# Status of Druid

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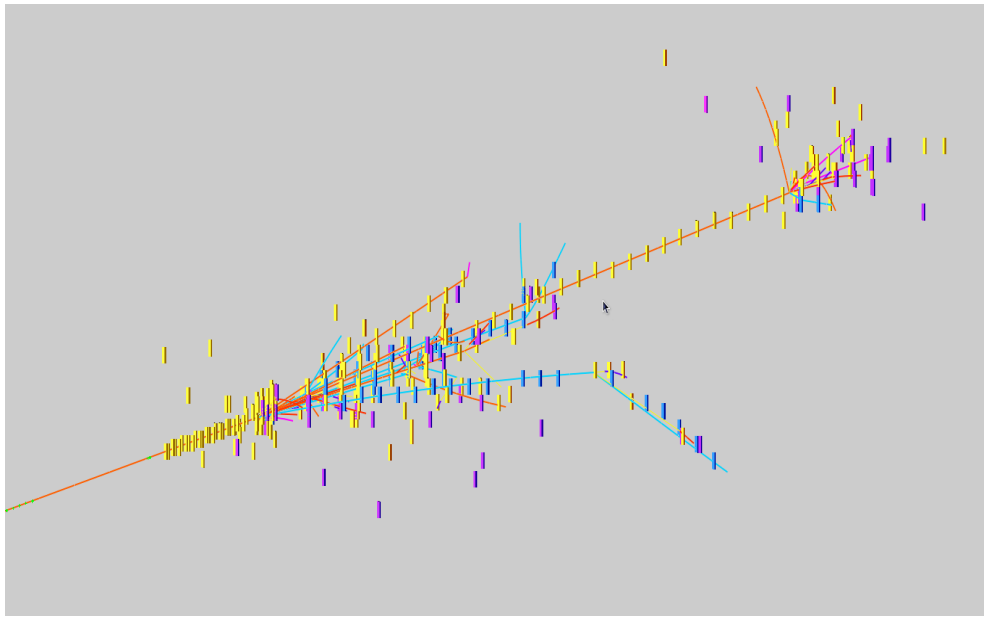
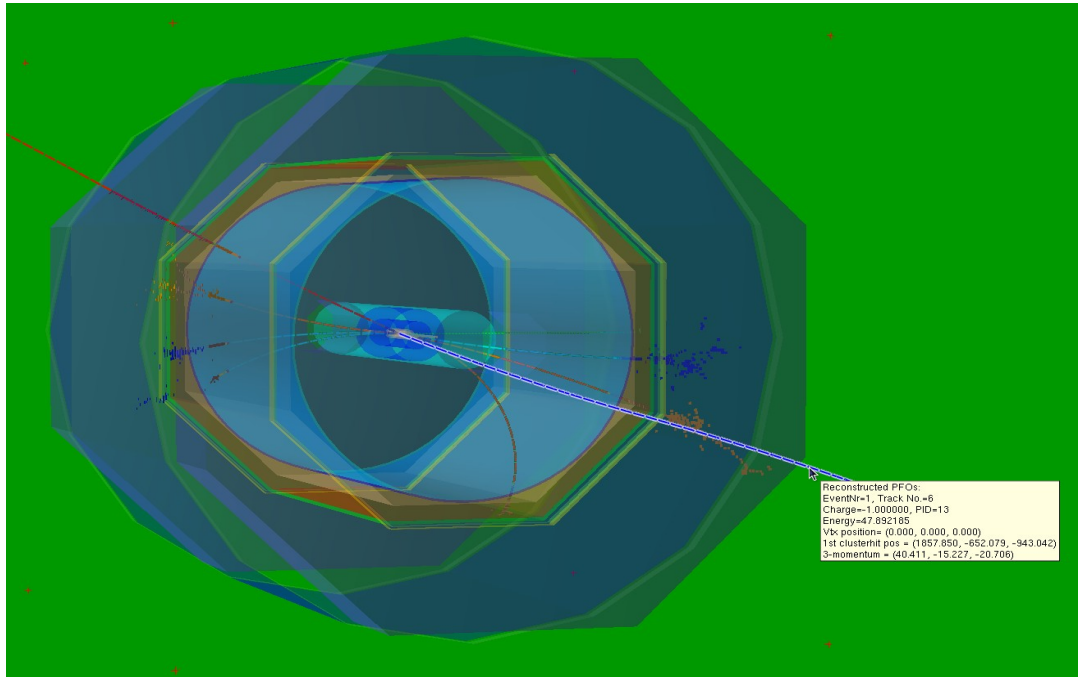
# Outline

