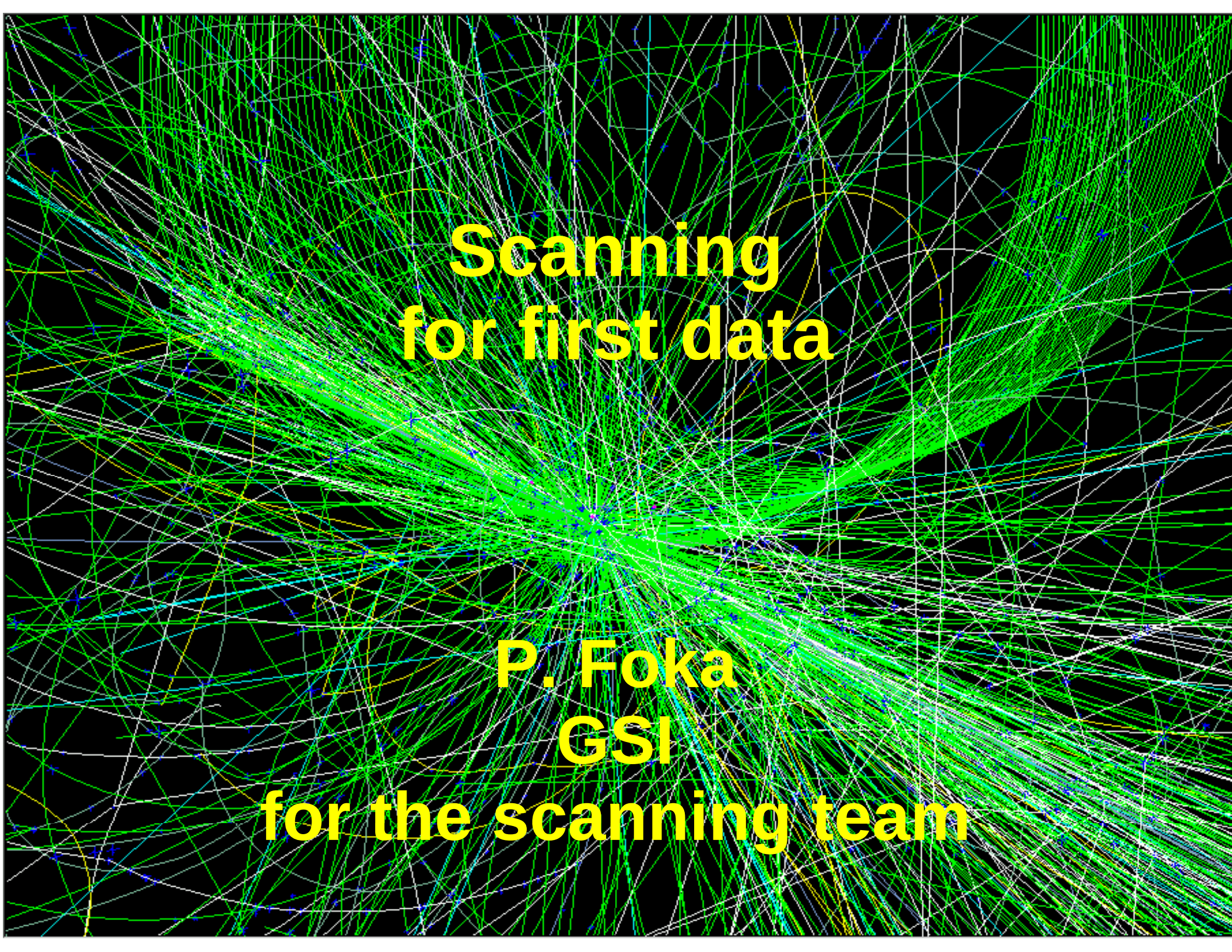

Scanning
for first data
P. Foka
GSI
for the scanning team

Updates since Prague Physics week

- New tools available to users
- New demos for the Open Day !!

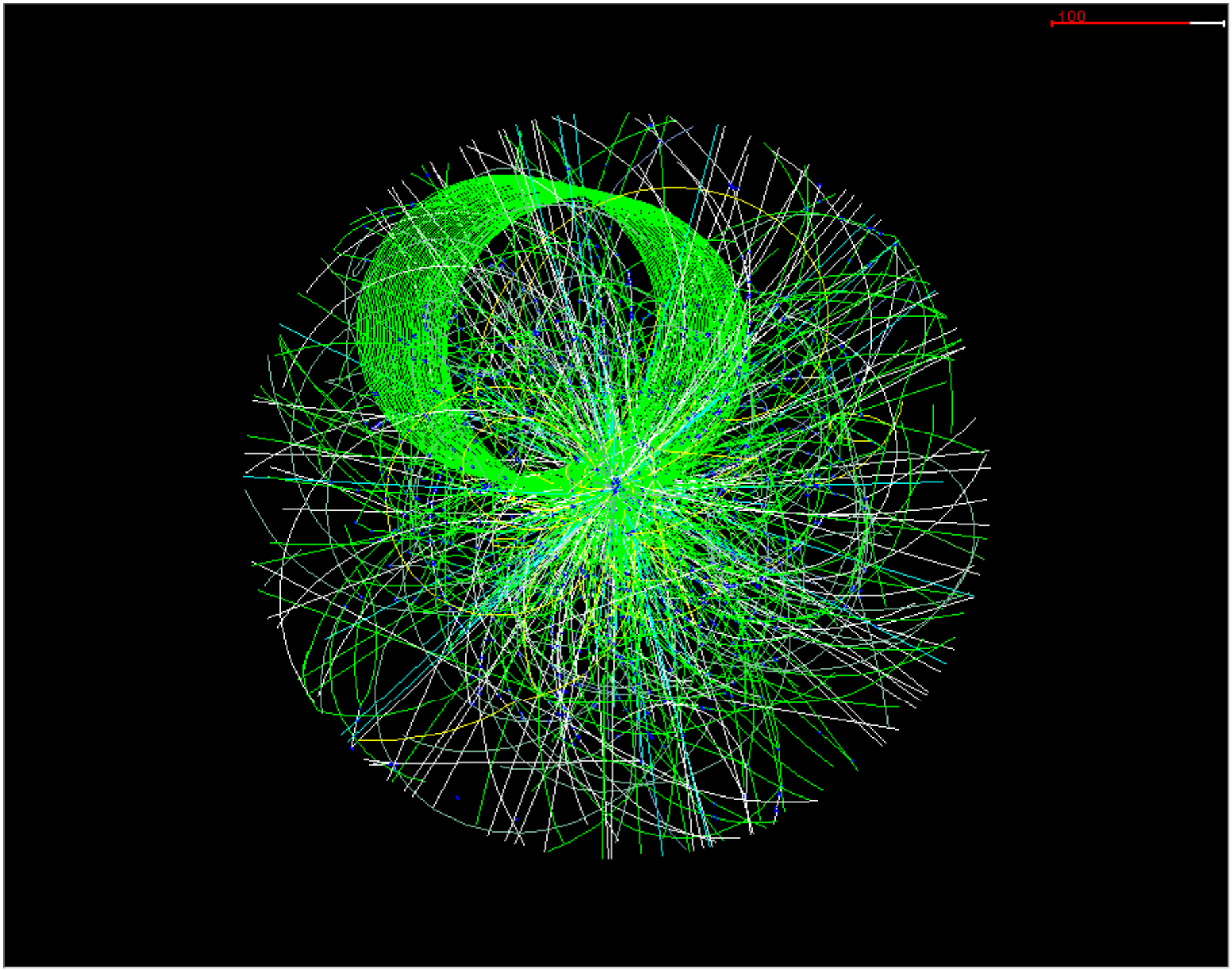
- Revisited the PWGs requirements
- Updated ToDo List in the Offline Planning tool
- ToDo list presented to the PB and prioritised

- People next to the items in the ToDo list
- We need to use the functionality of the system!!

Priorities for First Data

- Visualisation of “events of interests” including problematic events; make it part of the QA
- Select a class of events (high multiplicity, or with vertex-spike at (0,0,0), create clusters and pass them for visualisation
- P. Hristov and Panos trying the exercise

high multiplicity event by Christian Klein-Boesing AliRoot v4-04-Rev10



Priorities for First Data

- Investigate not-found tracks
- Take away clusters that belong to found tracks and check the rest
- M. Ivanov and Y. Belikov agreed with Matevz on strategy

Priorities for First Data

- Realistic visualisation of track fit
- Plot residuals
- Partly done

Priorities for First Data

- Extension of interactive track fitting
- Different fitting methods
- add or remove points and redo the fit
- ……..
- see development by Tadels and Analisa De Caro

AliEveCosmicRayFitter

by Tadels and Analisa De Caro in AliRoot

- This is a new version of this class: it will be available on next AliRoot release.
- Changes respect to the current version in the SVN repository:
  - introduction of a TEveElementList to collect all fitted lines;
  - suppression of a bug that didn't allow to visualize more that one fitted track at the same time;
  - suppression of the following trivial error message:

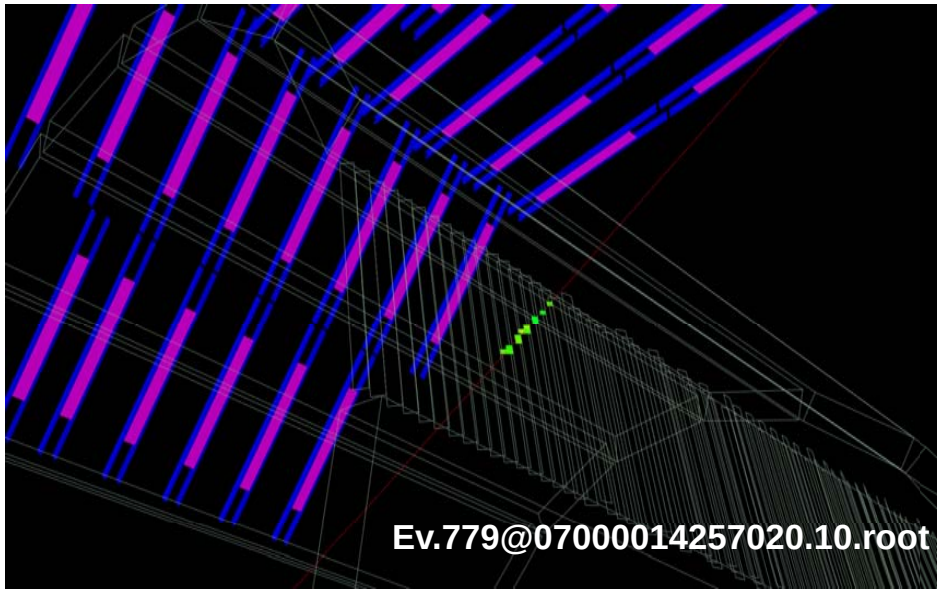
    Error in <TGraph::TGraph>: Cannot open file: Y vs X, TGraph is Zombie

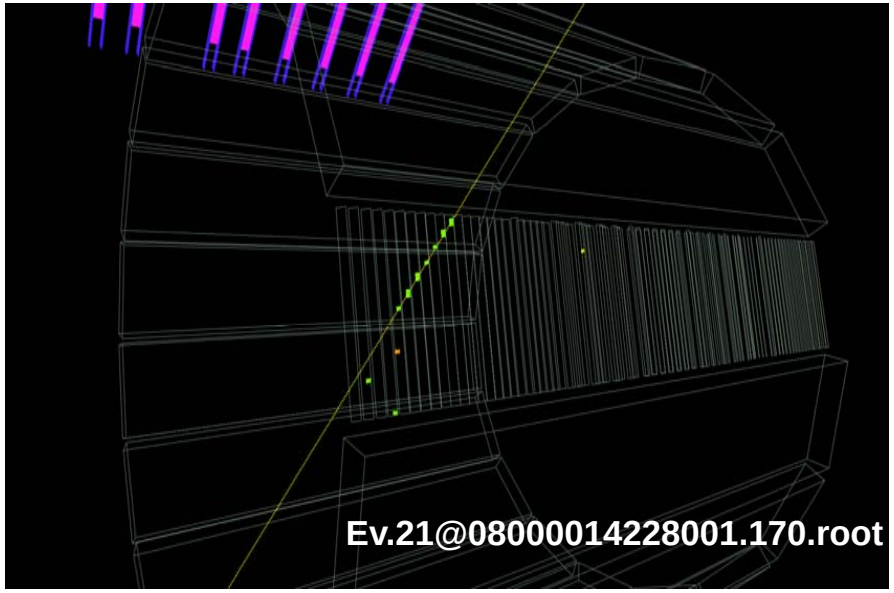
    Error in <TGraph::TGraph>: Cannot open file: Z vs X, TGraph is Zombie

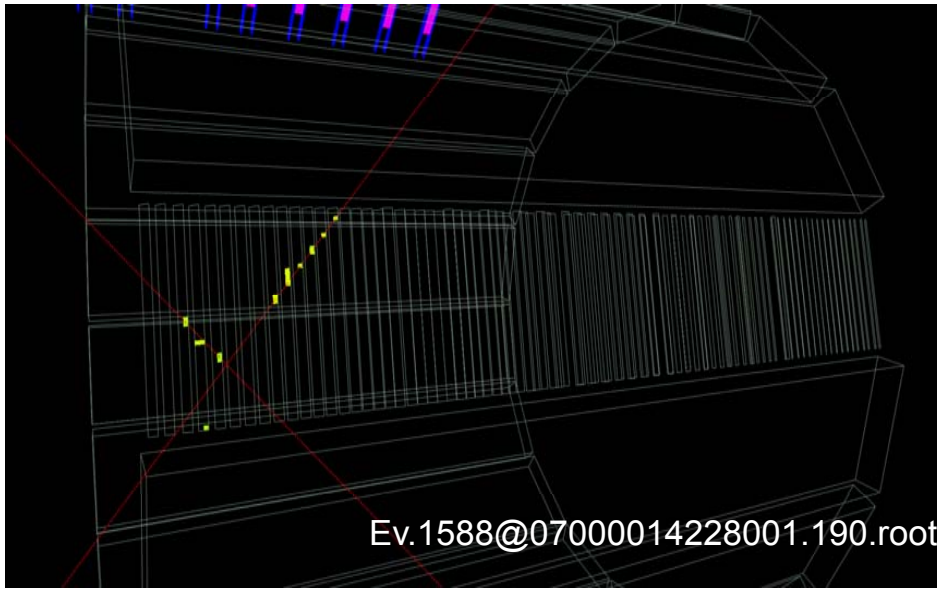
    Error in <TGraph2D::TGraph2D>: Cannot open file: Z vs Y vs X, TGraph2D is Zombie

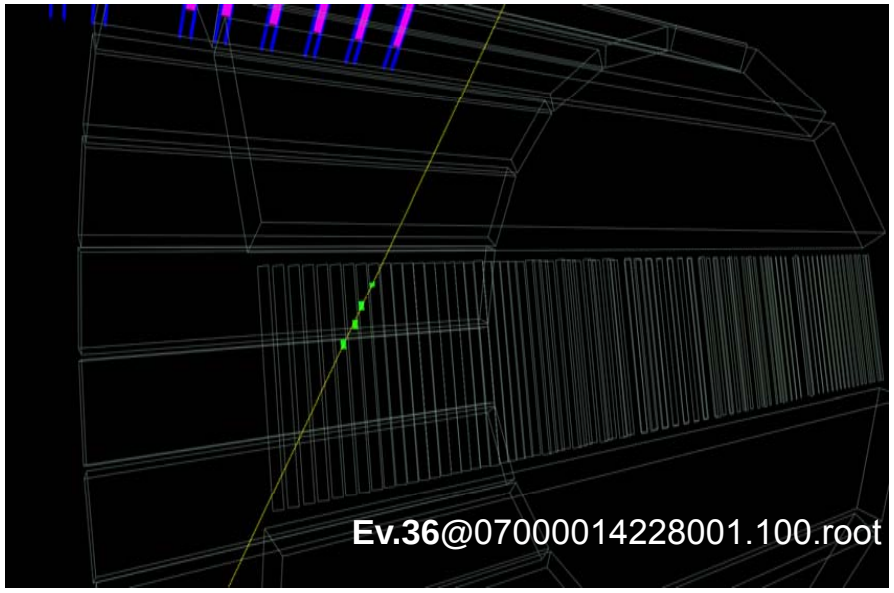
Some muon tracks on the TOF detector

BACK frame





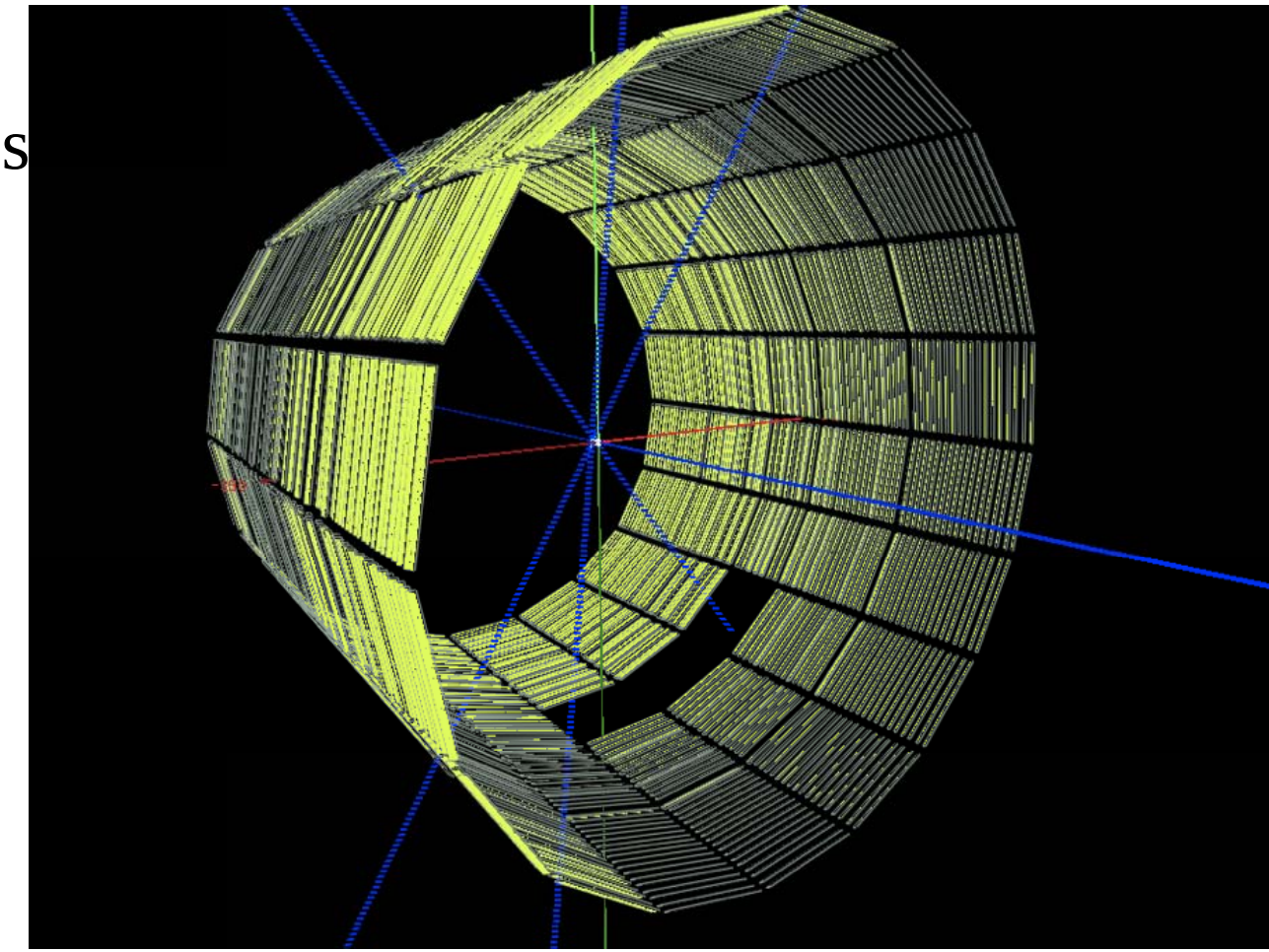


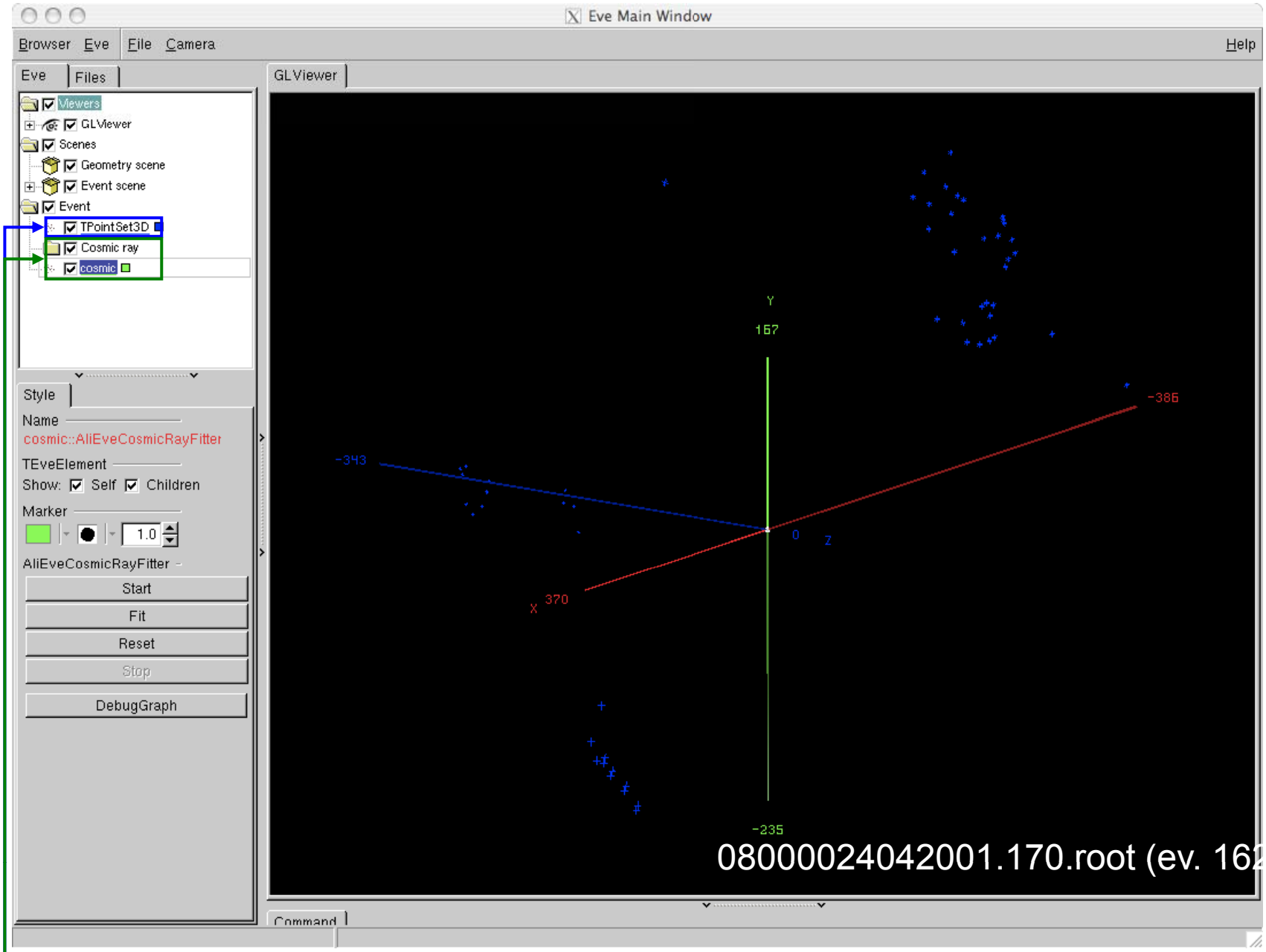


Baby frame

First three events pointed out by ITS people

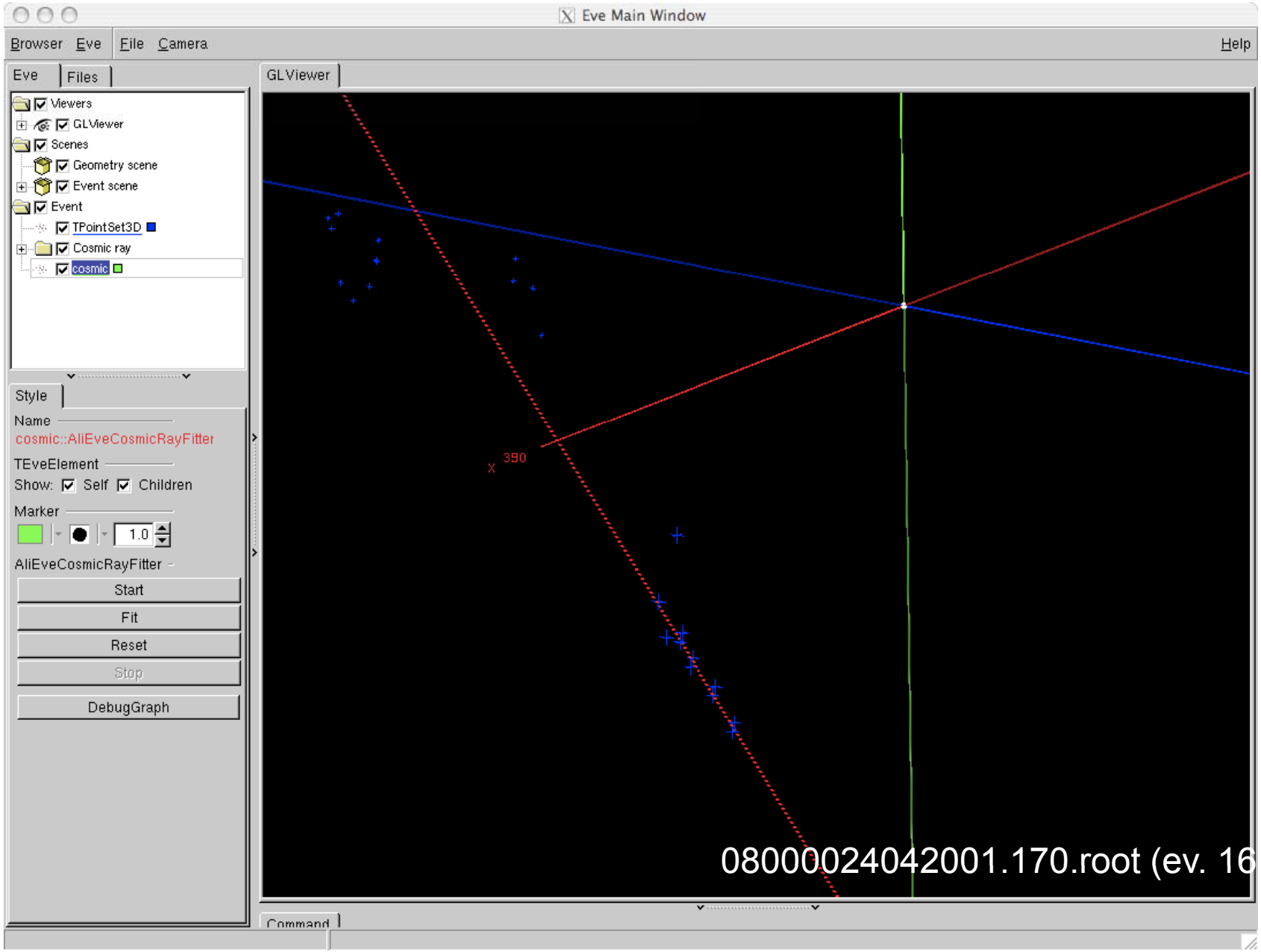
- First events reconstructed by the SPD layers:
  - 080000022252001.3630.root (ev. 100)
  - 080000022252012.3990.root (ev. 31)
  - 080000022252019.420.root (ev. 84)
- In yellow: TOF strips
- In blue: 3D straight lines resulting by fits of SPD clusters



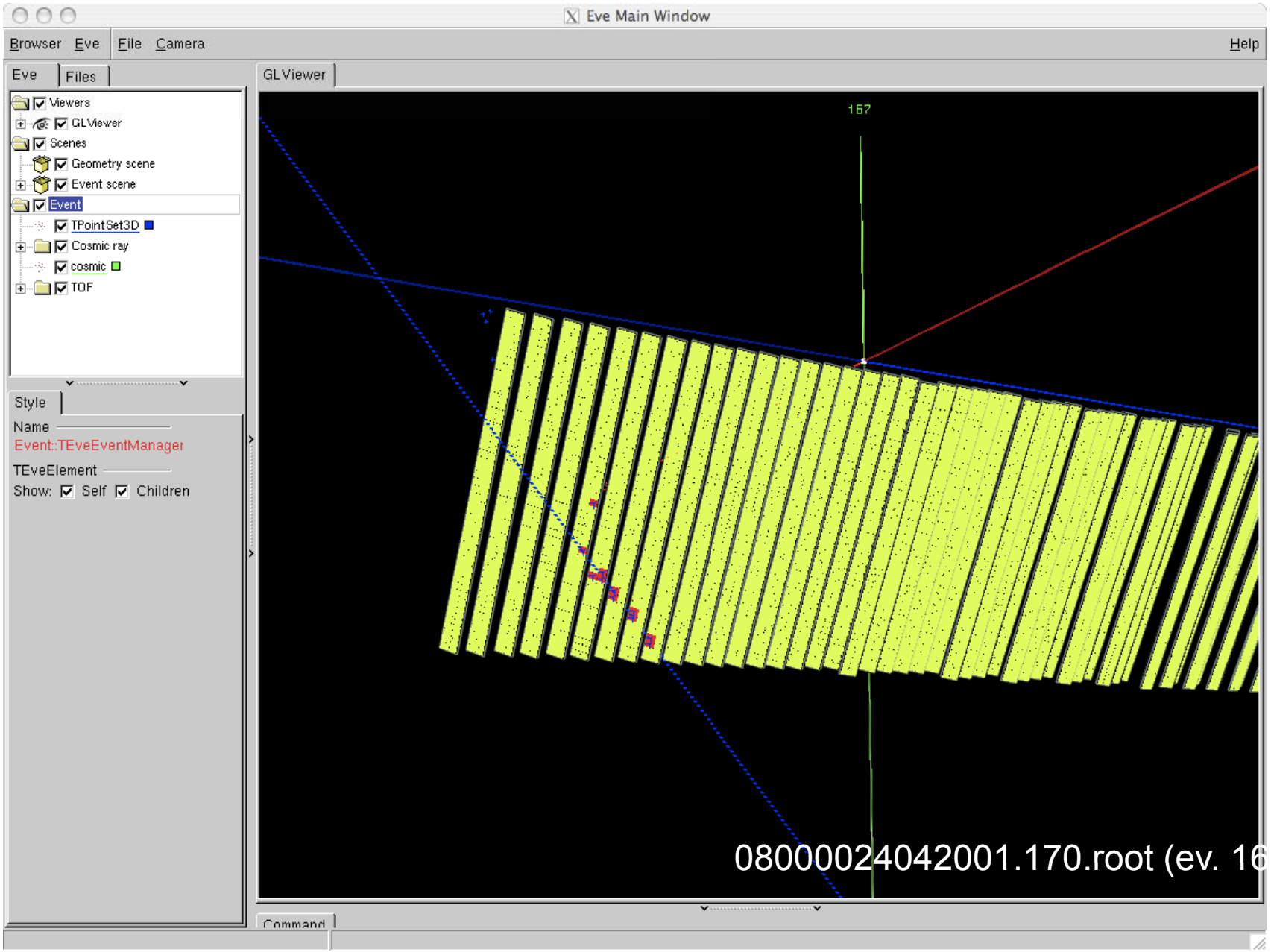


Load TOF raw data as TEvePointSet object.

