

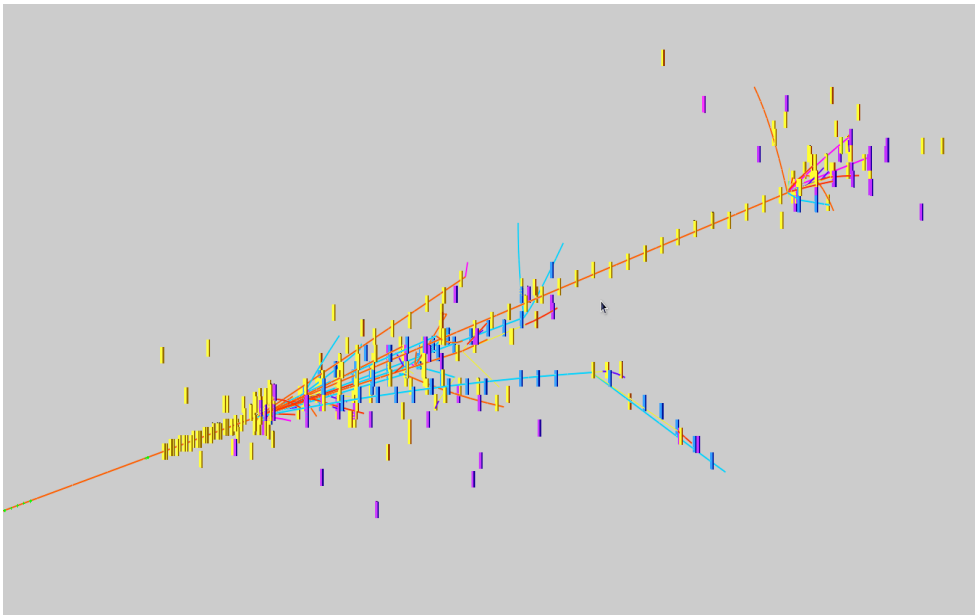
Status of Druid

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91128, Palaiseau

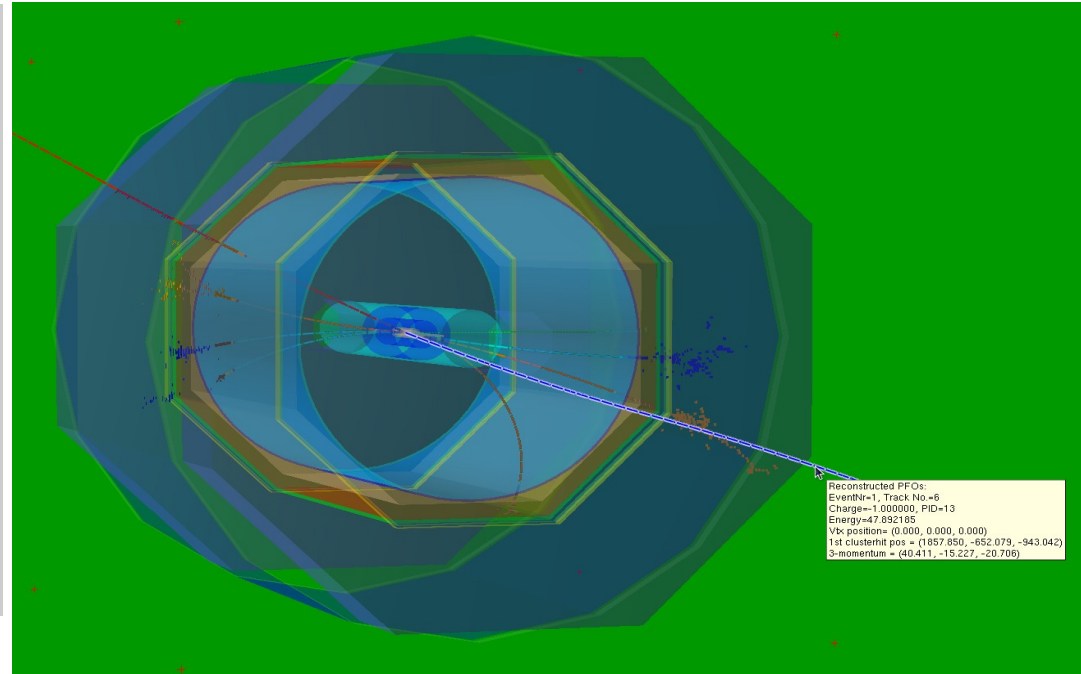
- Introduction
- Event display (*LCIO file*)
 - Objects & Options
 - Example: analysis reconstruction algorithm performance
- Geometry display (*GDML/xml file*)
- Summary

- Motivation:
 - To understand the ILC events & jet/shower details
 - To **understand/analysis reconstruction algorithm** performance



Left: 40GeV pion shower

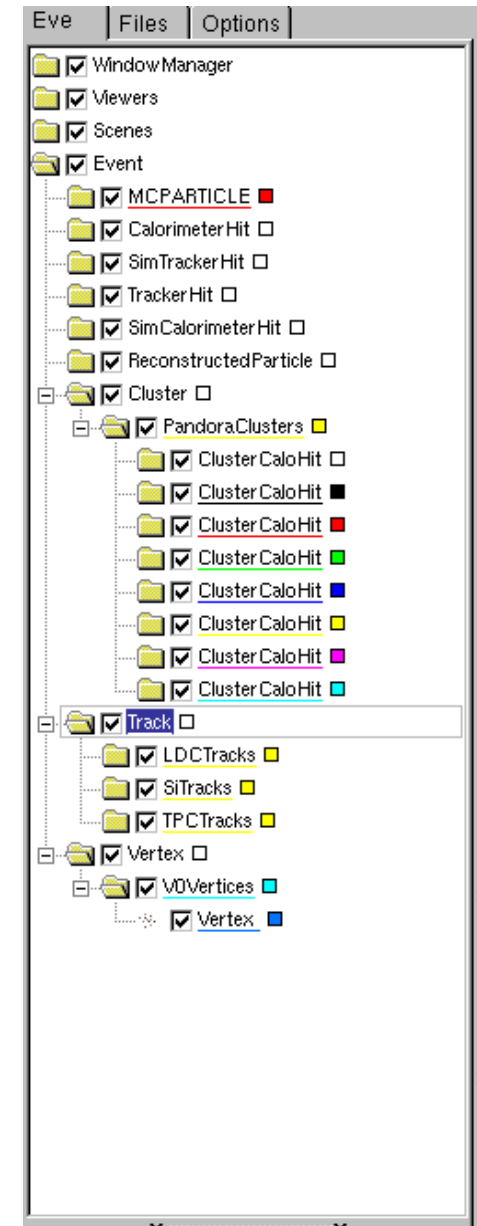
Right: 230GeV Z($\mu\mu$)H($\tau\tau$) event