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

# DRUID: display for ILD

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





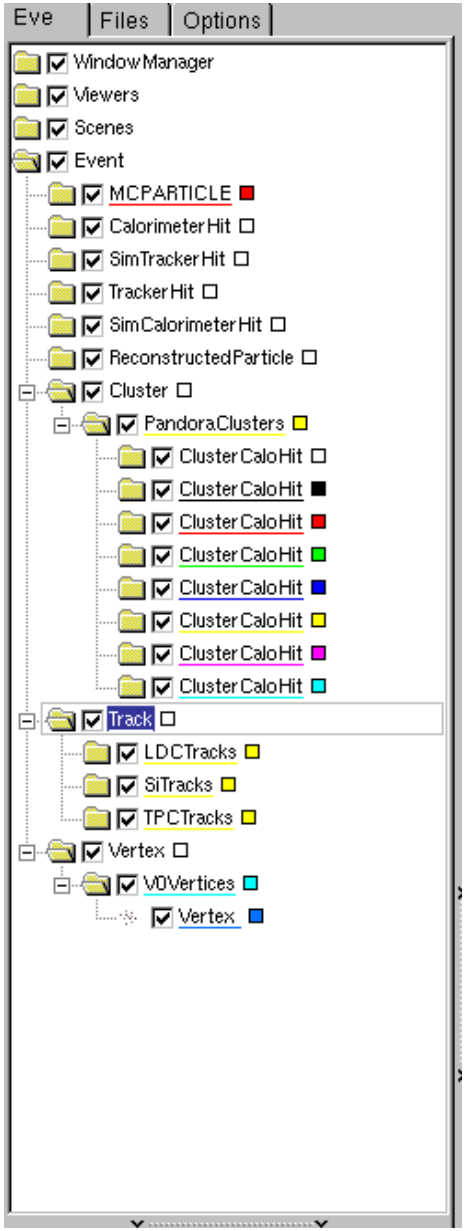

*Left: 40GeV pion shower*
*Right: 230GeV Z(μμ)H(ττ) event*

*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

# Event objects

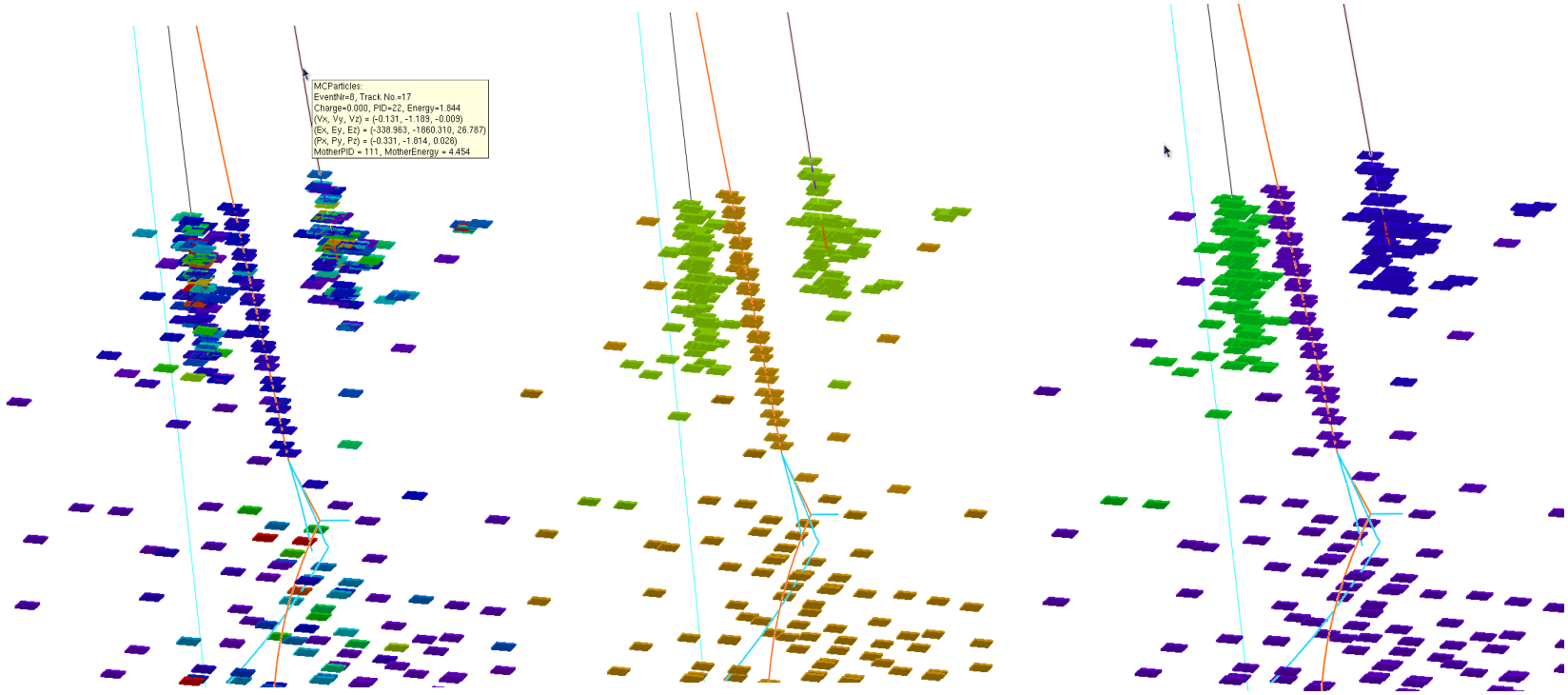
- LCIO collections:
  - MCTruth level: MCParticle tracks. To mark event type, mother particles at VTX can be displayed as arrows
  - Simulation level: simulated calorimeter/tracker hits: cuboid/points with tunable size/color according to Energy, dE/dx, PID, Mother PID, index, ...
  - Reconstruction level:
    - 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