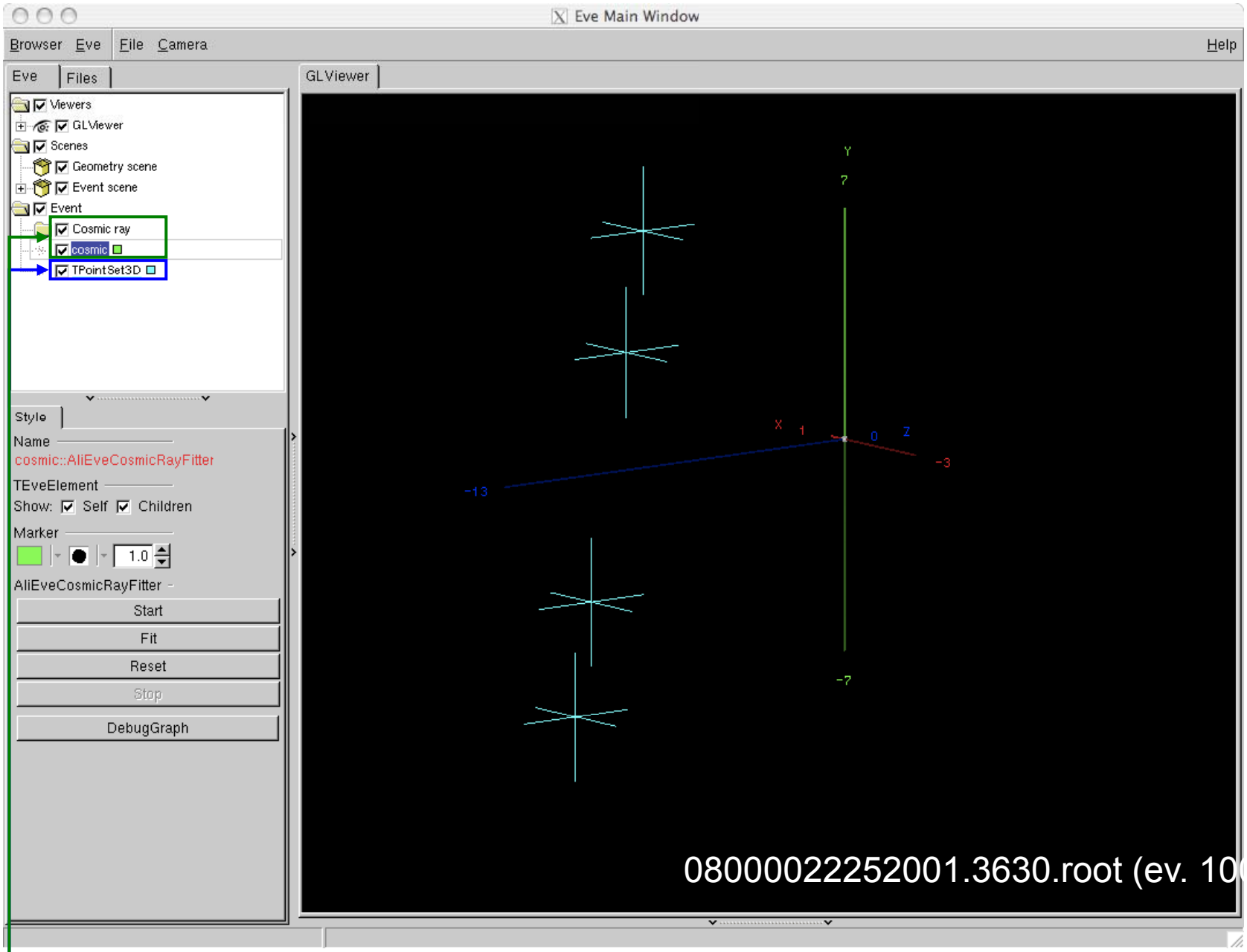
Load 3D straight linear fitter (called AliEveCosmicRayTracker)



Select points that ‘seem’ to be distributed along a straight line and fit them with a 3D line fitter.

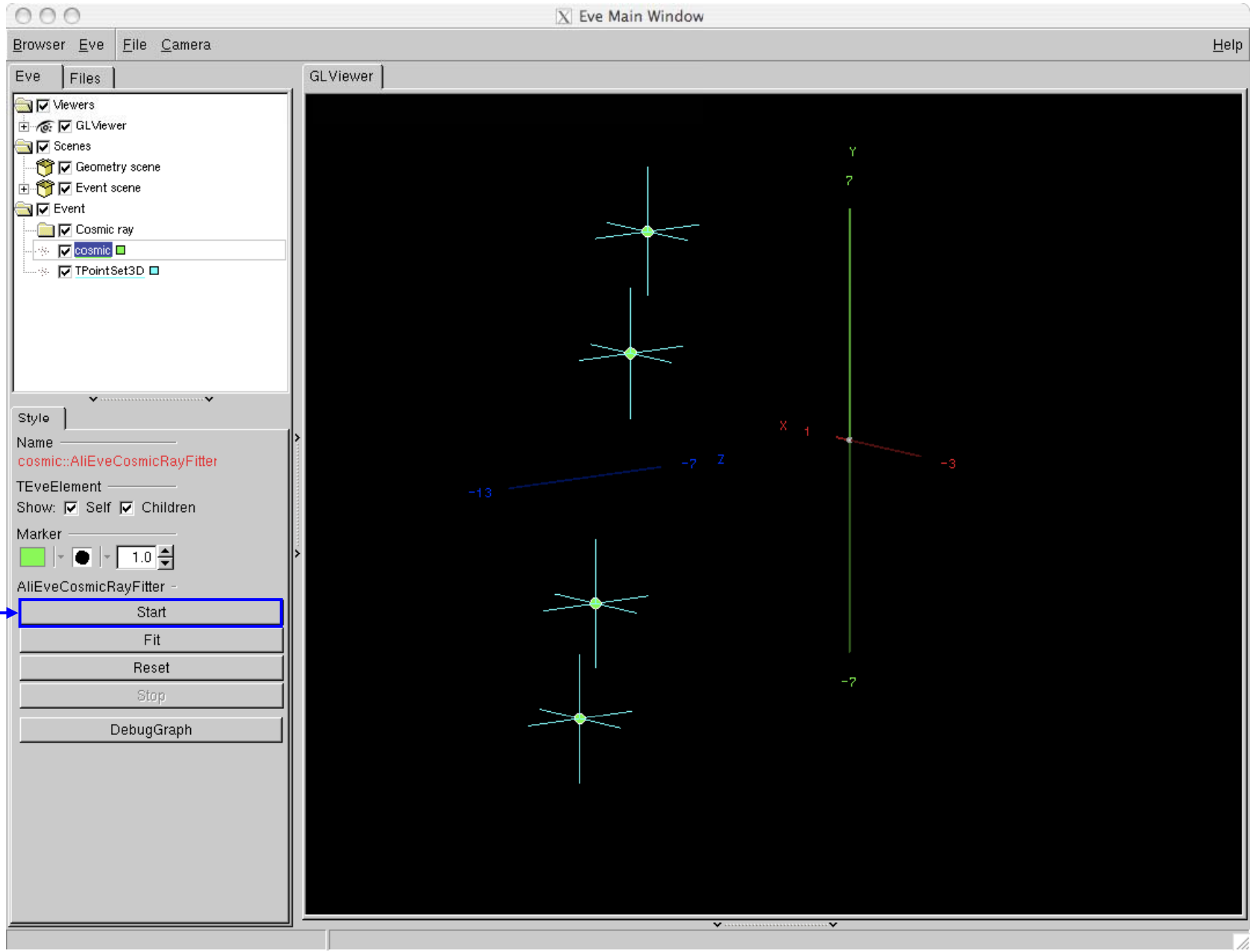


Other view of TOF raw data.

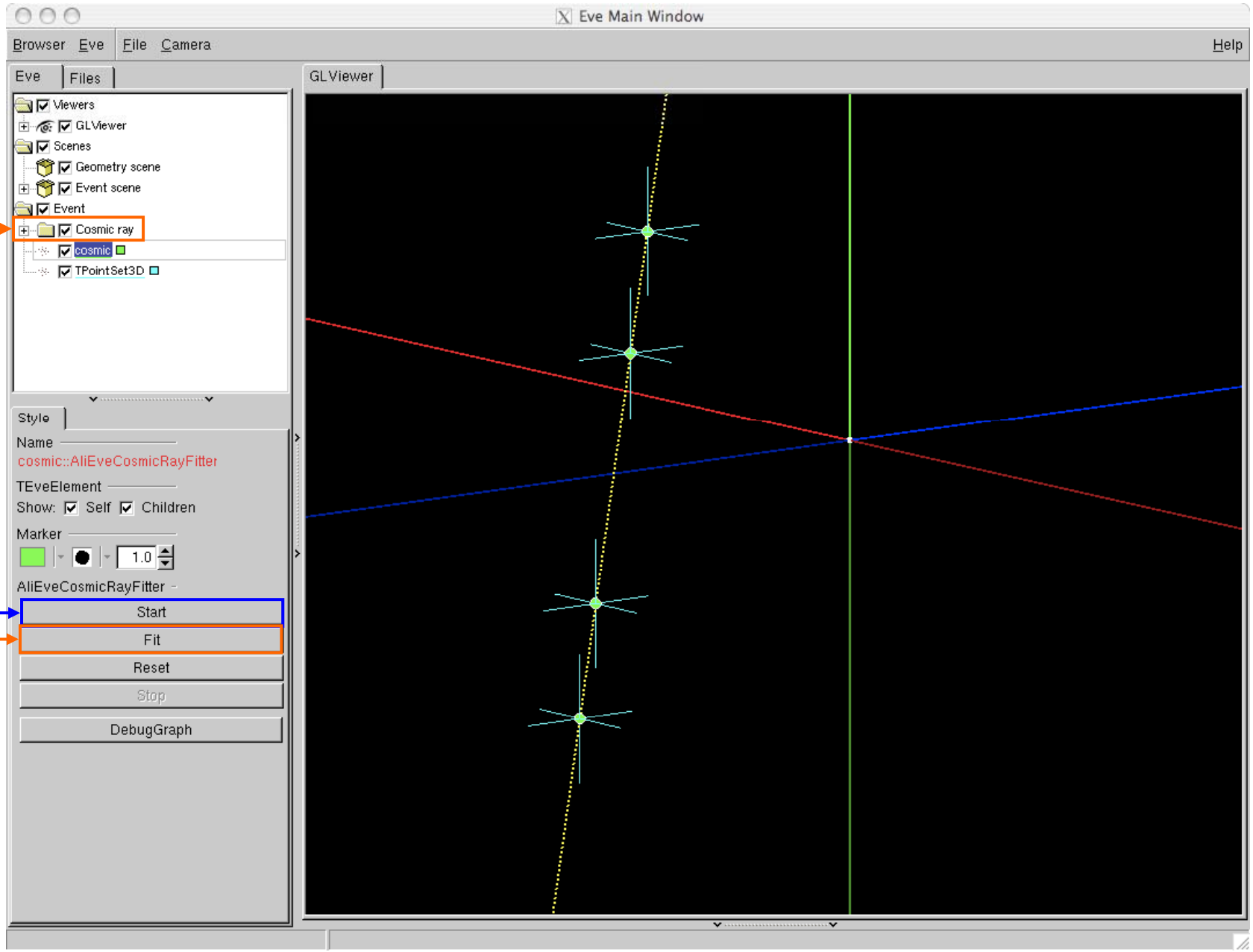


Load detector clusters, in particular, or TEvePointSet object, in general.

Load 3D straight linear fitter (called AliEveCosmicRayTracker)

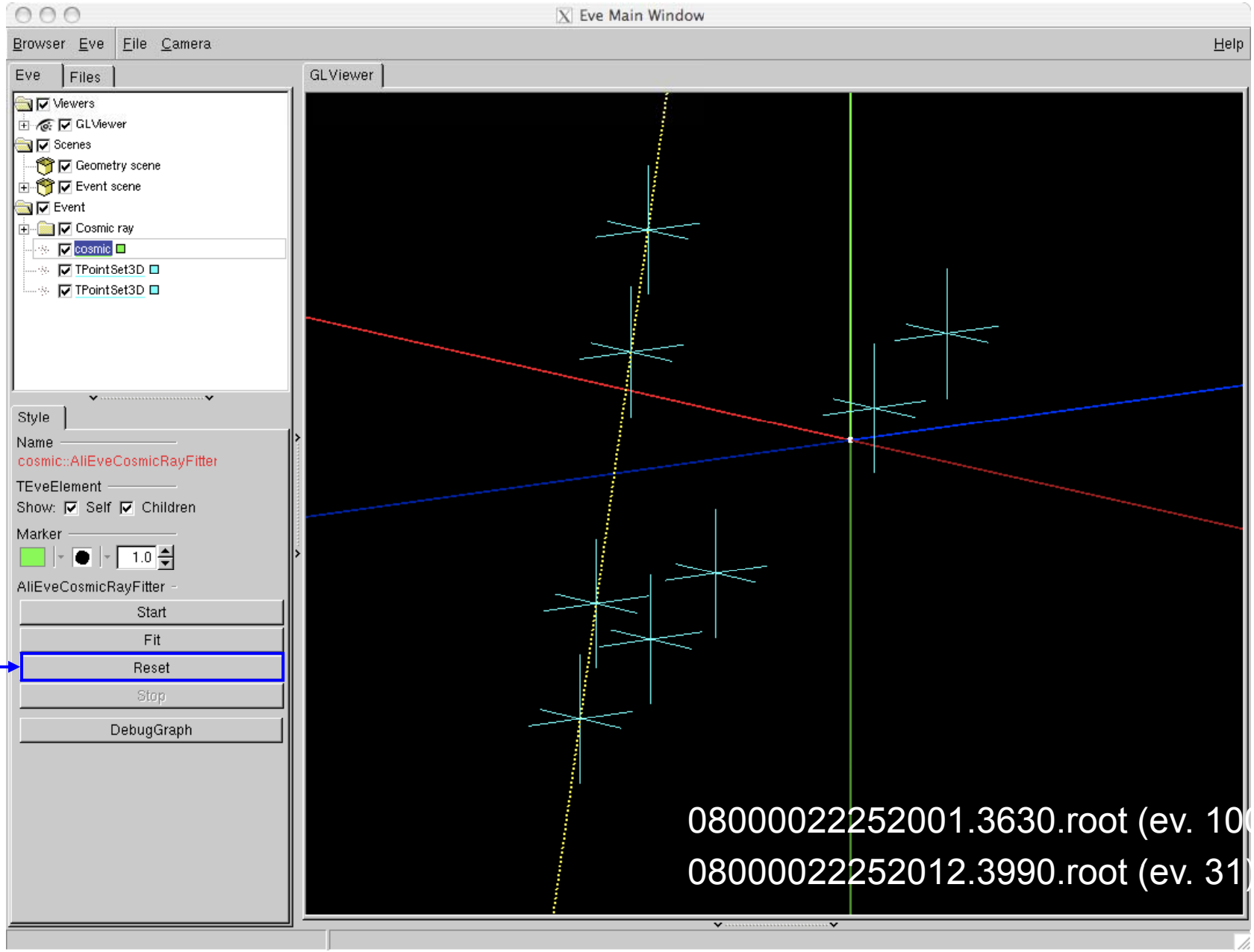


Click on ‘Start’ button and, by pushing keyboard ‘Alt’ key, choose the points to be fitted with the mouse left button. On the selected points small green balls will appear.



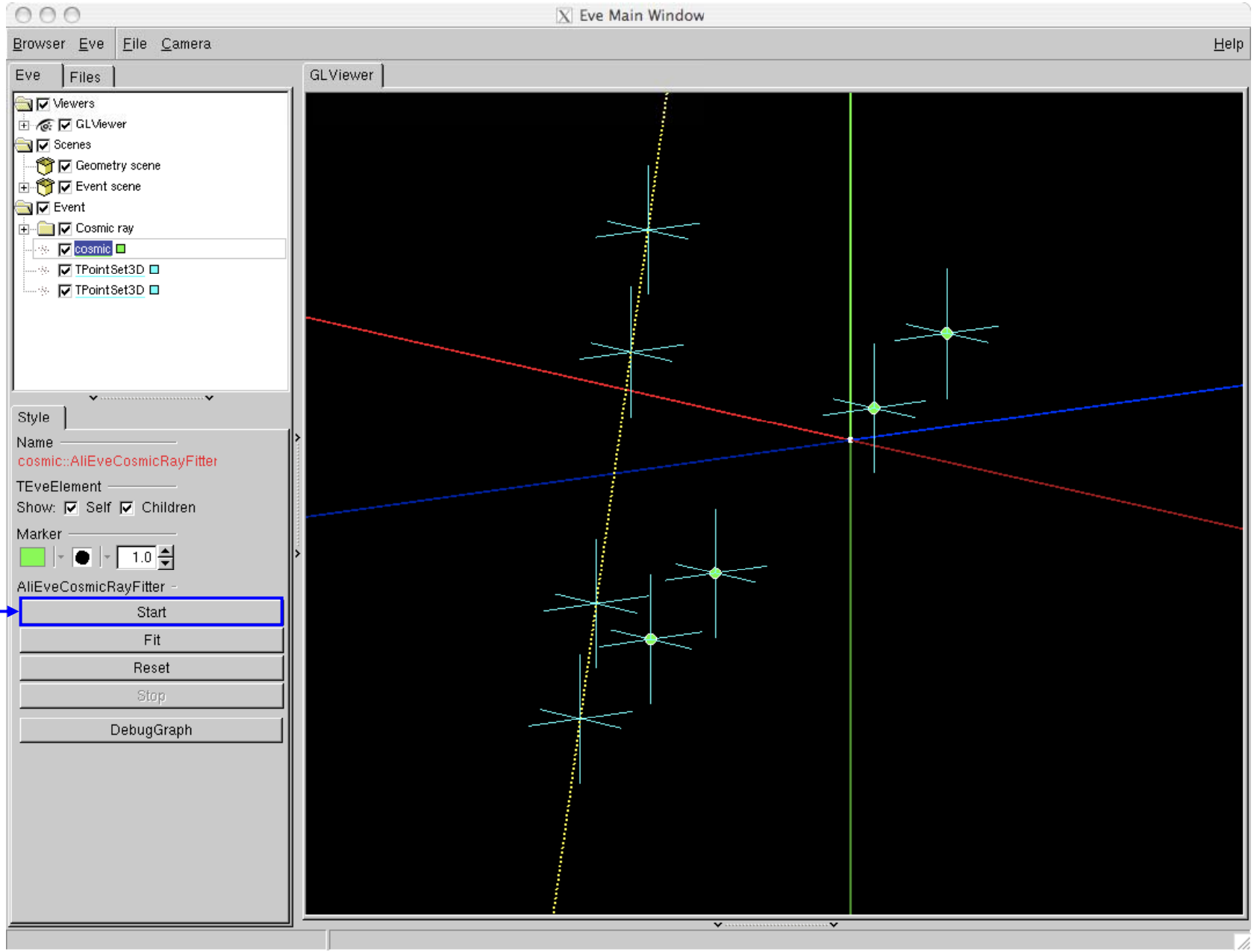
Then, click ‘Stop’ button to close the update the TEvePointSet array.

Click ‘Fit’ button to make the 3D straight linear fit.
The fitted line will appear in the ‘Eve Main Window’ and it will collect in the ‘Cosmic ray’ fold

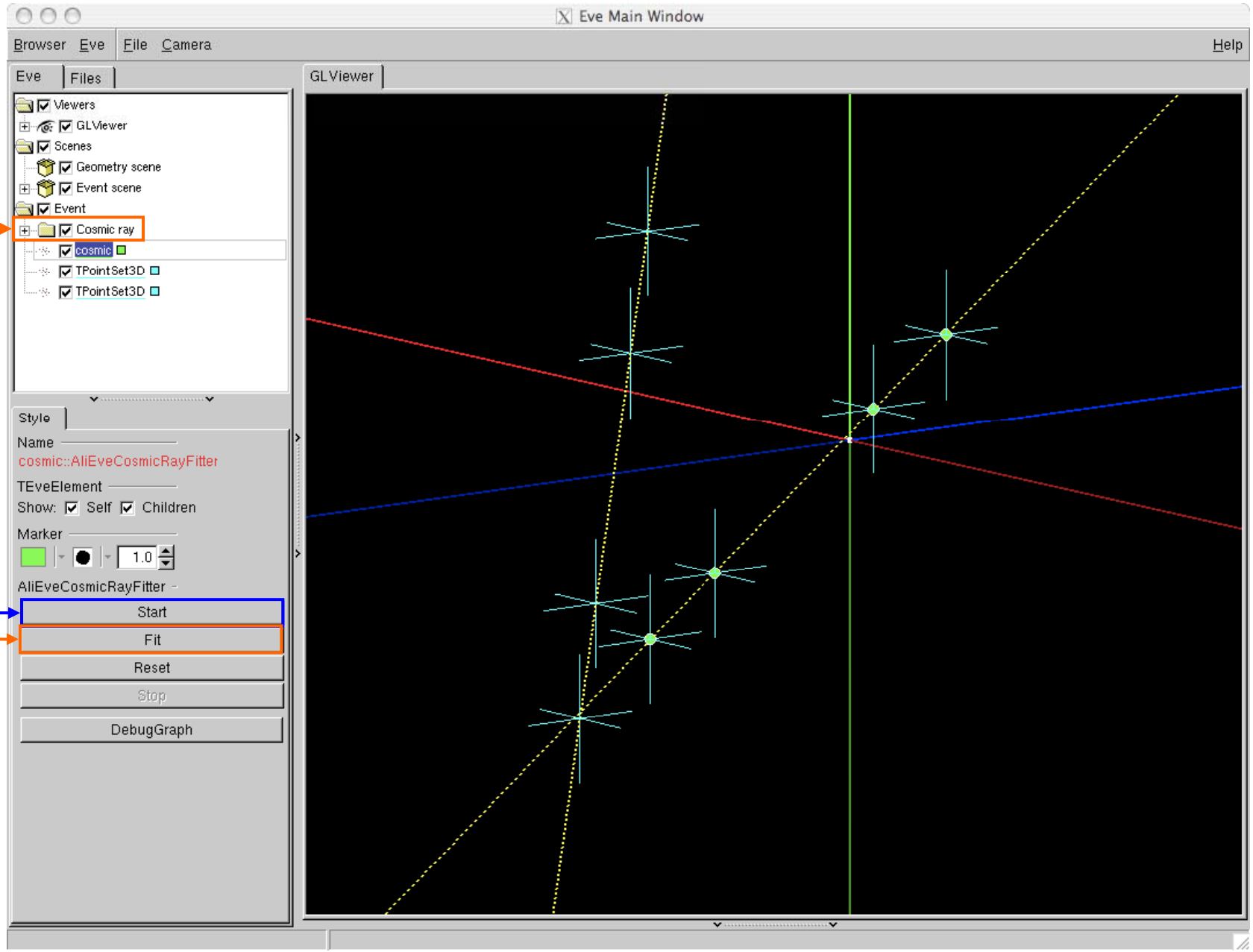


Then, click ‘Reset’ button to clear the TEvePointSet array.

Load other TEvePointSet objects or clusters.

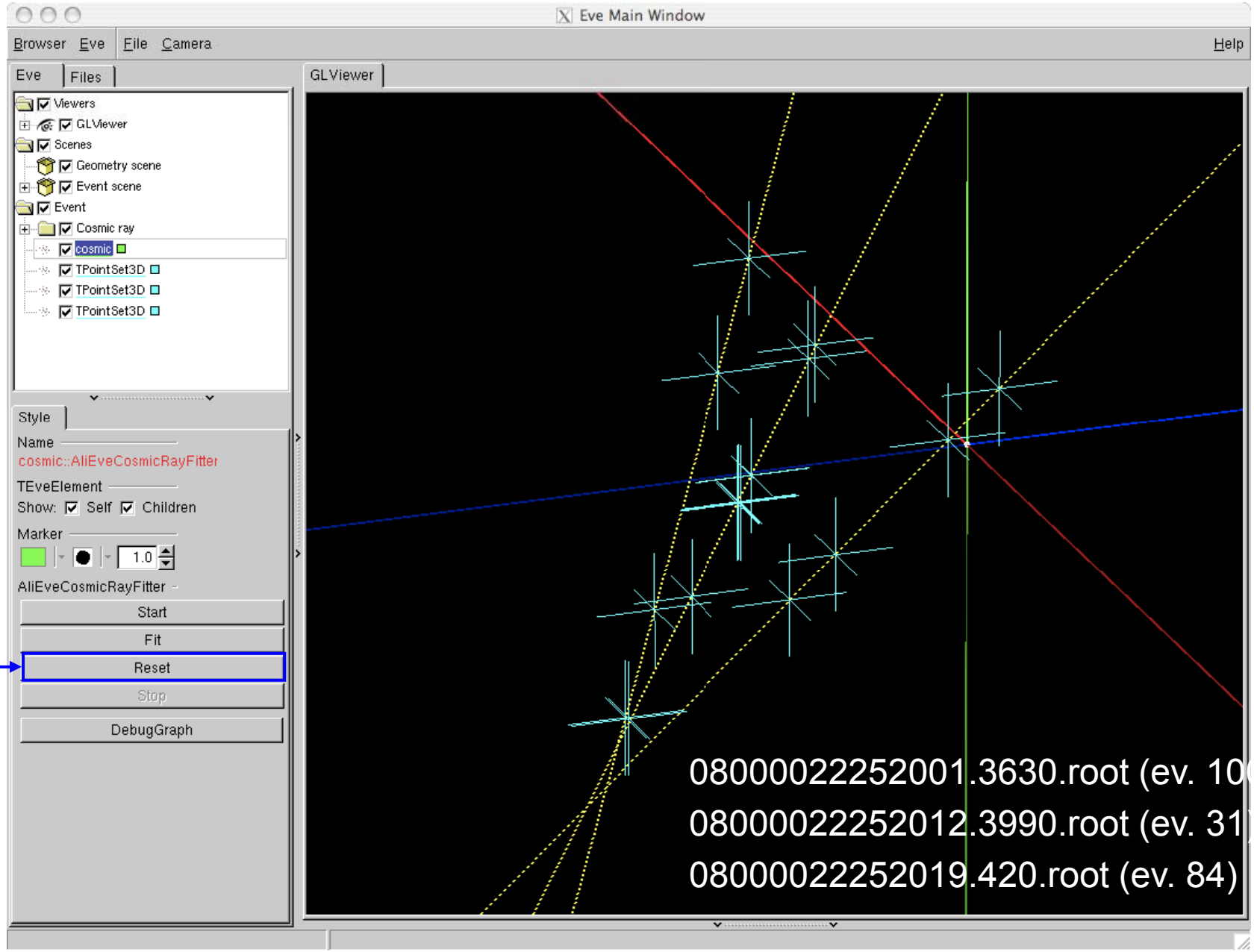


Again, click on ‘Start’ button and, by pushing keyboard ‘Alt’ key, choose the points to be fitted with the mouse left button.
On the selected points small green balls will appear.