Developed by Manqi, Vincent, Gabriel, Daniel & Jayant

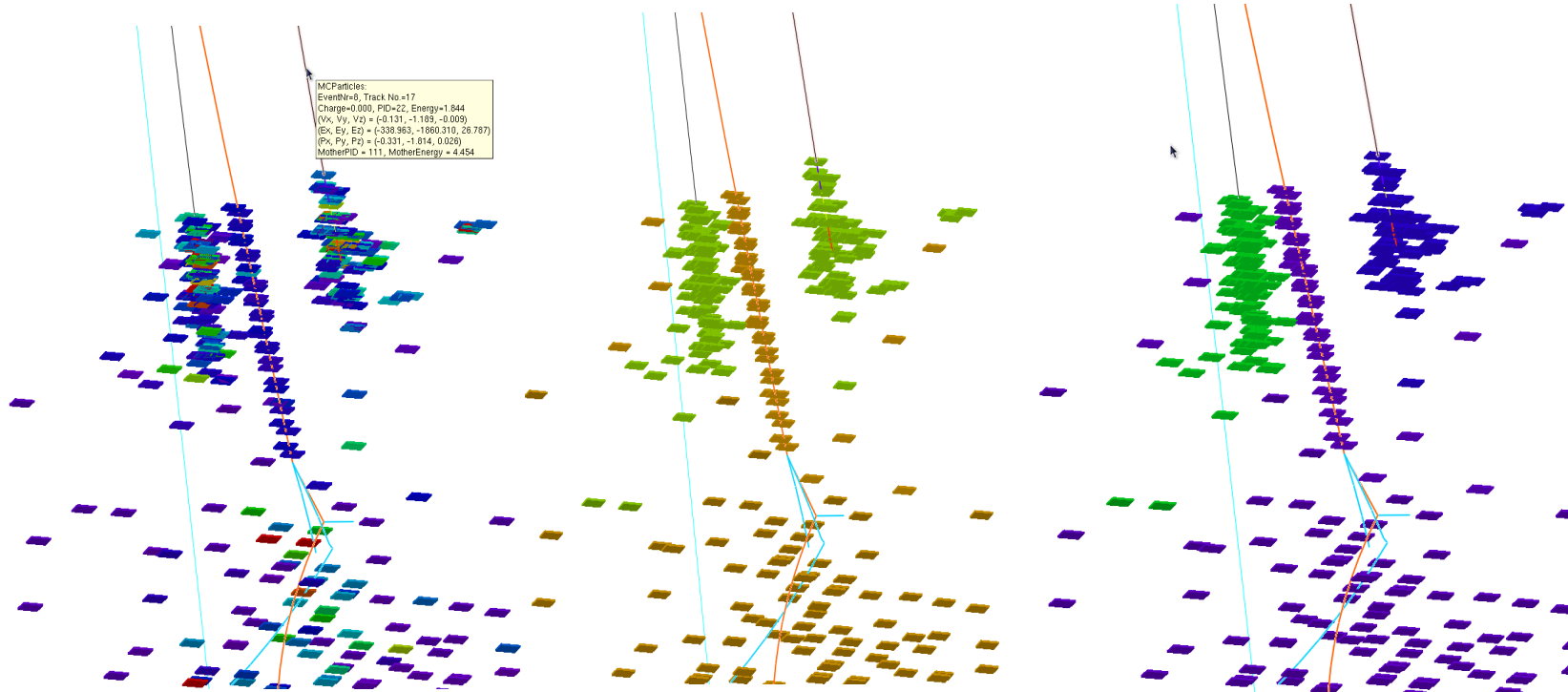
- Based on ROOT TEve class, visualize event information (in slcio file) **and/or** detector geometry (gear xml or **gdml** file) in arbitrary combination & different styles

- LCIO collections:
 - **MCTruth level:** MCParticle tracks. To mark event type, mother particles at VTX can be displayed as arrows
 - **Simulation level:** simulated calorimeter/tracker hits: cuboid/points with tunable size/color according to Energy, dE/dx, PID, Mother PID, index, ...
 - **Reconstruction level:**
 - Intermediate reconstruction collections: Digitized detector hits, reconstructed tracks, clusters, Vertexes...
 - Final Reconstructed Particle (Particle Flow Objects): displayed as track + assigned cluster
 - Skipped collections: LCRelation, LCGenericObject



- General:
 - Zoom, Rotate (with arbitrary center), Project, Tunable illuminating, bkgrd, references...
- For Individual objects:
 - Pick up & read attached information
 - Display/hidden: **inherit** the status from last event & always display new collections
 - Color/size options

*Tau jet ($\tau \rightarrow \nu + \pi^0 + \pi^+$)
with different color
option: energy, PID &
index*



- Buttons

- Event navigation
- Target: select rotation center
- Reroll object color if supported, i.e, clusters
- Drew back to origin orientation & scale
- Collection selection: switch between two scenarios

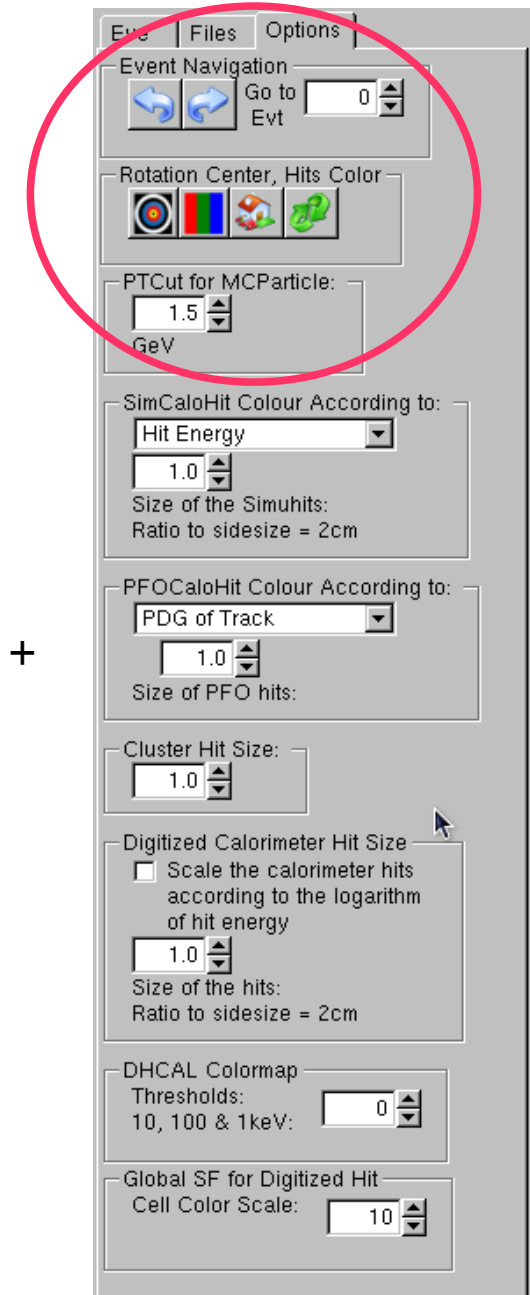
- Minimal (default):

MCParticle + Simulated Hits (+ Reconstructed PFO + geometry)

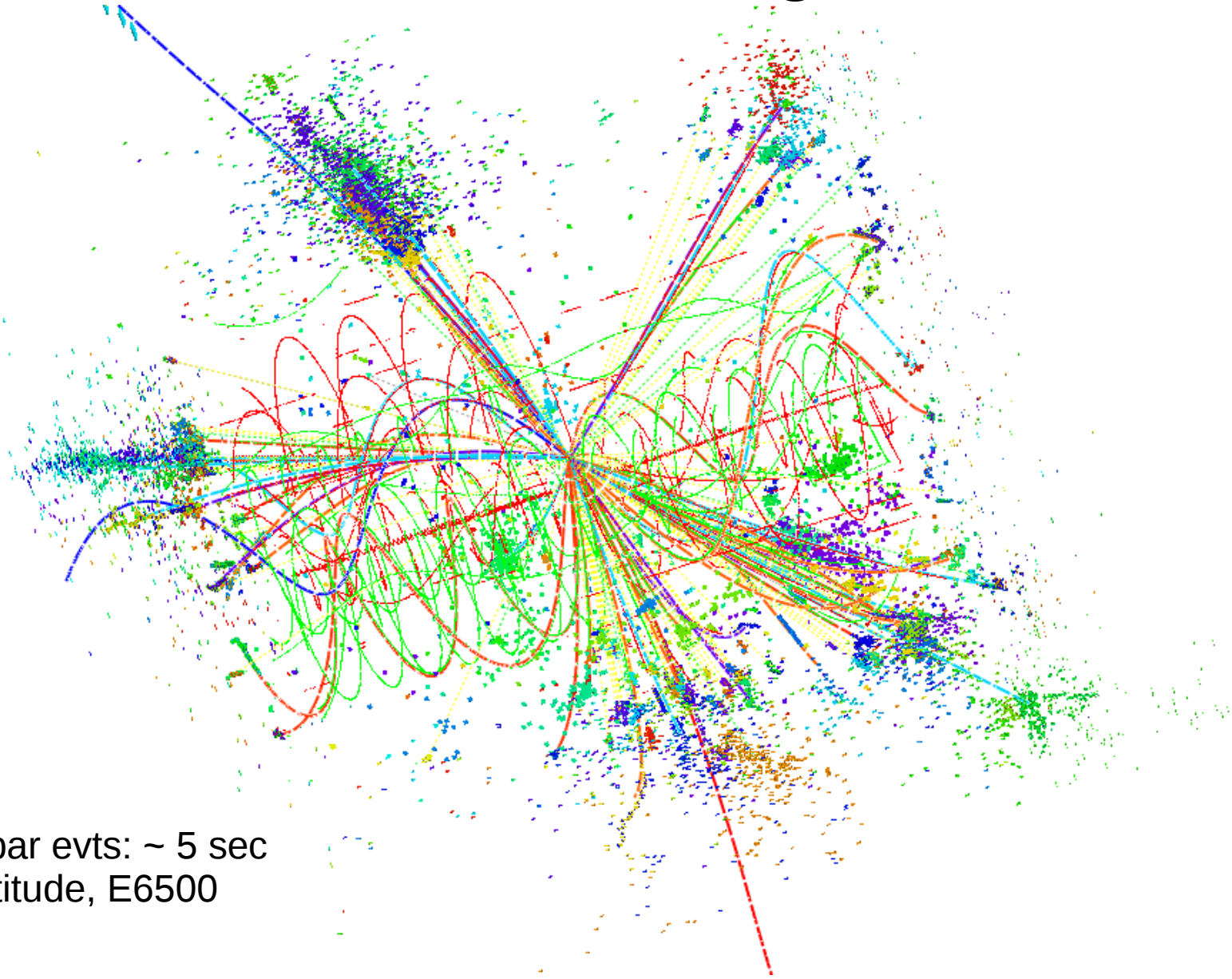
- Maximal:

*All supported collection, to include **intermediate reconstructed collections***

- P_T Cut on MCParticle: ignore event detail
- Hits options: specify color/size



Stress testing

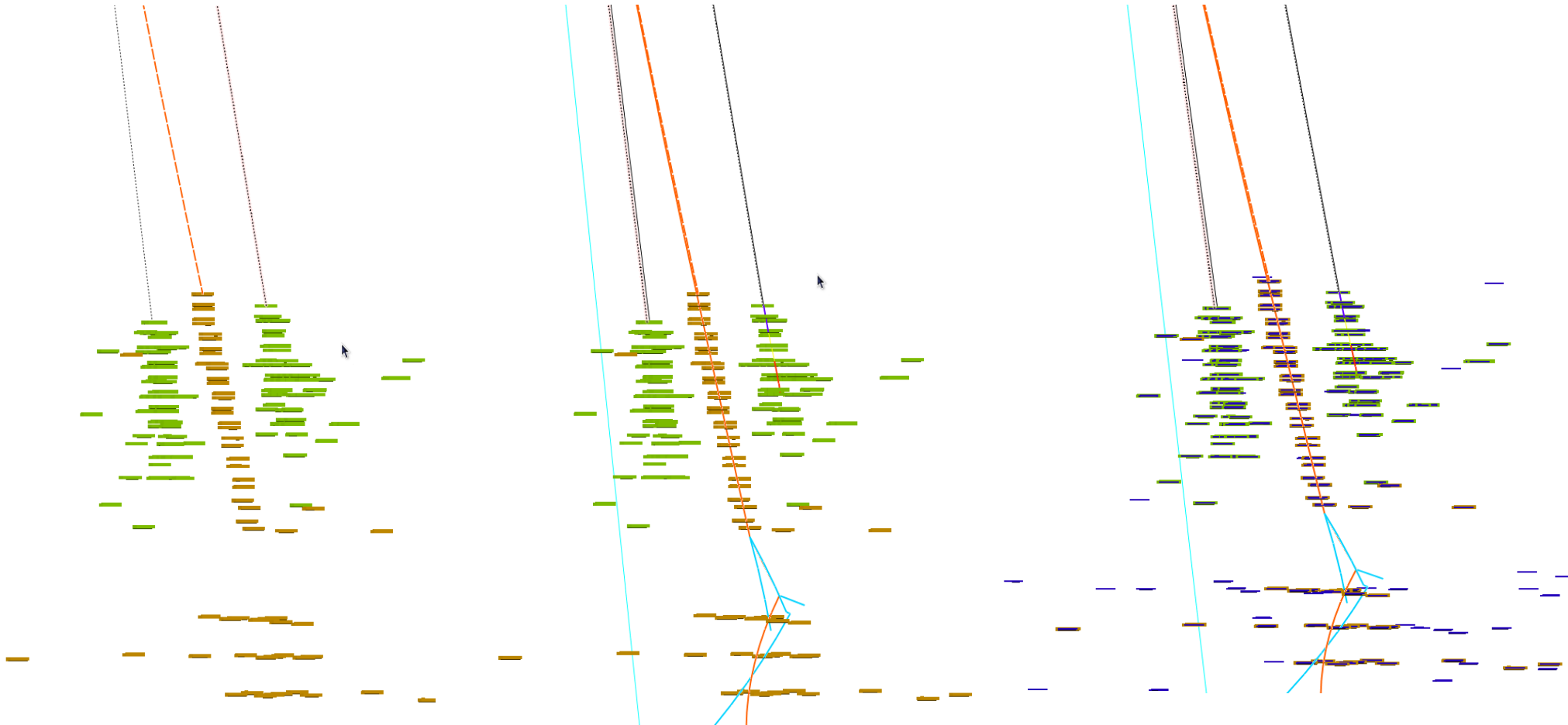


500GeV ttbar evts: ~ 5 sec
Dell Latitude, E6500

To analysis reco-soft performance



By comparing reconstructed & MC objects...



Same τ jet, from left to right:

- PFO;
- PFO + MCParticle;
- PFO + MCParticle + MC Calo Hits (with uniform blue color);