# Options

- 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*

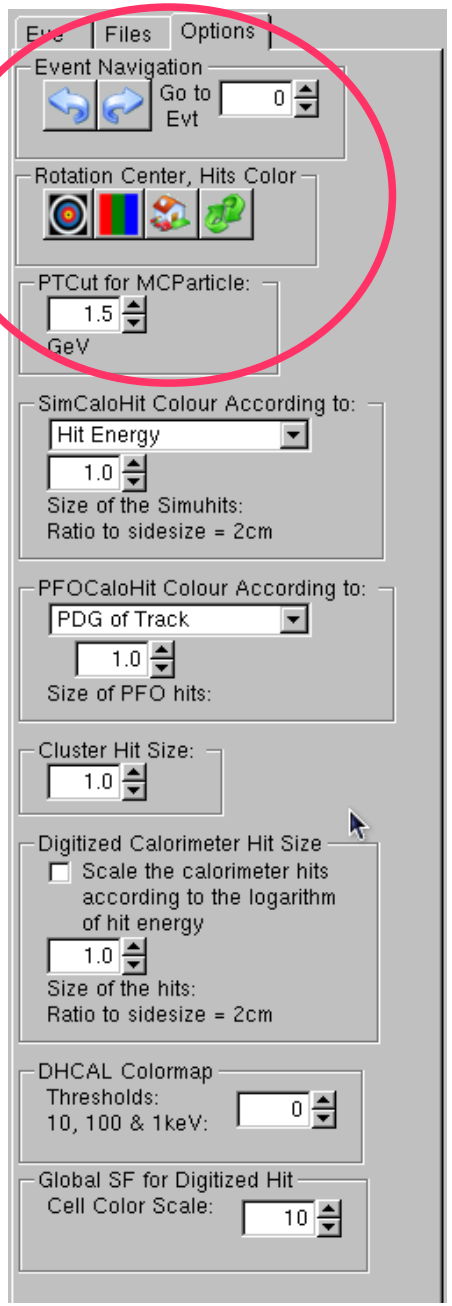


# GUI Panel

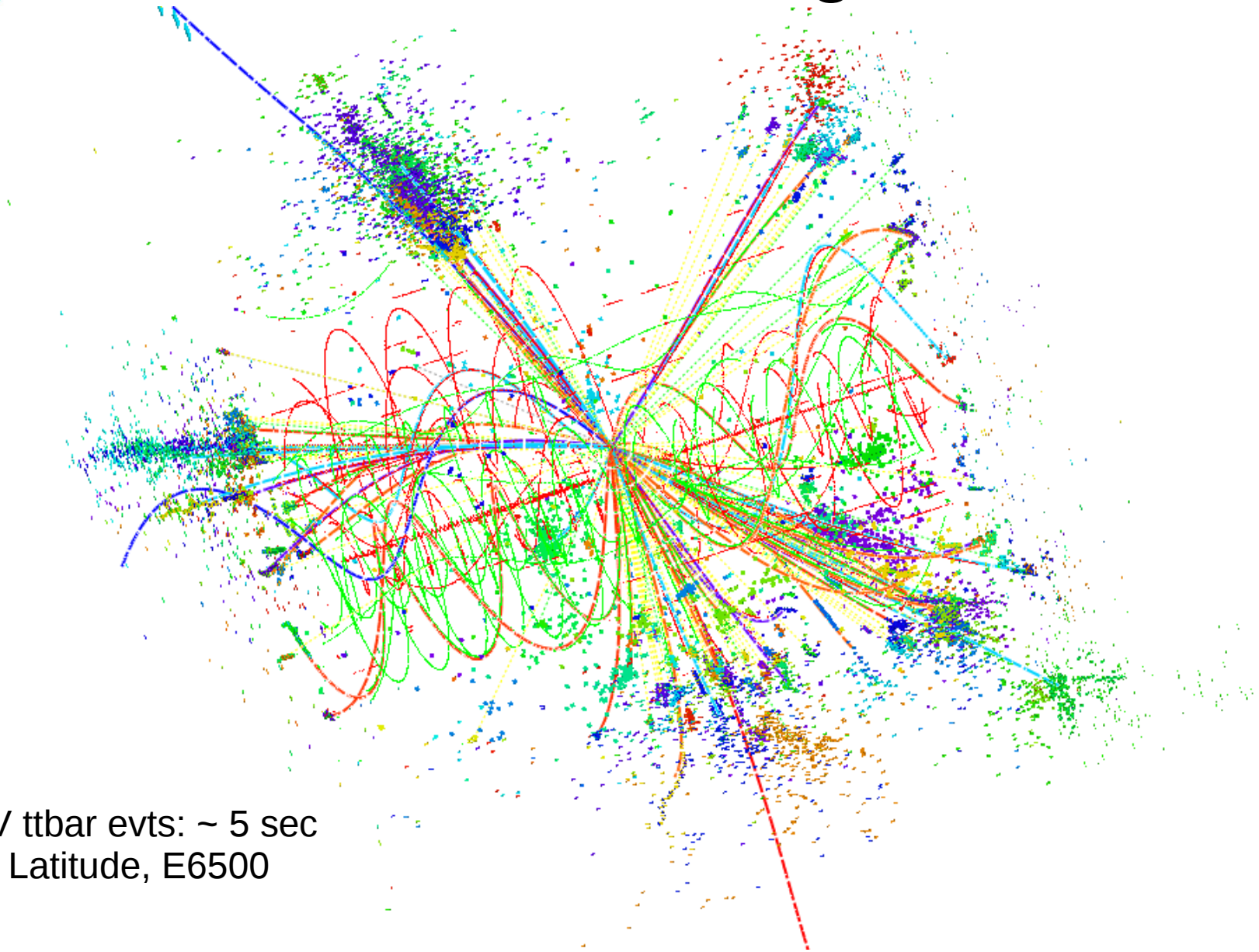
- Buttons
  - Event navigation
  - Target: select rotation center
  - Reroll object color if supported, i.e, clusters
  - Drew back to origin orientation & scale
  - Collection selection: switch between two scenarios
    - Minimal (default):