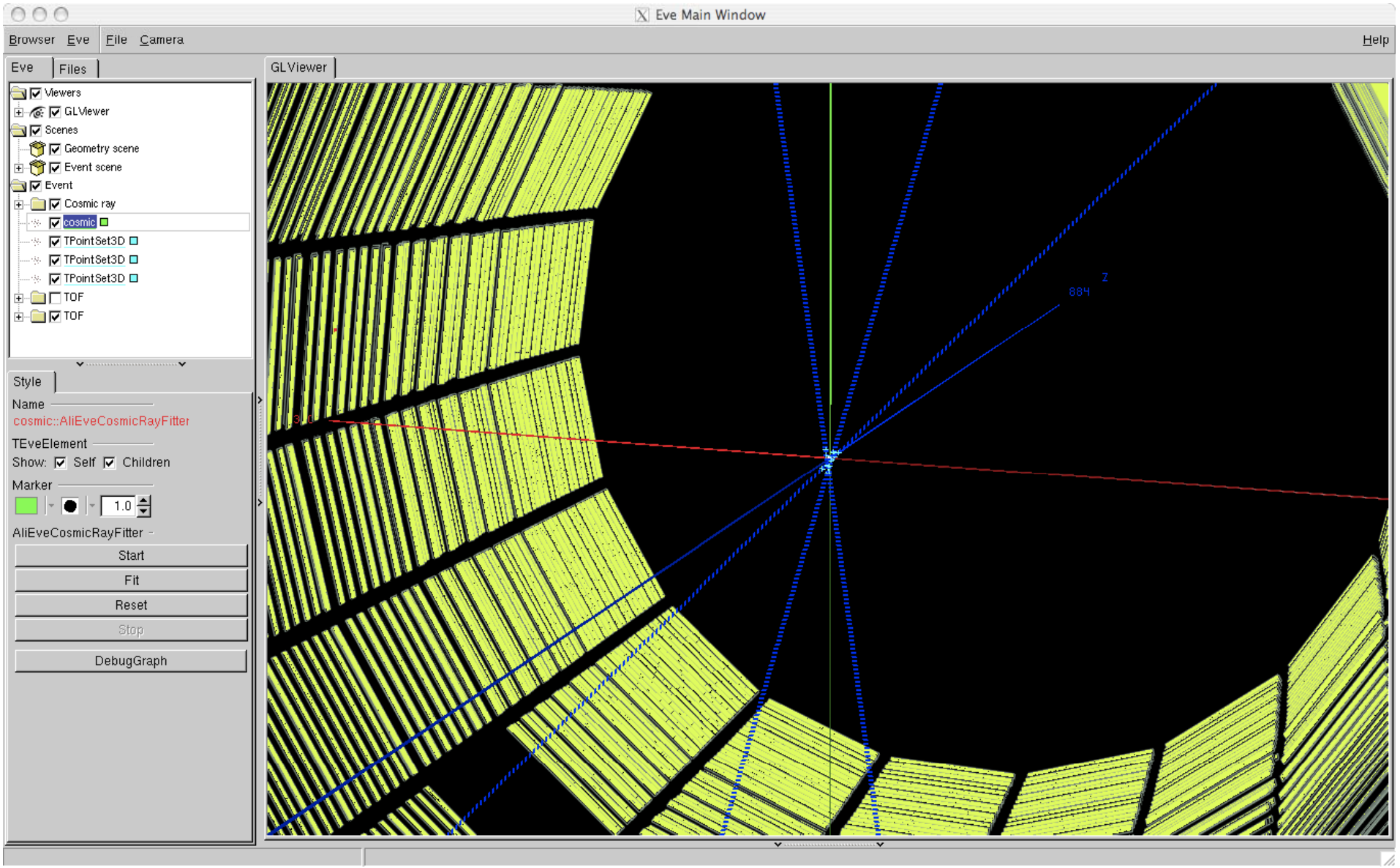
Again, click ‘Stop’ button to close the update the TEvePointSet array.

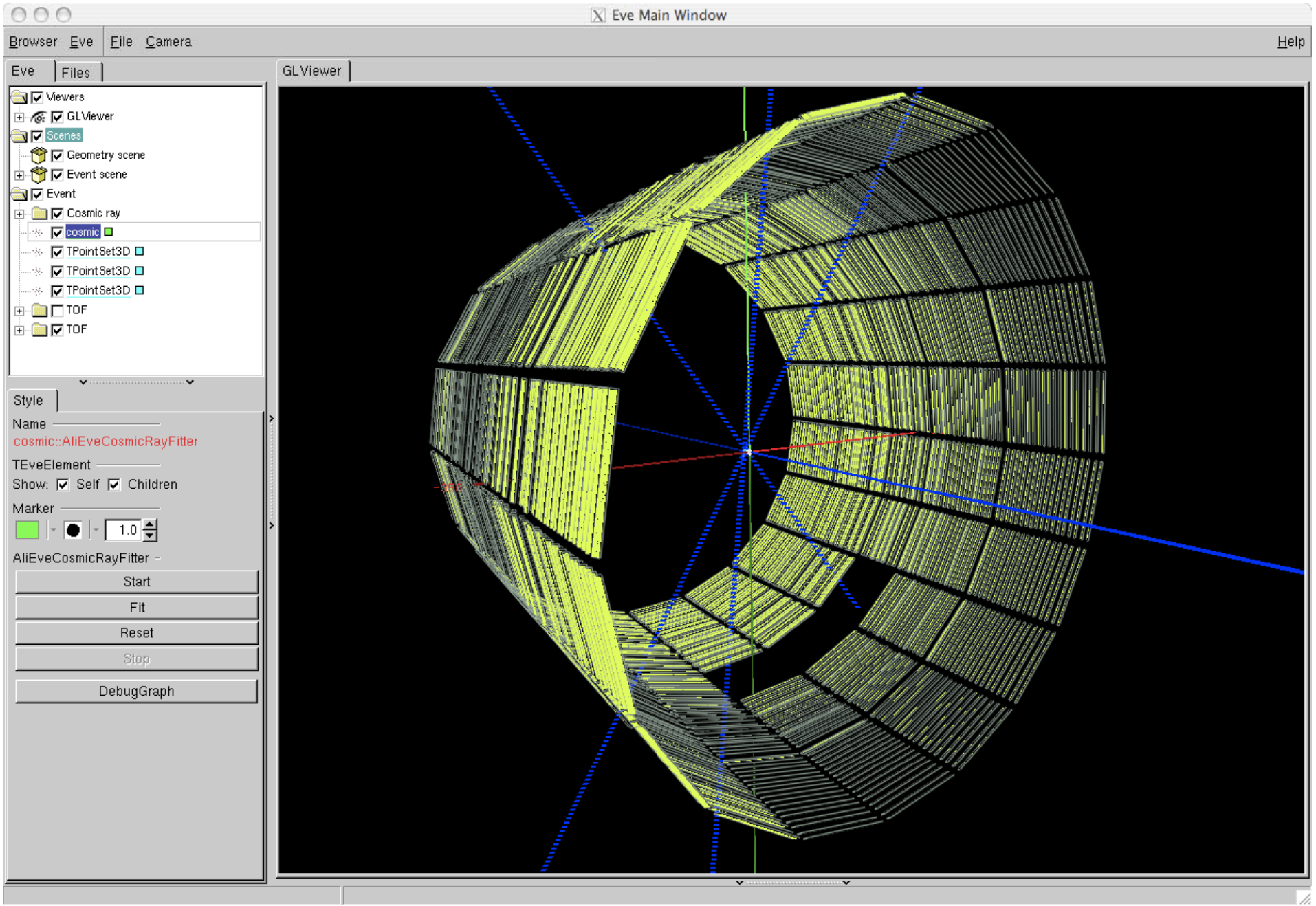
And then, click ‘Fit’ button to make the 3D straight linear fit.
The fitted line will appear in the ‘Eve Main Window’ and it will collect in the ‘Cosmic ray’ fold



Again, click ‘Reset’ button to clear the TEvePointSet array.

Load other TEvePointSet objects or clusters. And continue…


Eve Main Window
Browser Eve File Camera Help
Eve Files
Viewers
GLViewer
Scenes
Geometry scene
Event scene
Event
Cosmic ray
cosmic
TPointSet3D
TPointSet3D
TPointSet3D
TOF
TOF
Style
Name
cosmic::AliEveCosmicRayFitter
TEveElement
Show: Self Children
Marker
1.0
AliEveCosmicRayFitter
Start
Fit
Reset
Stop
DebugGraph
GLViewer
884
Z


Eve Main Window
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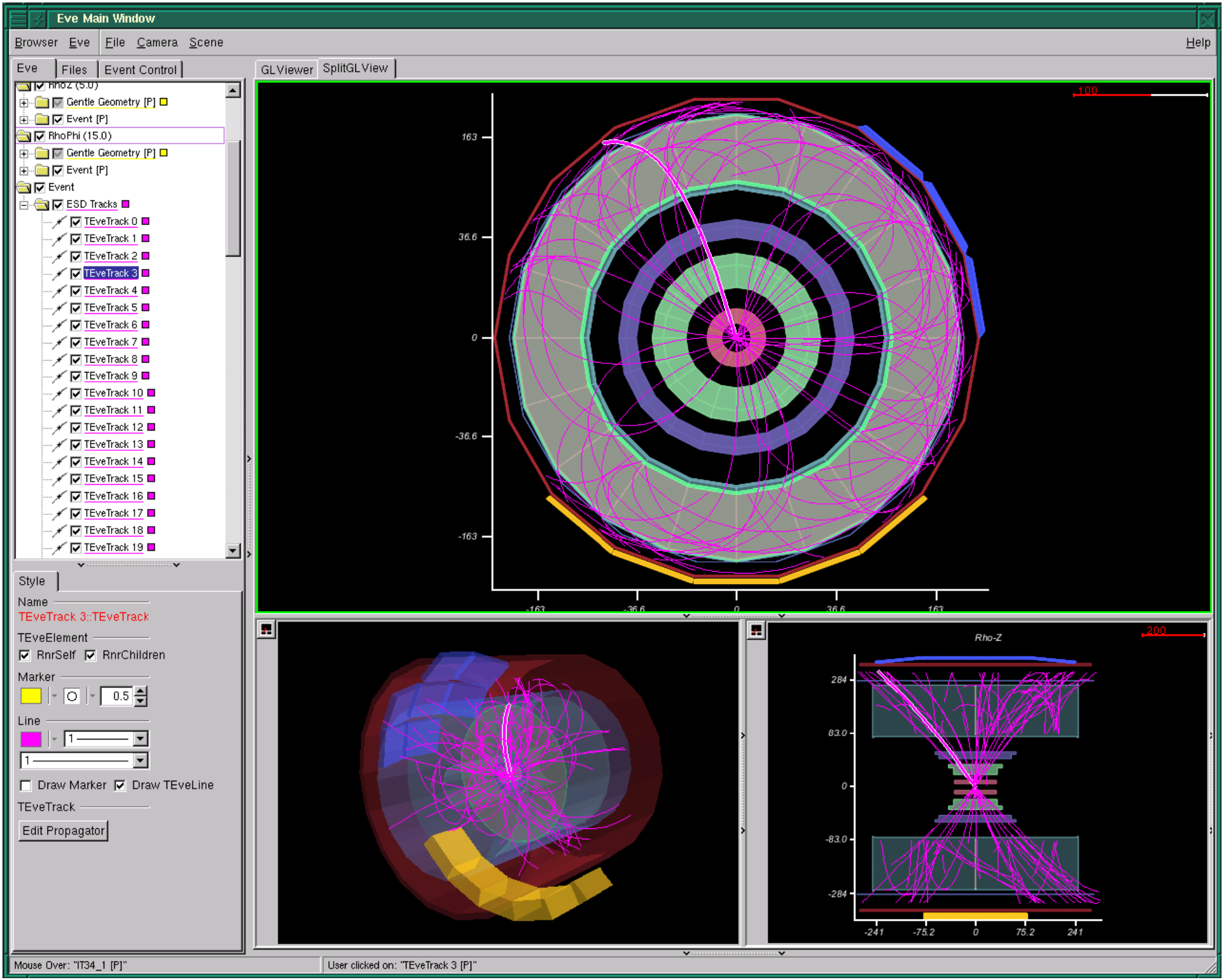
Help
Eve
Files
Viewers
GLViewer
Scenes
Geometry scene
Event scene
Event
Cosmic ray
cosmic
TPointSet3D
TPointSet3D
TPointSet3D
TOF
TOF
Style
Name
cosmic::AliEveCosmicRayFitter
TEveElement
Show:
Self
Children
Marker
1.0
AliEveCosmicRayFitter
Start
Fit
Reset
Stop
DebugGraph
GLViewer

Priorities for First Data

- Update the scanning for multiplicity
- Synchronise with Jan-Fiete
- use the split views

- Done
- 100 events produced and scanned (Ivonne trained)

- Look fine
- But problem with “show” histograms stored in file


Eve Main Window
Browser Eve File Camera Scene Help
Eve Files Event Control
RhoZ (5.0)
Gentle Geometry [P]
Event [P]
RhoPhi (15.0)
Gentle Geometry [P]
Event [P]
Event
ESD Tracks
TEveTrack 0
TEveTrack 1
TEveTrack 2
TEveTrack 3
TEveTrack 4
TEveTrack 5
TEveTrack 6
TEveTrack 7
TEveTrack 8
TEveTrack 9
TEveTrack 10
TEveTrack 11
TEveTrack 12
TEveTrack 13
TEveTrack 14
TEveTrack 15
TEveTrack 16
TEveTrack 17
TEveTrack 18
TEveTrack 19
Style
Name
TEveTrack 3::TEveTrack
TEveElement
RnrSelf RnrChildren
Marker
0.5
Line
Draw Marker Draw TEveLine
TEveTrack
Edit Propagator
GLViewer SplitGLView
100
163
36.6
0
-36.6
-163
Rho-Z
200
284
83.0
-83.0
-284
-241
-75.2
75.2
241
Mouse Over: "IT34_1 [P]"
User clicked on: "TEveTrack 3 [P]"

Multiplicity measurement

As part of the first paper

on multiplicity measurement

visual scanning of events is foreseen

in order to:

- **confirm the algorithmic method results**
- **provide a backup solution; update since Prague**

In the To Do List

- Visualisation of secondary vertices
- B. Hippolite and A. Maire responsible
- At CERN the week of 14 April

- Visualisation of signals used for embeding
- A. Kisiel

Detectors Event Display

- ACORDE
- Responsible: Marion Rodrigues Cahuantzi
- Progress: several discussions with Matevz on technical solutions (reuse of visualisation for MOOD)

- FMD
- Responsible: Hans Dalsgaard
- Progress: at CERN the week of 14 April

Detectors Event Display

- TOF
- Responsible: Analisa De Caro

- ITS
- Responsible: A. Dainese
- Alignment Adam Jacholkowski
- SPD: Domenico Elia and Rossela Romita
- SSD: Panos
- SDD:

- PMD
- Responsible: Basanda Nandi
- At CERN June/July

The strategy

- **develop methods for visual scanning**
  - **tools**
  - **procedures**
- **train scanners**
- **compare results with algorithmic method**
- **compare results among different scanners**
- **set-up scanning environment for first data**
  - **hardware**
  - **methods**

    visual inspection of pathologies, multiplicity
  - **user's guide, tutorials, web page**

The tool and demos

EVE developed by

- Matevz and Alja Tadel

- Bertand Bellenot from ROOT now helps with GUI

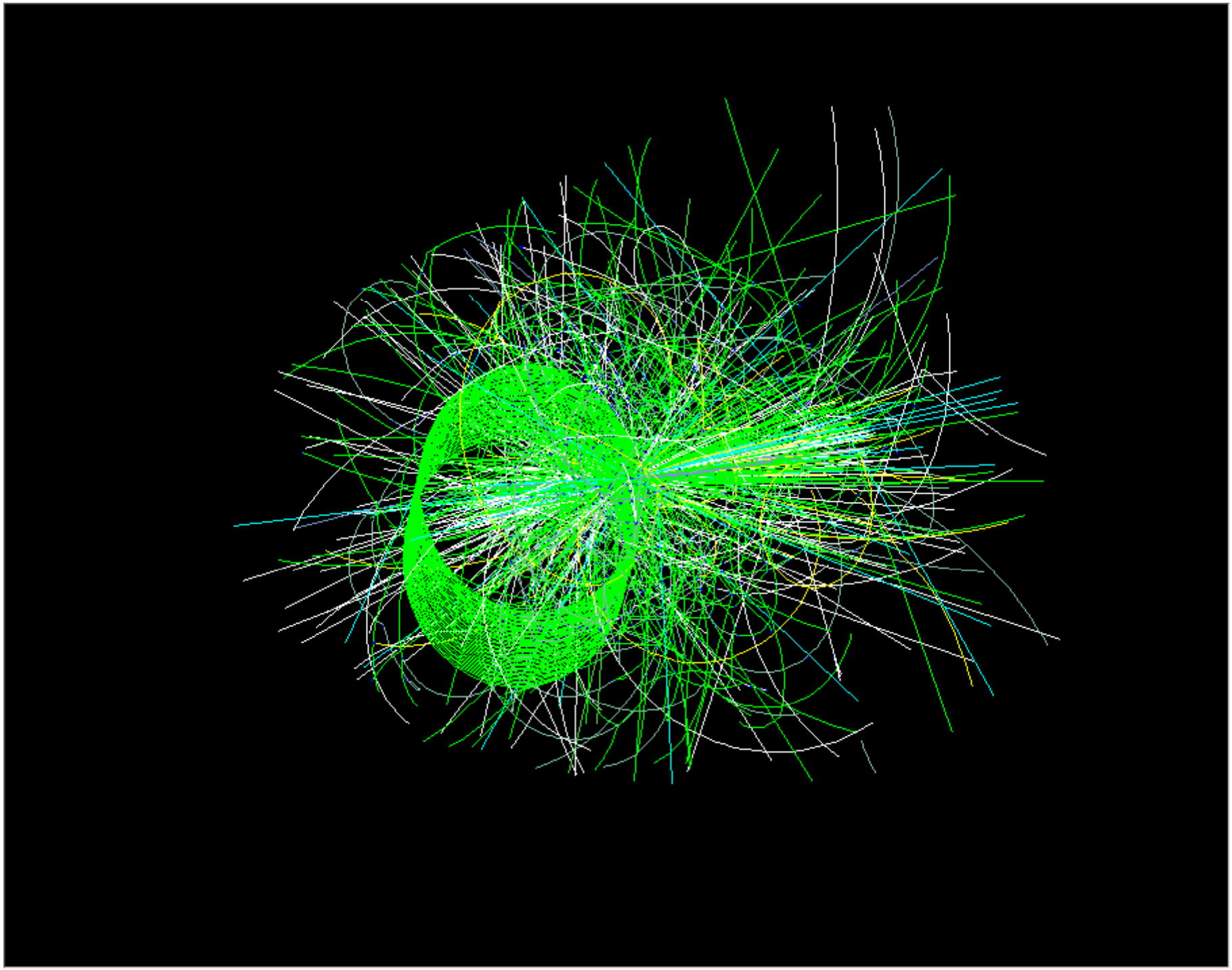
AliEVE in AliRoot, REVE in ROOT

CMS is using it and more manpower expected

For documentation see M. Tadel web page

- ***papers of CHEP***
  mtadel.home.cern.ch/mtadel/mydoc/chep07
- **demos, tutorials**
  mtadel.home.cern.ch/mtadel/mydoc/chep07/movies
  mtadel.home.cern.ch/mtadel/mydoc/apw-3.2008

high multiplicity event by Christian Klein-Boesing AliRoot v4-04-Rev10



Resent developments important for visual scanning

- in AliRoot already
  - non-linear transformations
  - rz projections
- in ROOT
  expected in AliRoot with the next ROOT release
  - multiple simultaneous viewers
  - selection across different views
  - interactive point selection and track fitting

Evolution of scanning

- **near future: start from (any) points**

  count tracks on the screen independently on reconstruction

  - resent developments of tools allow it

  - software not in AliRoot yet

- **current status: start from tracks**

  inspect visually results of reconstruction

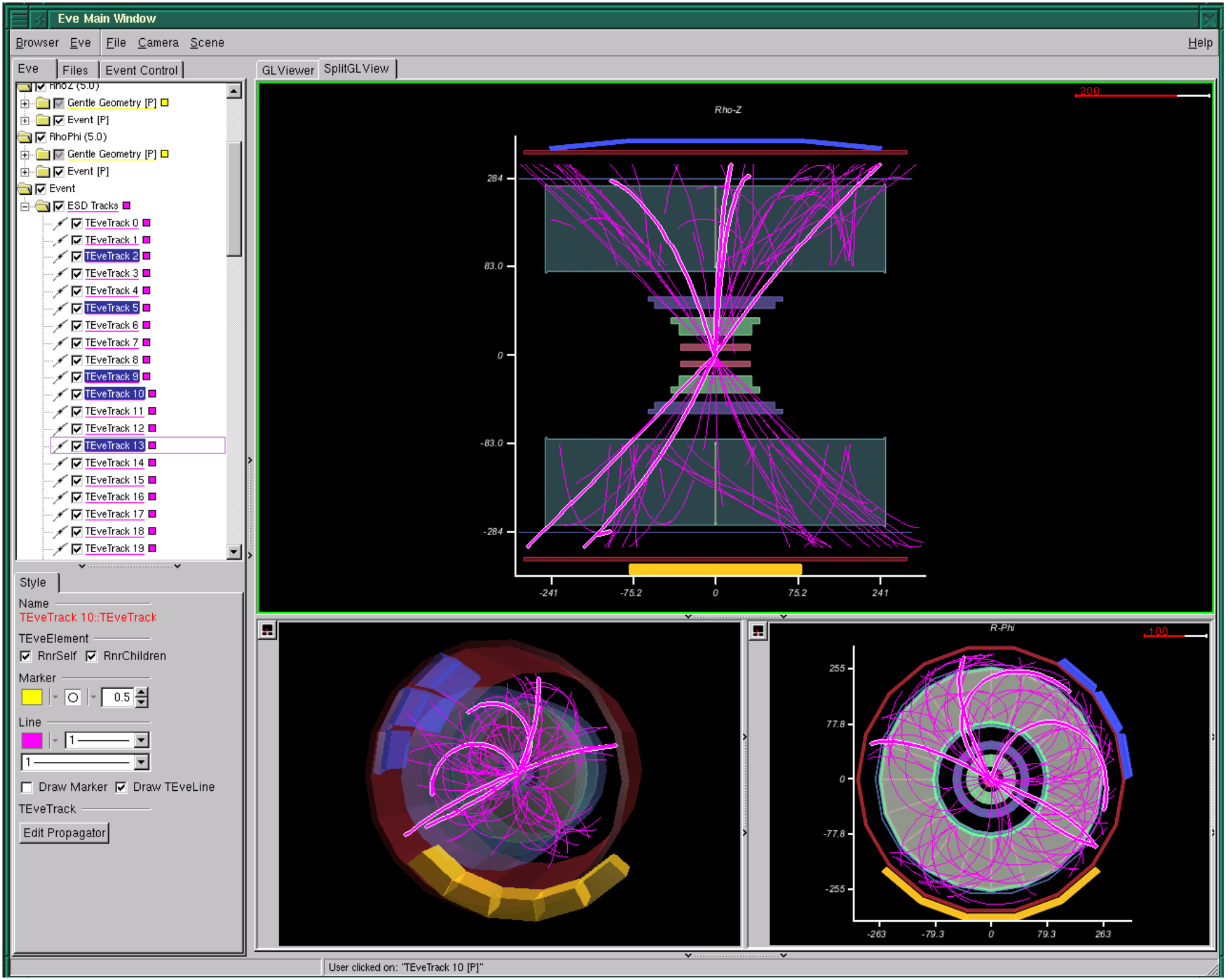
  - either confirm the results of the reconstruction

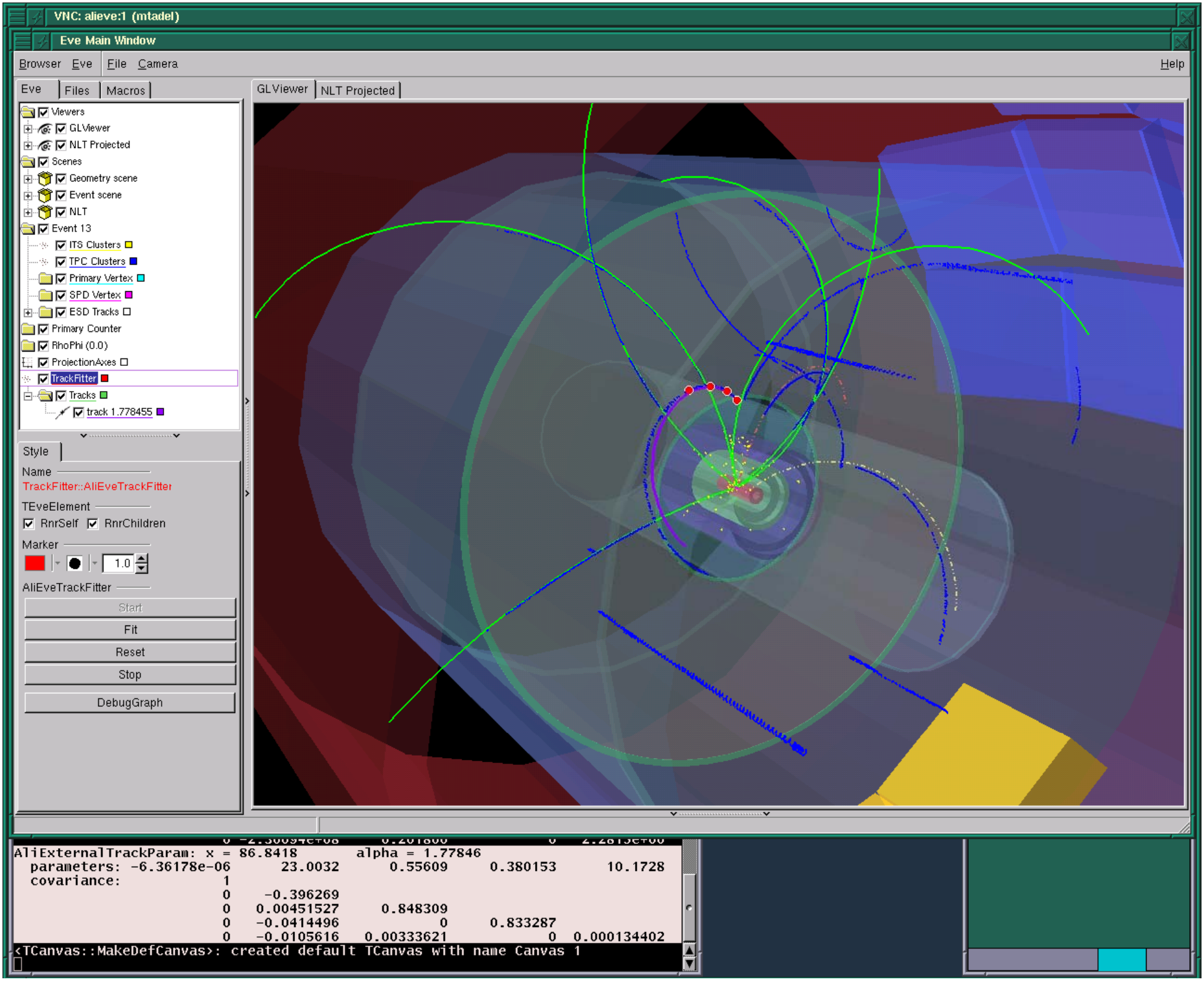
  - or take corrective action

- **development of diagnostic tools**

  iterations of generating-scanning-spotting-correcting

  - problems in the reconstruction, or on the generated events....


