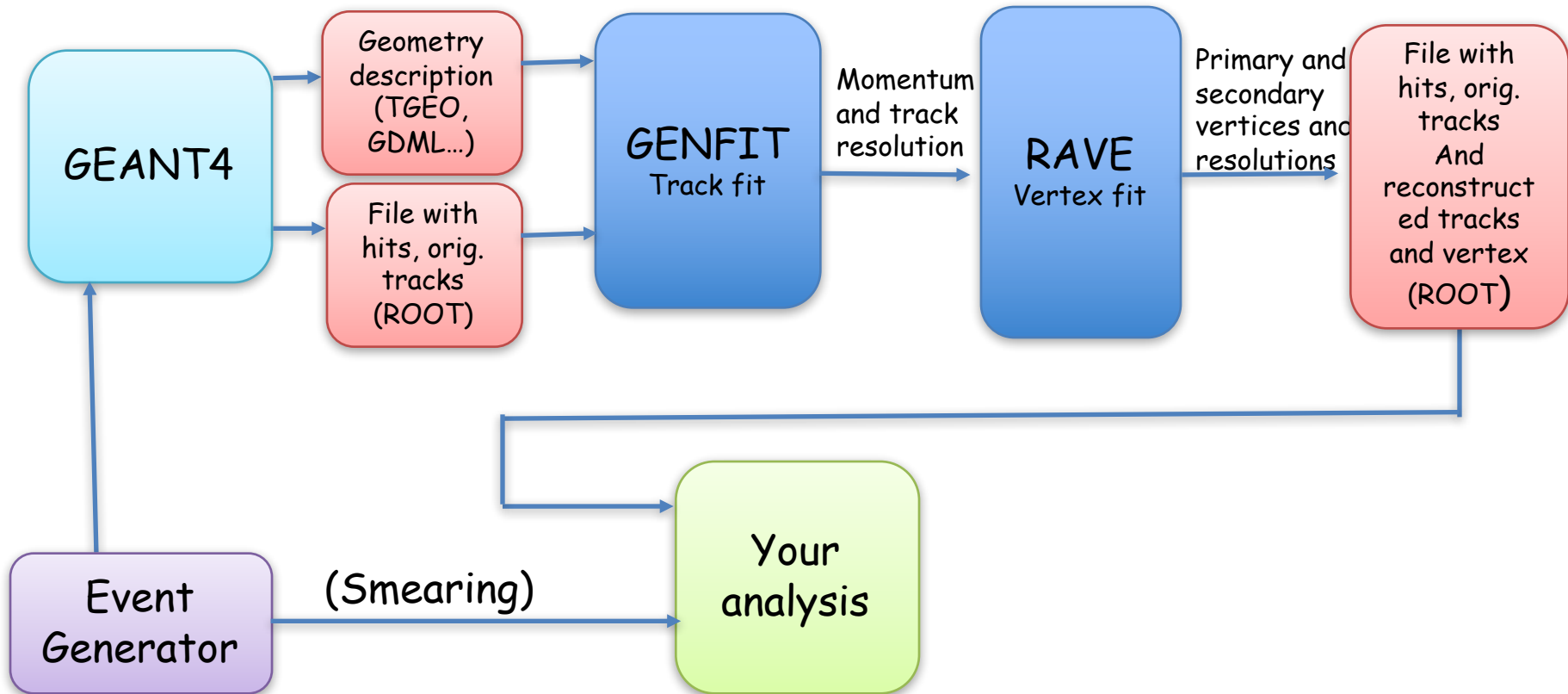




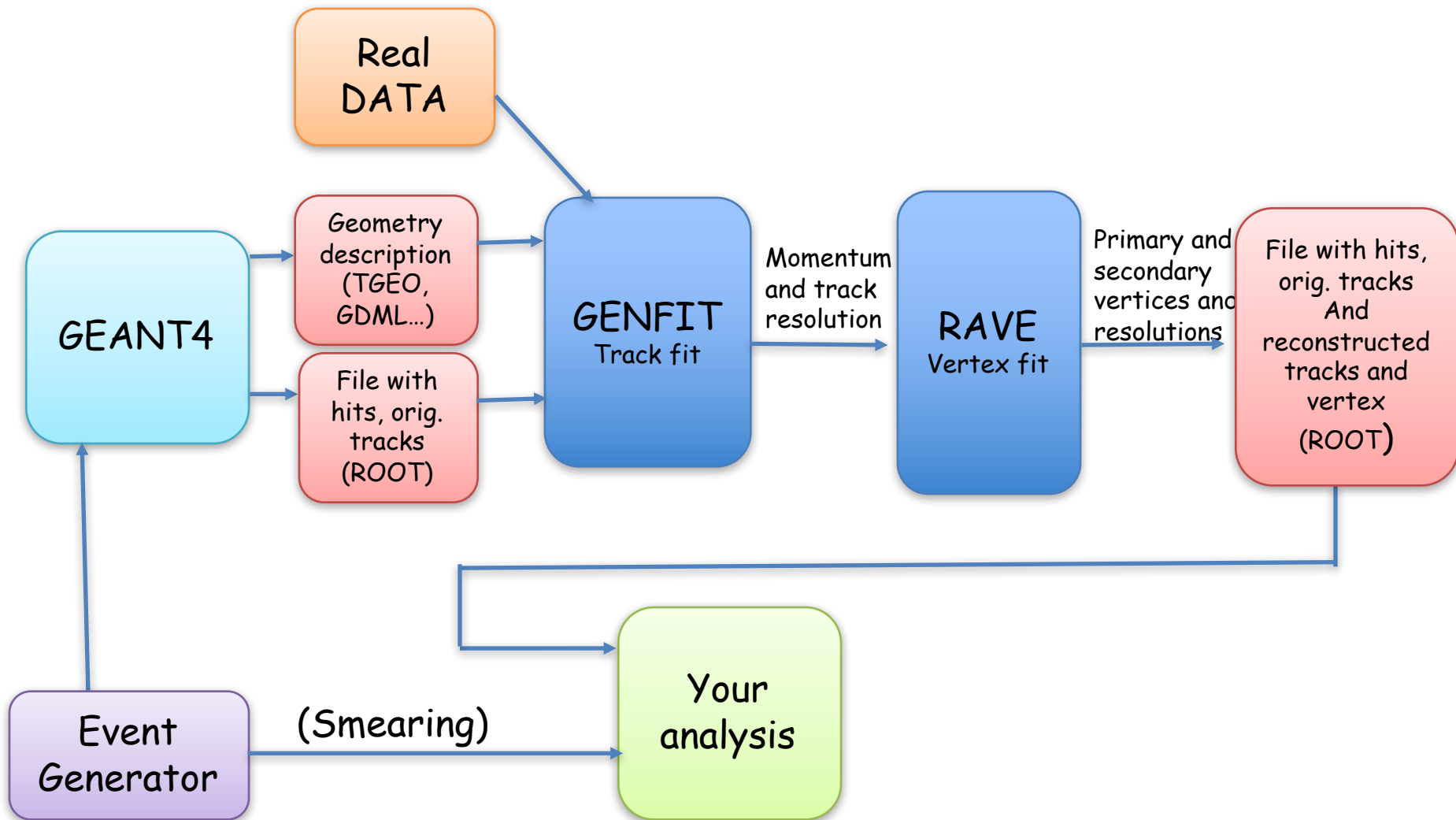
Tracking and reconstruction

Y. Furletova/S.Furletov

MC SIMULATION AND RECONSTRUCTION

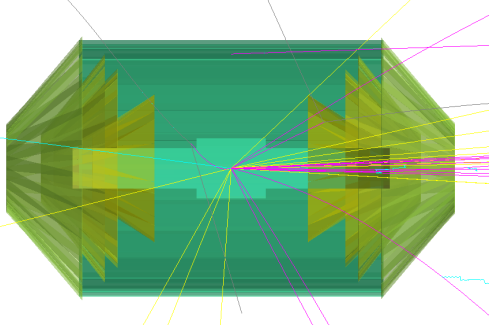


MC SIMULATION AND RECONSTRUCTION

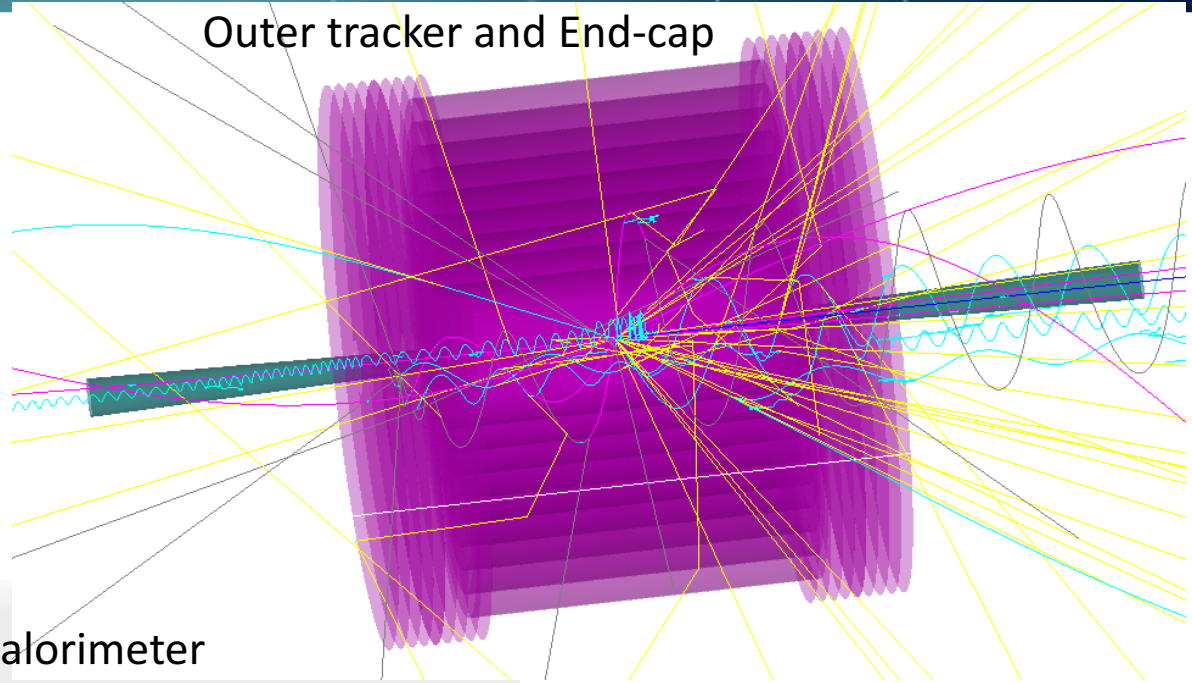


GEANT4

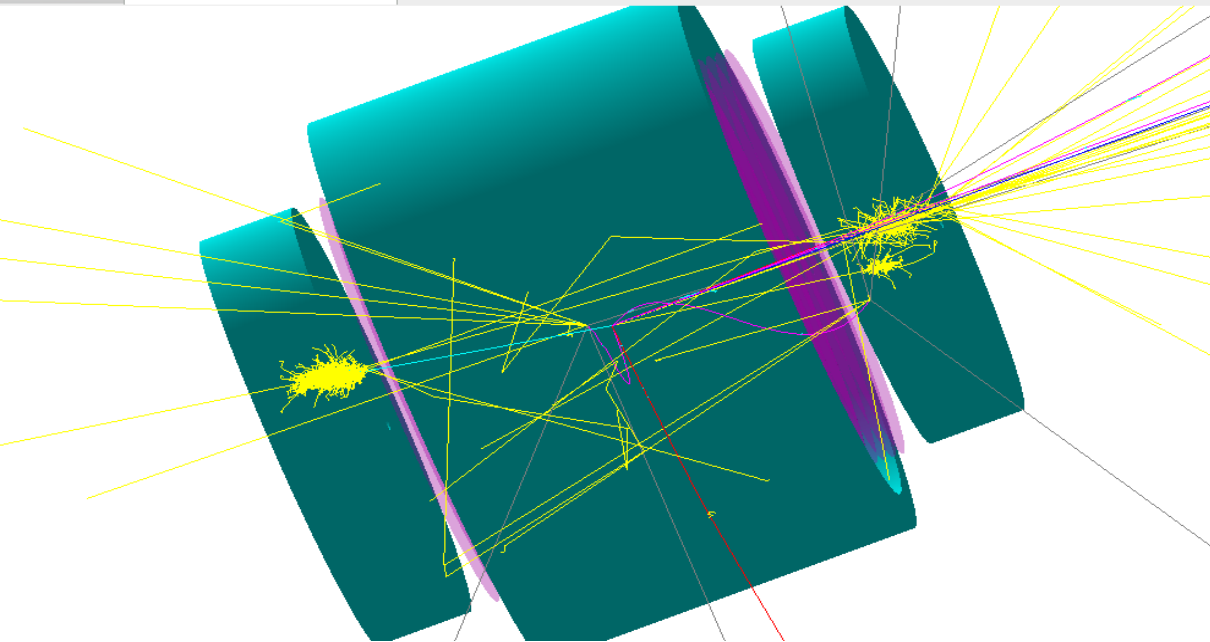
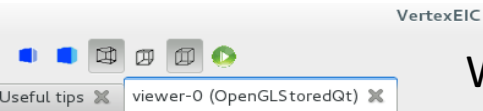
Vertex



Outer tracker and End-cap



With Iron/Calorimeter



GENFIT/EVE EVENT DISPLAY

Eve Main Window

Browser Eve

Eve Files Draw Control Refit Contrc

Viewer 1

Hide Viewer 1 Actions

World_1
detPlane_shape
cov_shape
cov_shape
detPlane_shape
StraightLineSet
TEveTriangleSet
cov_shape
cov_shape
detPlane_shape
StraightLineSet
TEveTriangleSet