qq evt@91.2GeV

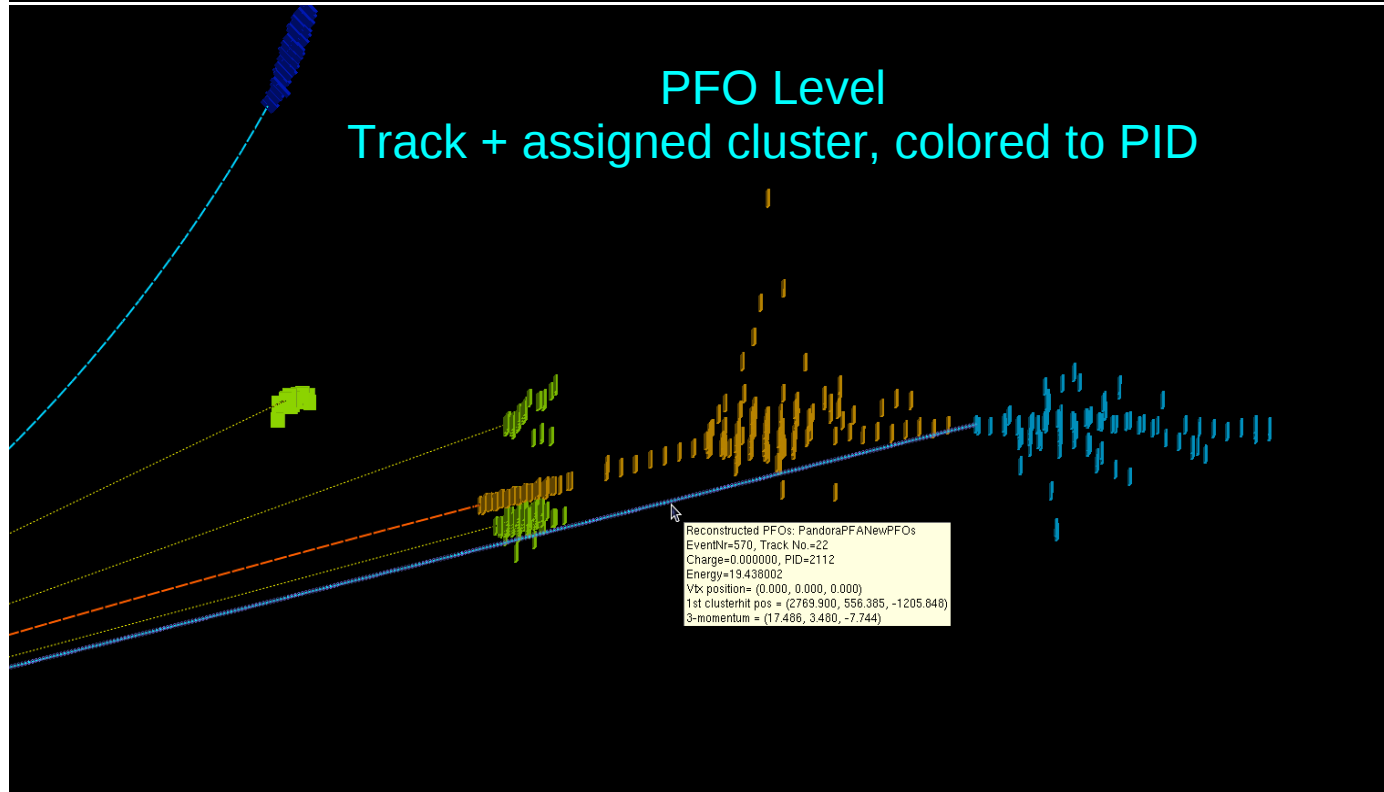
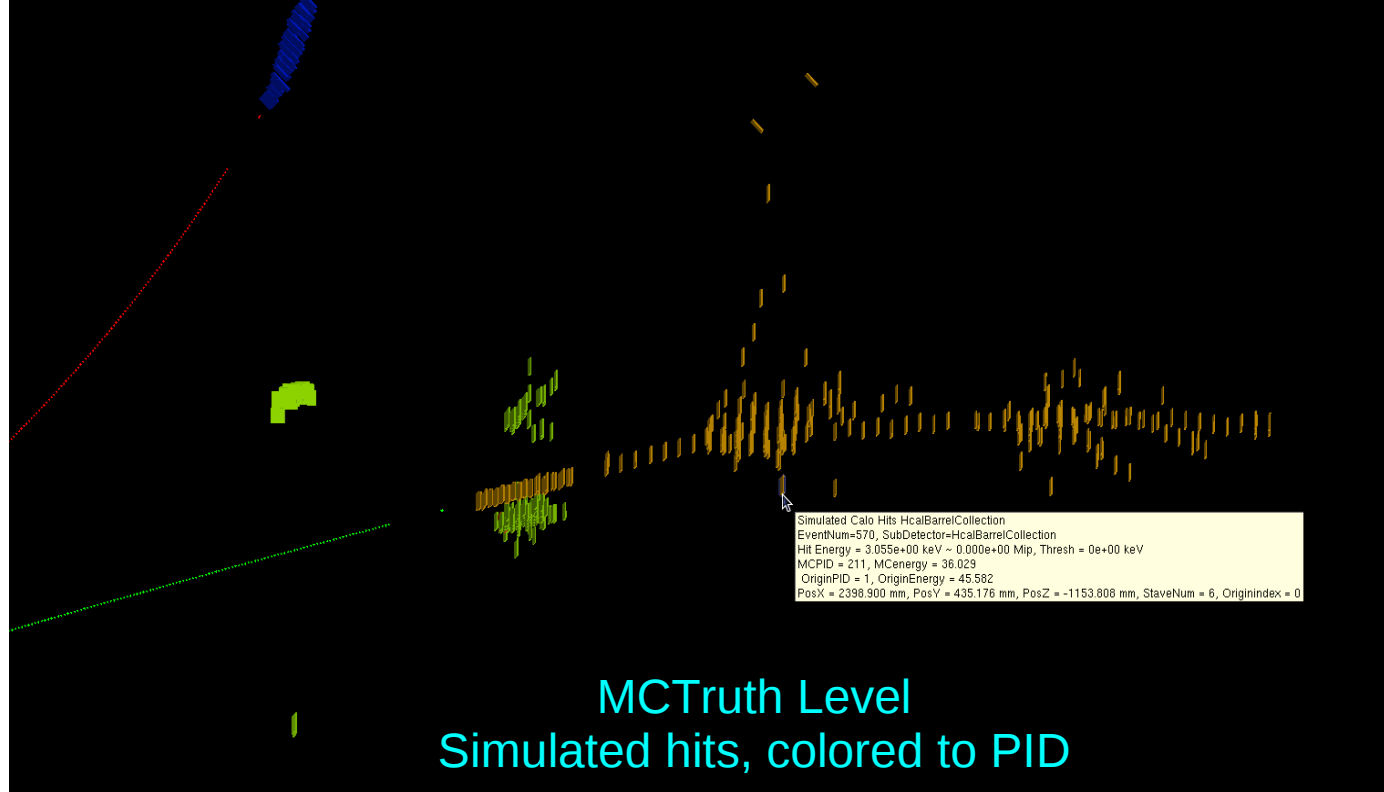
Total energy = 109 GeV,
Total Neutral energy = 21.3 GeV

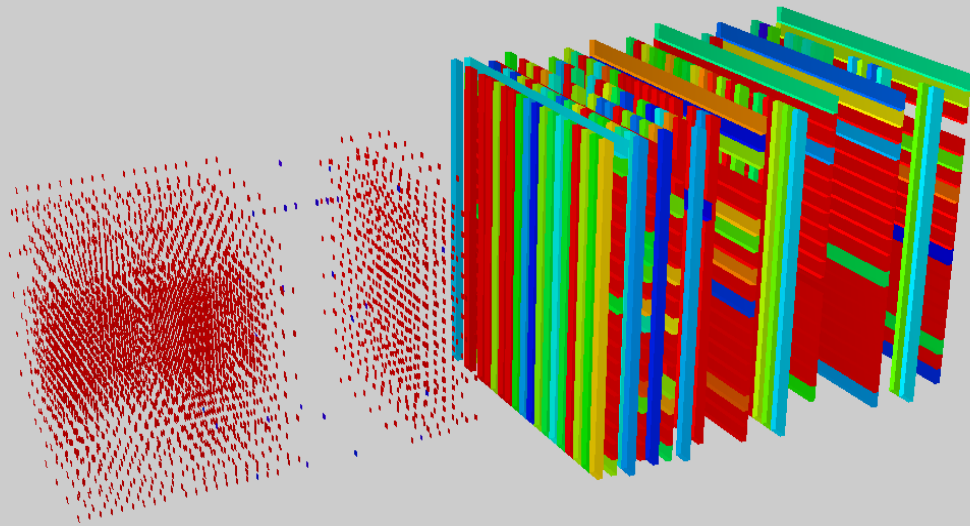
MCTruth level: 36GeV Pion

PFO level: 36GeV Pion with
27.3GeV Cluster + 19.4GeV
neutron

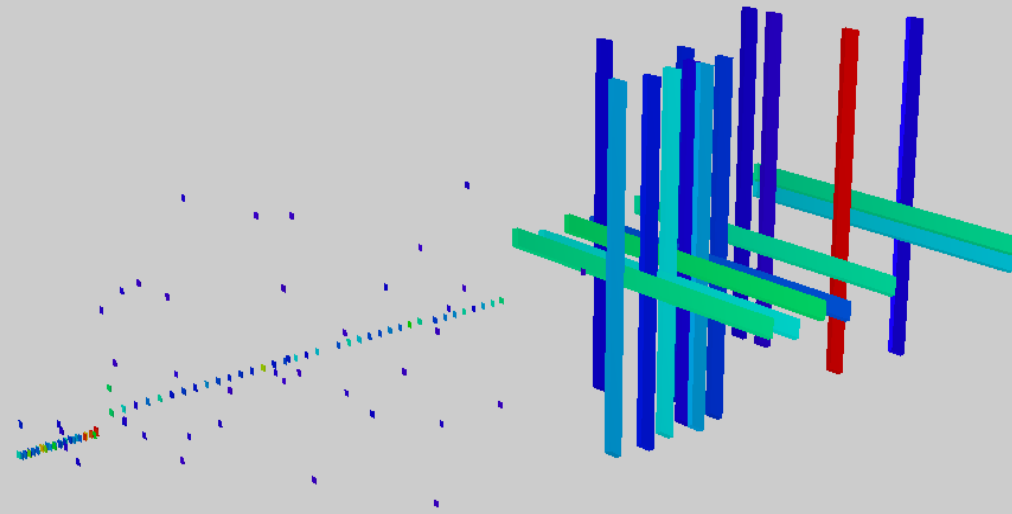
Splitting of hadron cluster: over
estimated cluster energy + fake
seed