Eve Main Window
Browser Eve File Camera Scene Help
Eve Files Event Control
RhoZ (5.0)
Gentle Geometry [P]
Event [P]
RhoPhi (5.0)
Gentle Geometry [P]
Event [P]
Event
ESD Tracks
TEveTrack 0
TEveTrack 1
TEveTrack 2
TEveTrack 3
TEveTrack 4
TEveTrack 5
TEveTrack 6
TEveTrack 7
TEveTrack 8
TEveTrack 9
TEveTrack 10
TEveTrack 11
TEveTrack 12
TEveTrack 13
TEveTrack 14
TEveTrack 15
TEveTrack 16
TEveTrack 17
TEveTrack 18
TEveTrack 19
Style
Name
TEveTrack 10::TEveTrack
TEveElement
RnrSelf RnrChildren
Marker
0.5
Line
Draw Marker Draw TEveLine
TEveTrack
Edit Propagator
GLViewer SplitGLView
Rho-Z
200
284
83.0
0
-83.0
-284
-241
-75.2
0
75.2
241
R-Phi
100
255
77.8
0
-77.8
-255
-263
-79.3
0
79.3
263
User clicked on: "TEveTrack 10 [P]"


VNC: alieve:1 (mtadel)
Eve Main Window
Browser Eve File Camera Help
Eve Files Macros
Viewers
GLViewer
NLT Projected
Scenes
Geometry scene
Event scene
NLT
Event 13
ITS Clusters
TPC Clusters
Primary Vertex
SPD Vertex
ESD Tracks
Primary Counter
RhoPhi (0.0)
ProjectionAxes
TrackFitter
Tracks
track 1.778455
Style
Name
TrackFitter::AliEveTrackFitter
TEveElement
RnrSelf RnrChildren
Marker
1.0
AliEveTrackFitter
Start
Fit
Reset
Stop
DebugGraph
GLViewer NLT Projected
AliExternalTrackParam: x = 86.8418 alpha = 1.77846
parameters: -6.36178e-06 23.0032 0.55609 0.380153 10.1728
covariance: 1
0 -0.396269
0 0.00451527 0.848309
0 -0.0414496 0 0.833287
0 -0.0105616 0.00333621 0 0.000134402
<TCanvas::MakeDefCanvas>: created default TCanvas with name Canvas 1

Current method for multiplicity scan

implemented in
NLT_trackcount_init.C

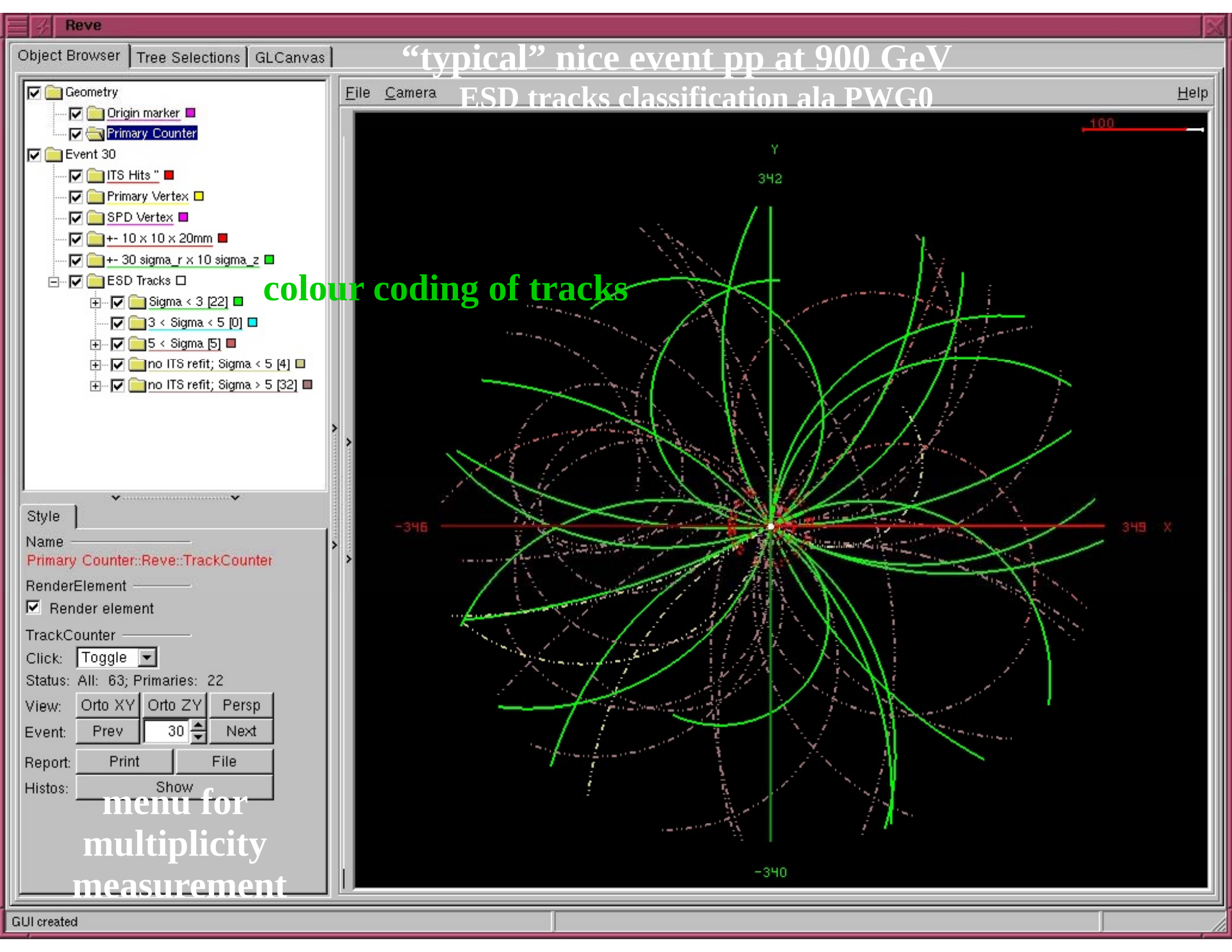
- Read ESD and navigate through events
- Tracks are classified based on criteria similar to PWG0 algorithms
  on the distance from primary-vertex normalised with the errors on track parameters;
  the error calculation code of PWG0 was used
- Separate the tracks with failed ITS extrapolation;
  they have large track-parameter errors when propagated to the point of closest approach to the primary-vertex
- Separate tracks on N-sigma and store in different containers, show tracks with different colour
  green and cyan are within 3 and 5 sigma from the vertex respectively
- De-select tracks without ITS association and tracks with N-sigma > 5, shown as dotted lines
- Select primaries within 3 and 5 sigma from the vertex, shown as green and cyan
- A track counter counts all tracks
  and another counter counts primary tracks

Current method for multiplicity scan

- Mark the primary vertex from tracks
- Mark the primary vertex from SPD
- Draw a cylinder according to errors
  green cylinder 30 x sigma in r, 10 x sigma in z; corresponds to TPC only
- Inspect in all views
- Take corrective action if needed
  click to select or deselect tracks; the counter changes
- Report on file
  get multiplicity, pt, eta histograms

Still missing

- primary vertex finding using interactive tracking
- use momentum at entry poit of TPC and not at primary vertex
- take away the “found objects” and inspect what is “not-found”
- corrections (acceptance, efficiency of scanners)
- pile-up

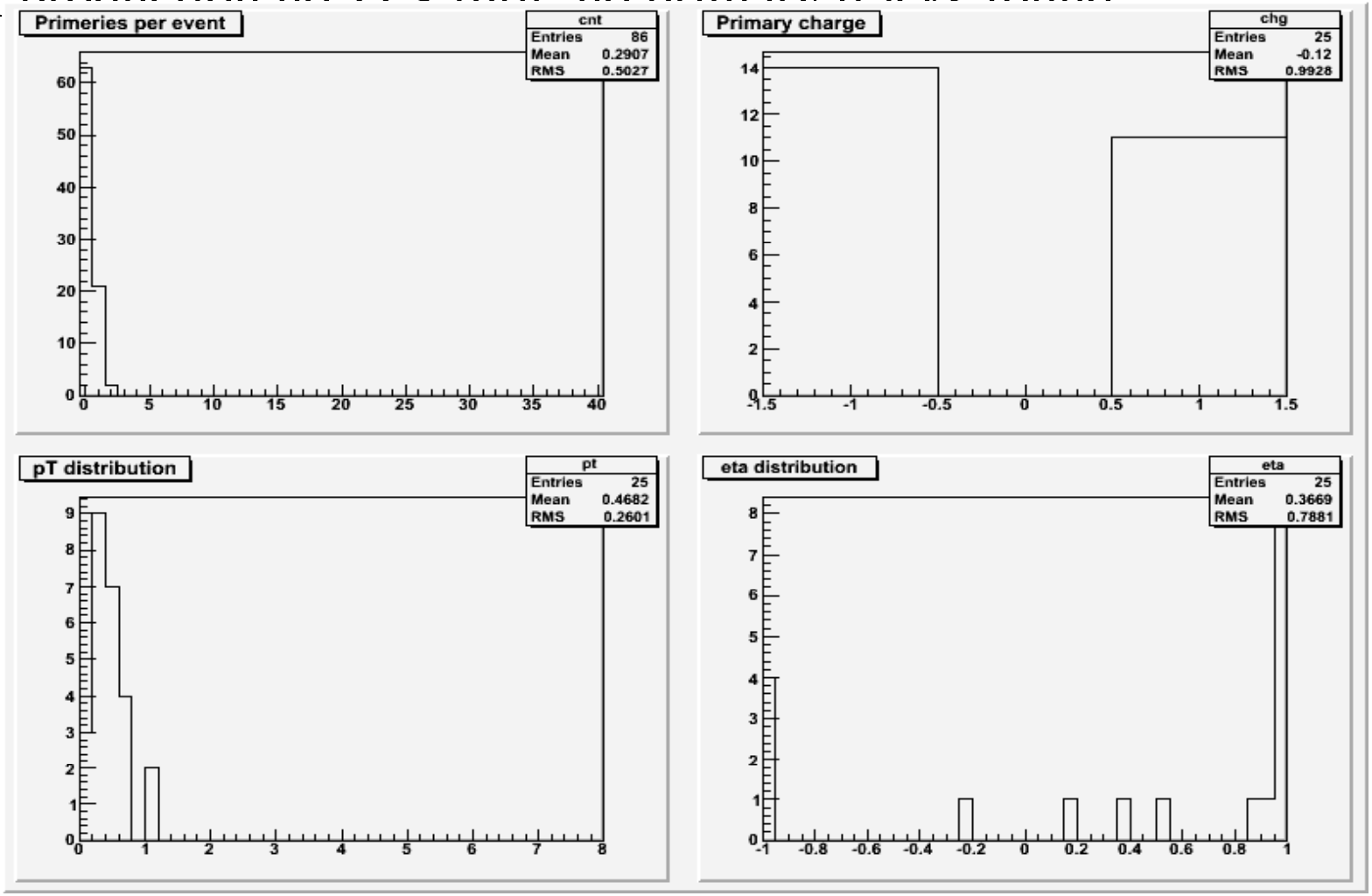

Reve
Object Browser
Tree Selections
GLCanvas
“typical” nice event pp at 900 GeV
ESD tracks classification ala PWG0
Geometry
Origin marker
Primary Counter
Event 30
ITS Hits ''
Primary Vertex
SPD Vertex
+- 10 x 10 x 20mm
+- 30 sigma_r x 10 sigma_z
ESD Tracks
Sigma < 3 [22]
3 < Sigma < 5 [0]
5 < Sigma [5]
no ITS refit; Sigma < 5 [4]
no ITS refit; Sigma > 5 [32]
colour coding of tracks
File
Camera
Help
100
Y
342
-346
349
X
-340
Style
Name
Primary Counter::Reve::TrackCounter
RenderElement
Render element
TrackCounter
Click:
Toggle
Status: All: 63; Primaries: 22
View:
Orto XY
Orto ZY
Persp
Event:
Prev
30
Next
Report:
Print
File
Histos:
Show
menu for multiplicity measurement
GUI created

Results

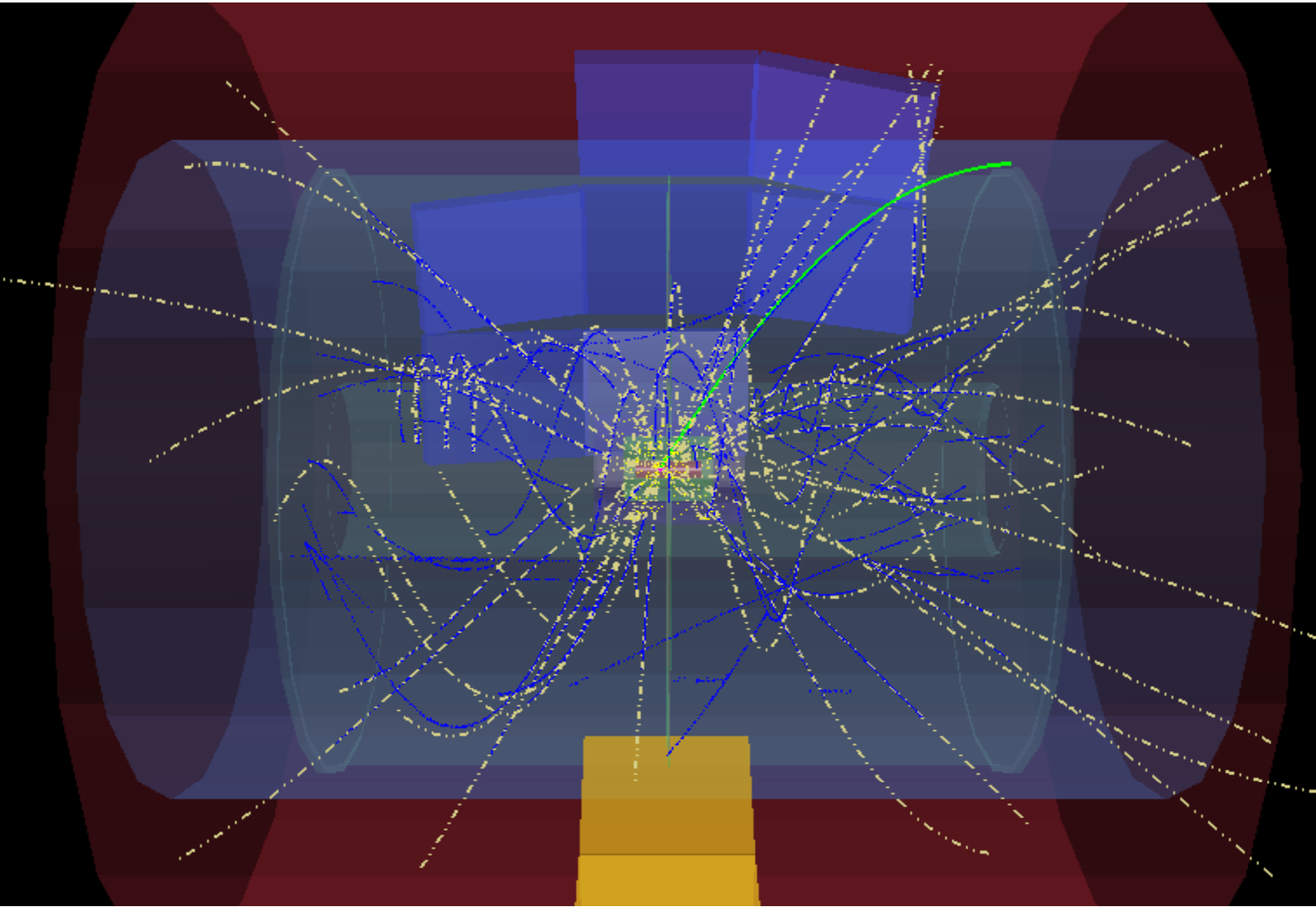
300 events AliRoot v4-11-Release

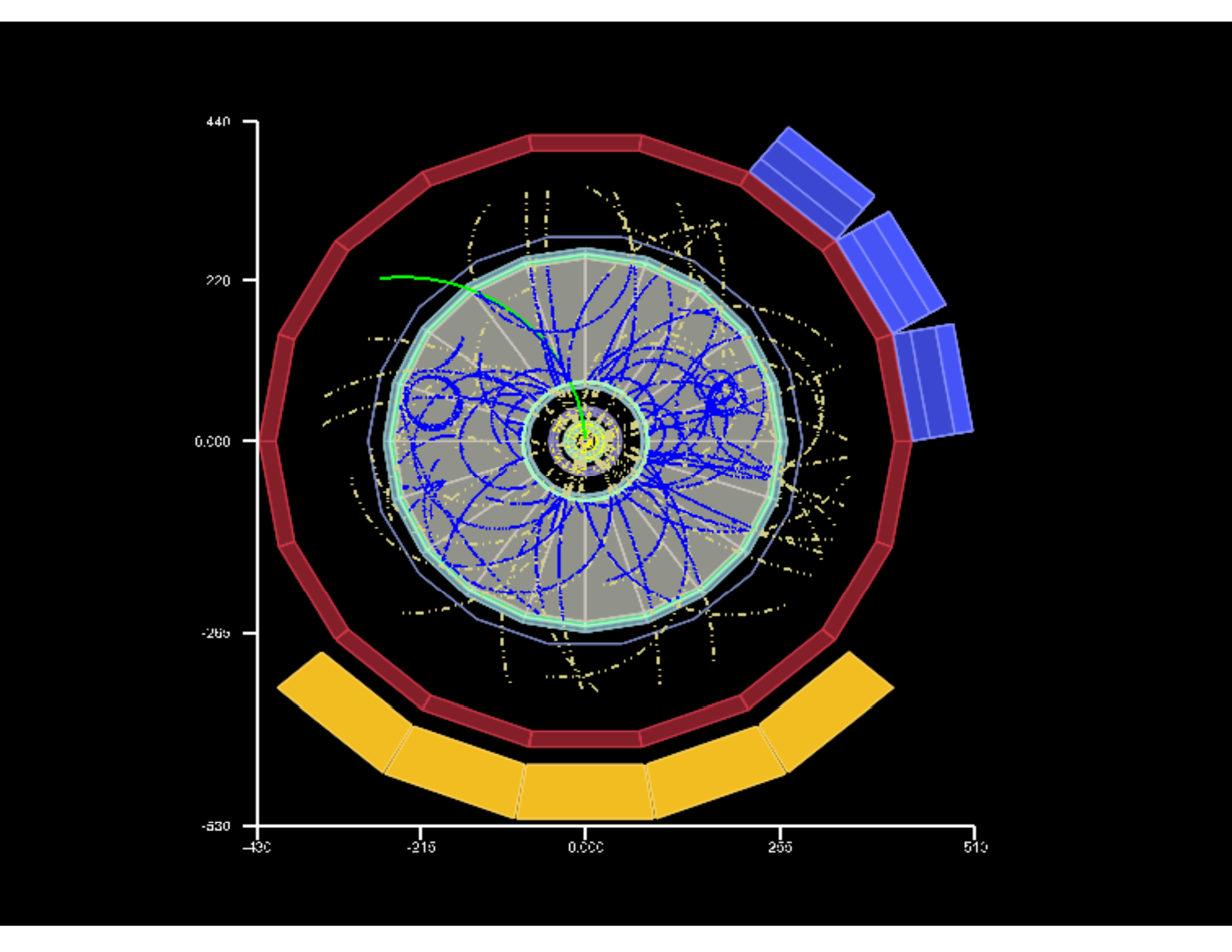
couple of problems spotted

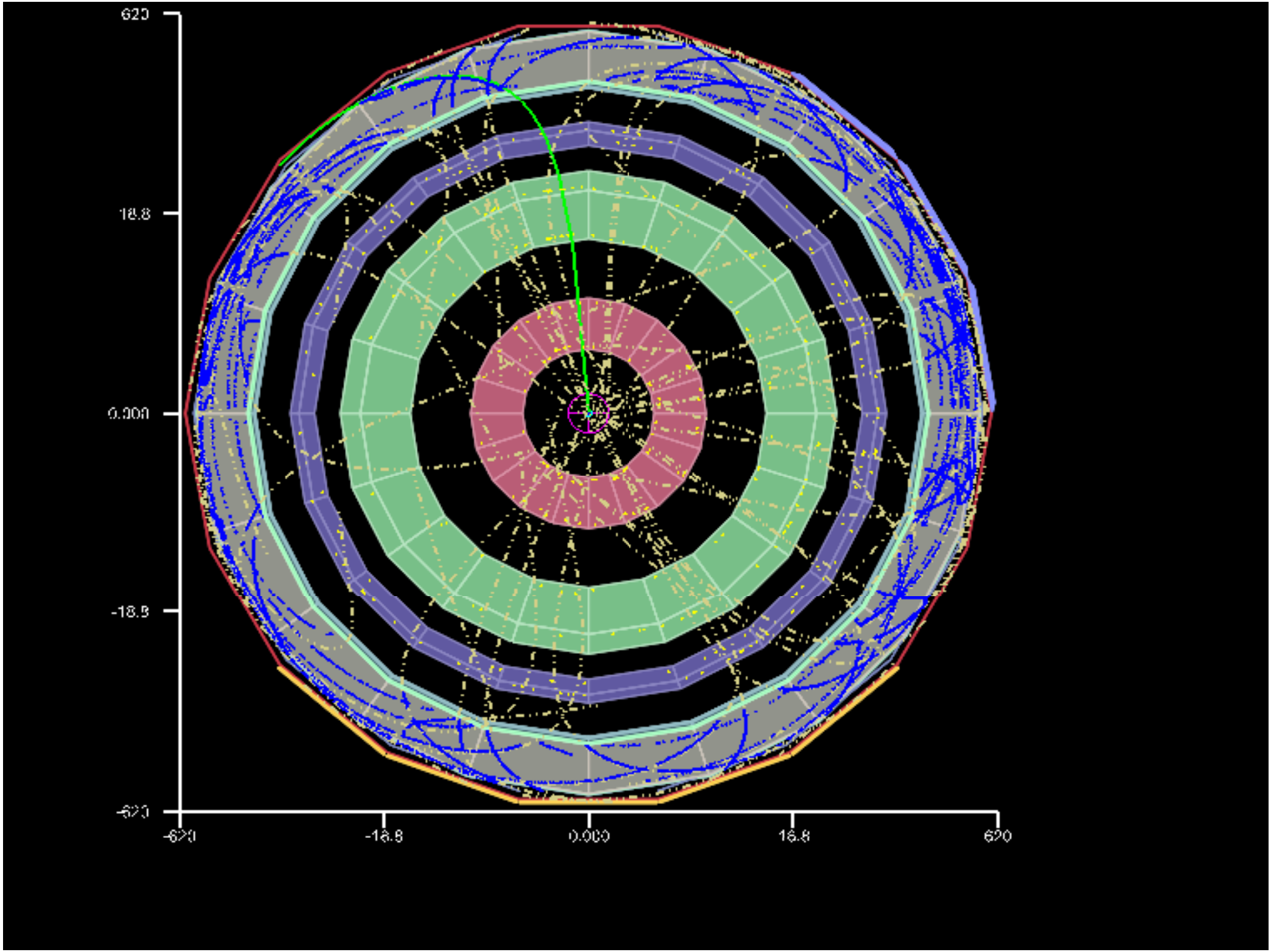
- no SDD digits for the 1st event of every file
- special production no ITS refit: no primary tracks found