Style Guides Clipping Extras

GLViewer [TGLSAViewer]

Update behaviour
 Ignore sizes
 Reset on update

Update Scene
Camera Home

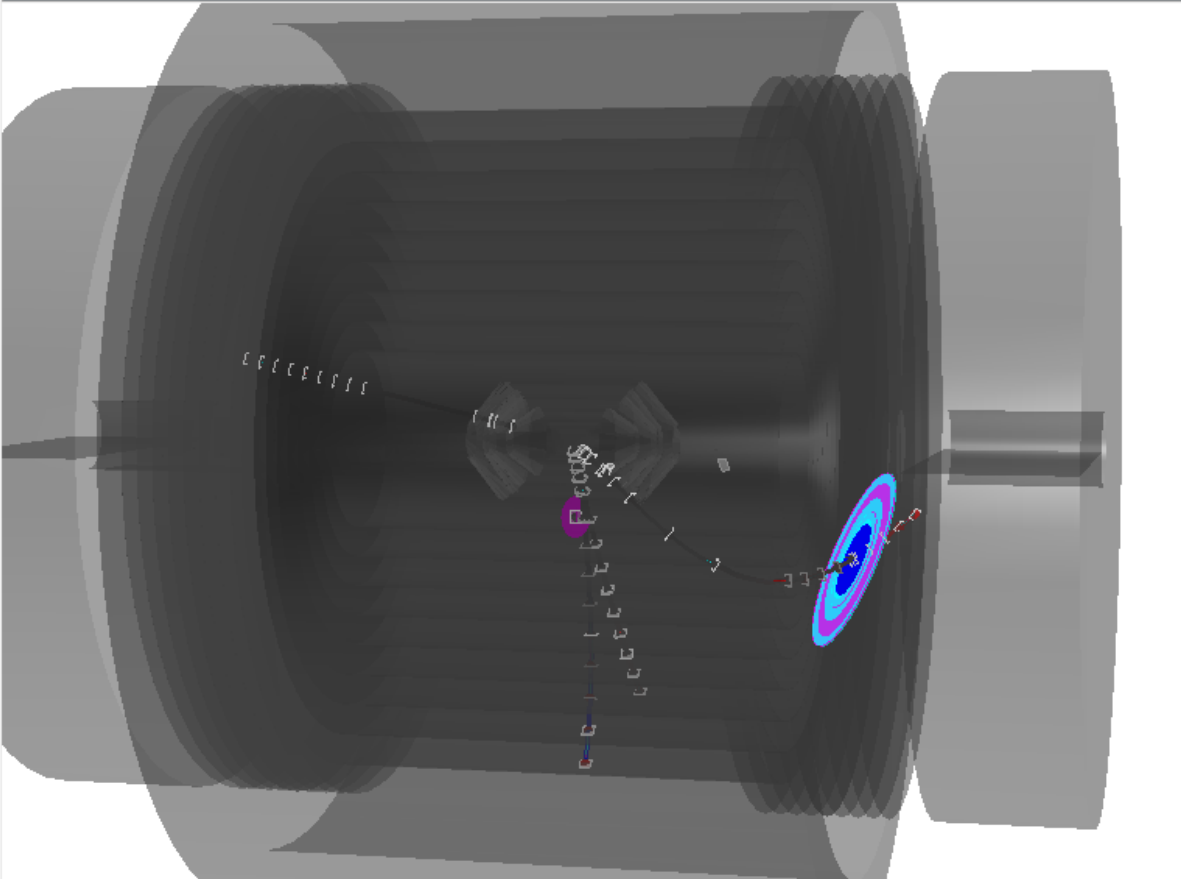
Max HQ draw time: 5000
Max LQ draw time: 100

Clear Color

Light sources:
 Top Bottom
 Left Right
 Front Specular

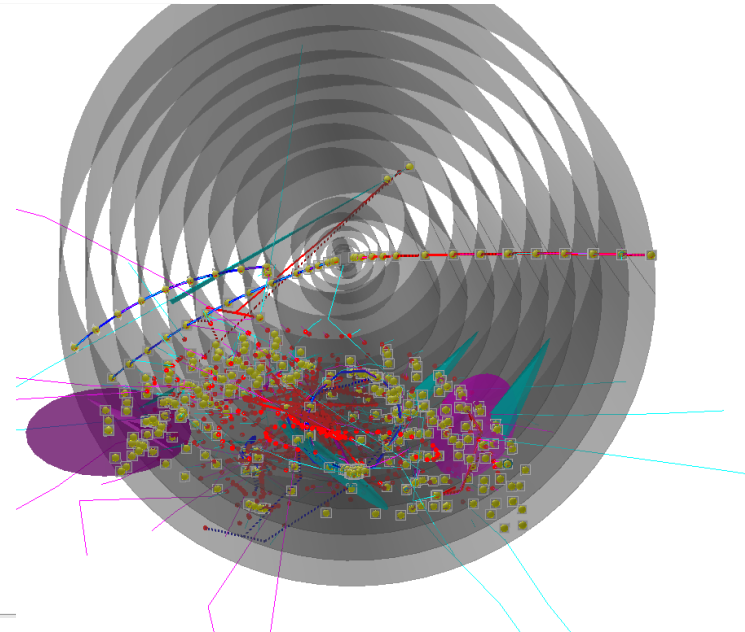
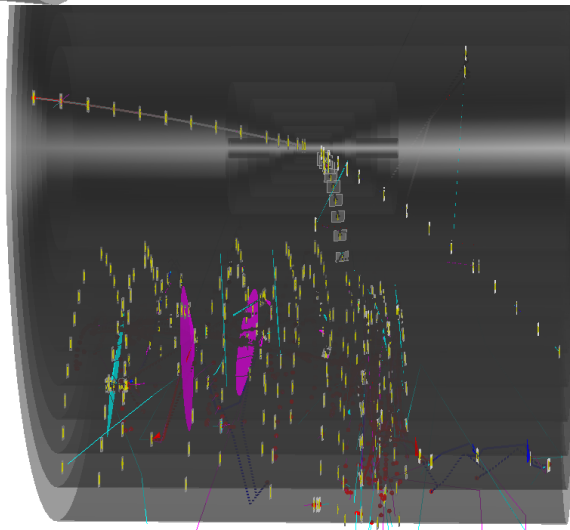
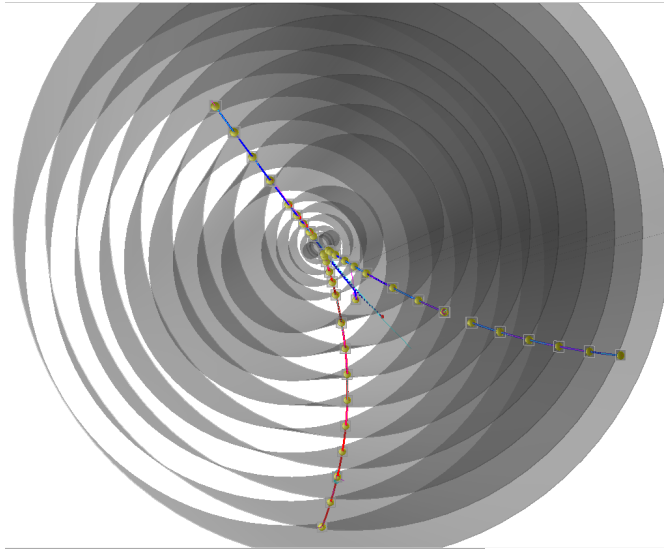
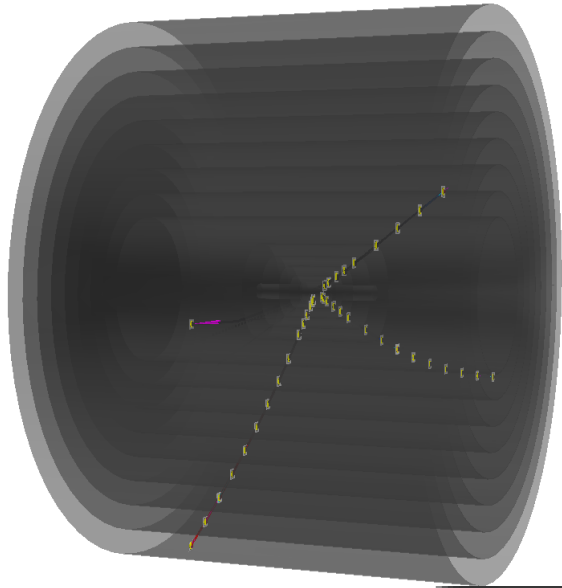
Point-size scale: 1.0
Line-width scale: 1.0