      *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



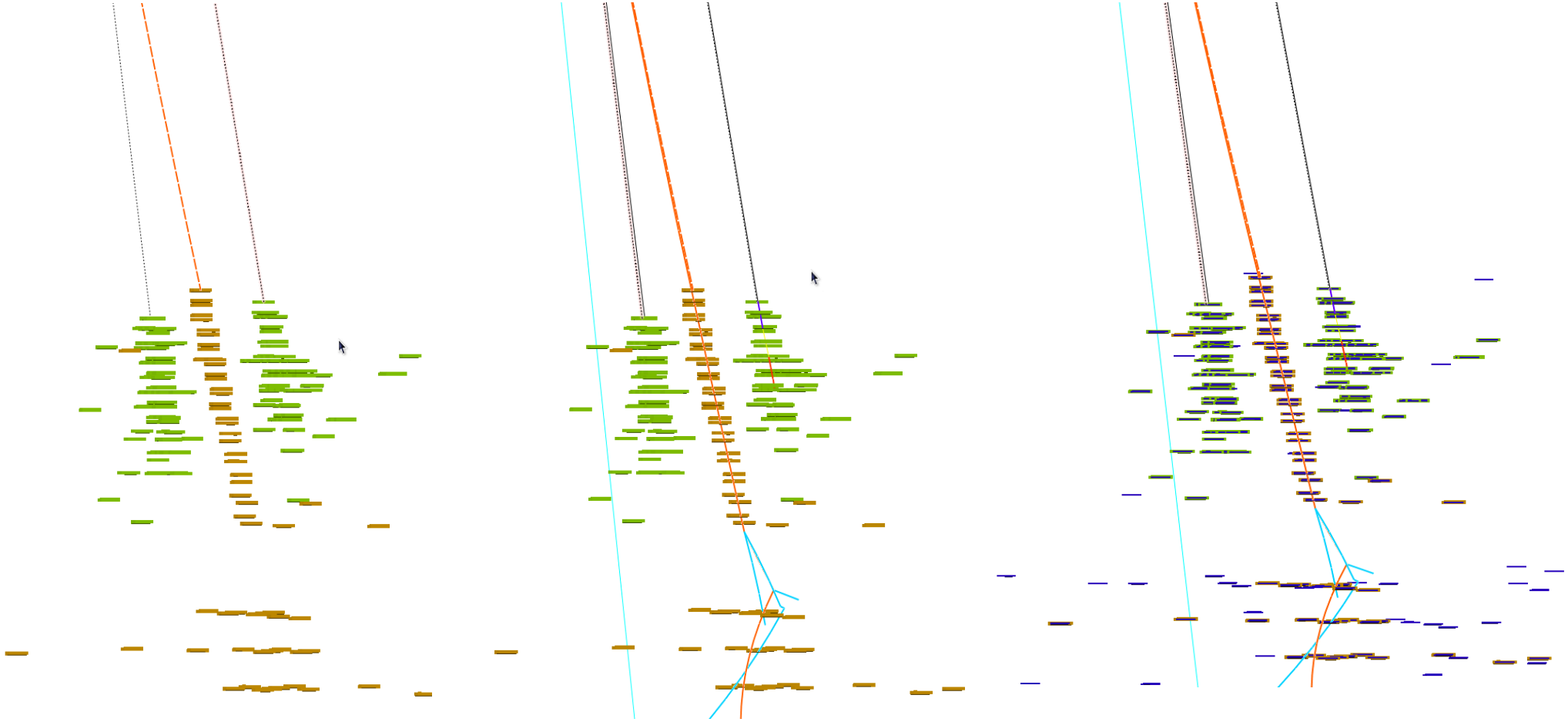
# Stress testing



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,

