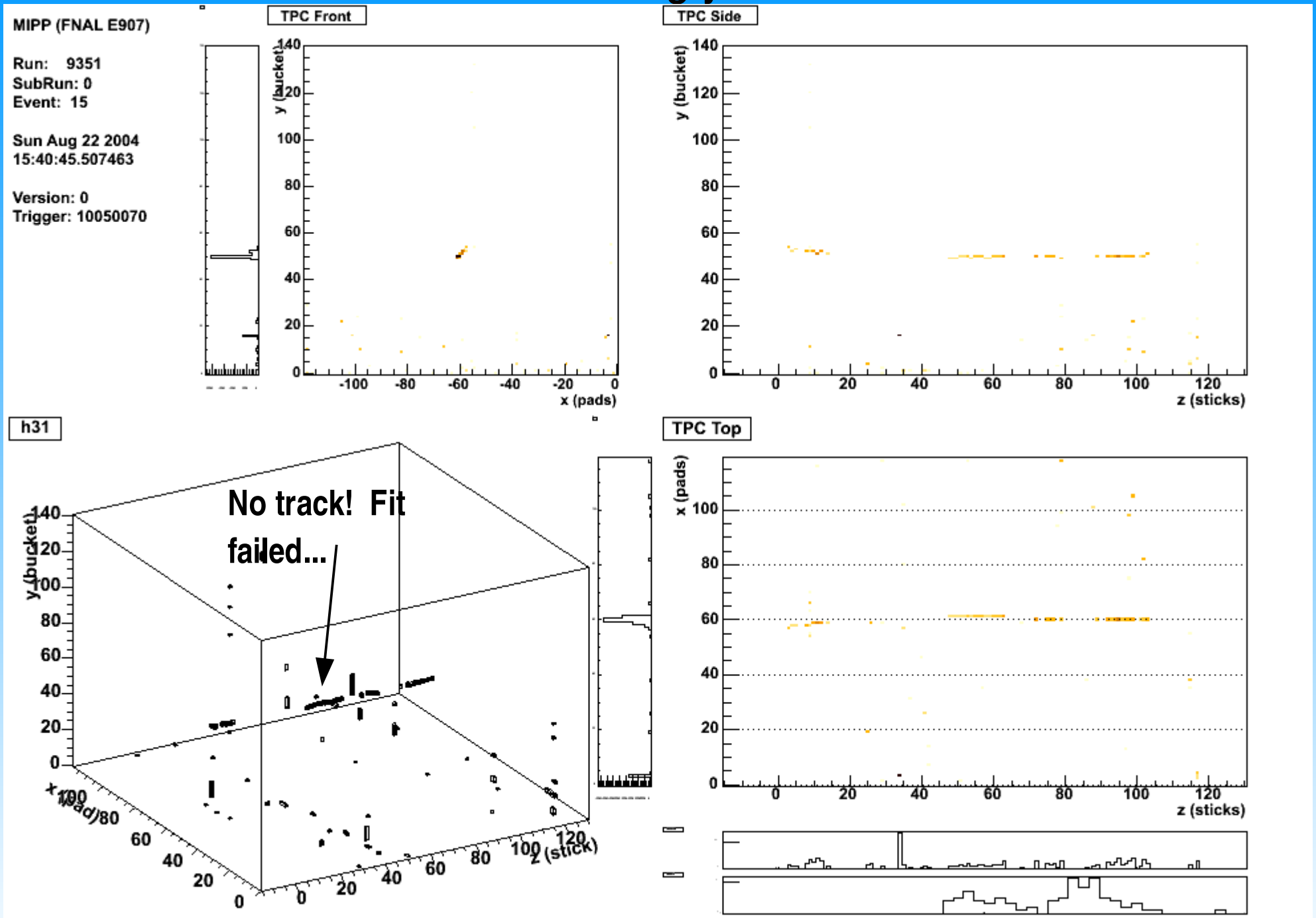


Some Ugly Fits



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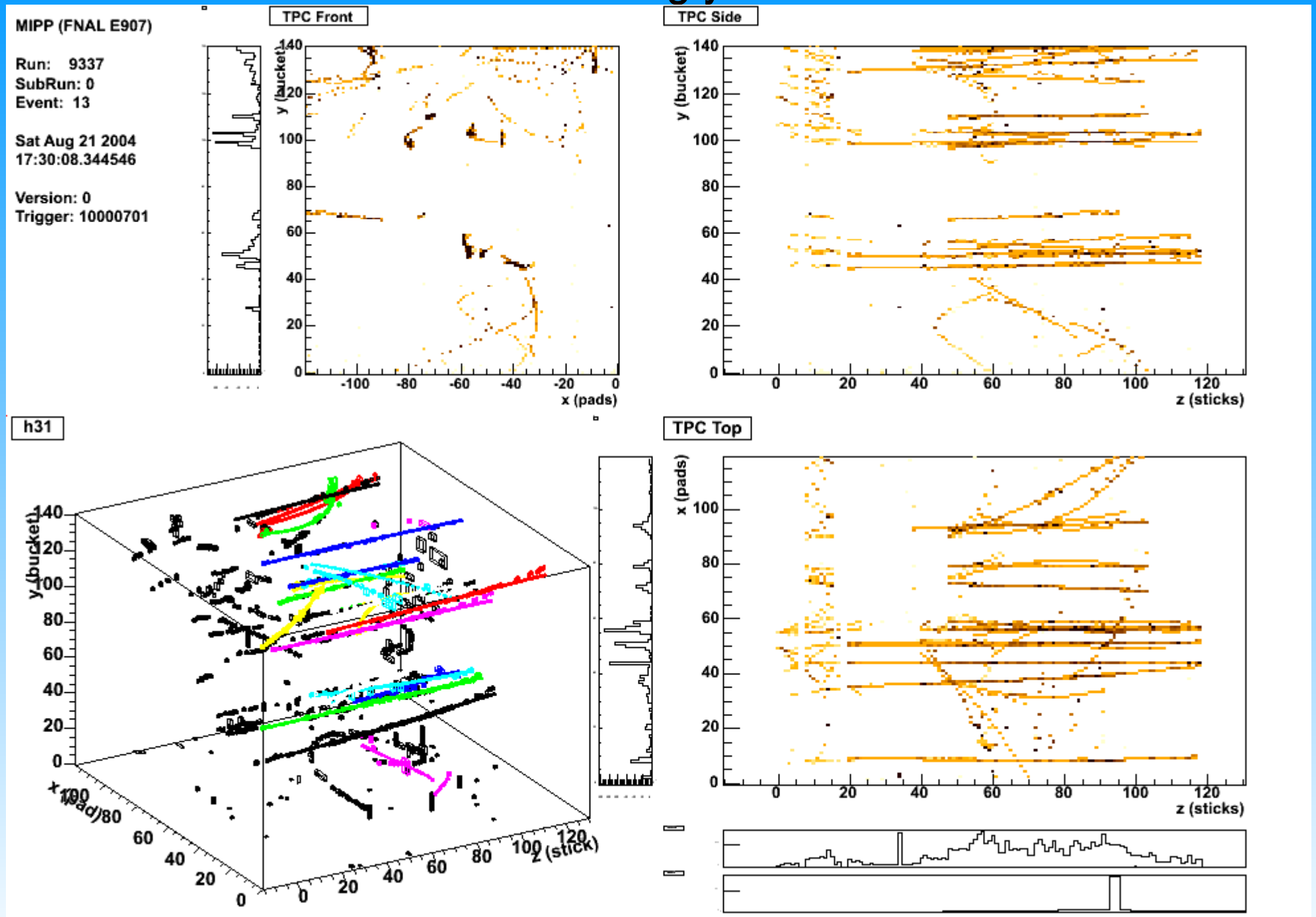
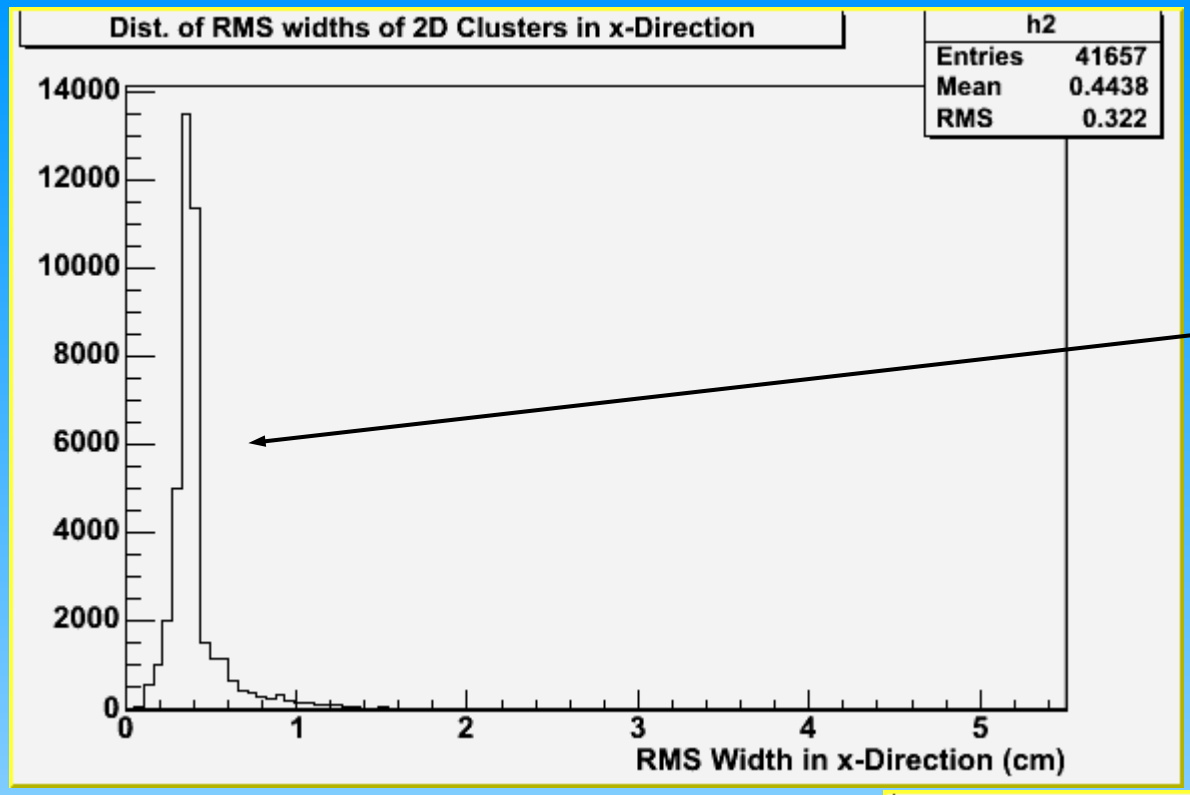