Command
Command (local):

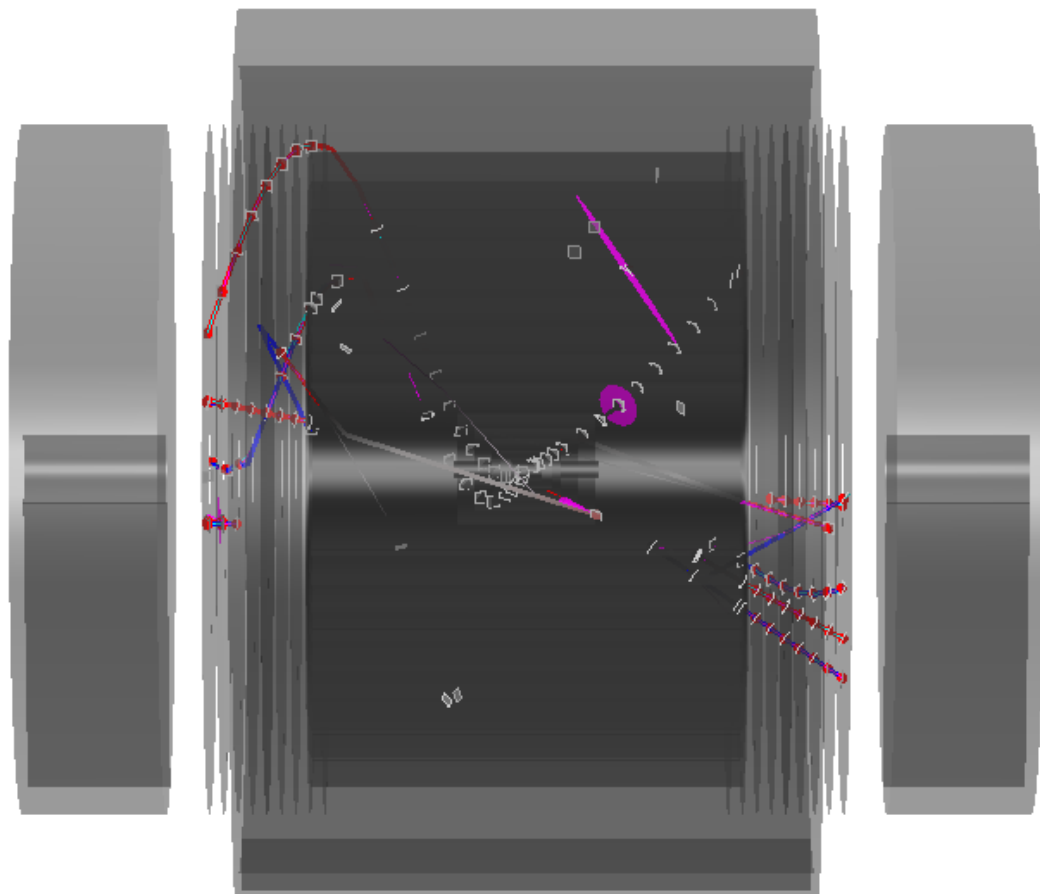
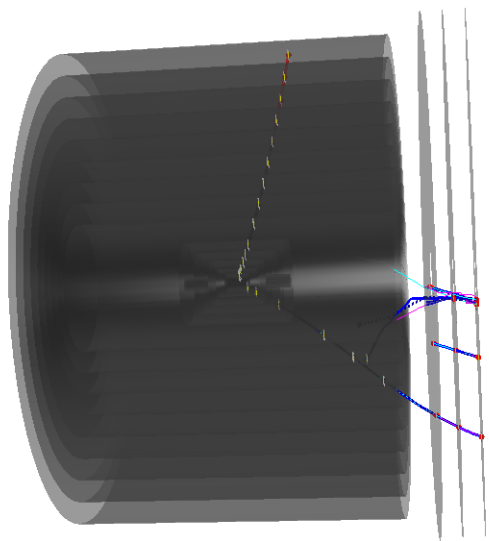


The main window displays a 3D visualization of a particle detector or event display. The central view shows a complex structure with multiple cylindrical and rectangular components. A central interaction point is visible, with several tracks or paths extending outwards. The tracks are represented by lines and points, some of which are highlighted in purple and blue. The detector components are rendered in shades of gray and black, with some parts appearing semi-transparent. The overall scene is set against a dark background, and the viewer is positioned to look through the detector from a perspective view.