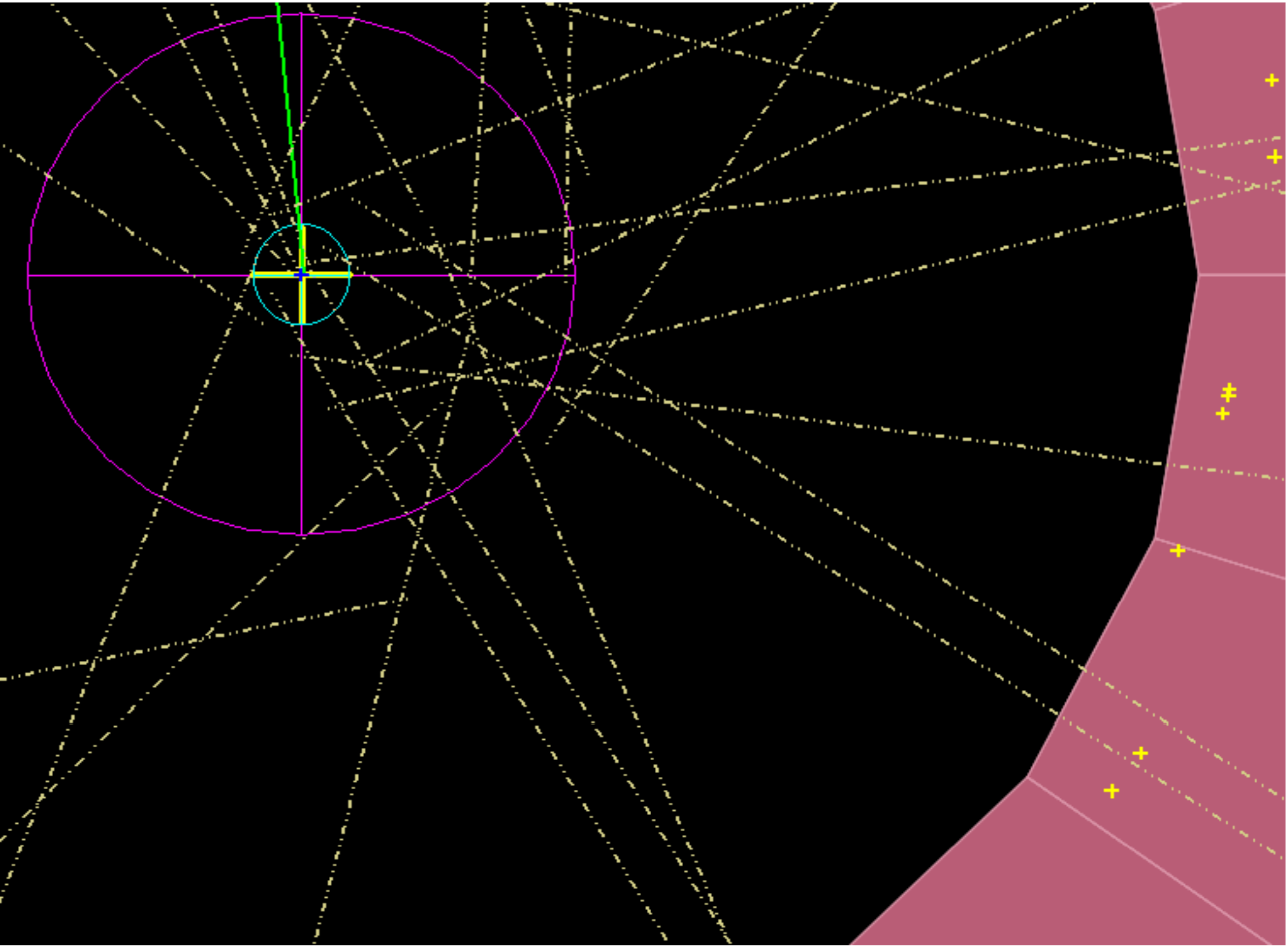


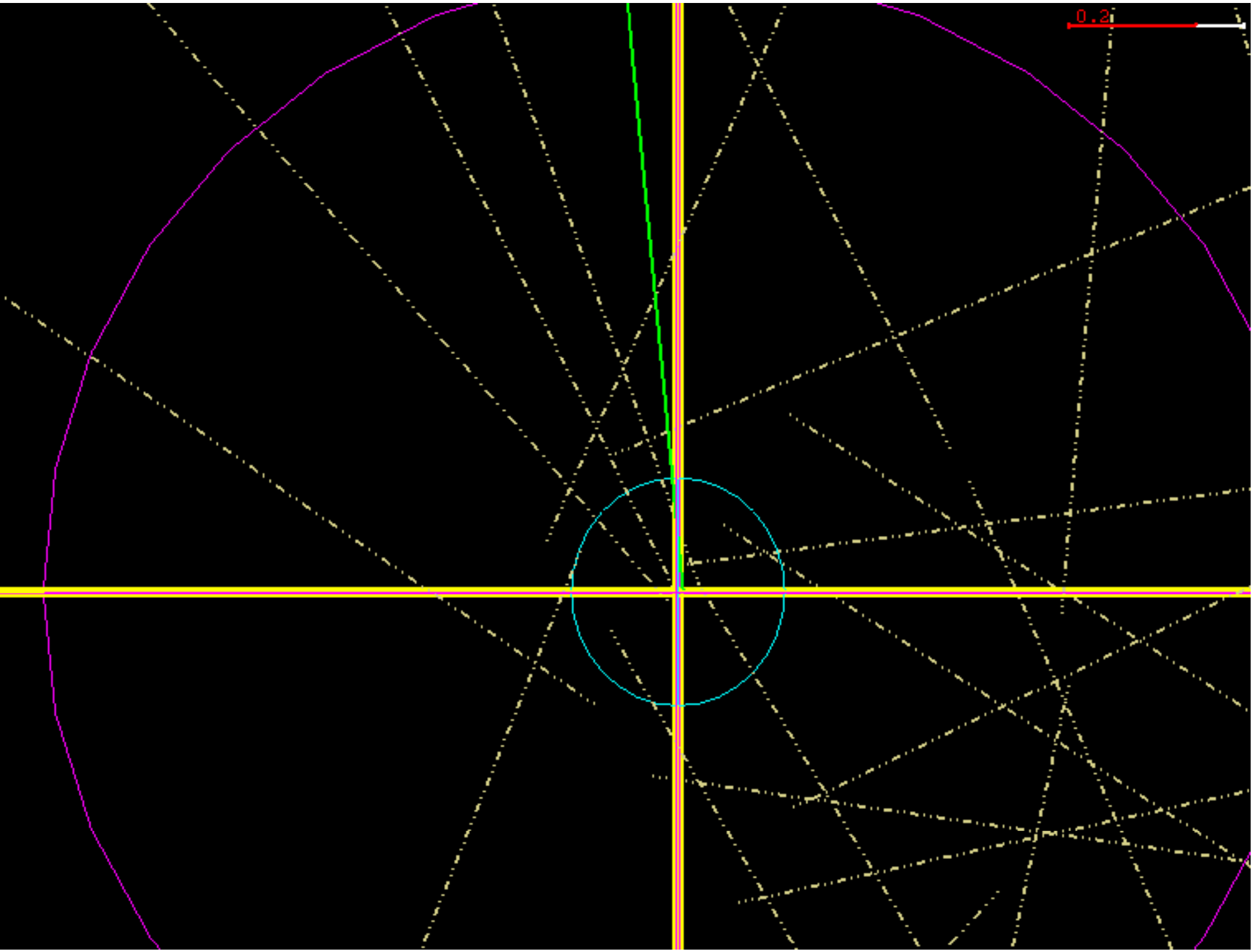
“problem with finding primary tracks

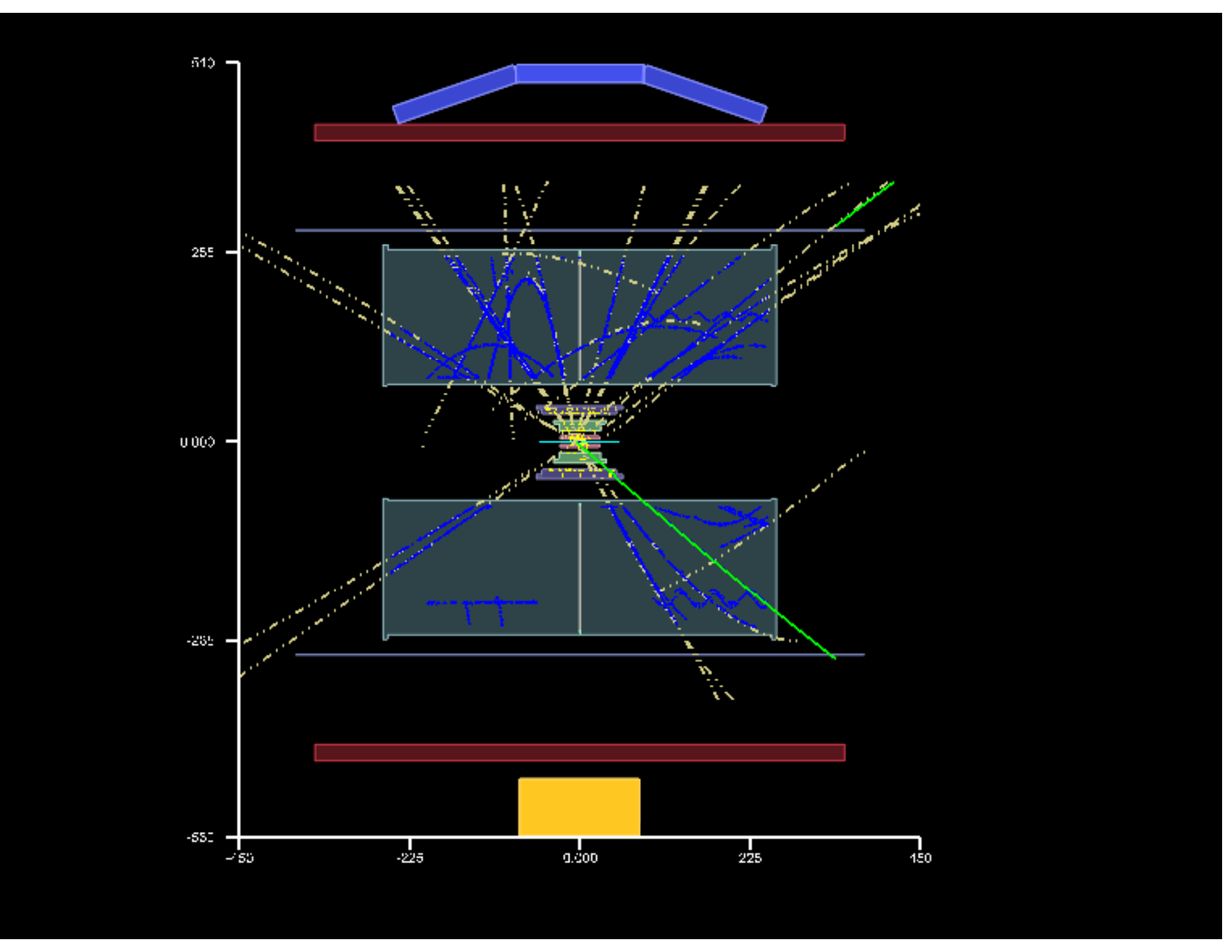


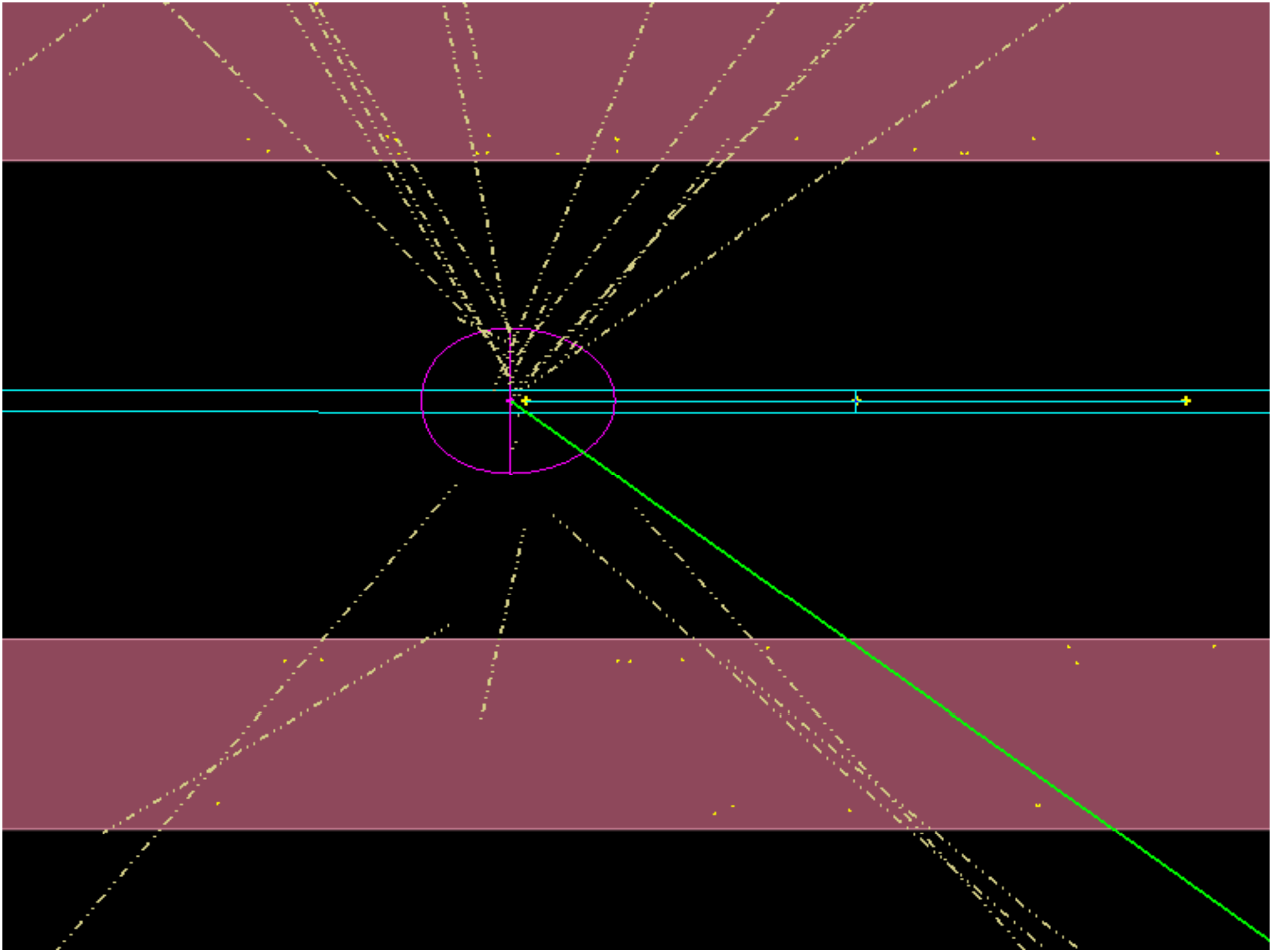

440
220
0.000
-330
-430
-215
0.000
255


620
18.8
0.000
-18.8
-620
-620
-18.8
0.000
18.8
620




0.2


255
0.000
-225
225



Strategy....

when spotting problem two ways to go

- report problem
  experts and diagnostic tools to fix it

- take corrective action
  click and increase by hand the primary counter

.... for simulated events... go to sleep....

Exercise
with special event samples

The events are meant to substitute for real data;
there is no Monte Carlo information
available to the scanners

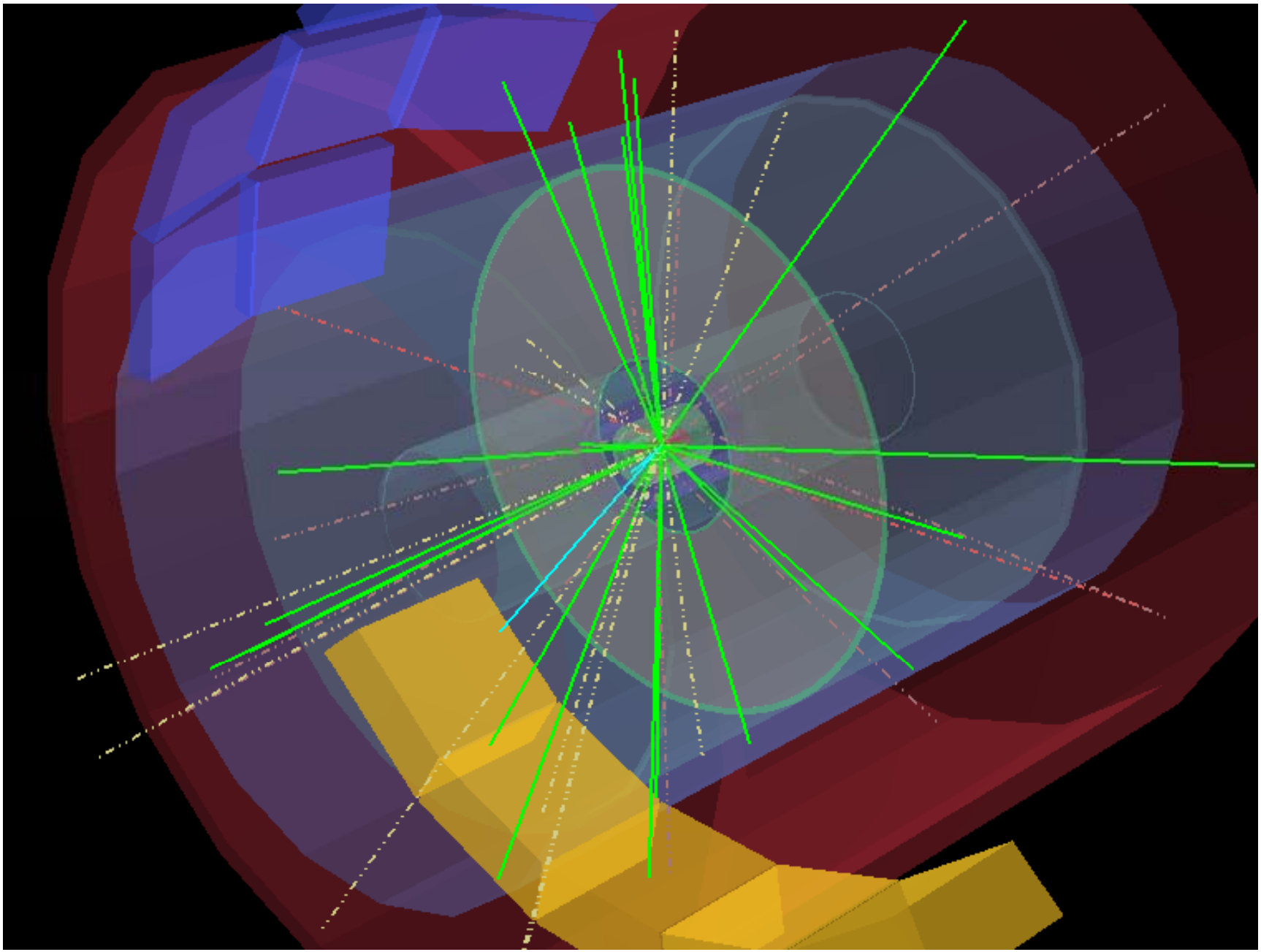
The starting point here is ESD reconstructed
tracks and primary vertex

Before christmas samples

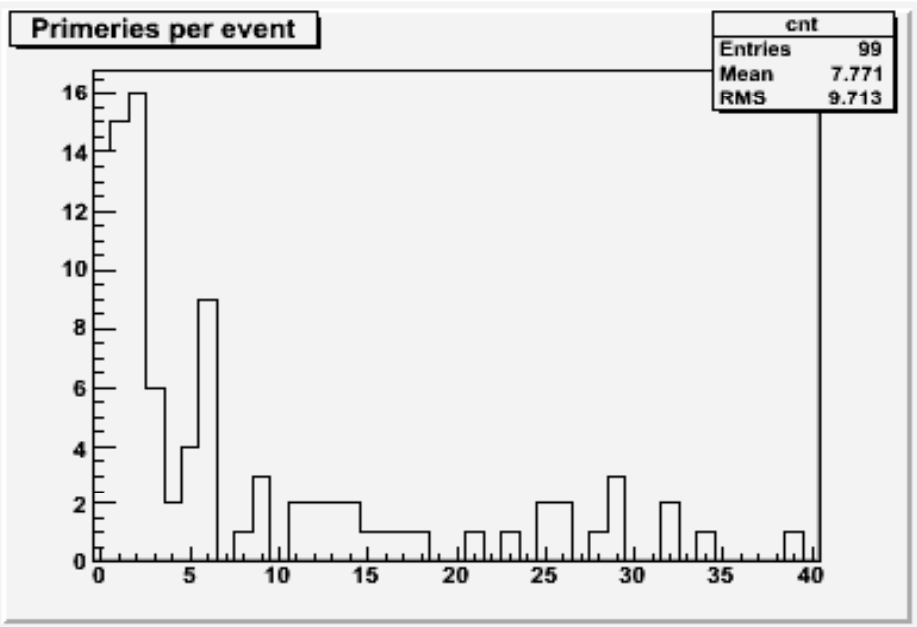
- pp 14 TeV NO mag. field
- **pp 14 TeV with mag. field of 01.12.07**

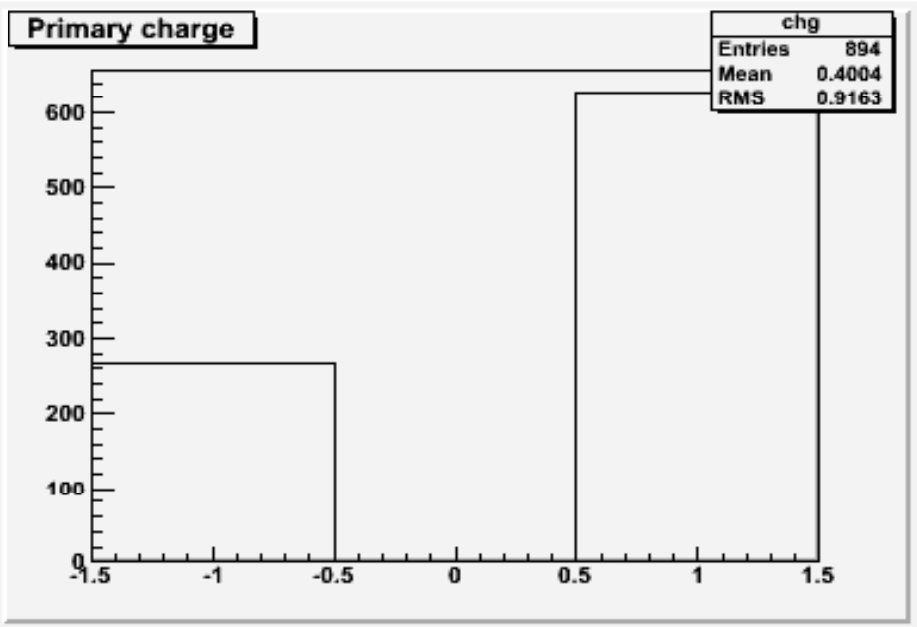
bug in production spotted by scanning

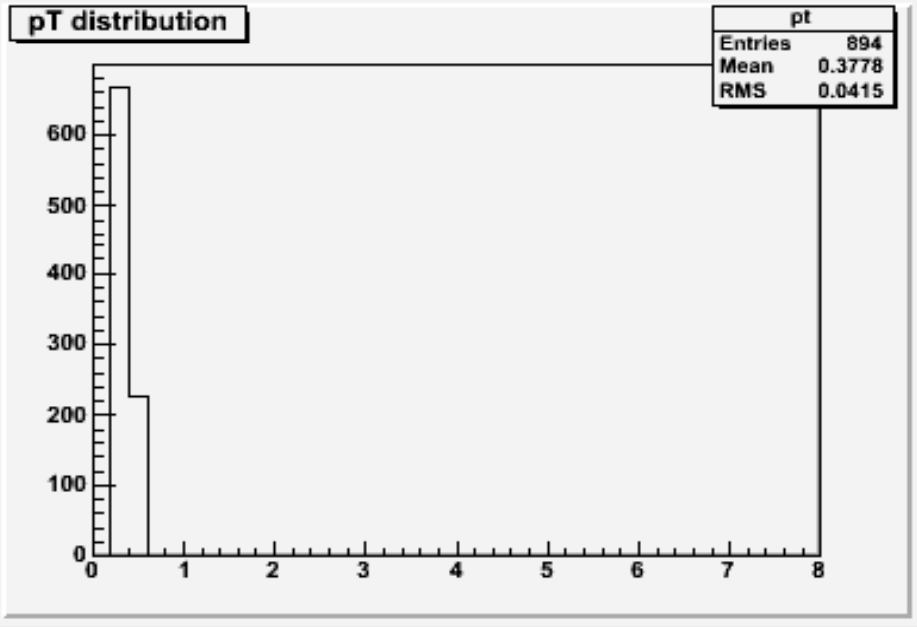
100 events with NO field scanned by Yiota