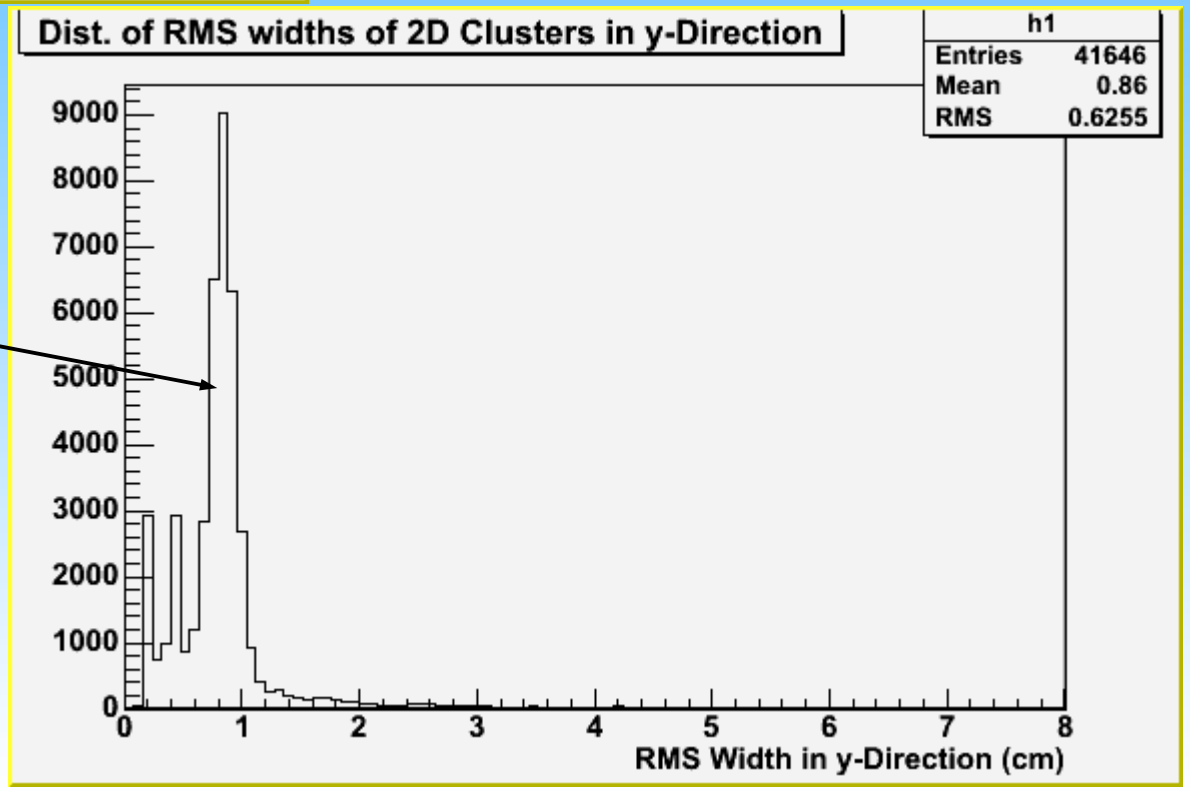


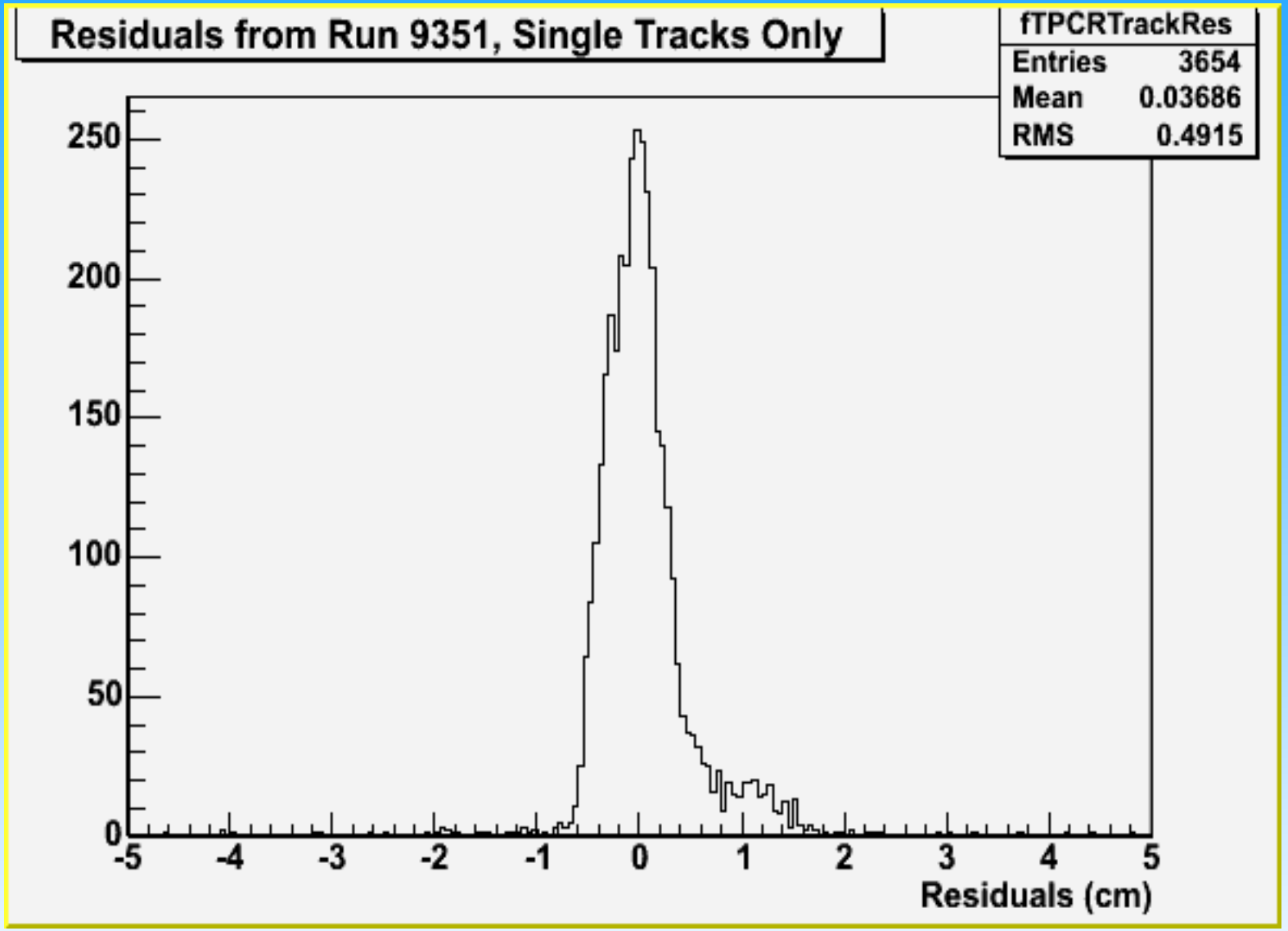


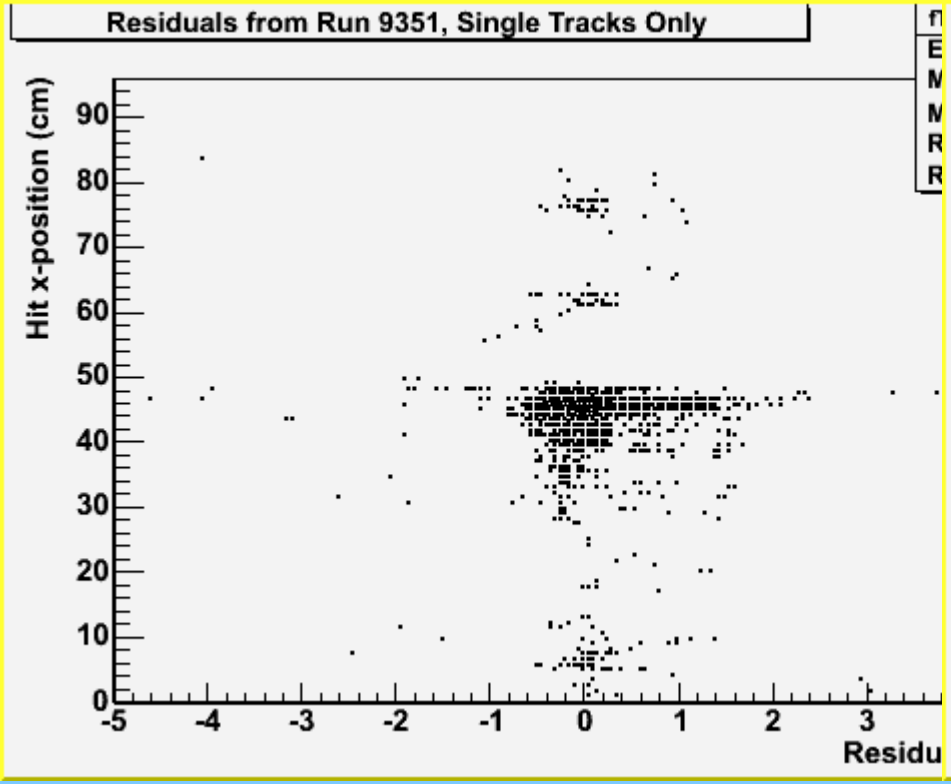
RMS widths of the 2D Clusters in the x-direction

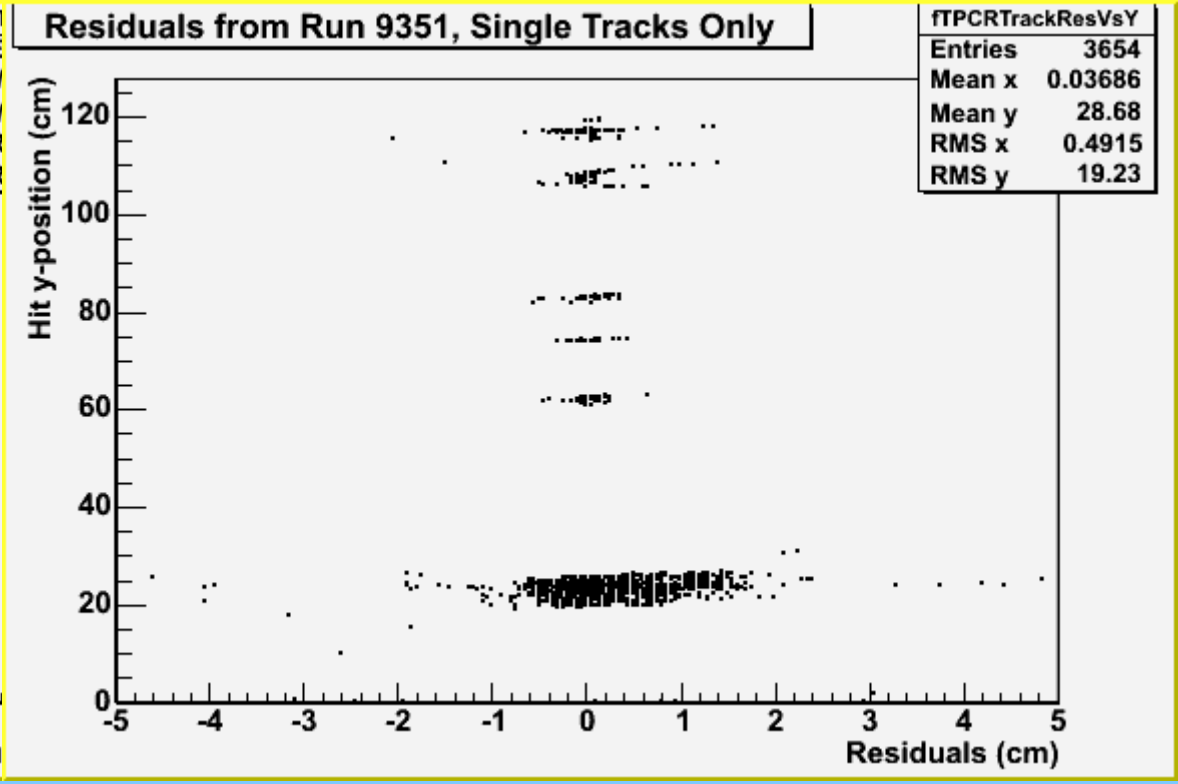