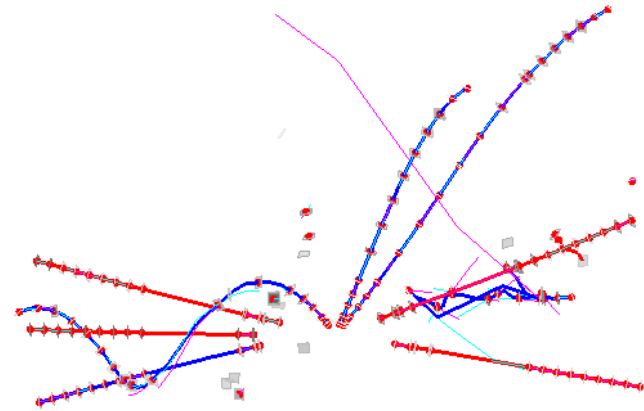
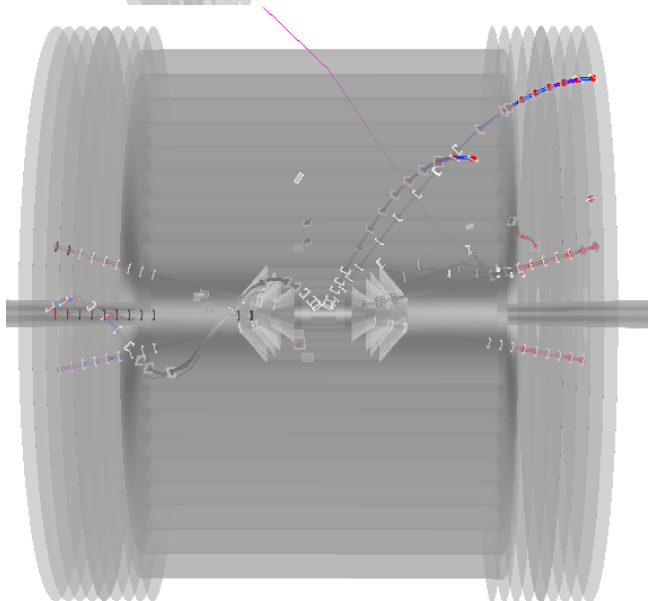
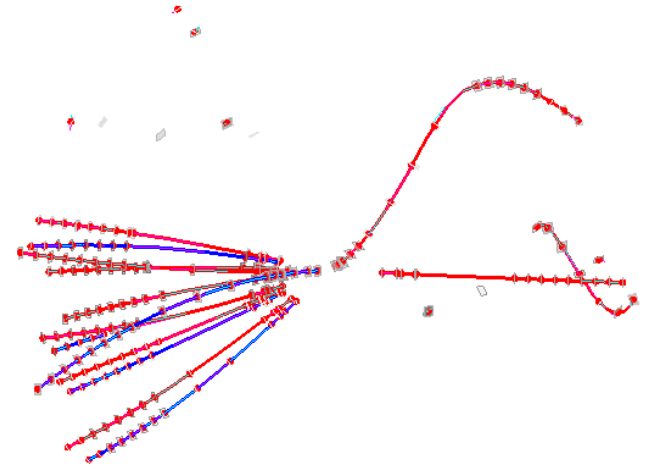
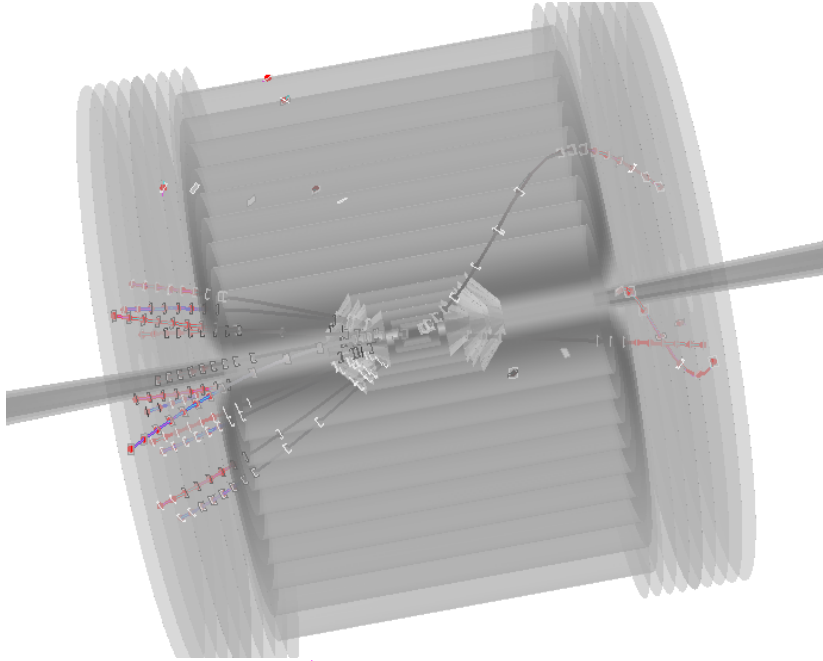
GENFIT/EVE EVENT DISPLAY