07/10/2010

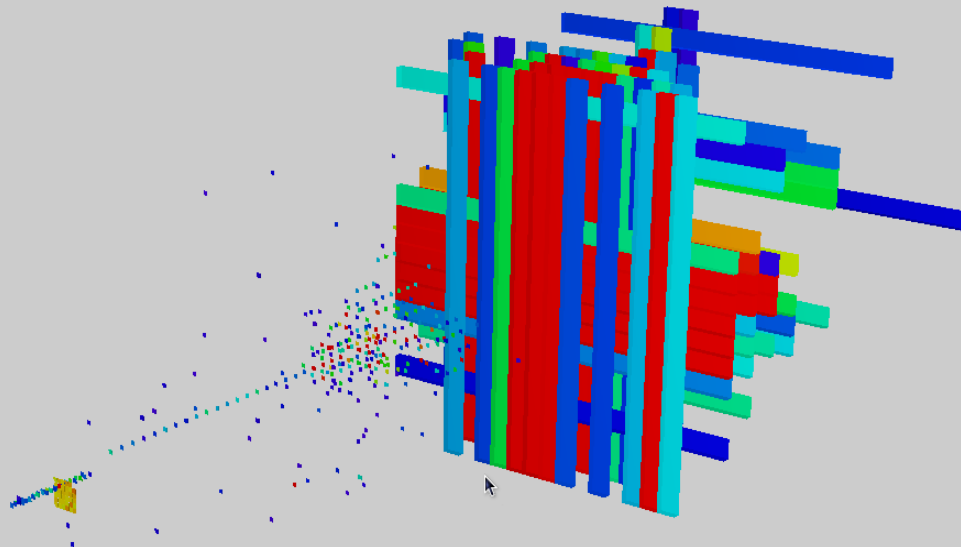




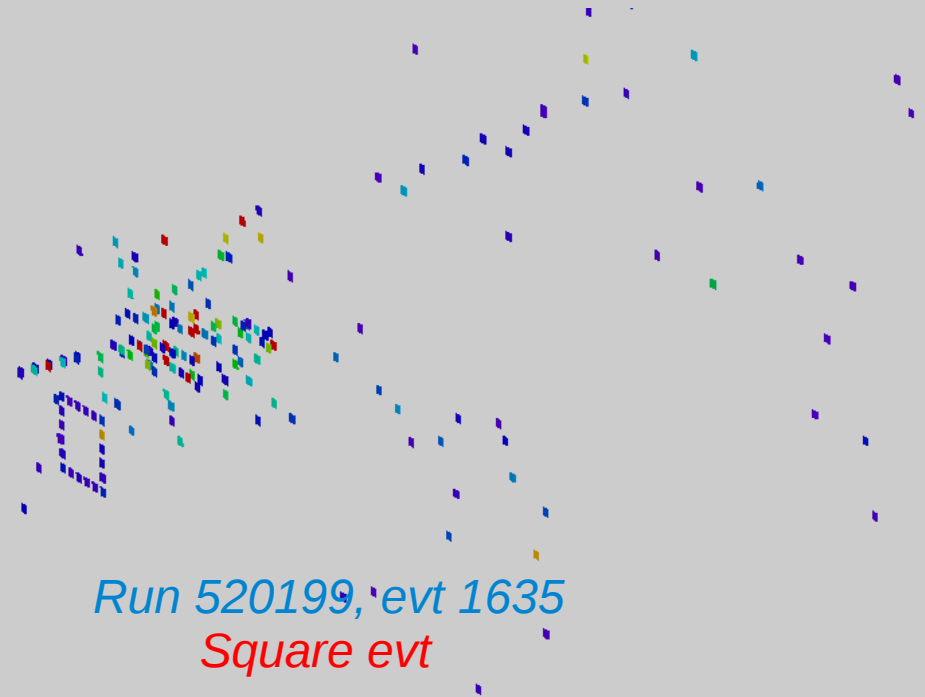
Run 330437, self Calibrate evt



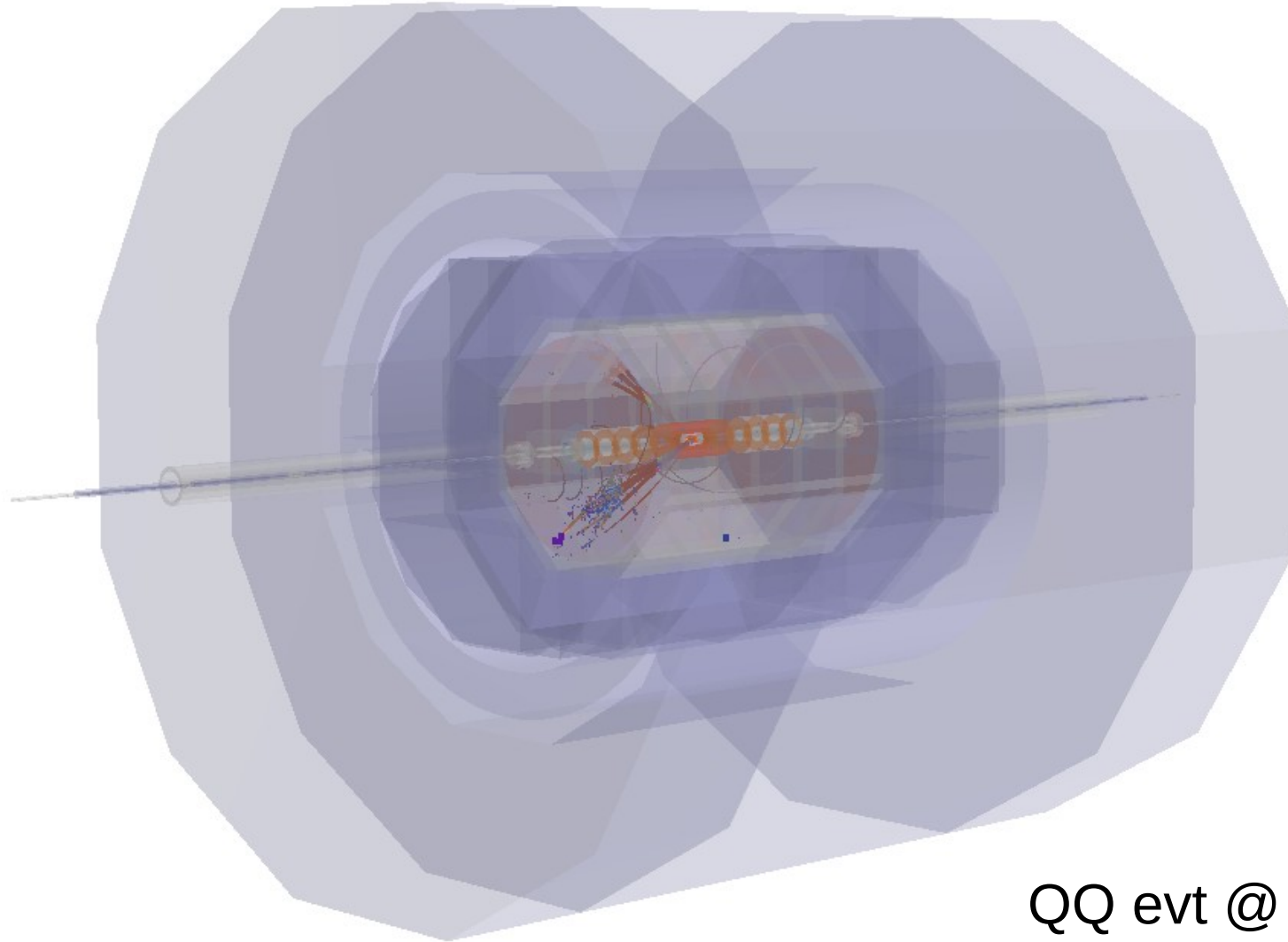
Run 330437, MIP evt:
Misalignment (?)