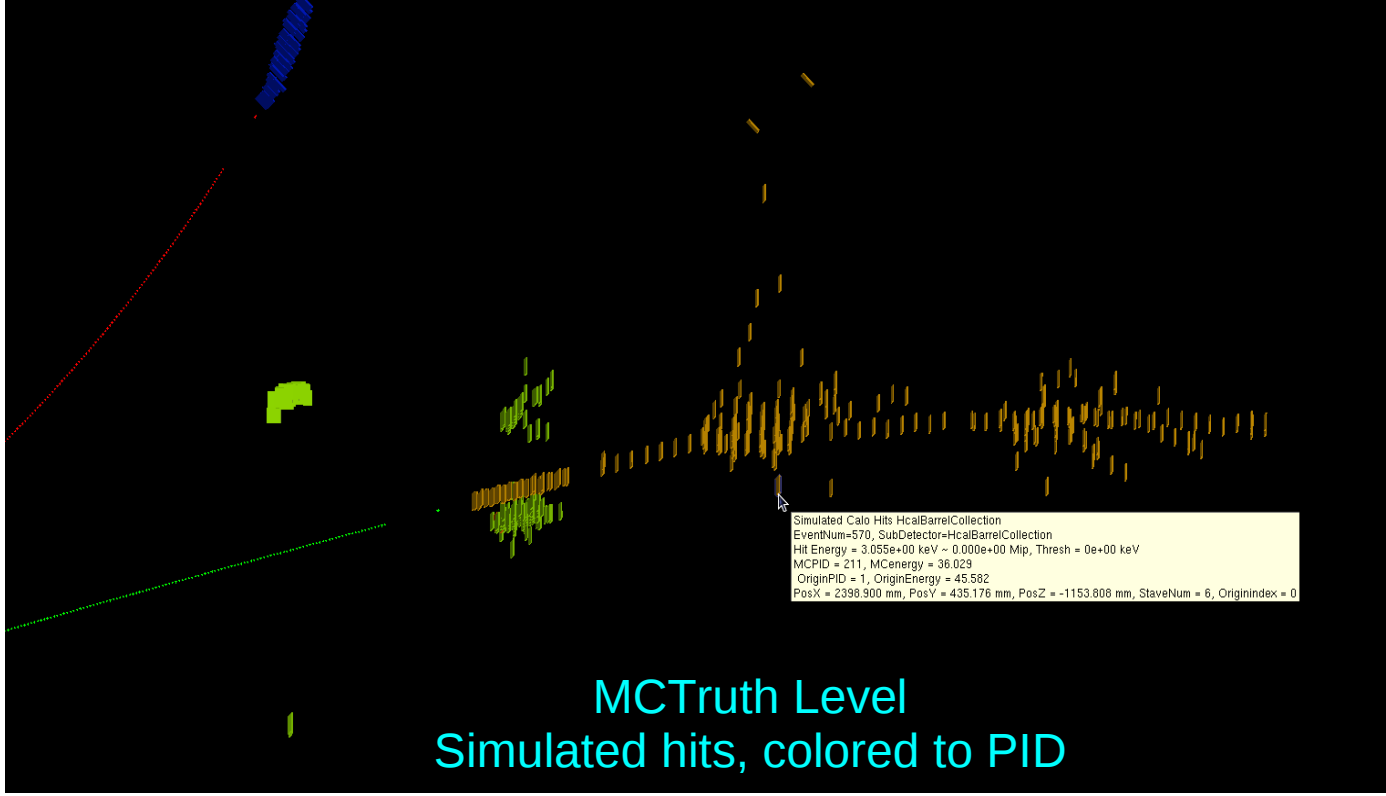
Total Neutral energy = 21.3 GeV

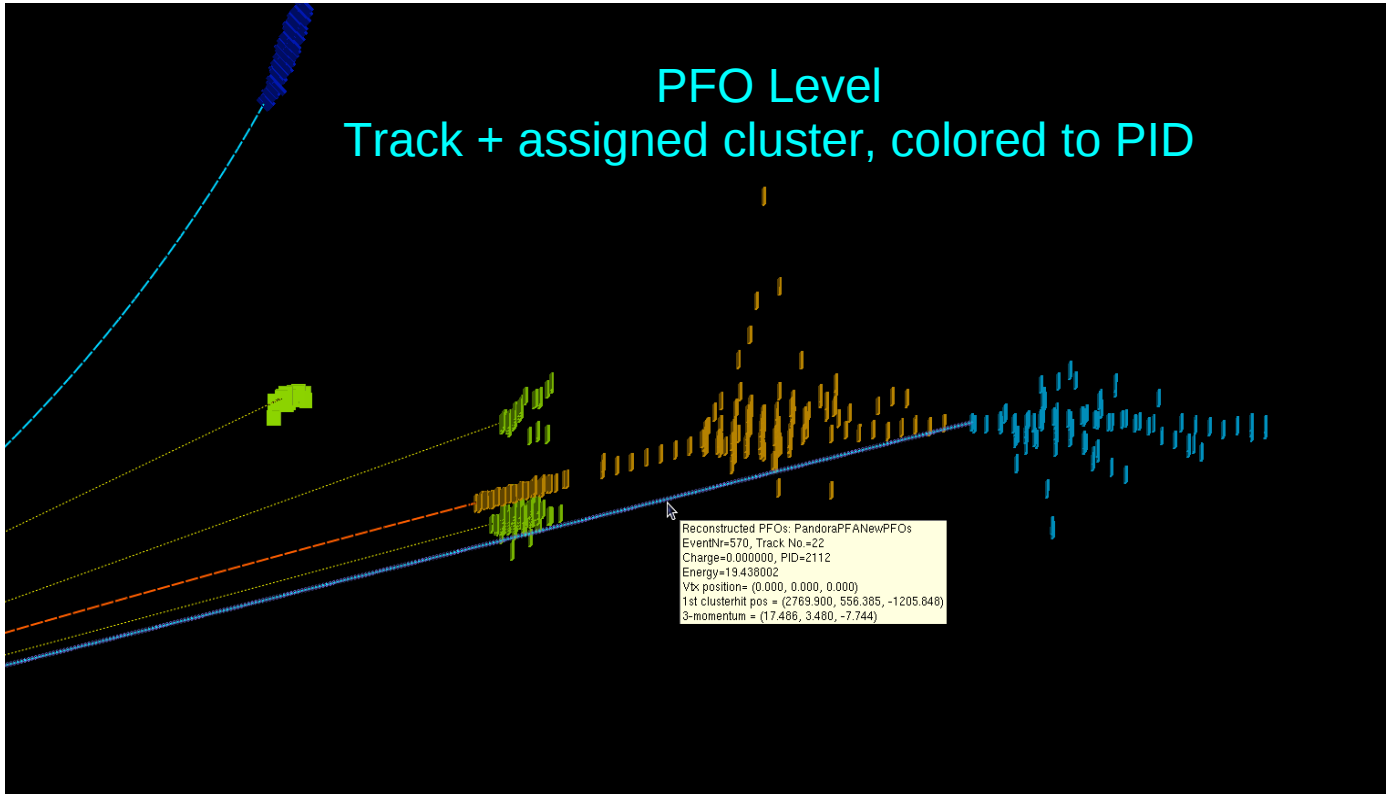
MCTruth level: 36GeV Pion