GENFIT/EVE EVENT DISPLAY

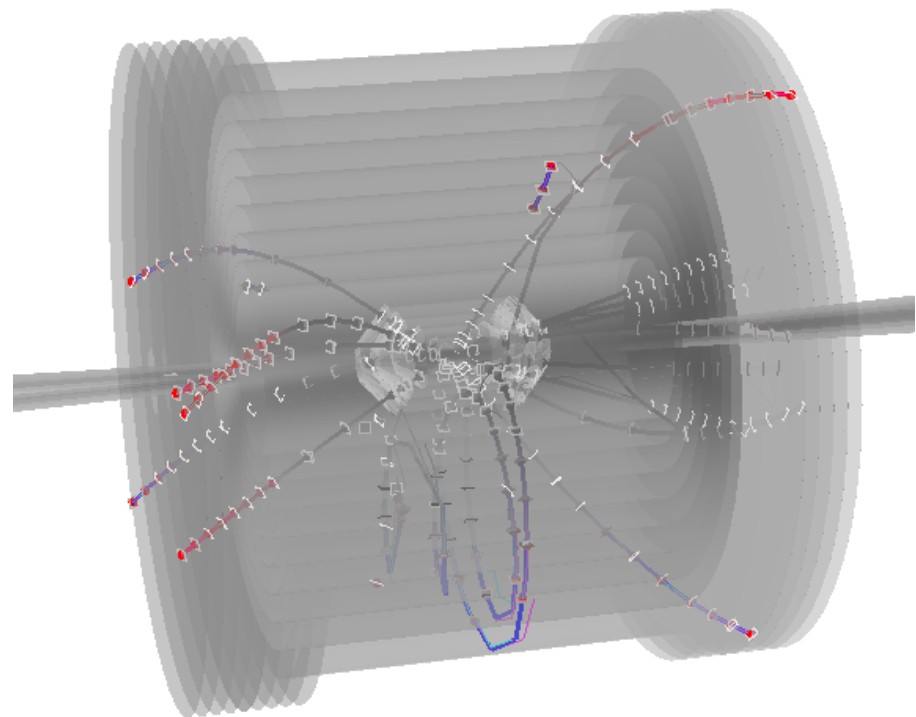
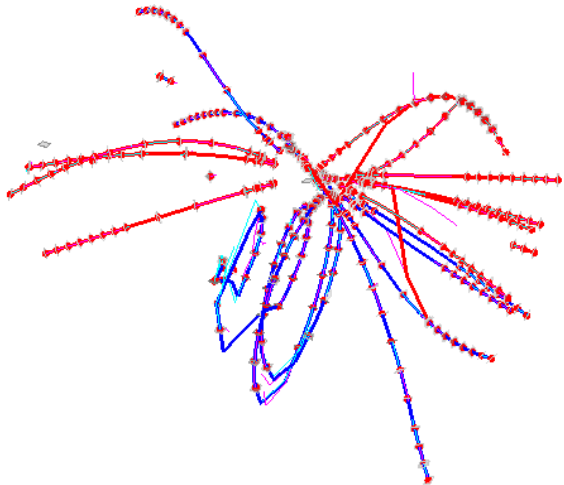
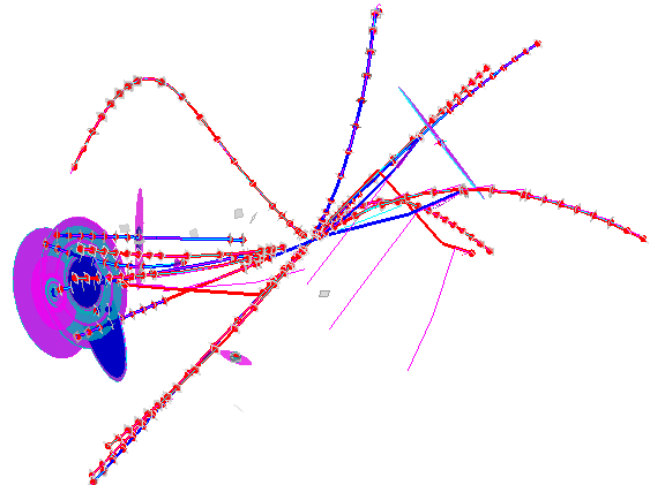
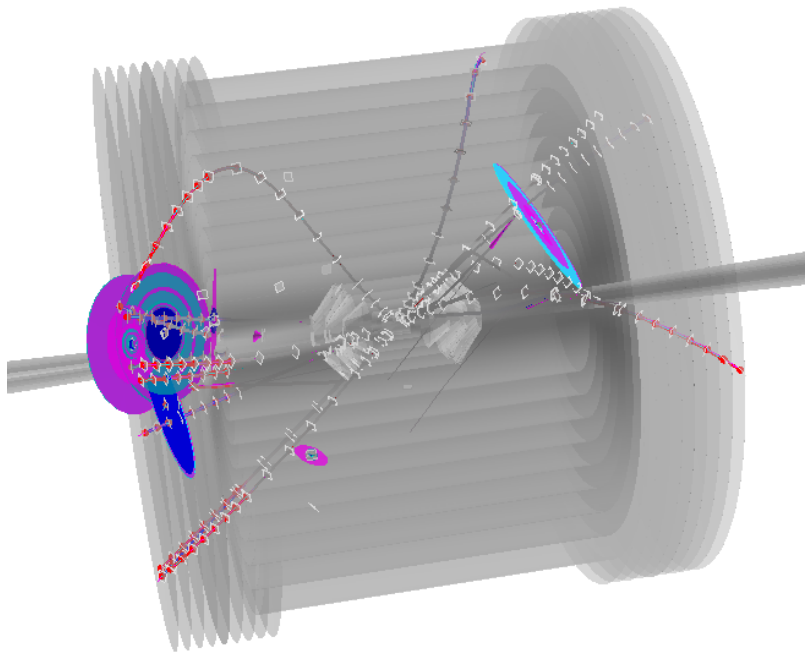


GENFIT/EVE EVENT DISPLAY



Furletova

GENFIT/EVE EVENT DISPLAY



Yulia Furletova

GEMC EIC HITS TO GENFIT/EVE

Eve Main Window

Browser Eve

Eve Files Draw Control Refit Control Viewer 1

Go to event: 0 Redraw Event Hide Viewer 1 Actions

Fitting options

Refit

0 debug level

Fitter type:

- Simple Kalman
- Reference Kalman
- DAF w/ simple Kalman
- DAF w/ reference Kalman

Multiple measurement handling in Kalman

- weighted average
- unweighted average
- weighted, closest to reference
- unweighted, closest to reference
- weighted, closest to prediction
- unweighted, closest to prediction
- weighted, closest to reference for W_{ij}
- unweighted, closest to reference for W_{ij}
- weighted, closest to prediction for W_{ij}
- unweighted, closest to prediction for W_{ij}

Use square root formalism (simple Kalman)

0.001 delta pVal (convergence criteria)

0.2 rel chi² change (non-convergence)