Run 330437, pion evt:
noisy ECAL wafer

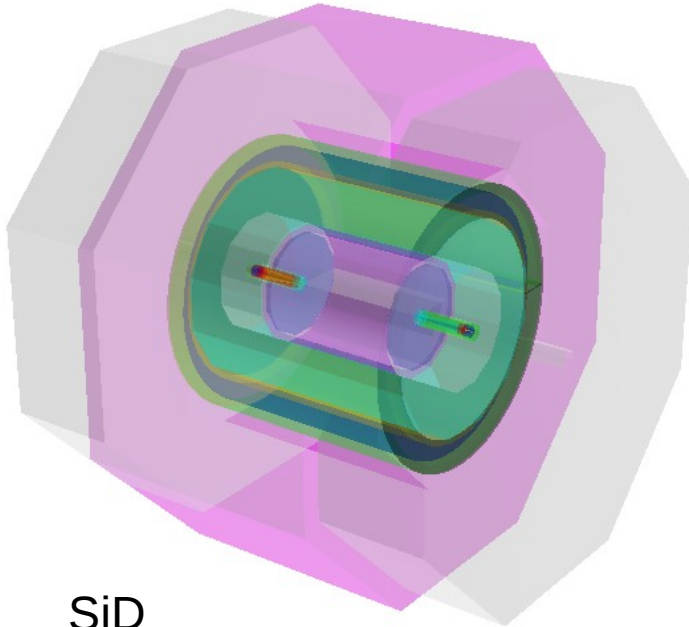


Run 520199, evt 1635
Square evt

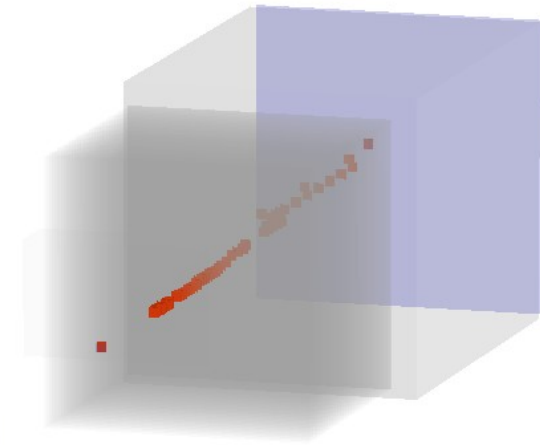


QQ evt @ Z Thr, ILD

Available since Druid_1.8



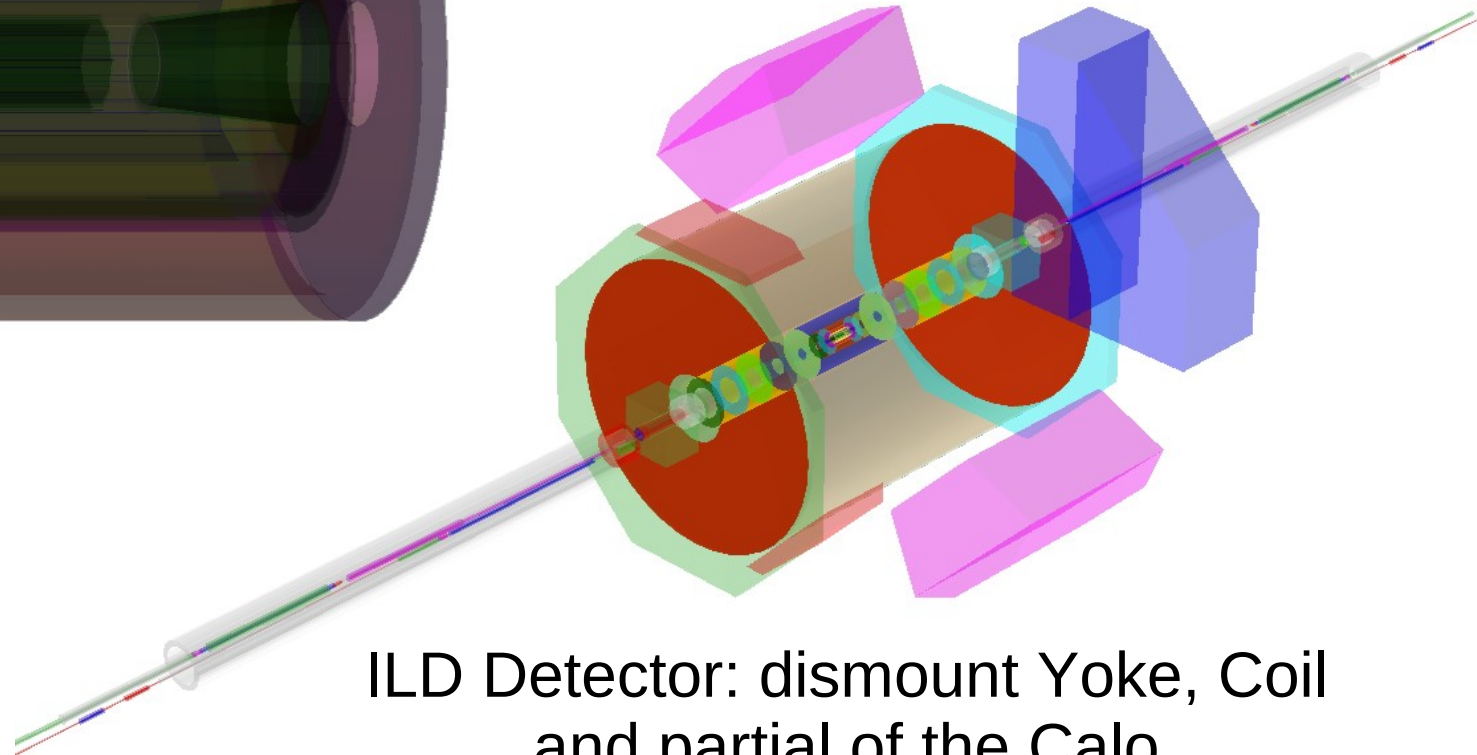
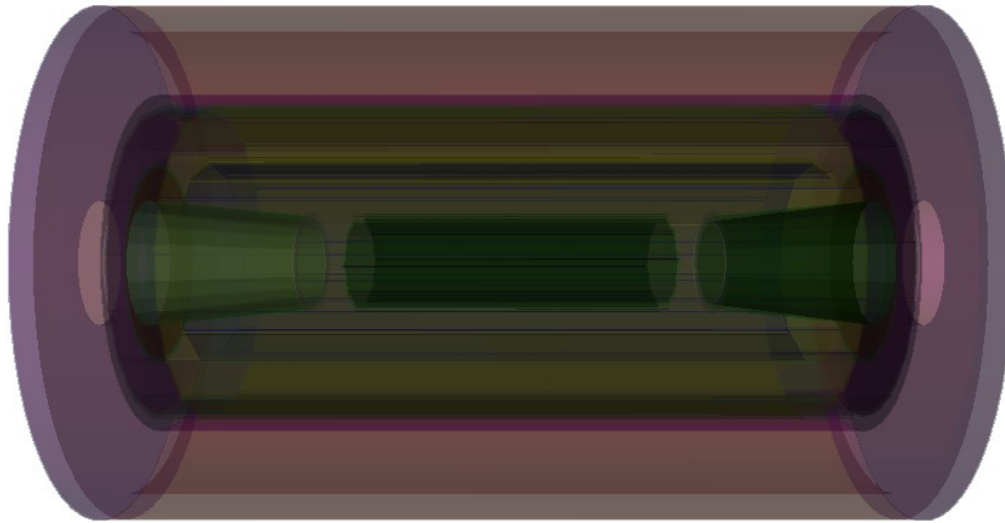
SiD



Simulated 10GeV Muon event
with TBCern1006

- GDML file: **simulation level** geometry information, could be dumped from Mokka (*version higher than 07-03. Converted gdml to root file for Druid*)
- Druid Option:
 - Tunable transparency, color, bkgrd, mount/unmount sub detectors...
 - **Tunable display depth**

Inner Detector of ILD: Vtx, SiD
(*Num of Volumes* > 700)...