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

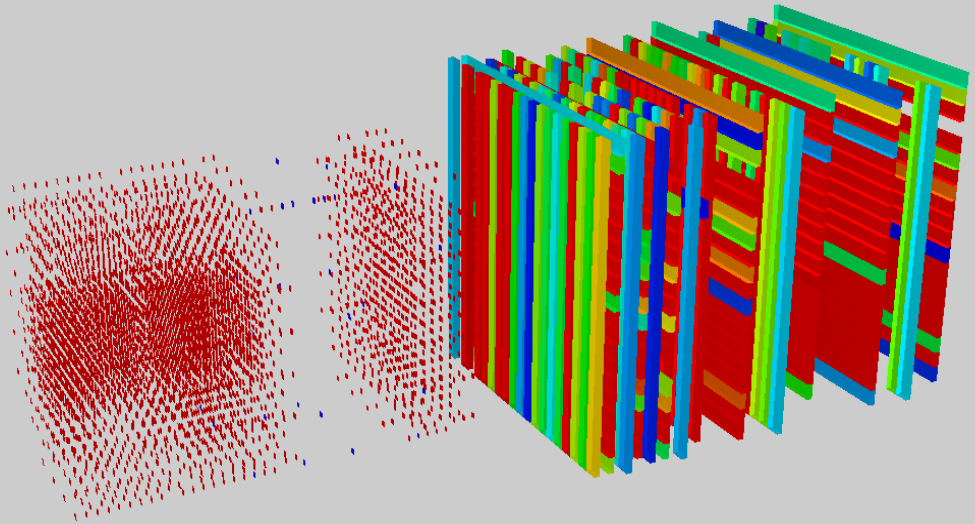
Splitting of hadron cluster: over estimated cluster energy + fake seed