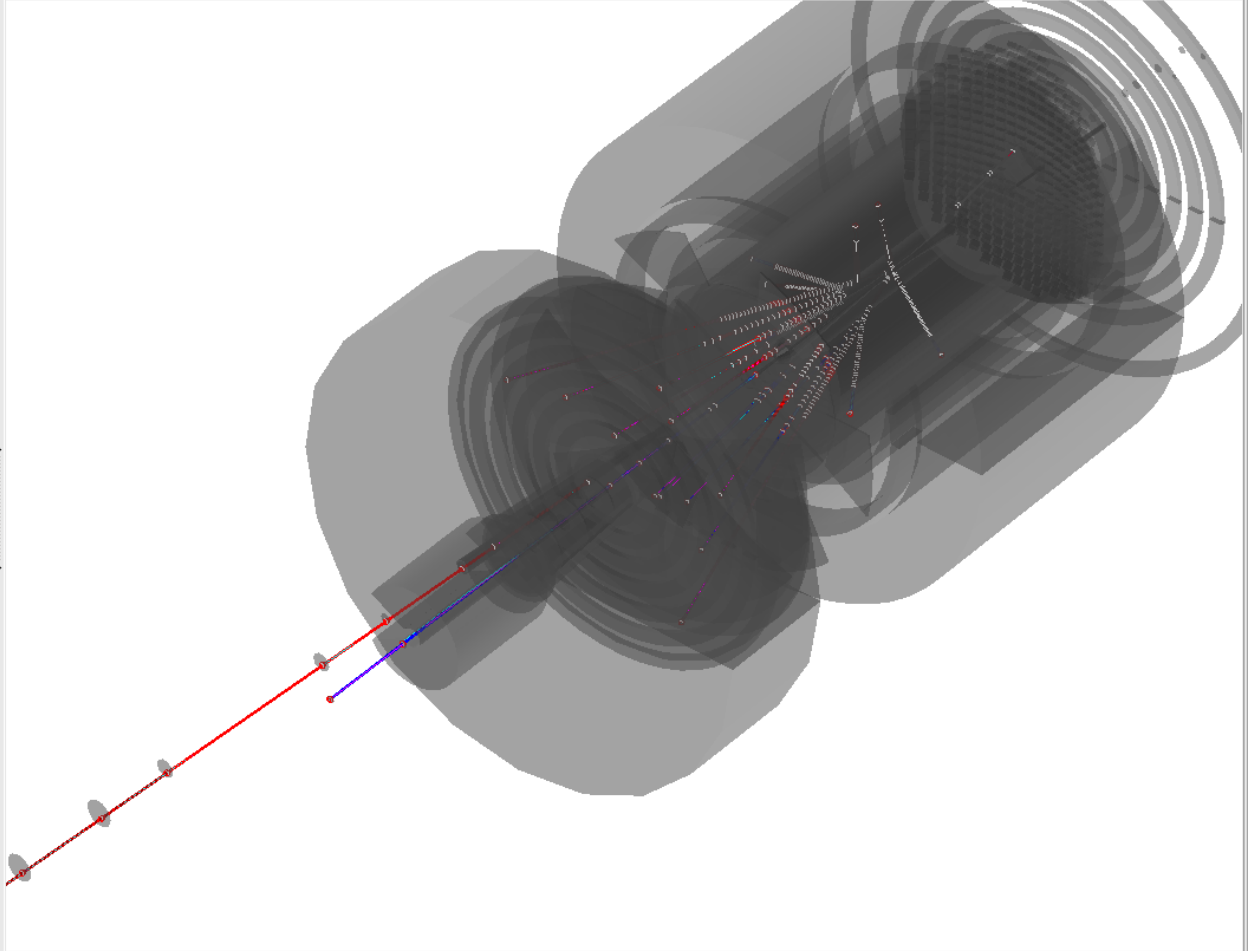
1 min chi² change for re-calculation

2 Minimum nr of iterations

4 Maximum nr of iterations

-1 Maximum nr of failed hits

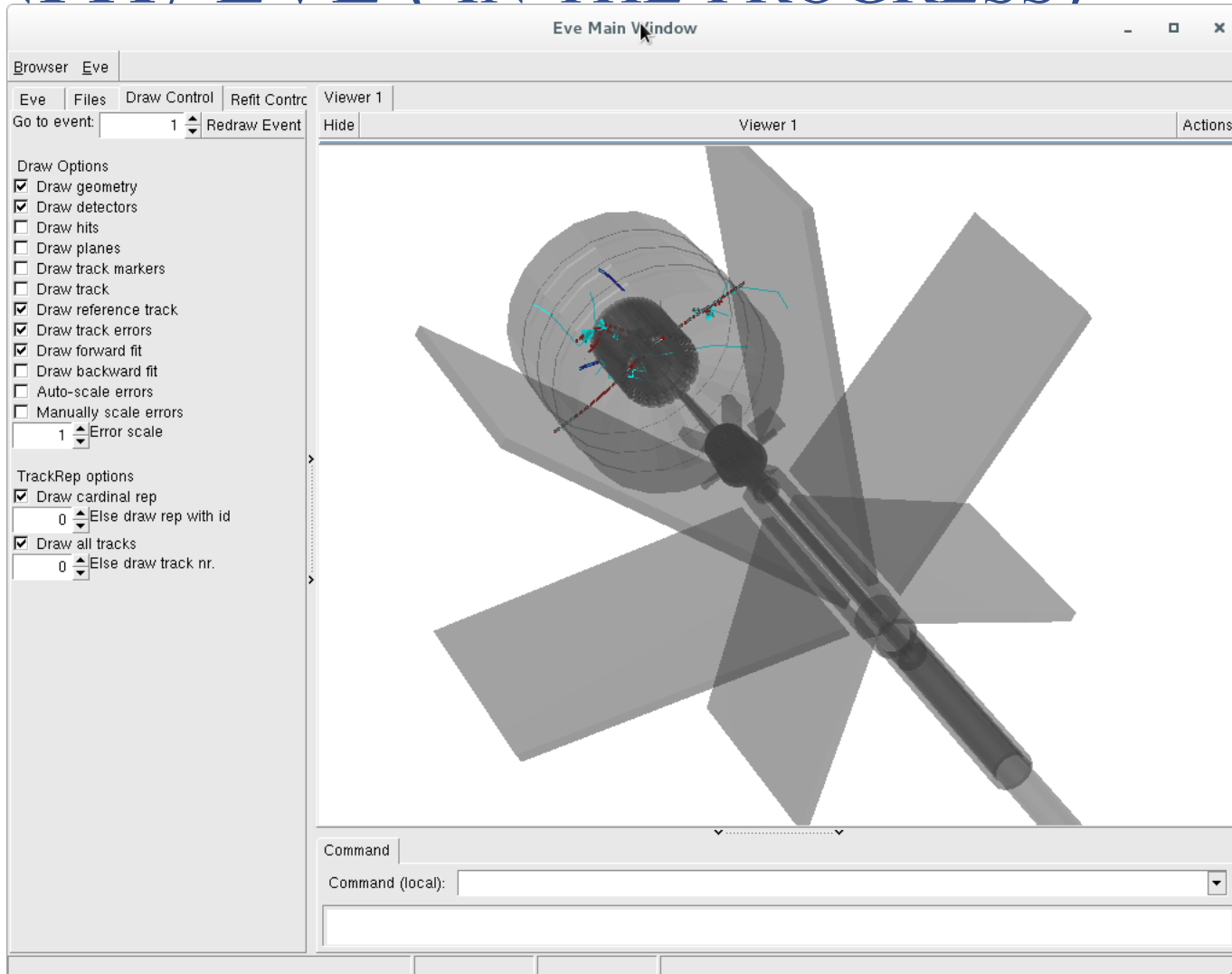
Resort track



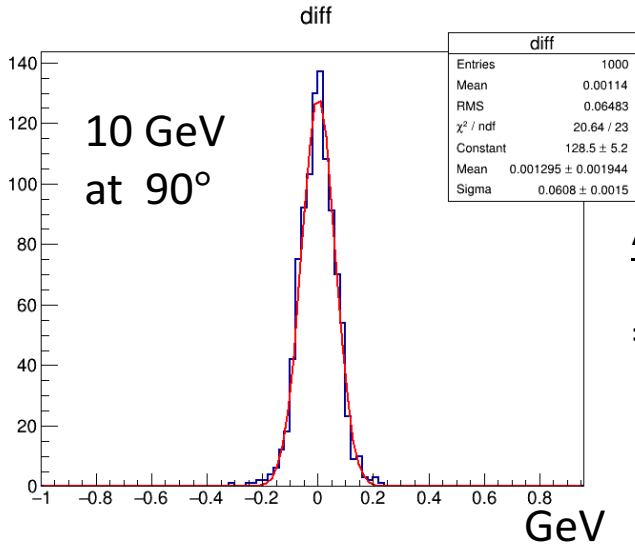
Command

Command (local):