RMS widths of the 2D Clusters in the y-direction

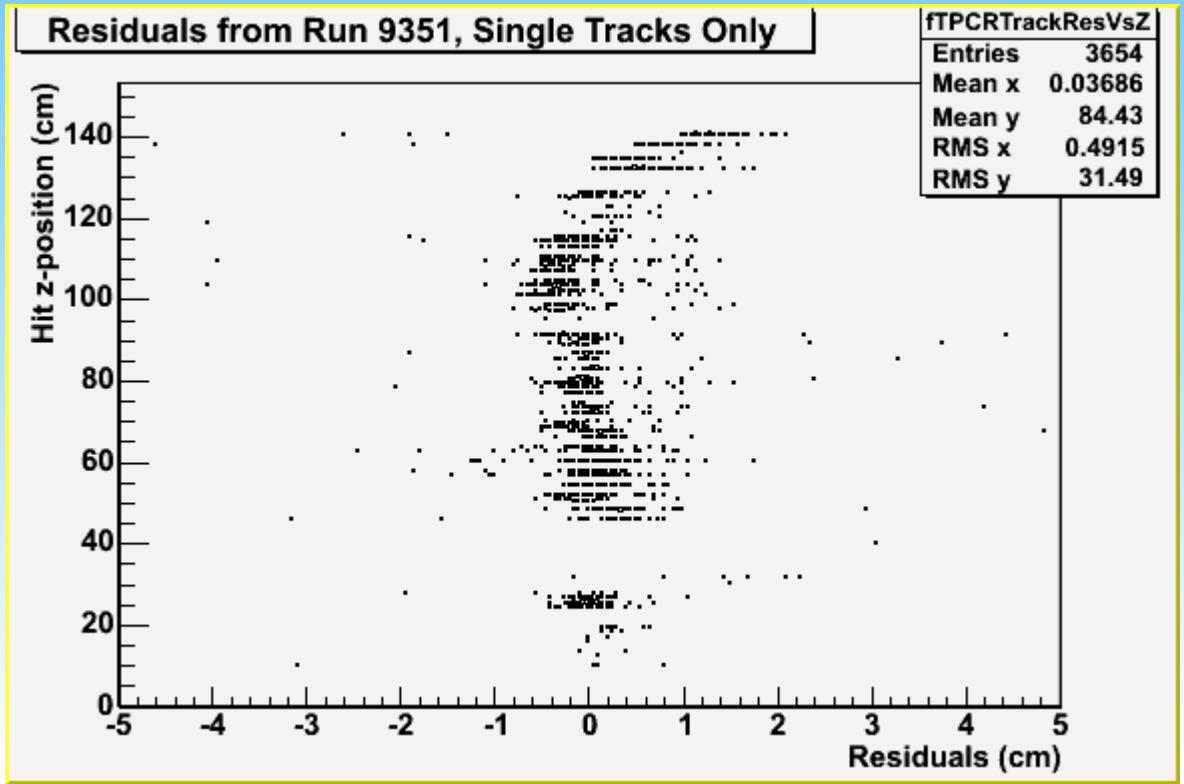


For single (beam) tracks, where I know the fits are quite reasonable...




Residuals from Run 9351, Single Tracks Only
Hit x-position (cm)
Residu


Residuals from Run 9351, Single Tracks Only
fTPCRTrackResVsY
Entries 3654
Mean x 0.03686
Mean y 28.68
RMS x 0.4915
RMS y 19.23
Hit y-position (cm)
Residuals (cm)


Residuals from Run 9351, Single Tracks Only
fTPCRTrackResVsZ
Entries 3654
Mean x 0.03686
Mean y 84.43
RMS x 0.4915
RMS y 31.49
Hit z-position (cm)
Residuals (cm)

Conclusions

- The TPC track reconstruction is a work-in-progress and the algorithm needs a bit of tweaking, but preliminary results are encouraging.
- Up to this point, ADC information has been used only to determine 2D cluster centroids.
- Improvements/changes in the TPC hardware will certainly simplify and improve the performance of the track reconstruction.
- Track merging and vertex finding still need to be implemented.