ILD Detector: dismount Yoke, Coil
and partial of the Calo

Display depth



The screenshot displays the GEANT4 visualization interface. On the left, a tree view shows the hierarchy of geometrical volumes. The selected node is `HcalBarrel_envelope_12887`. The tree structure is as follows:

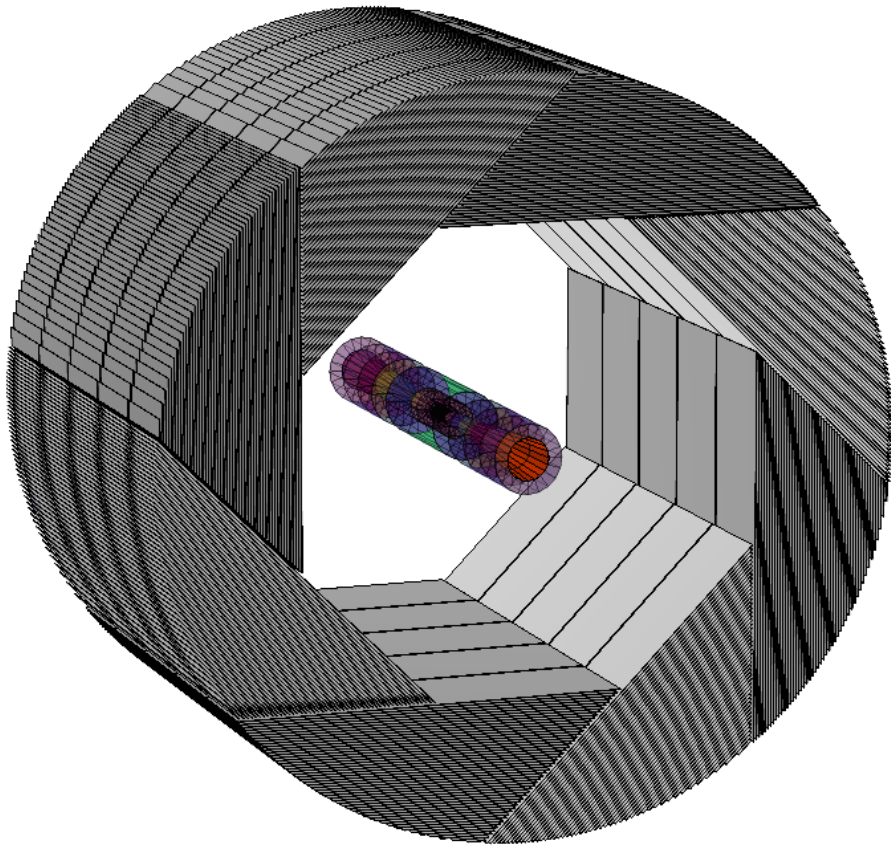
- SolenoidCoilBarrel_layer2_volume_12883
- SolenoidCoilBarrel_layer1_volume_12884
- SolenoidCoilBarrel_layer0_volume_12885
- MuonBarrel_envelope_12886
 - MuonBarrel_stave_outer_12058
 - MuonBarrel_stave_outer_12059
 - MuonBarrel_stave_outer_12060
 - MuonBarrel_stave_outer_12061
 - MuonBarrel_stave_outer_12062
 - MuonBarrel_stave_outer_12063
 - MuonBarrel_stave_outer_12064
 - MuonBarrel_stave_outer_12065
- HcalBarrel_envelope_12887
 - HcalBarrel_stave_outer_11858
 - HcalBarrel_stave_inner_11857
 - HcalBarrel_stave_layer39_11817
 - HcalBarrel_stave_layer38_11818
 - HcalBarrel_stave_layer37_11819
 - HcalBarrel_stave_layer36_11820
 - HcalBarrel_stave_layer35_11821
 - HcalBarrel_stave_layer34_11822
 - HcalBarrel_stave_layer33_11823
 - HcalBarrel_stave_layer32_11824
 - HcalBarrel_stave_layer31_11825
 - HcalBarrel_stave_layer30_11826
 - HcalBarrel_stave_layer29_11827
 - HcalBarrel_stave_layer28_11828
 - HcalBarrel_stave_layer27_11829
 - HcalBarrel_stave_layer26_11830
 - HcalBarrel_stave_layer25_11831
 - HcalBarrel_stave_layer24_11832
 - HcalBarrel_stave_layer23_11833
 - HcalBarrel_stave_layer22_11834

The 3D view on the right shows the detector geometry. The outermost layer is a pinkish-purple octagonal envelope. Inside, there are several layers of calorimeter staves, with the innermost layer being a dark purple cylinder. The central region contains the solenoid and muon barrel components.

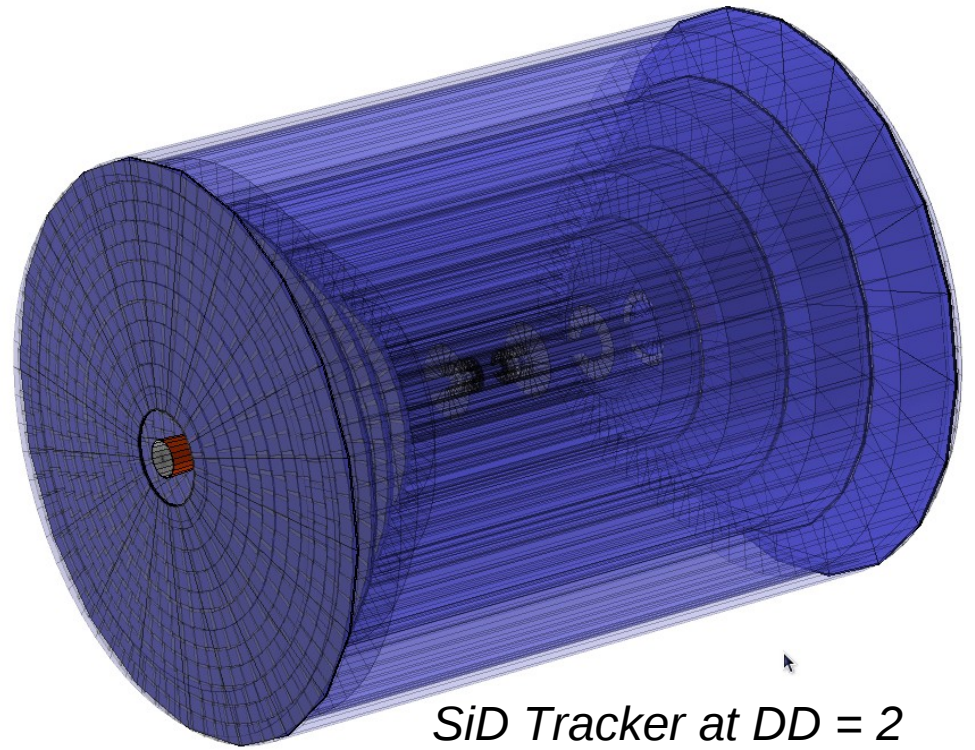
The interface includes a 'Style' panel for the selected node, showing the 'TEveElement' color set to cyan and a depth value of 70. The 'VizNode', 'VizNodeDaughters', 'VizVolume', and 'VizVolumeDaughters' options are all checked. A 'Command' panel is visible at the bottom right.