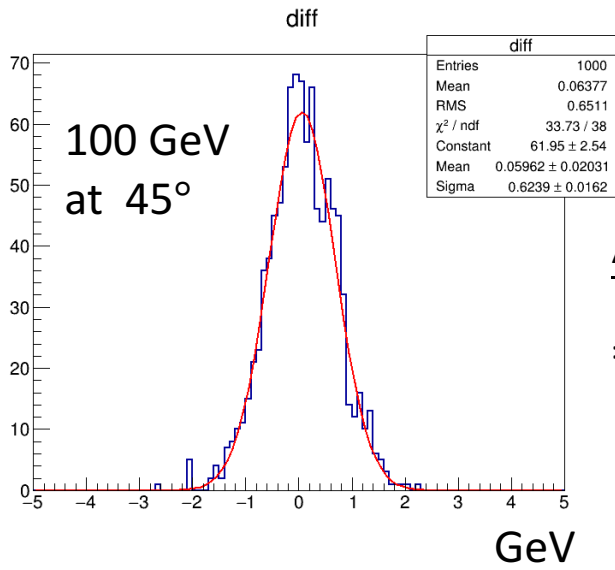
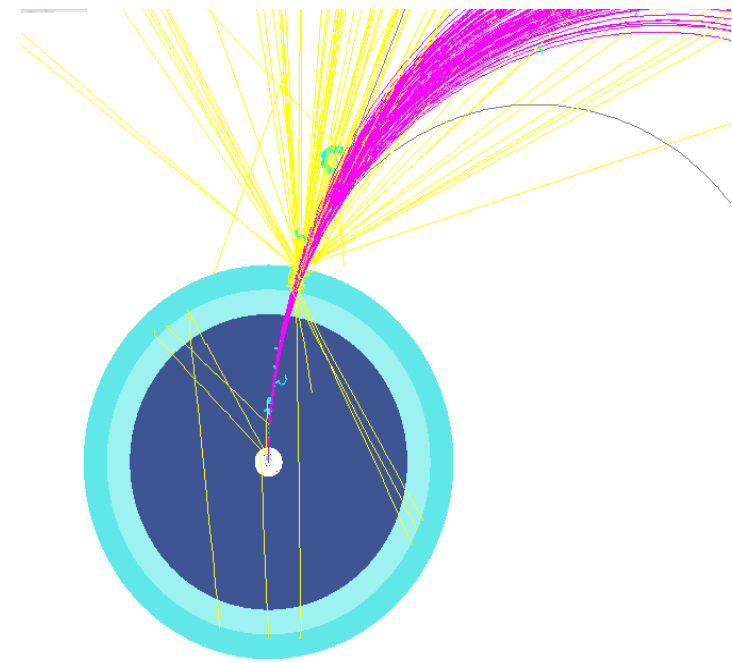
HALL-B GEOMETRY CONVERSION INTO GENFIT/ EVE (IN THE PROGRESS)



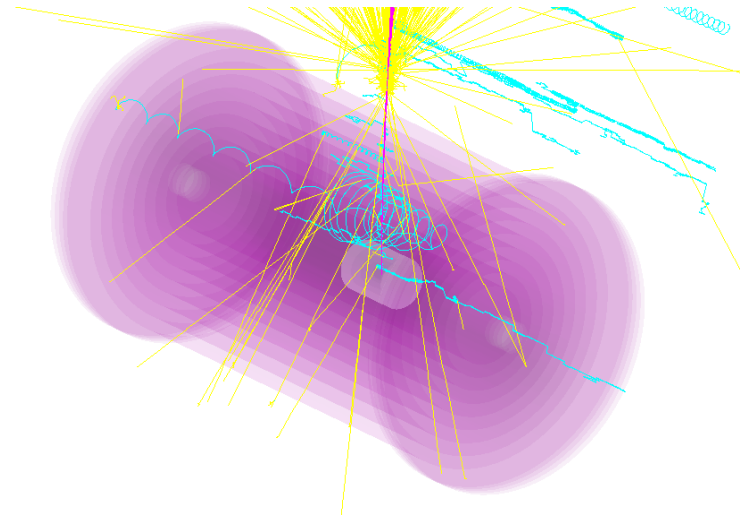
TRACKING PERFORMANCE



$$\frac{\Delta p}{p} = 0.0608/10 * 100 = 0.6\%$$

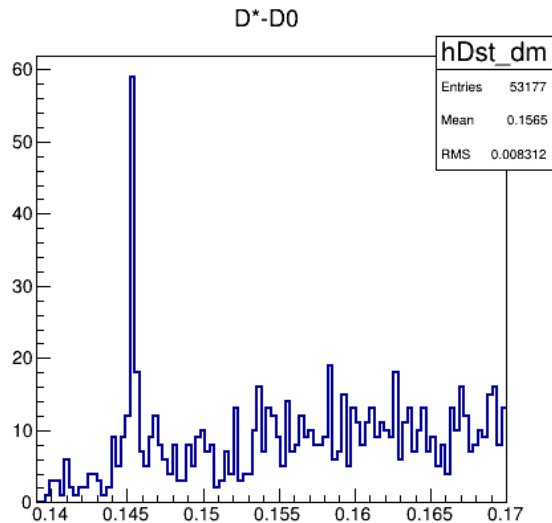


$$\frac{\Delta p}{p} = 0.632/100 * 100 = 0.632\%$$

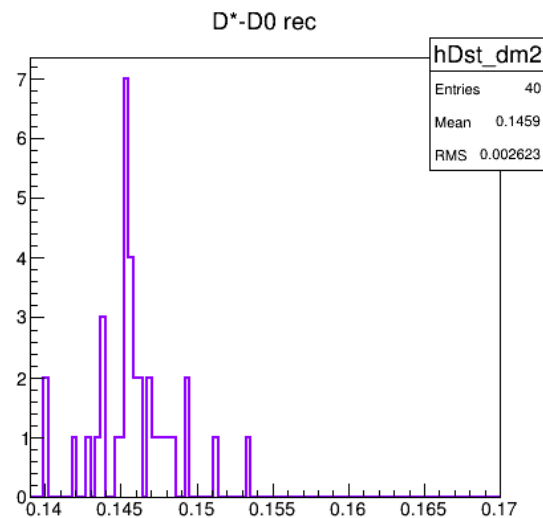


TRACKING PERFORMANCE

~60 D* events
with TRUE MC



~40 D* events
with rec. tracks



Main inefficiency is coming from reconstruction of π_{slow} with momentum $< 0.1-0.5$ GeV

SUMMARY AND TODO:

- **GEANT4:**
 - ✓ VERTEX det. is ready
 - ✓ Outer tracker barrel, GEM-endcaps)
 - ✓ Calorimeter
- **I/O file : Simple File Format (SFF) - ROOT based**
 - ✓ Hits
 - ✓ and MC info (org. momentum, id, etc.)
- **GENFIT** (track fitting)
 - ✓ is working well
 - ✓ ROOT based 'Eve' Event display
 - Event with multiple tracks
- **RAVE** (vertex fitting)
 - ✓ Software is installed, and link it with genfit.
 - ✓ Single vertex only (multi-vertexing - to be done)
- **Analysis:**
 - ✓ SFF- I/O file with reconstructed mometa, vertex, PID , initial MC information.
 - Run through a full analysis
- **GEMC implementation: done**
- **JANA implementation: to be done**