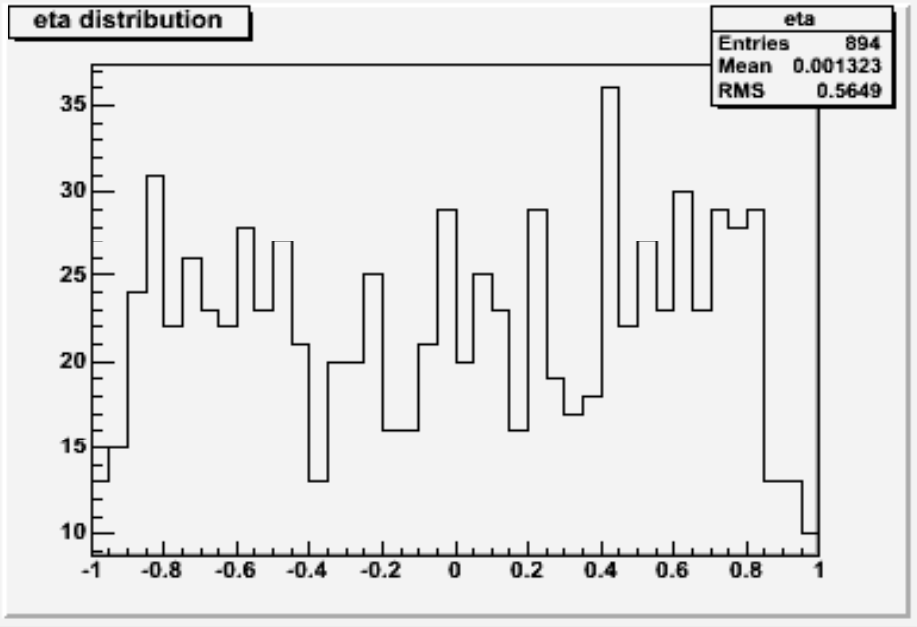


100 events NO field scanned by Yiota

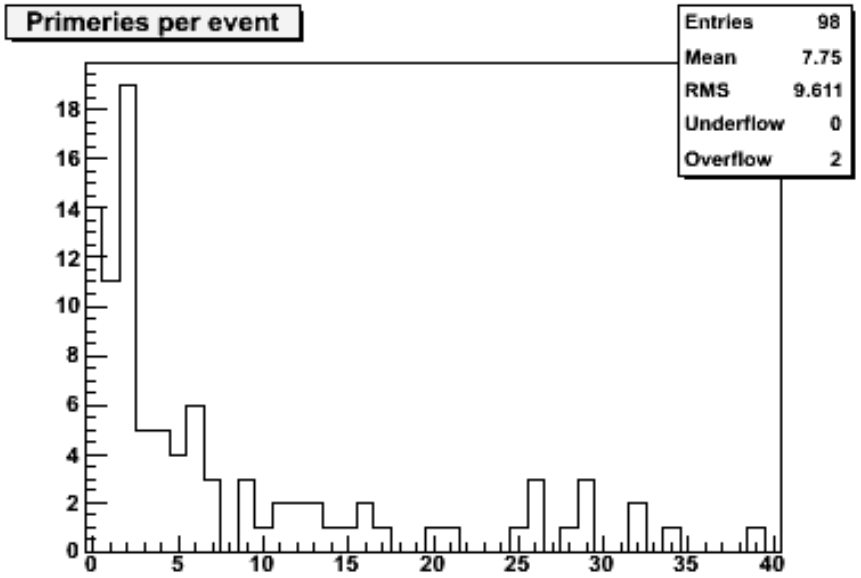


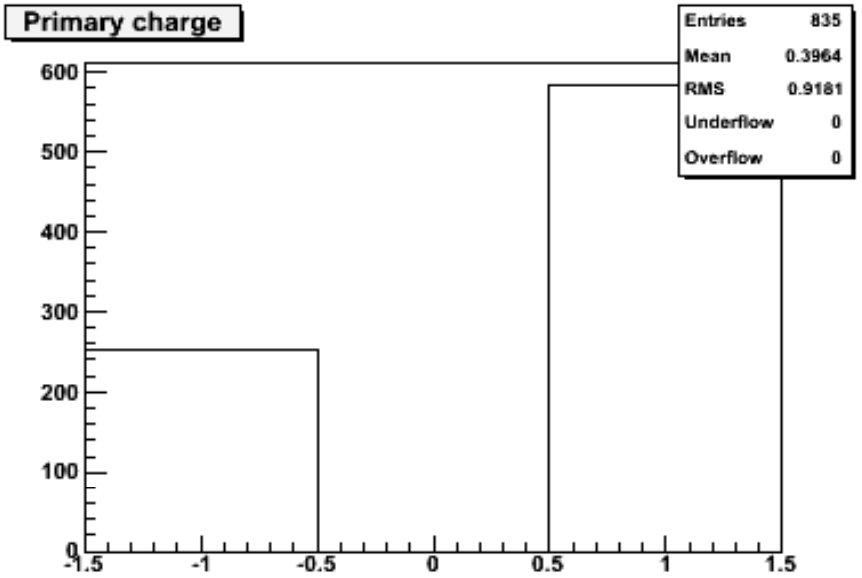


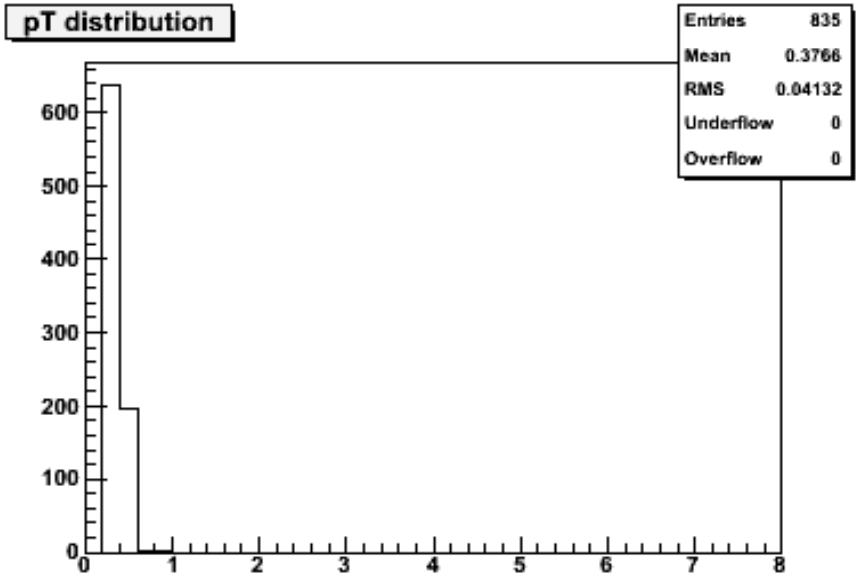


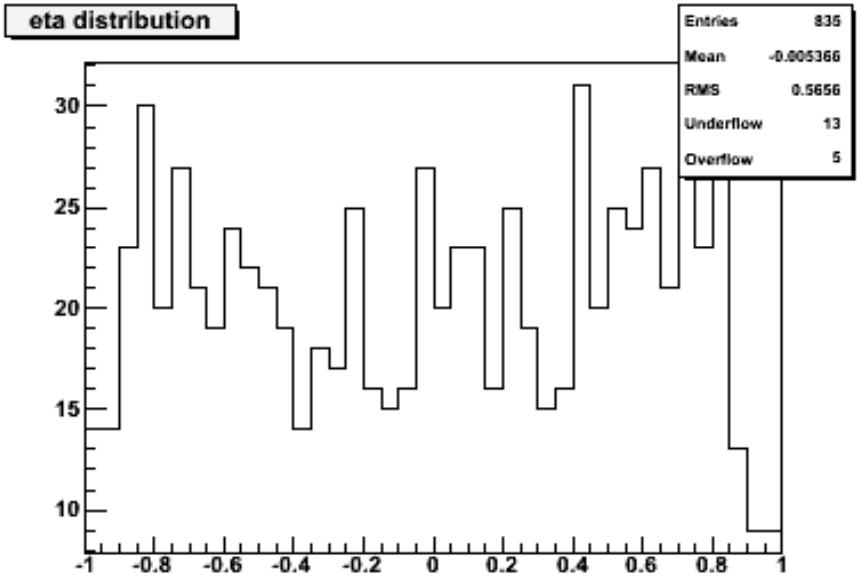


the same 100 events NO field scanned by Yuri

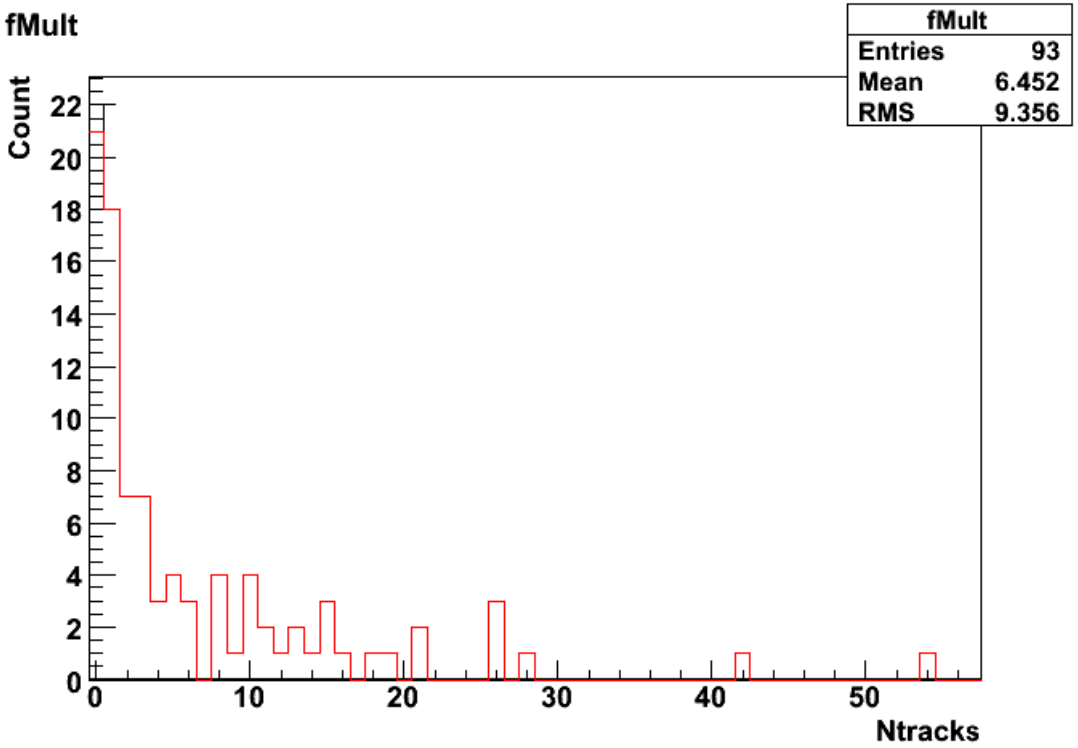


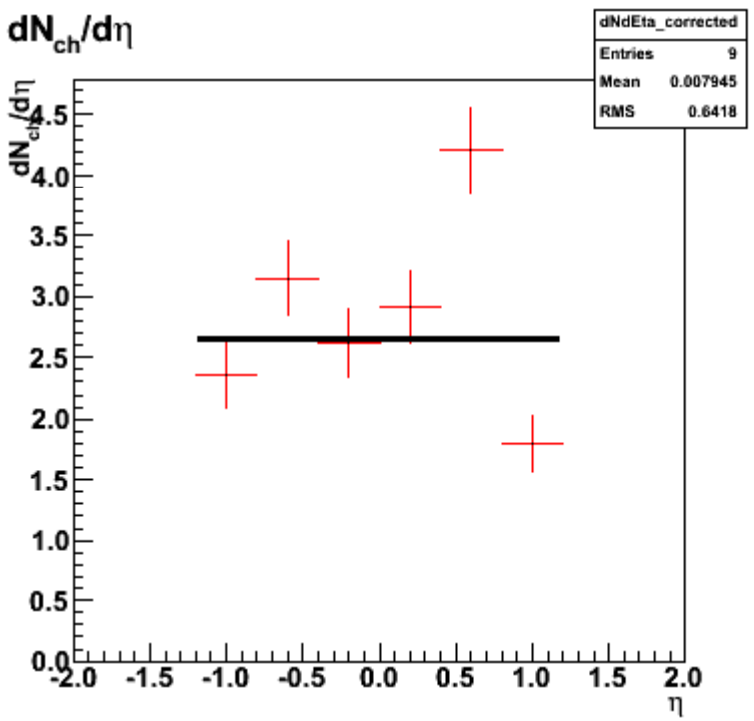


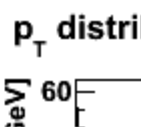




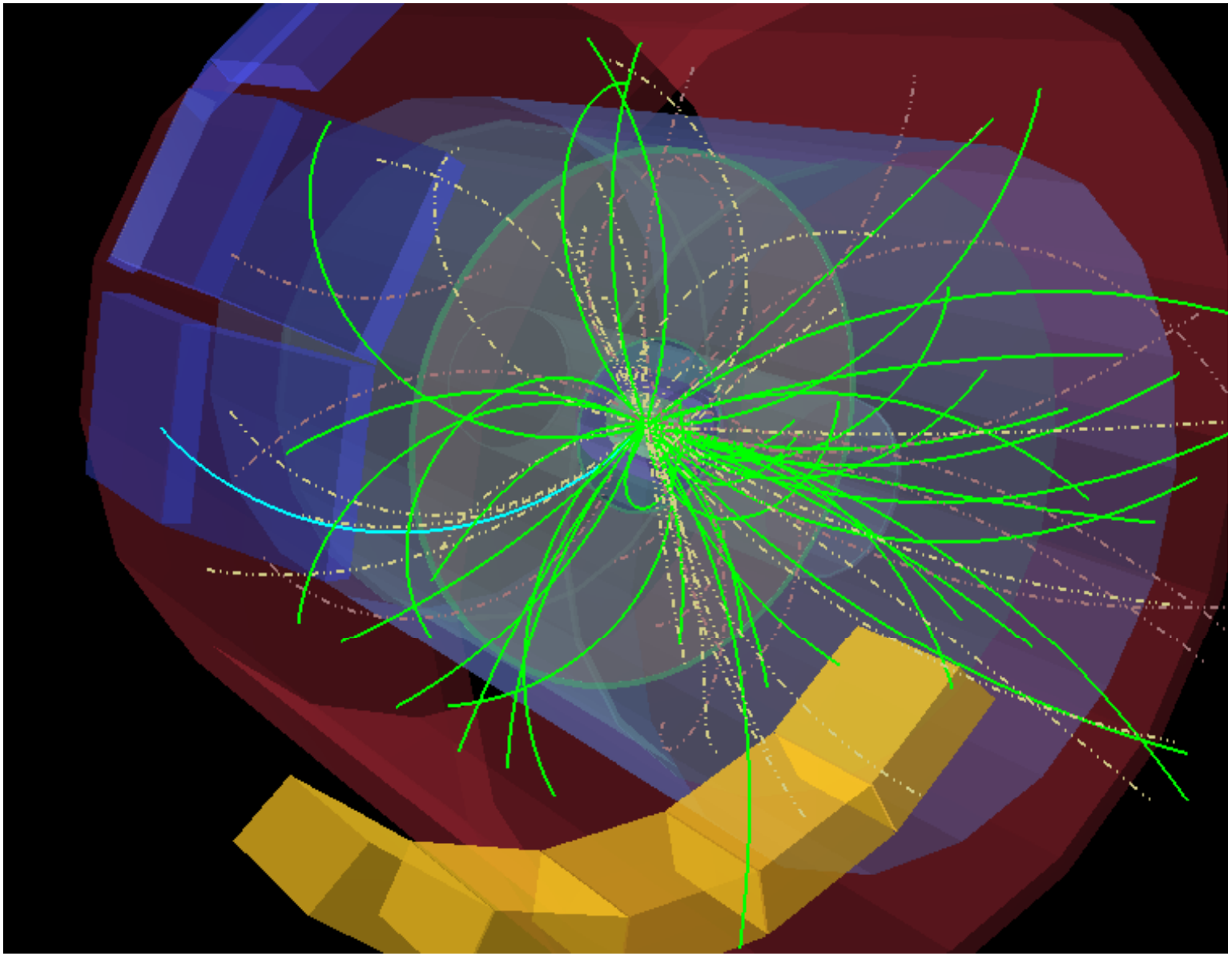
the same 100 events NO field analysed by Jan-Fiete



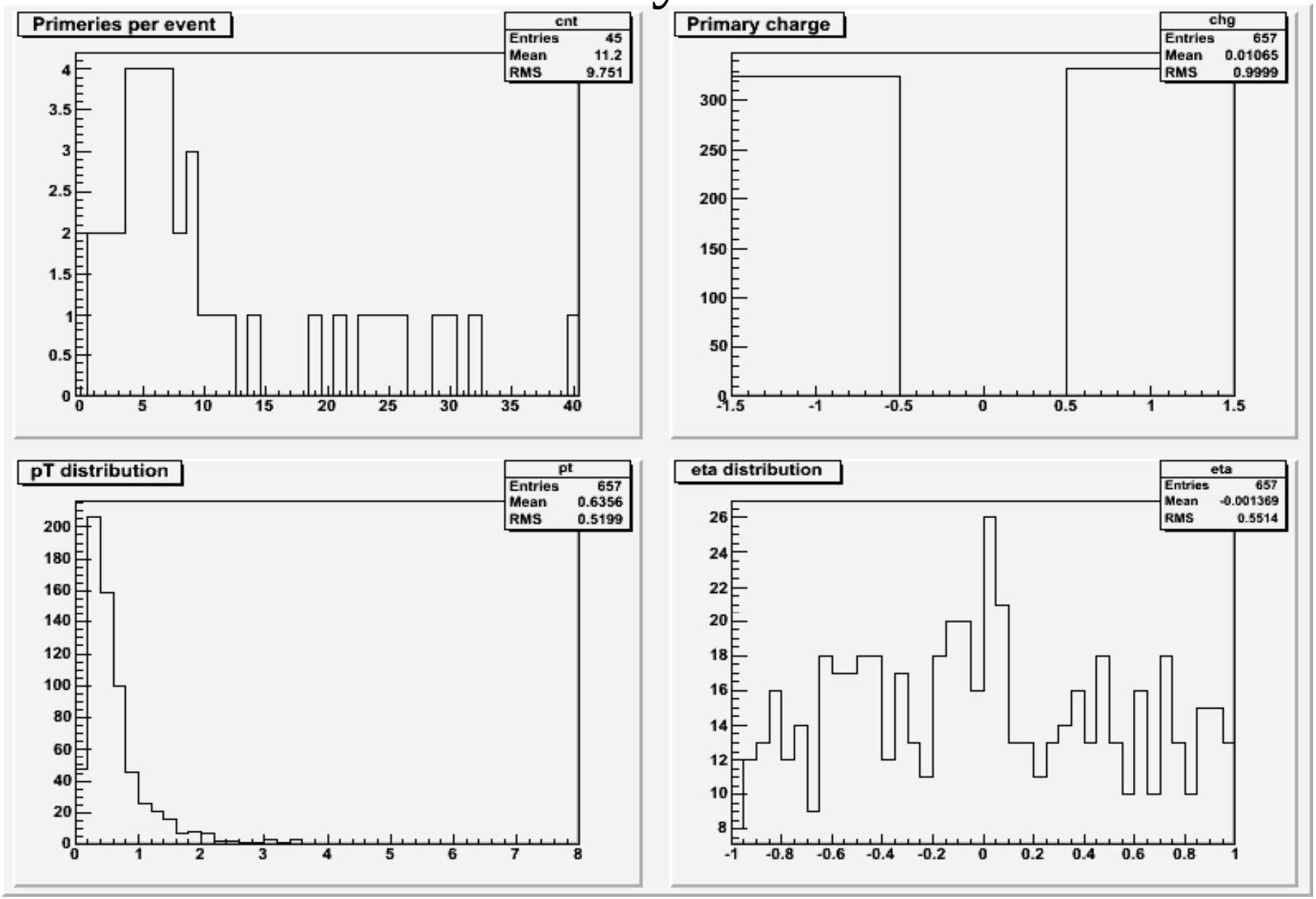




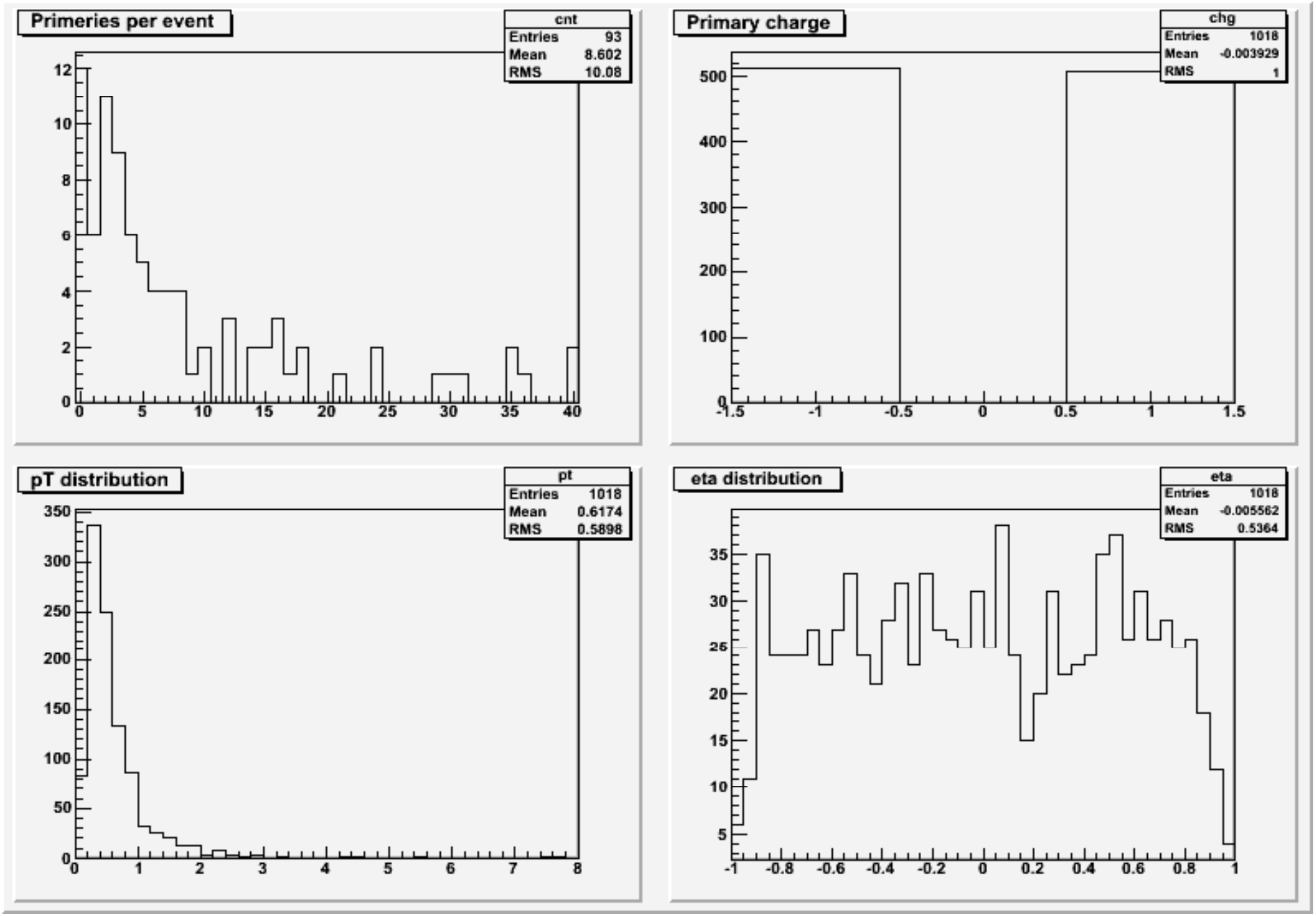
50 events with field ON using SPD vertex and 3D scanned by Adam



50 events with field ON using SPD vertex and 3D scanned by Adam



total of 400 events with field ON scanned by Yiota



Conclusions

- **Visual event scanning is a continuous cycle**
- **The scanning tools and methods were used to spot and fix problems while in continuous development**
- ***At day 1***
  check by eye at one-by-one level
  the full reconstruction chain from raw-data, clusters and tracking
  to higher level reconstruction algorithm
  including primary and secondary vertices

Conclusions

- **The visual scanning tools were also used for visual multiplicity measurement**
- **Criteria to be fine-tuned with real data**
- **Several scanners have scanned the same events; the scanning time for 100 “standard” events was in the range of few hours**
- **Results from the scanning method and algorithmic Jan-Fiete analysis were compared**
- **Coming soon important developments for multiplicity measurement**

The team

- **EVE: Matevz and Alja Tadel**
- **Scanners: A. Kisiel, P. Christakoglou, Y. Belikov, Y. Foka**
- **Production of events: P. Hristov**
- **Comparison with algorithmic: Jan-Fiete**
- **Reconstruction debuging: Y. Belikov et al**

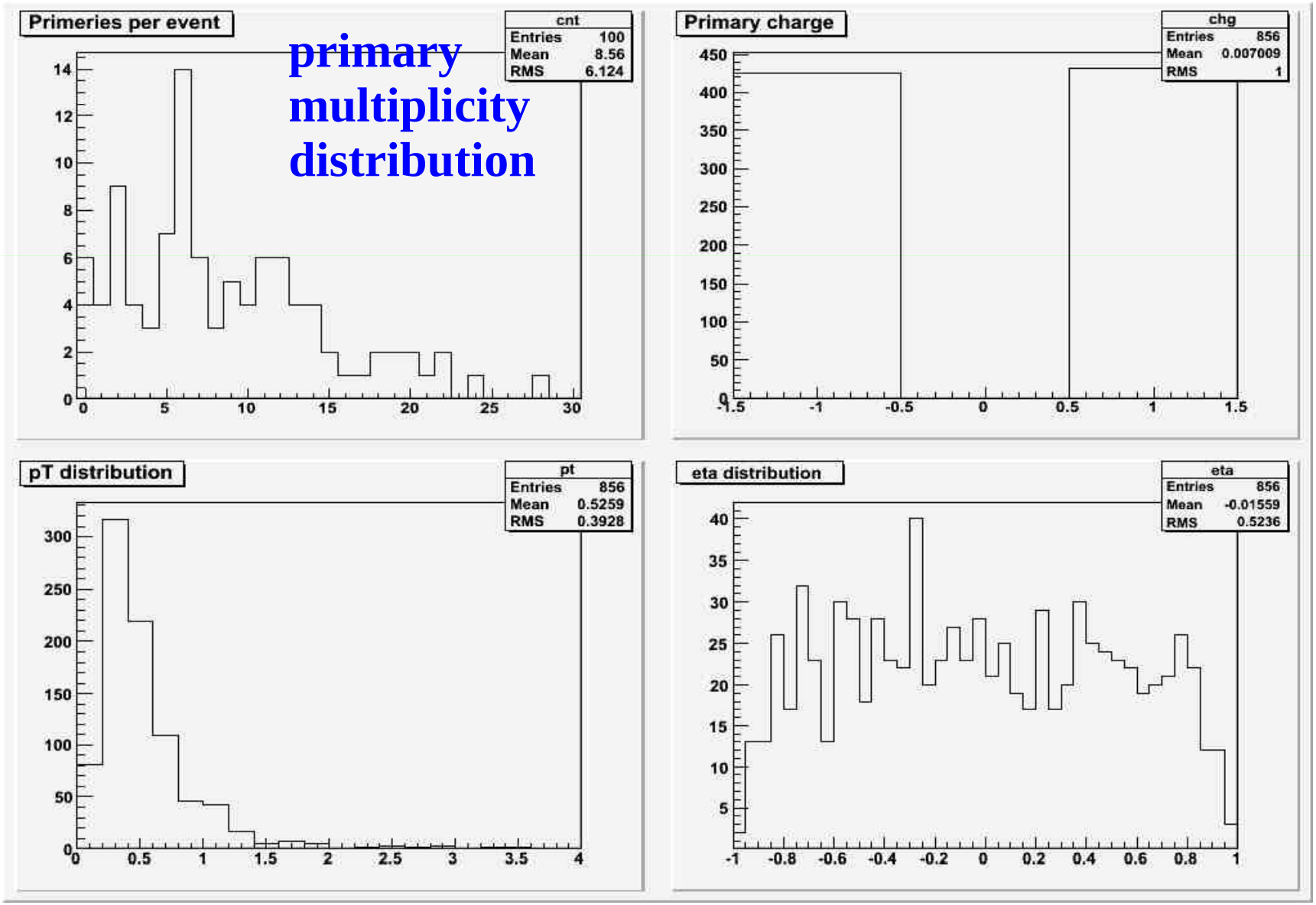
Example of problem spotted via individual inspection of events

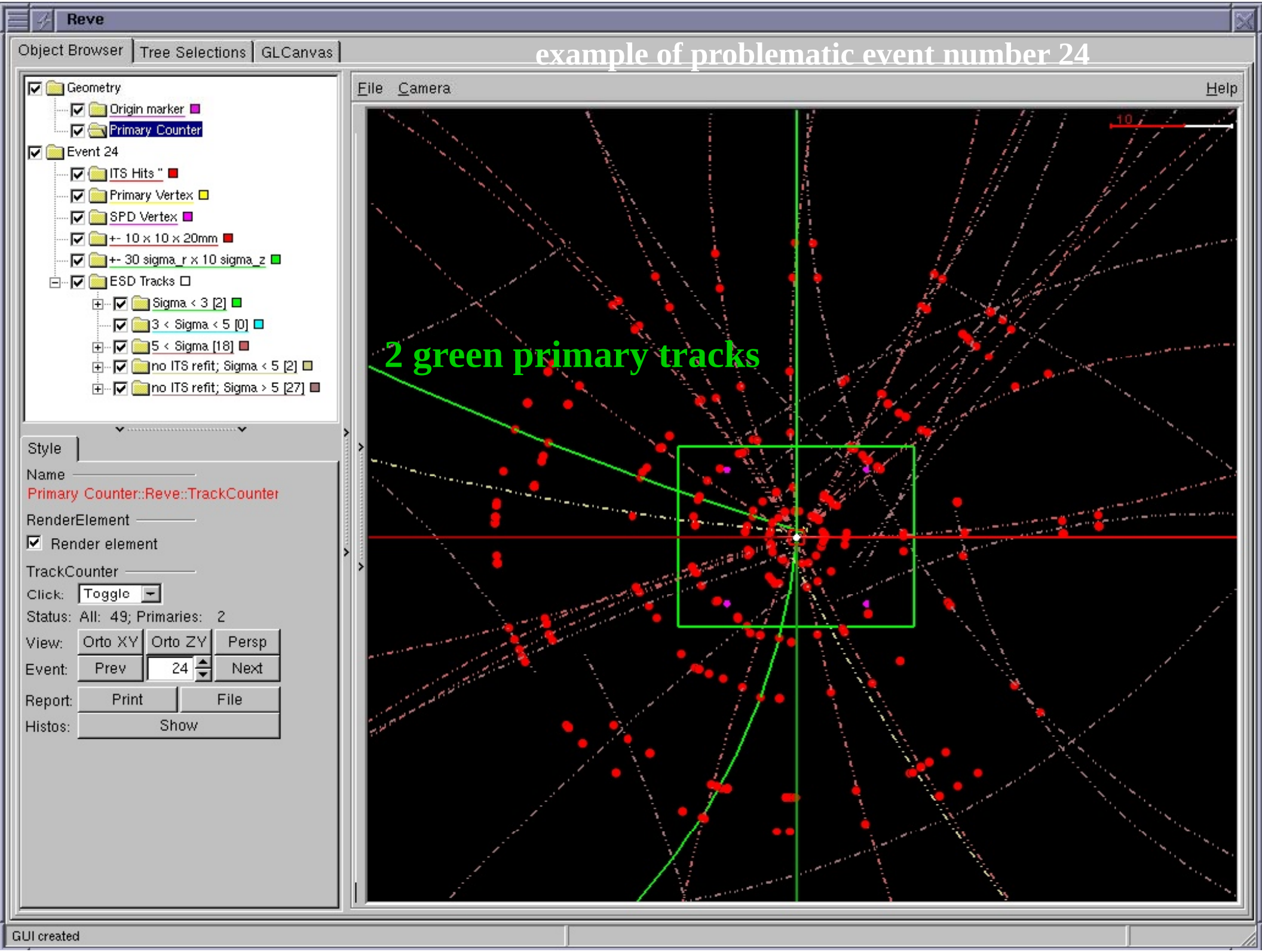
100 pp events at 900 GeV and 20 at 14 TeV

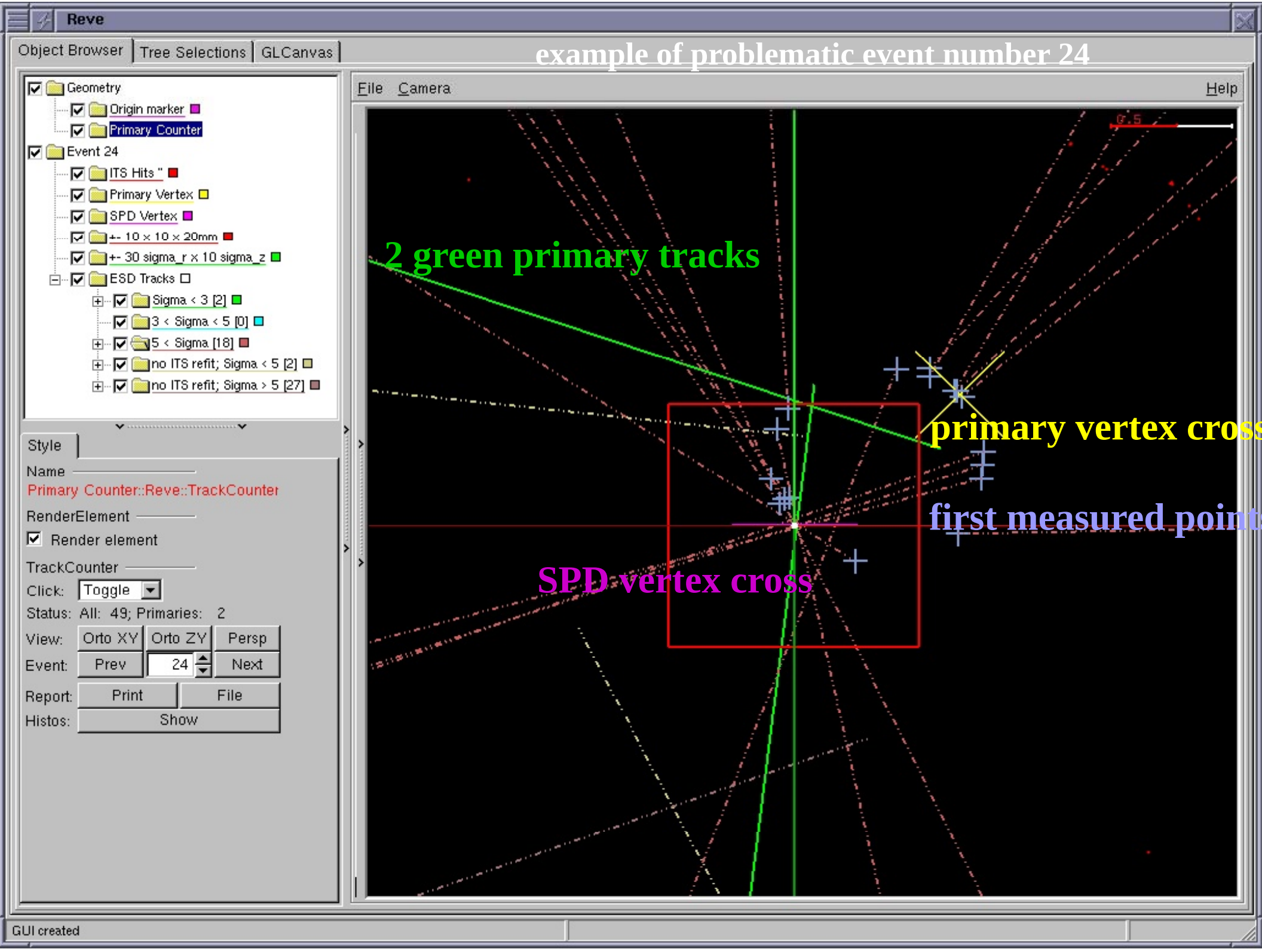
- **20 out of 100 events at 900 GeV and**

  17 out of 20 at 14 TeV were marked problematic
- **The marked events were checked by Y. Belikov, P. Hristov, M. Ivanov, M. Masera, A. Dainese et al**