07/10/2010

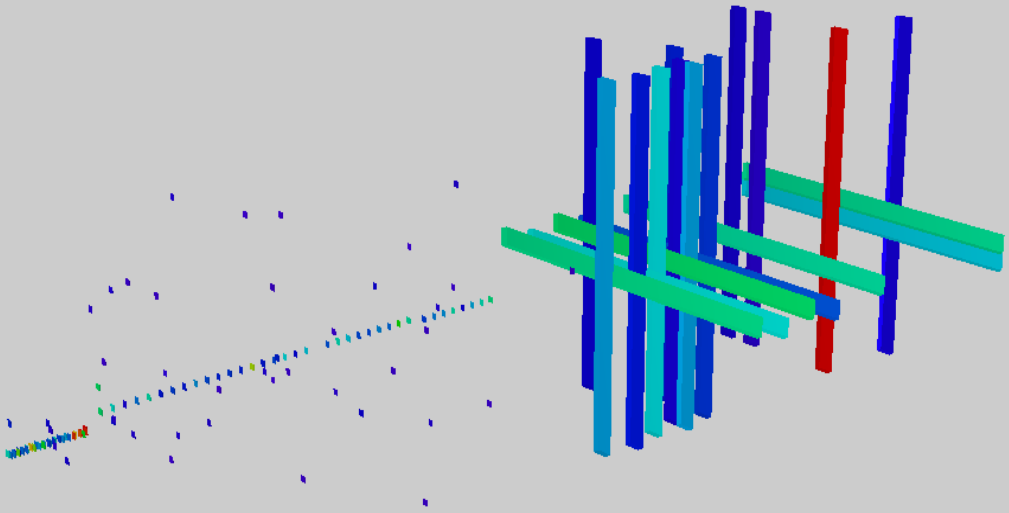


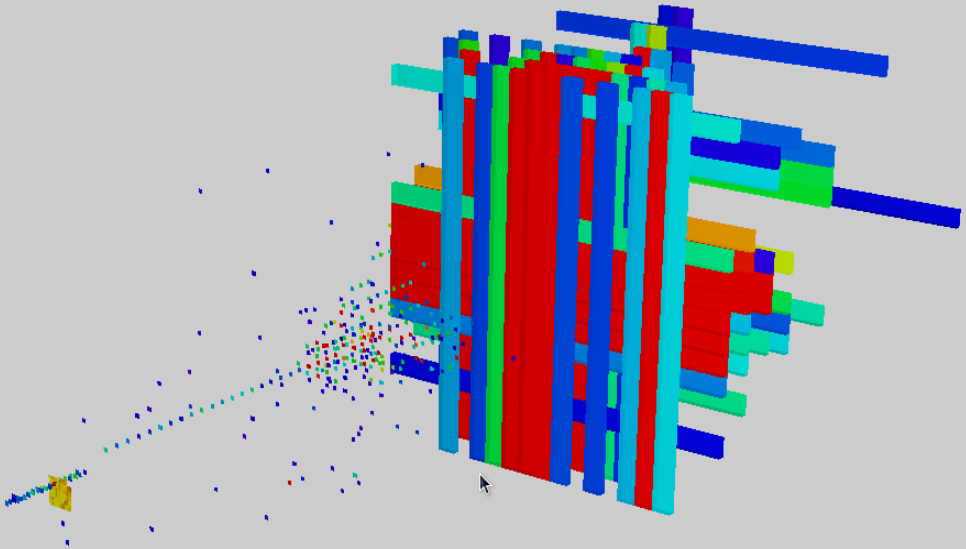
# CALICE TB events



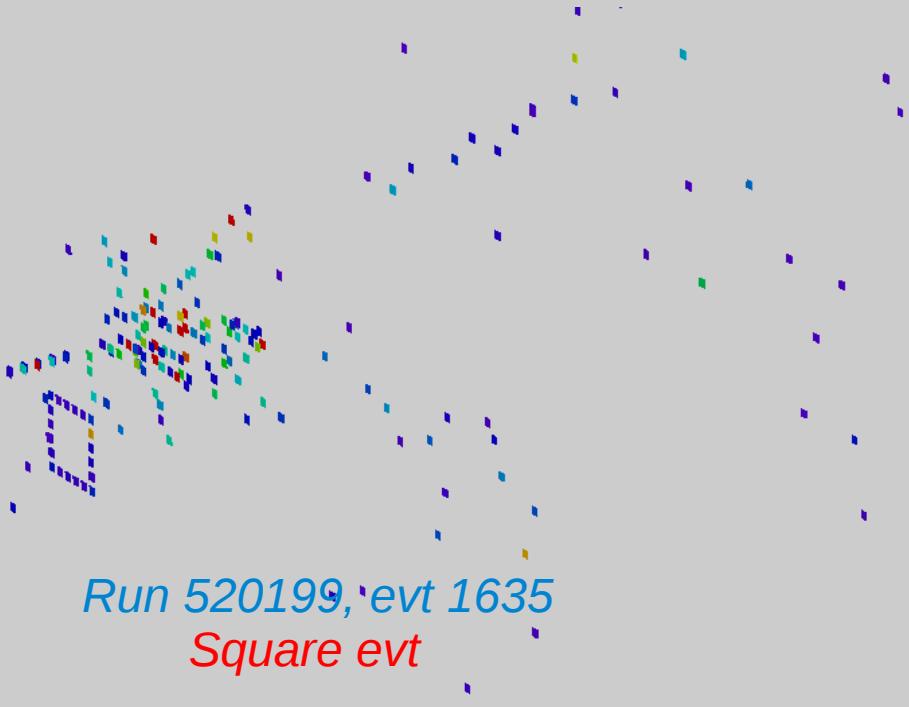
*Run 330437, self Calibrate evt*



*Run 330437, MIP evt:*
*Misalignment (?)*

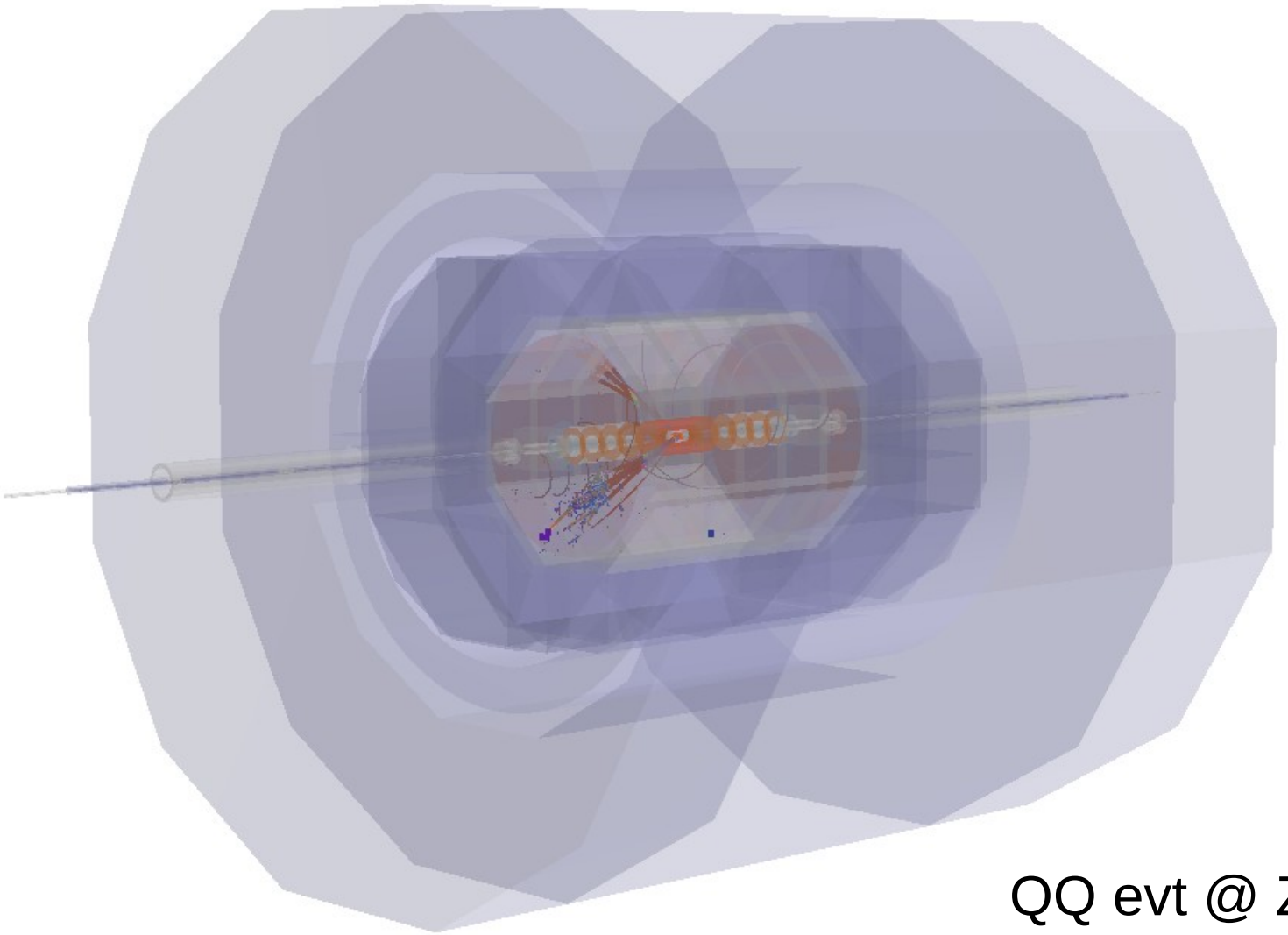