Hierarchy of geometrical volume in gdml file. Higher Depth = More detailed info

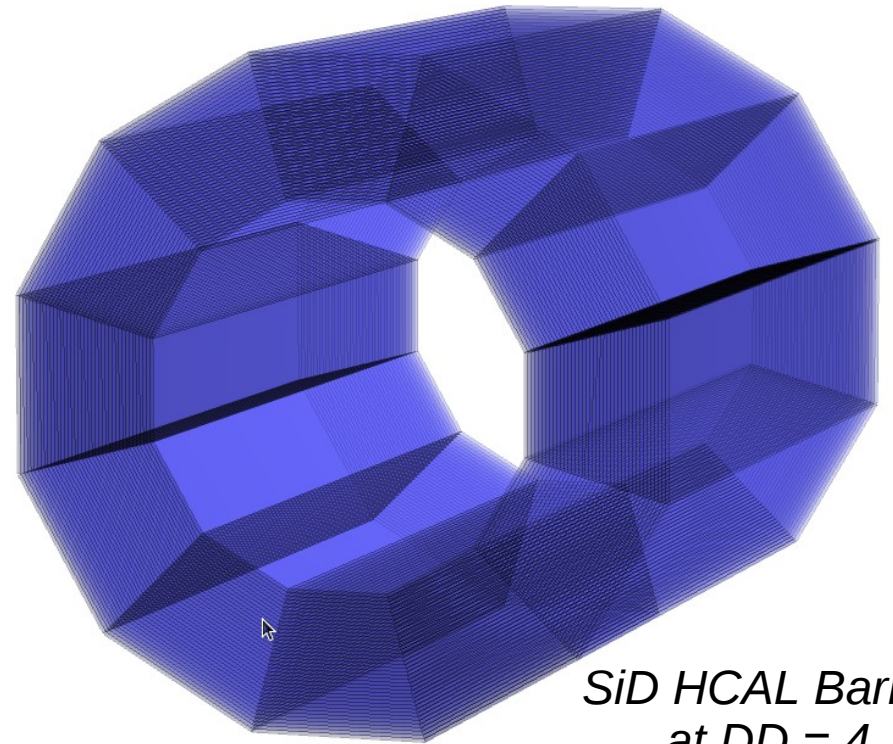
Examples



*ILD (a la Videau) HCAL Barrel
+ inner detectors at DD = 3*



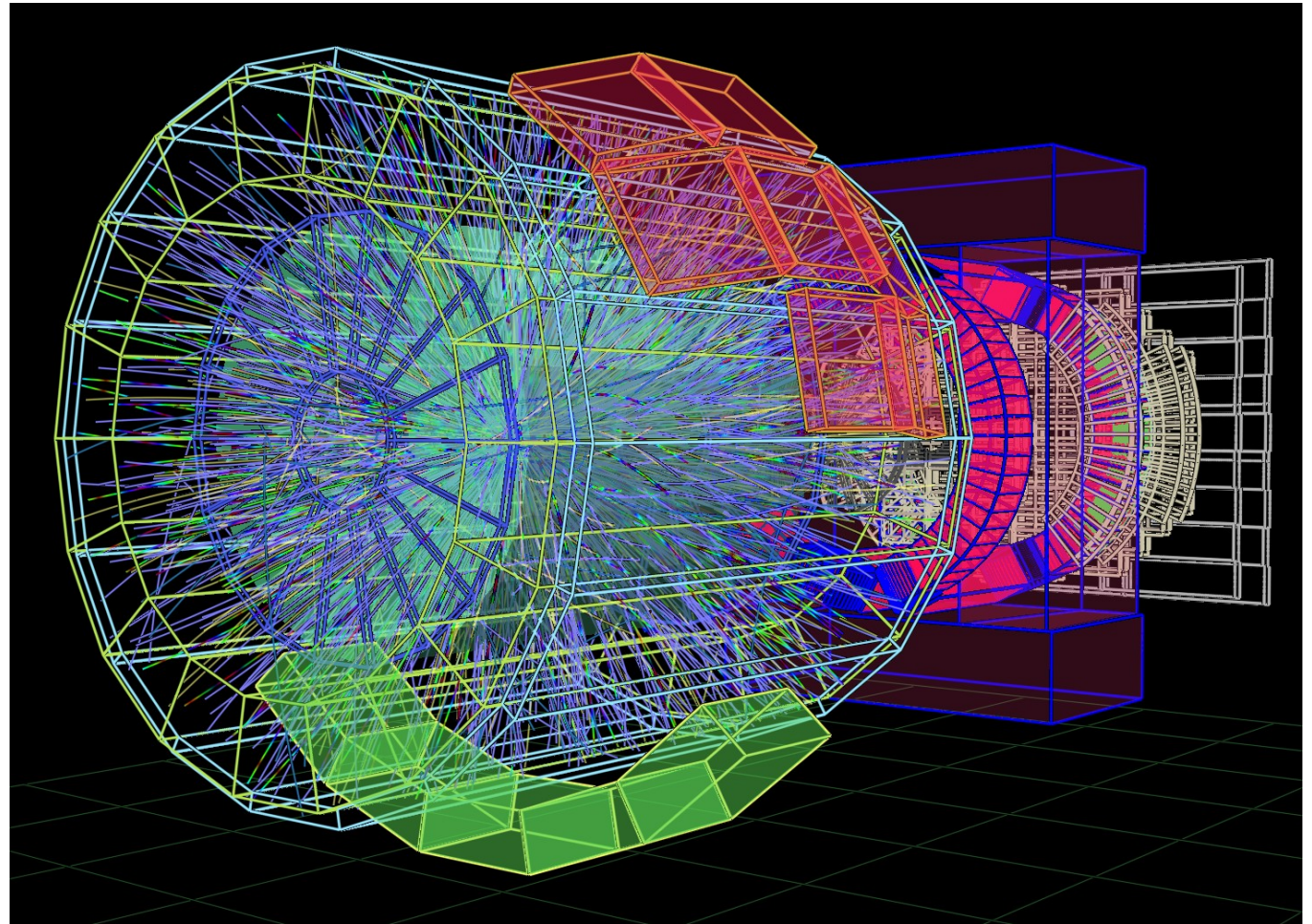
SiD Tracker at DD = 2



*SiD HCAL Barrel
at DD = 4*

- **Druid is ready:** to visualize event information & detector geometry
 - Better understand event and reconstruction algorithm performance
 - With the gdml file, detector geometry could be visualized to simulation level
- Availability
 - DESY SVN server: [svn co https://svnsrv.desy.de/svn/Druid/trunk](https://svnsrv.desy.de/svn/Druid/trunk) Druid
 - LLRforge: [svn co https://llrforge.in2p3.fr/svn/Druid/trunk](https://llrforge.in2p3.fr/svn/Druid/trunk) Druid
 - <http://llr.in2p3.fr/~ruan/ILDDisplay>
- For more detail
 - Manual: http://polywww.in2p3.fr/~ruan/ILDDisplay/DruidManual_v1.8.pdf

*Special thanks to Mr. TAdam (Matevz Tadel)
stands behind TEve...*



BK Slides

- Flexible parameter managing beside the steering file
 - *bin/Druid*: print a instruction for the input format
 - Separate geometry & data display
 - *bin/Druid *.slcio*: display the first event in given slcio file
 - *bin/Druid *.gdml(*.xml)*: display detector geometry
 - Together with other arguments:
 - *bin/Druid *.slcio \$EventNumber*: given event in given slcio file
 - *bin/Druid *.slcio *.gdml(*.xml)*: first event & geometry
 - *bin/Druid *.slcio *.gdml(*.xml) \$EventNumber*
 - *bin/Druid *.slcio *.gdml(*.xml) \$RunNumber \$EventNumber*
- Screen output with collection statistic and sub detector list

- ECAL Module:
 - *Depth = 1: Total Volume (fine for **Event Display**)*
 - *Depth = 2: Divided into different slabs*
 - *Depth = 3: Equip each slab with layers of different materials (simulation level)*