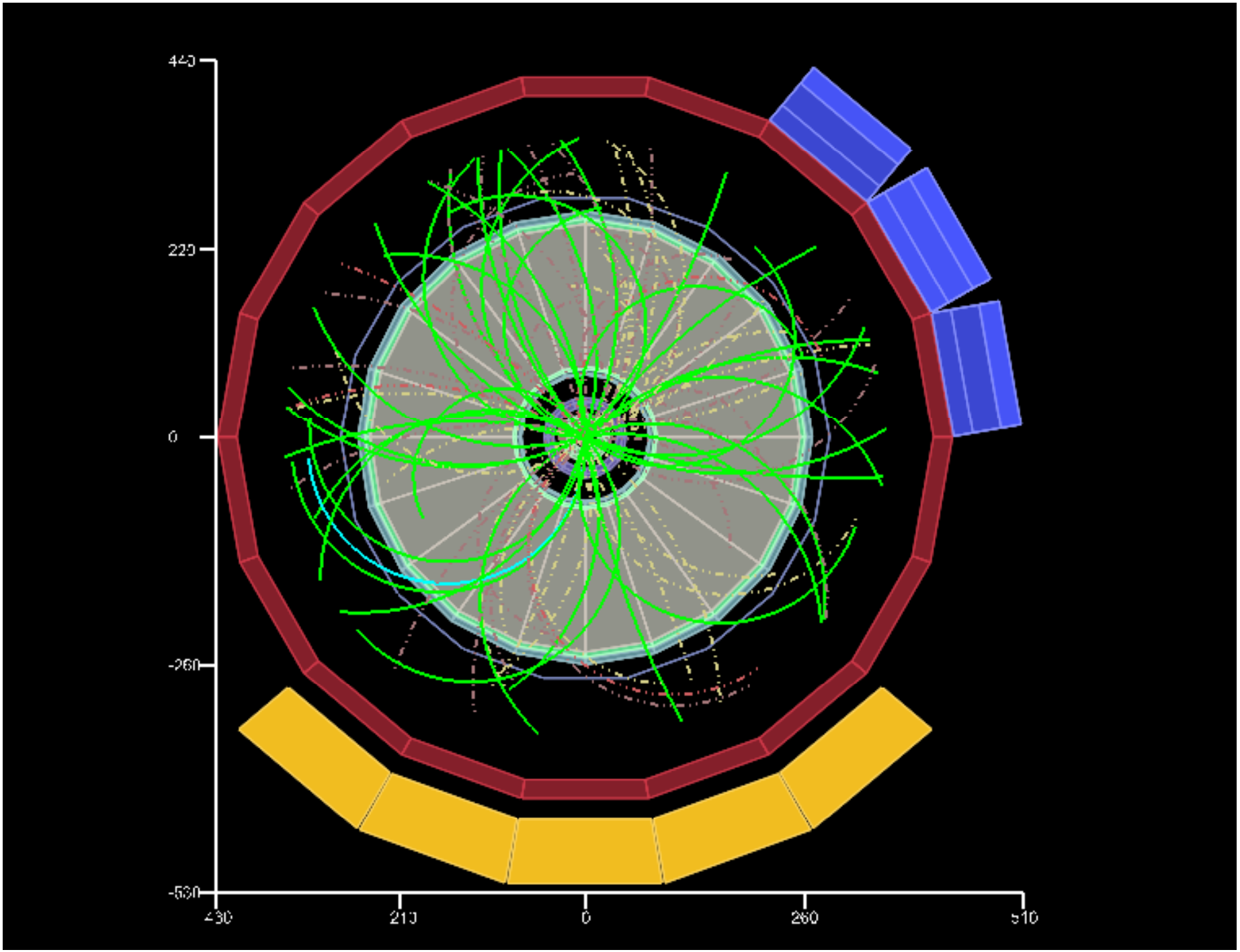
Results shown in Munster, consistent to Jan-Fiete analysis



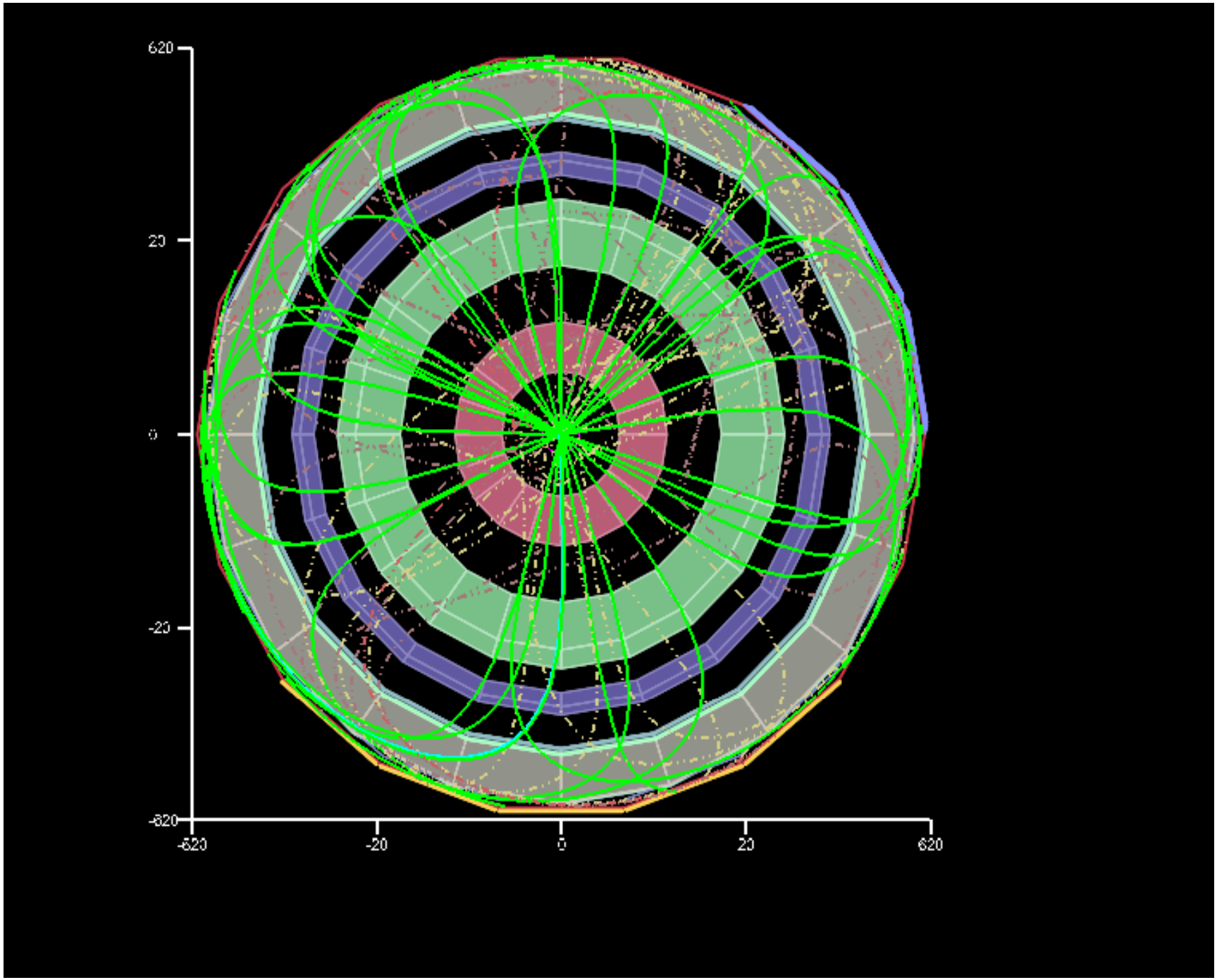

Reve
Object Browser
Tree Selections
GLCanvas
example of problematic event number 24
Geometry
Origin marker
Primary Counter
Event 24
ITS Hits ''
Primary Vertex
SPD Vertex
+- 10 x 10 x 20mm
+- 30 sigma_r x 10 sigma_z
ESD Tracks
Sigma < 3 [2]
3 < Sigma < 5 [0]
5 < Sigma [18]
no ITS refit; Sigma < 5 [2]
no ITS refit; Sigma > 5 [27]
File
Camera
Help
10
2 green primary tracks
Style
Name
Primary Counter::Reve::TrackCounter
RenderElement
Render element
TrackCounter
Click:
Toggle
Status: All: 49; Primaries: 2
View:
Orto XY
Orto ZY
Persp
Event:
Prev
24
Next
Report:
Print
File
Histos:
Show
GUI created


Reve
Object Browser
Tree Selections
GLCanvas
example of problematic event number 24
Geometry
Origin marker
Primary Counter
Event 24
ITS Hits ''
Primary Vertex
SPD Vertex
+- 10 x 10 x 20mm
+- 30 sigma_r x 10 sigma_z
ESD Tracks
Sigma < 3 [2]
3 < Sigma < 5 [0]
5 < Sigma [18]
no ITS refit; Sigma < 5 [2]
no ITS refit; Sigma > 5 [27]
Style
Name
Primary Counter::Reve::TrackCounter
RenderElement
Render element
TrackCounter
Click:
Toggle
Status: All: 49; Primaries: 2
View:
Orto XY
Orto ZY
Persp
Event:
Prev
24
Next
Report:
Print
File
Histos:
Show
File
Camera
Help
2 green primary tracks
primary vertex cross
first measured point
SPD vertex cross
GUI created

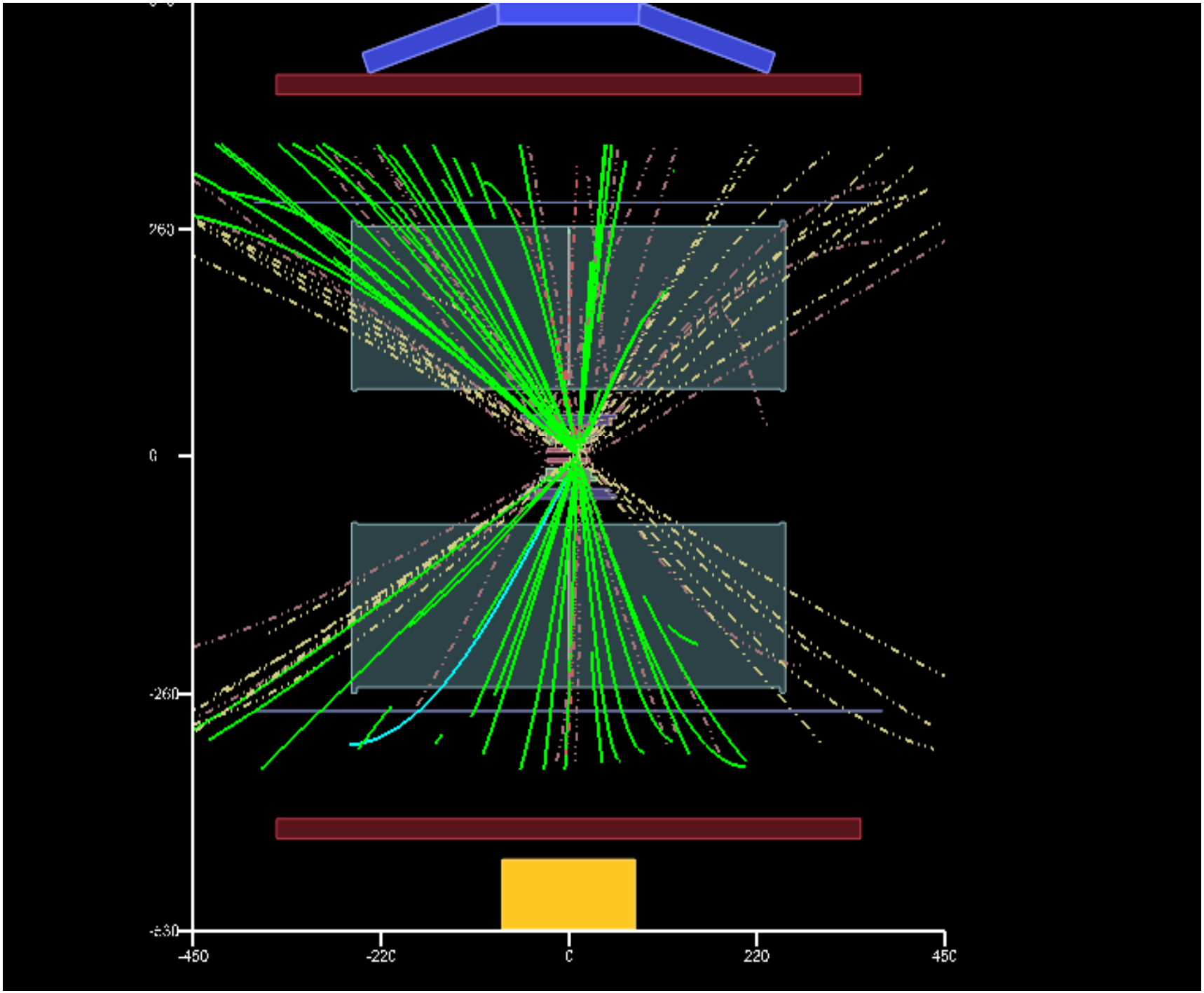
pp 14 TeV linear xy view



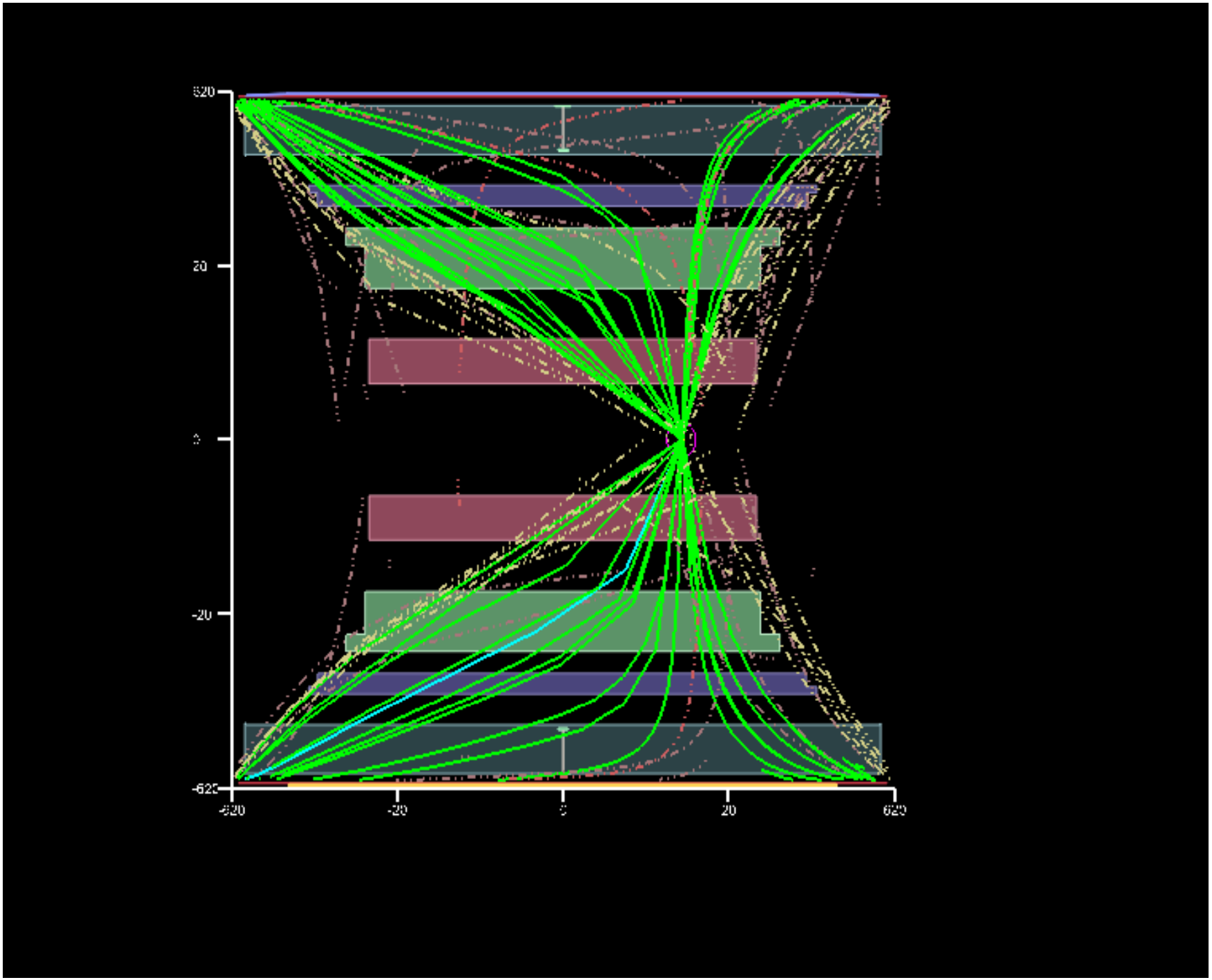
same event xy with fish-eye transformation

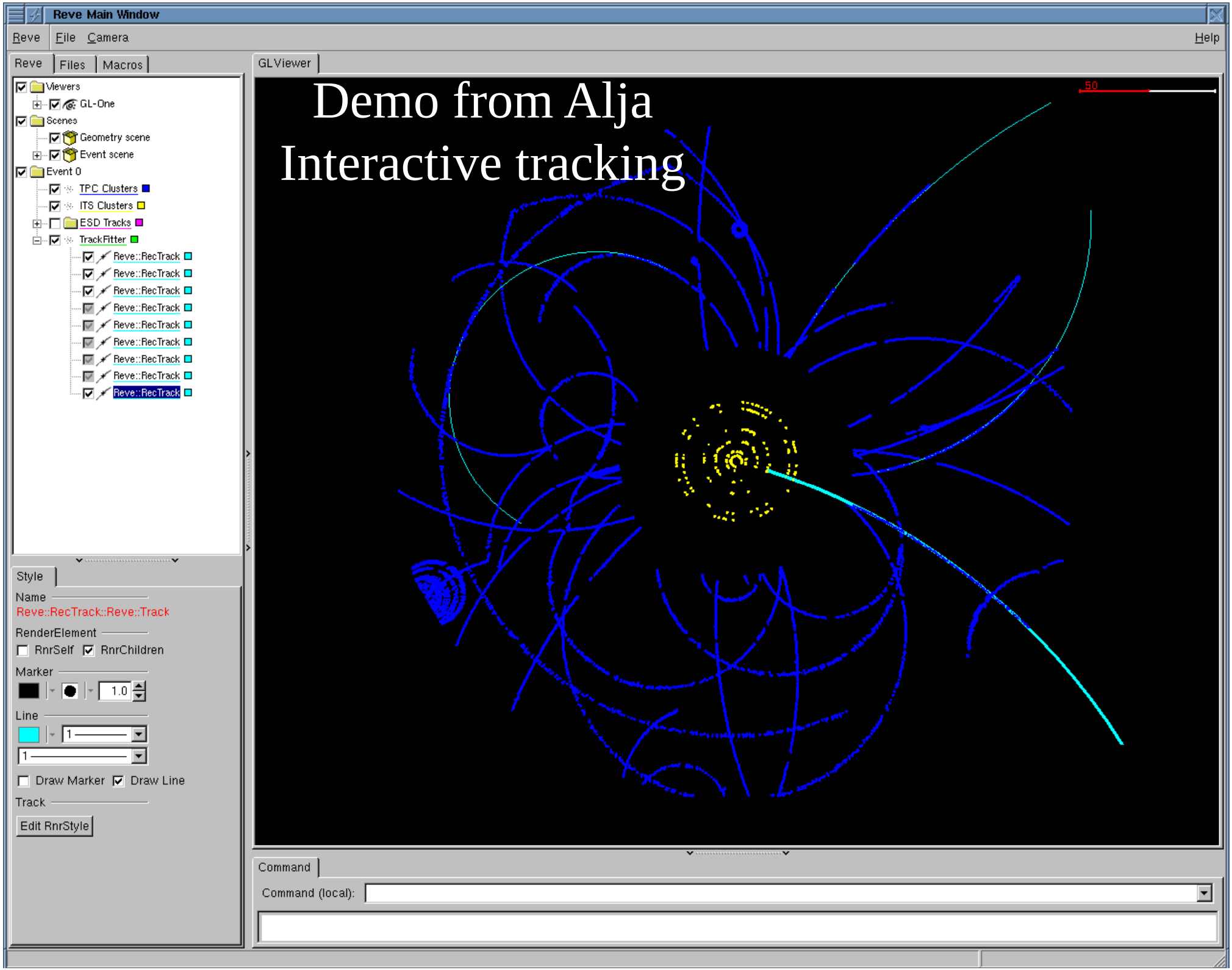


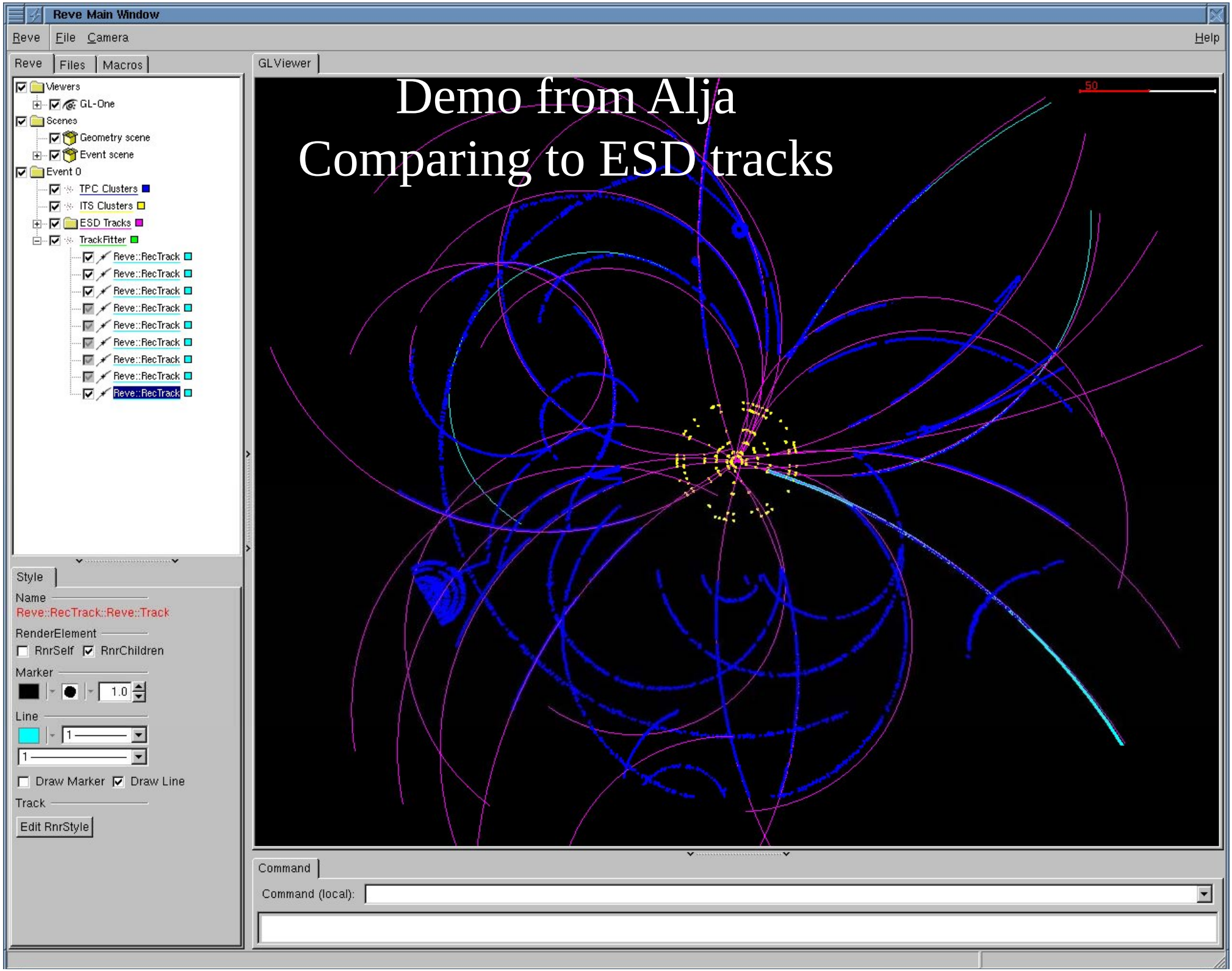
same event linear rz projection

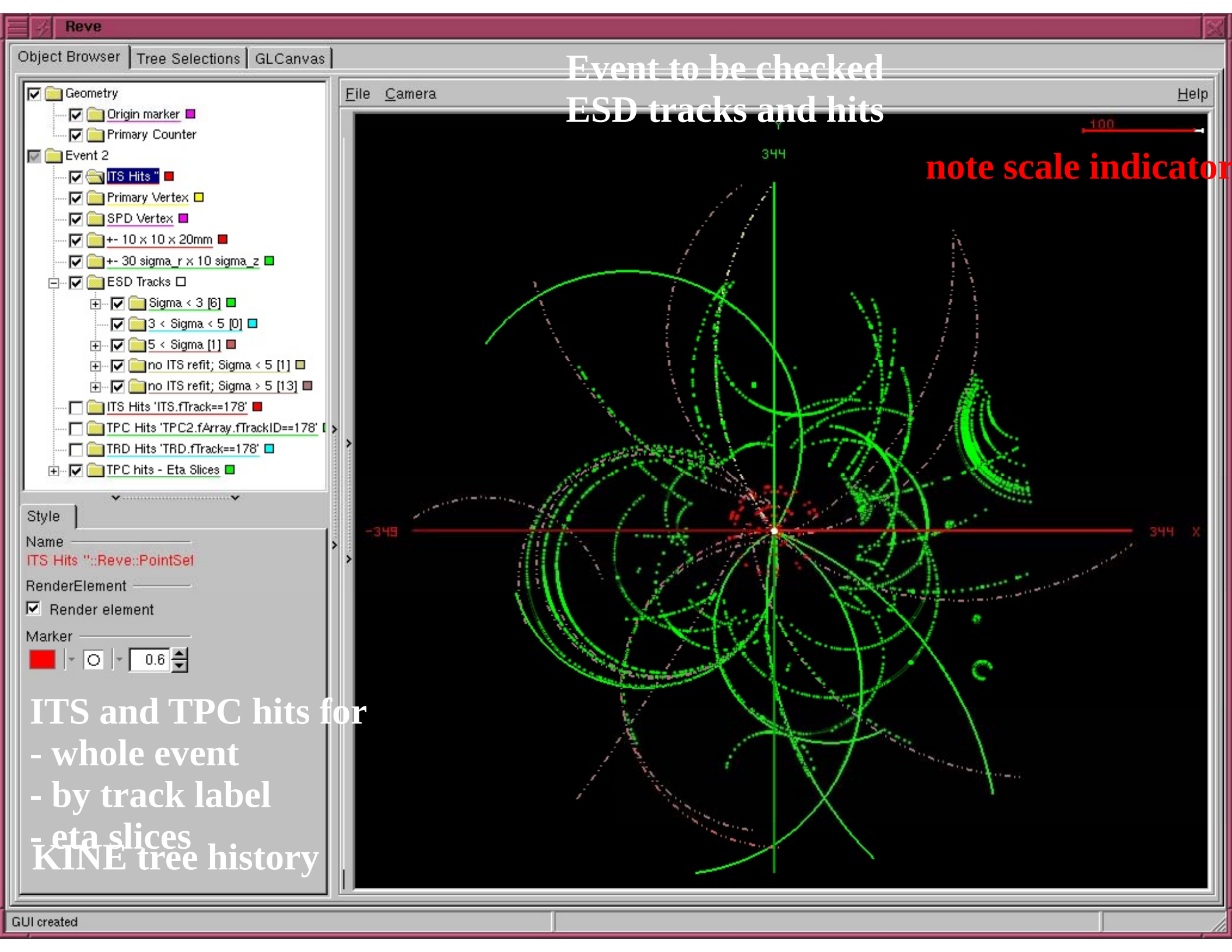


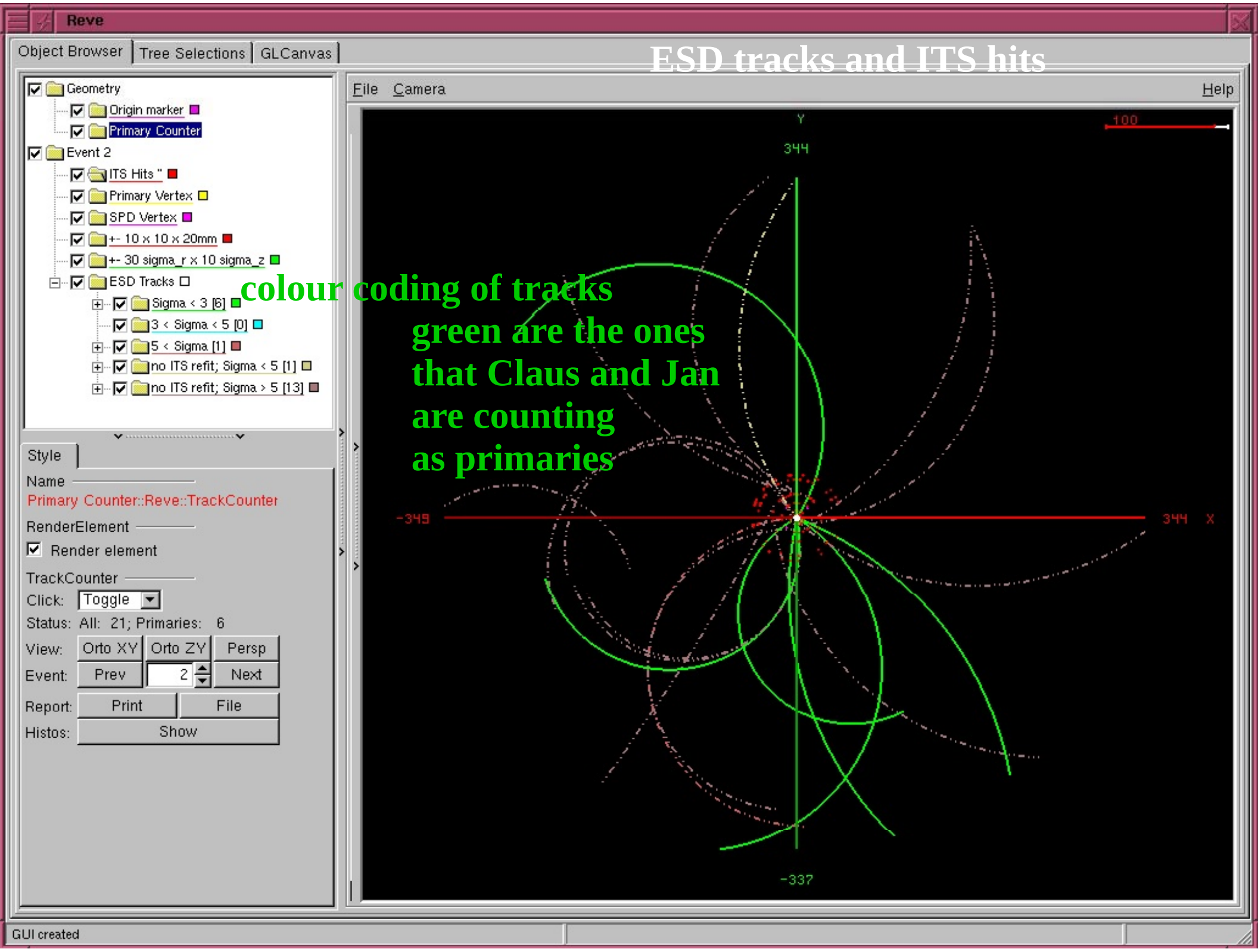
same event rz projection fish-eye transformation

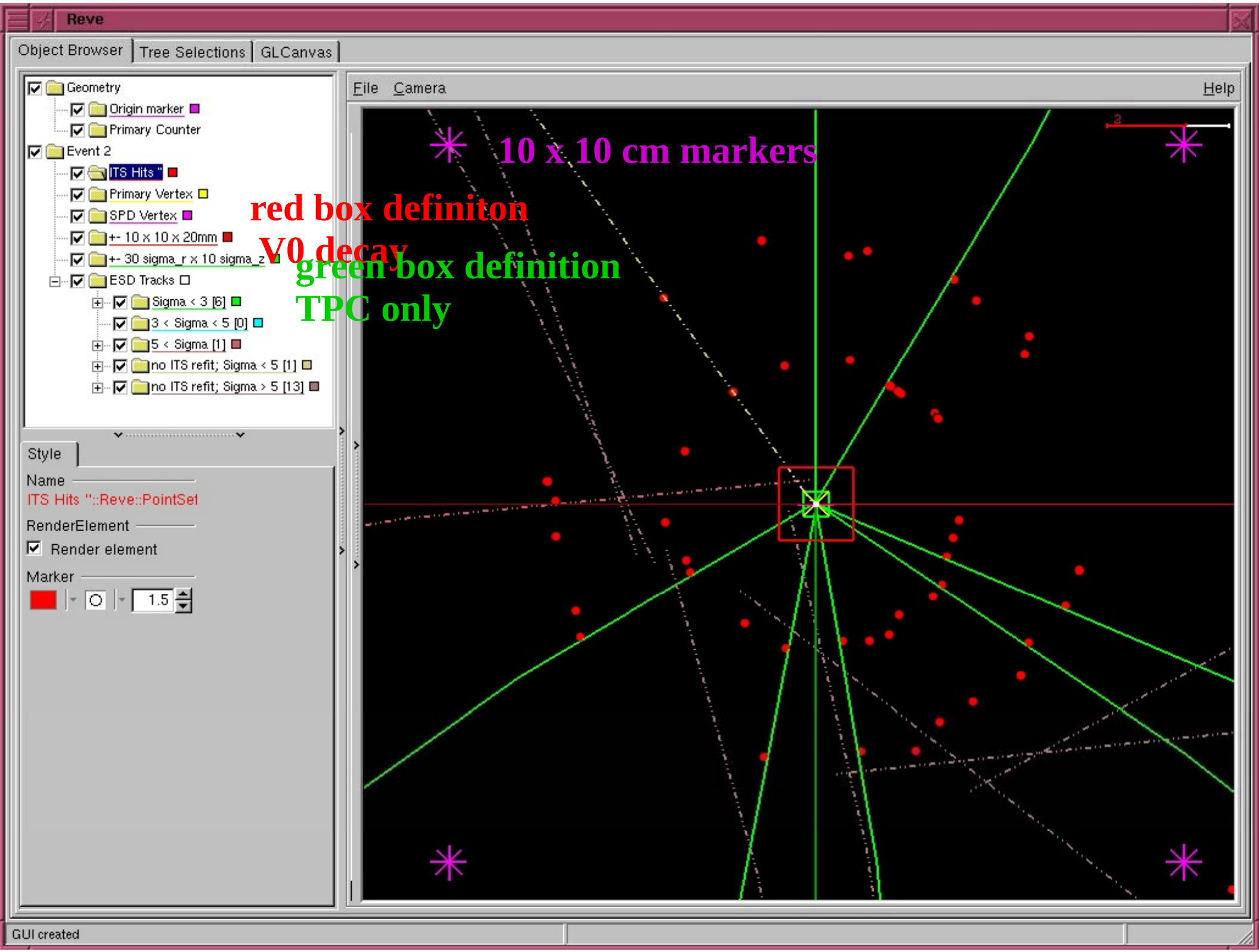


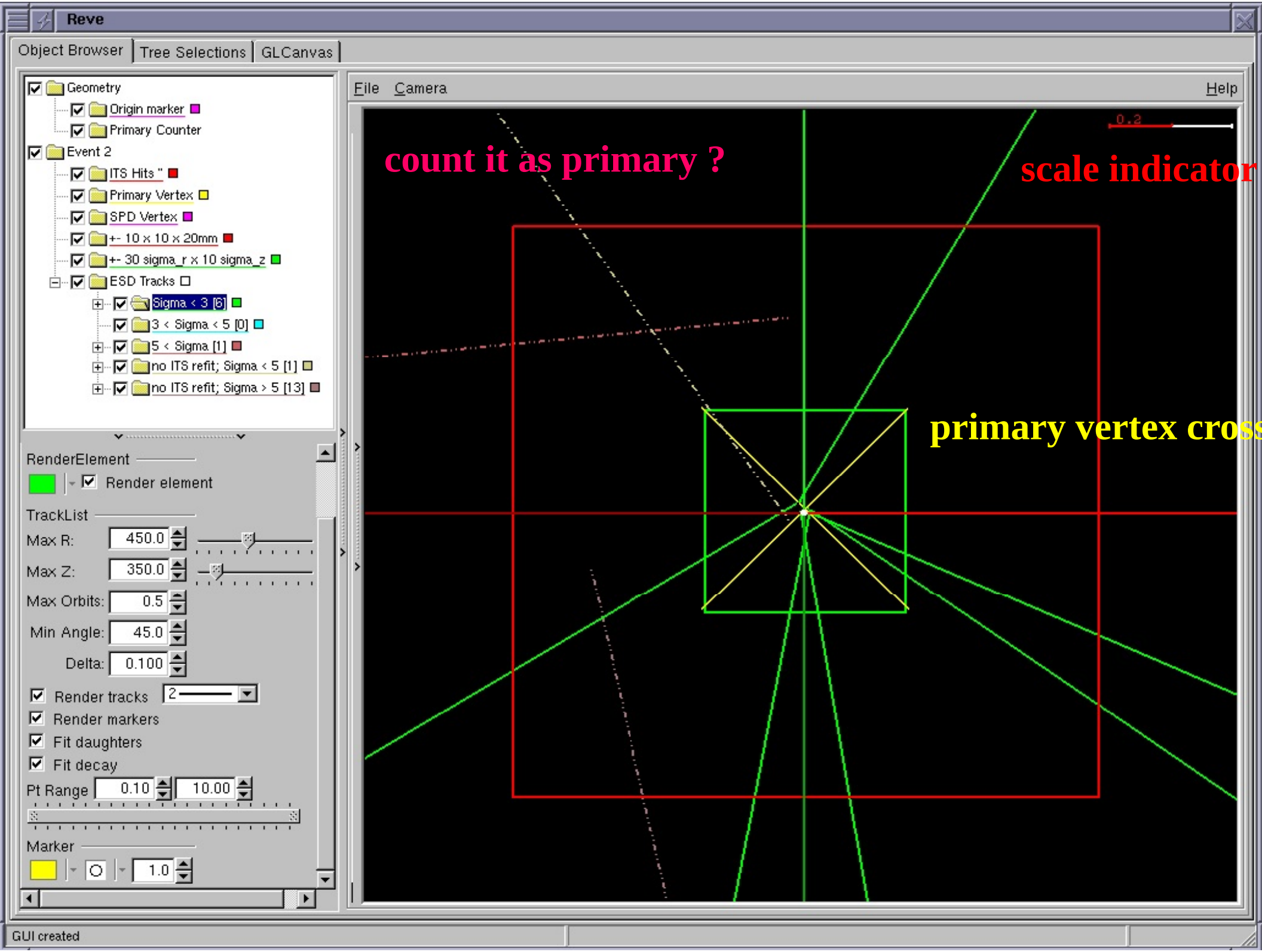

Reve Main Window
Reve
File
Camera
Help
Reve
Files
Macros
Viewers
GL-One
Scenes
Geometry scene
Event scene
Event 0
TPC Clusters
ITS Clusters
ESD Tracks
TrackFitter
Reve::RecTrack
Reve::RecTrack
Reve::RecTrack
Reve::RecTrack
Reve::RecTrack
Reve::RecTrack
Reve::RecTrack
Reve::RecTrack
Reve::RecTrack
Style
Name
Reve::RecTrack::Reve::Track
RenderElement
RnrSelf
RnrChildren
Marker
1.0
Line
Draw Marker
Draw Line
Track
Edit RnrStyle
GLViewer
Demo from Alja
Interactive tracking
50
Command
Command (local):

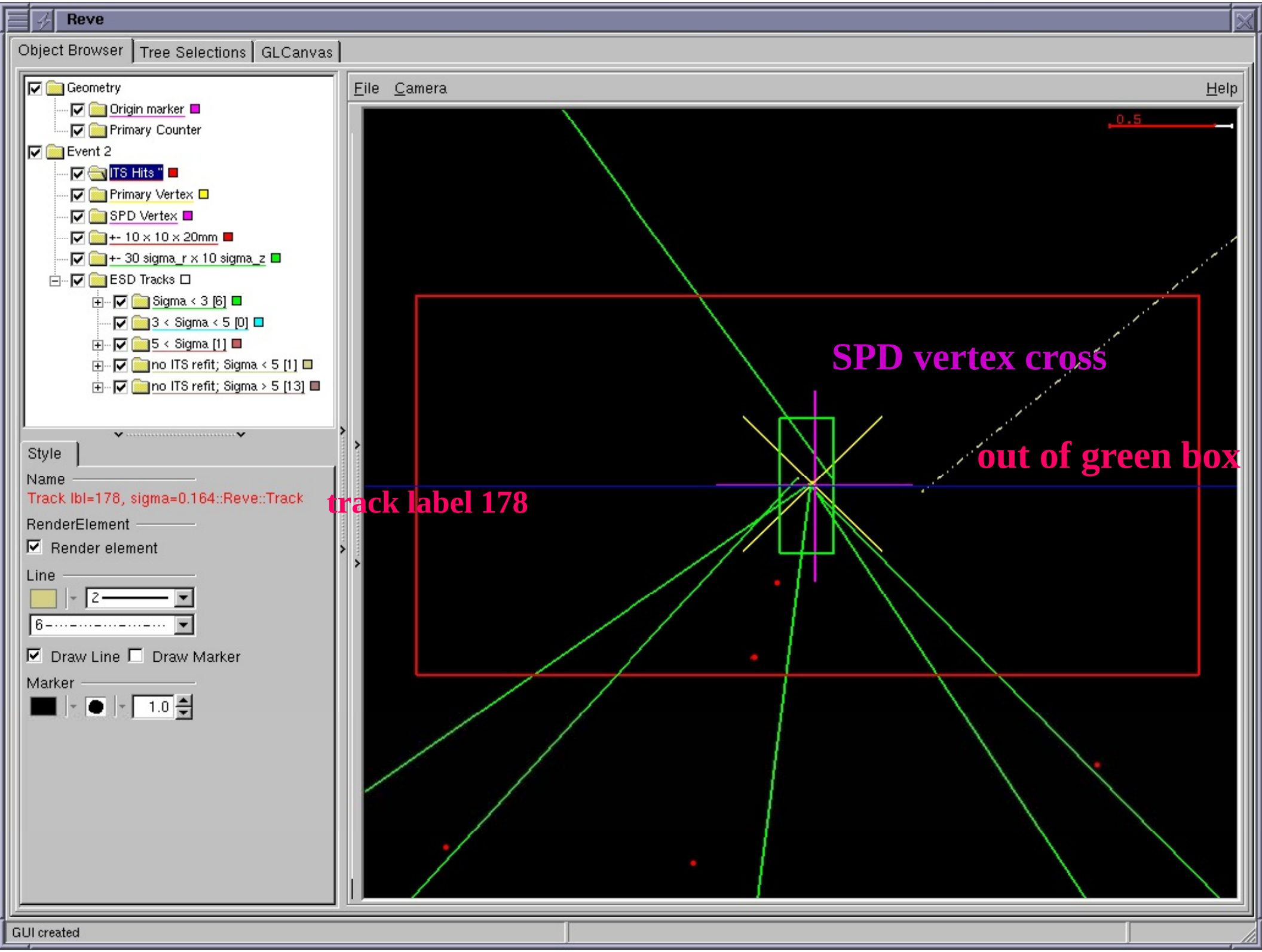

Reve Main Window
Reve
File
Camera
Help
Reve
Files
Macros
Viewers
GL-One
Scenes
Geometry scene
Event scene
Event 0
TPC Clusters
ITS Clusters
ESD Tracks
TrackFitter
Reve::RecTrack
Reve::RecTrack
Reve::RecTrack
Reve::RecTrack
Reve::RecTrack
Reve::RecTrack
Reve::RecTrack
Reve::RecTrack
Reve::RecTrack
Style
Name
Reve::RecTrack::Reve::Track
RenderElement
RnrSelf
RnrChildren
Marker
1.0
Line
Draw Marker
Draw Line
Track
Edit RnrStyle
GLViewer
50
Demo from Alja
Comparing to ESD tracks
Command
Command (local):


Reve
Object Browser
Tree Selections
GLCanvas
Event to be checked
ESD tracks and hits
File
Camera
Help
Geometry
Origin marker
Primary Counter
Event 2
ITS Hits ''
Primary Vertex
SPD Vertex
+- 10 x 10 x 20mm
+- 30 sigma_r x 10 sigma_z
ESD Tracks
Sigma < 3 [6]
3 < Sigma < 5 [0]
5 < Sigma [1]
no ITS refit; Sigma < 5 [1]
no ITS refit; Sigma > 5 [13]
ITS Hits 'ITS.fTrack==178'
TPC Hits 'TPC2.fArray.fTrackID==178'
TRD Hits 'TRD.fTrack==178'
TPC hits - Eta Slices
Style
Name
ITS Hits ''::Reve::PointSet
RenderElement
Render element
Marker
0.6
100
note scale indicator
344
-344
344
X
ITS and TPC hits for
- whole event
- by track label
- eta slices
KINE tree history
GUI created

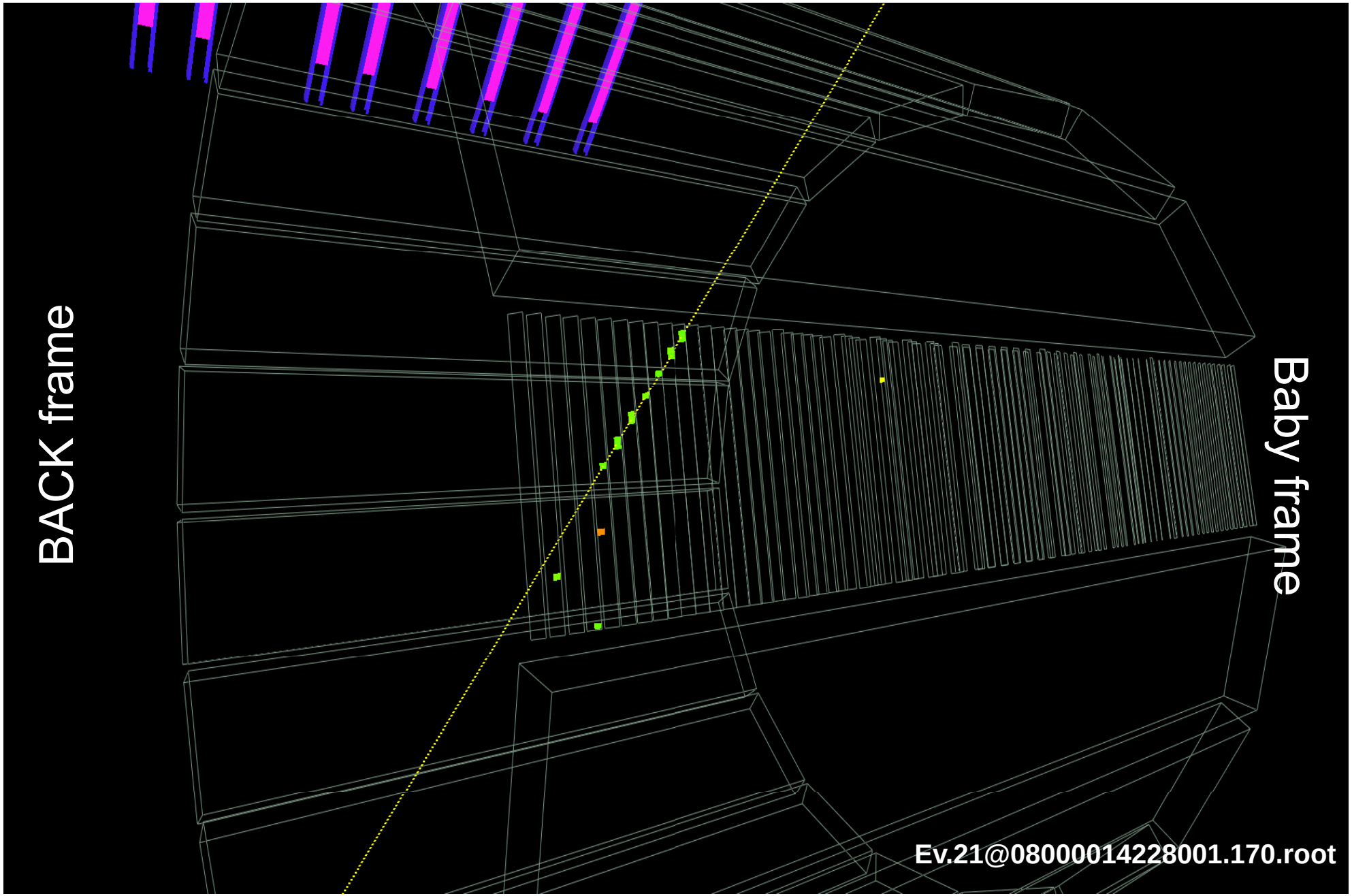

Reve
Object Browser
Tree Selections
GLCanvas
ESD tracks and ITS hits
Geometry
Origin marker
Primary Counter
Event 2
ITS Hits "
Primary Vertex
SPD Vertex
+- 10 x 10 x 20mm
+- 30 sigma_r x 10 sigma_z
ESD Tracks
Sigma < 3 [6]
3 < Sigma < 5 [0]
5 < Sigma [1]
no ITS refit; Sigma < 5 [1]
no ITS refit; Sigma > 5 [13]
colour coding of tracks
green are the ones
that Claus and Jan
are counting
as primaries
Style
Name
Primary Counter::Reve::TrackCounter
RenderElement
Render element
TrackCounter
Click:
Toggle
Status: All: 21; Primaries: 6
View:
Orto XY
Orto ZY
Persp
Event:
Prev
2
Next
Report:
Print
File
Histos:
Show
File
Camera
Help
Y
344
100
-349
344
X
-337
GUI created


Reve
Object Browser
Tree Selections
GLCanvas
Geometry
Origin marker
Primary Counter
Event 2
ITS Hits ''
Primary Vertex
SPD Vertex
+- 10 x 10 x 20mm
+- 30 sigma_r x 10 sigma_z
ESD Tracks
Sigma < 3 [6]
3 < Sigma < 5 [0]
5 < Sigma [1]
no ITS refit; Sigma < 5 [1]
no ITS refit; Sigma > 5 [13]
Style
Name
ITS Hits ''::Reve::PointSet
RenderElement
Render element
Marker
1.5
File
Camera
Help
10 x 10 cm markers
red box definiton
V0 decay
green box definition
TPC only
GUI created

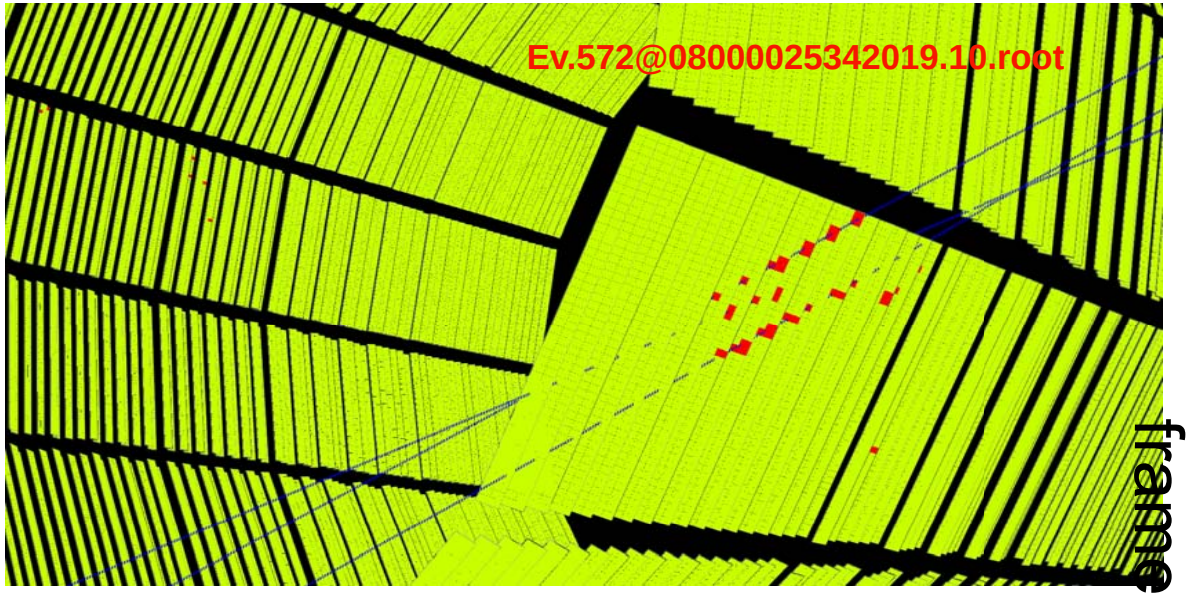

Reve
Object Browser
Tree Selections
GLCanvas
Geometry
Origin marker
Primary Counter
Event 2
ITS Hits "
Primary Vertex
SPD Vertex
+- 10 x 10 x 20mm
+- 30 sigma_r x 10 sigma_z
ESD Tracks
Sigma < 3 [6]
3 < Sigma < 5 [0]
5 < Sigma [1]
no ITS refit; Sigma < 5 [1]
no ITS refit; Sigma > 5 [13]
RenderElement
Render element
TrackList
Max R: 450.0
Max Z: 350.0
Max Orbits: 0.5
Min Angle: 45.0
Delta: 0.100
Render tracks
Render markers
Fit daughters
Fit decay
Pt Range 0.10 10.00
Marker
1.0
File
Camera
Help
0.2
count it as primary ?
scale indicator
primary vertex cross
GUI created

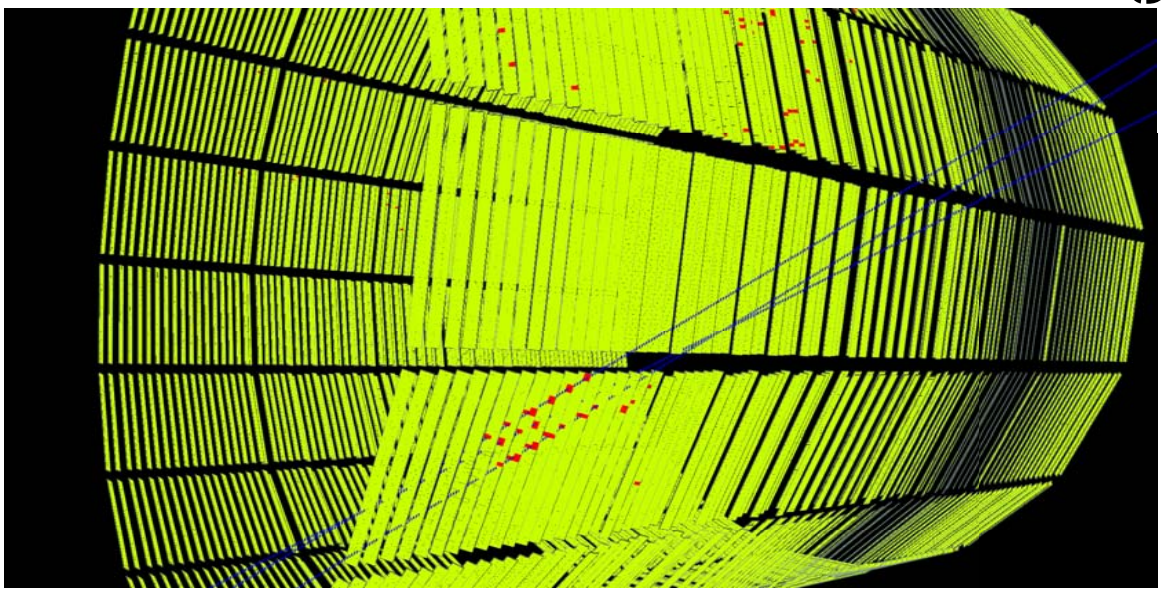

Reve
Object Browser
Tree Selections
GLCanvas
Geometry
Origin marker
Primary Counter
Event 2
ITS Hits "
Primary Vertex
SPD Vertex
+- 10 x 10 x 20mm
+- 30 sigma_r x 10 sigma_z
ESD Tracks
Sigma < 3 [6]
3 < Sigma < 5 [0]
5 < Sigma [1]
no ITS refit; Sigma < 5 [1]
no ITS refit; Sigma > 5 [13]
Style
Name
Track lbl=178, sigma=0.164::Reve::Track
RenderElement
Render element
Line
Draw Line
Draw Marker
Marker
1.0
File
Camera
Help
0.5
SPD vertex cross
out of green box
track label 178
GUI created

A muon track on the TOF detector



A funny event seen by TOF detector





- Yellow boxes: TOF strips
- Red boxes: TOF raw data
- In blue: 3D straight lines resulting by fits of TOF clusters