*Run 330437, pion evt:*
*noisy ECAL wafer*



*Run 520199, evt 1635*
*Square evt*

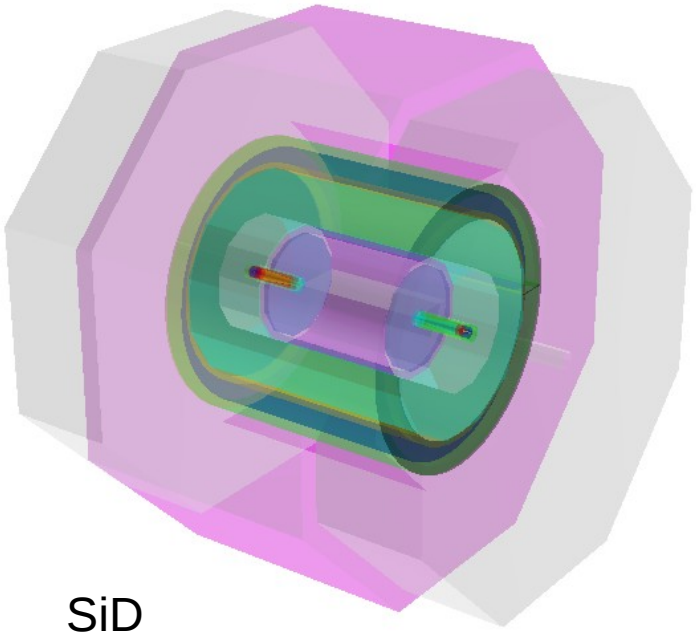
# GDML Geometry browser



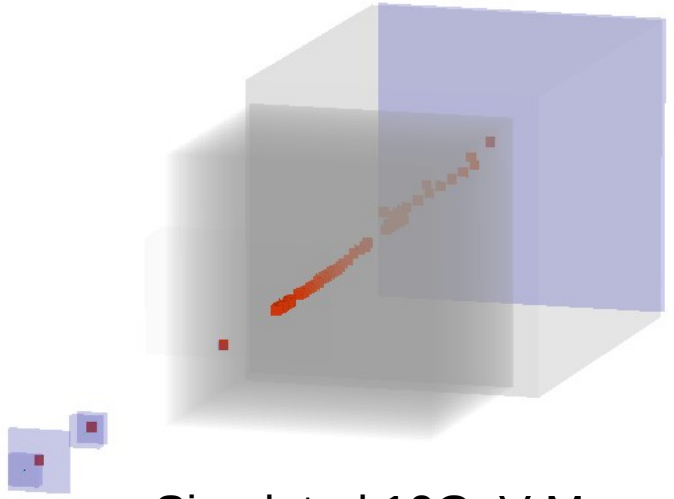
QQ evt @ Z Thr, ILD

*Available since Druid_1.8*

# Introduction



SiD

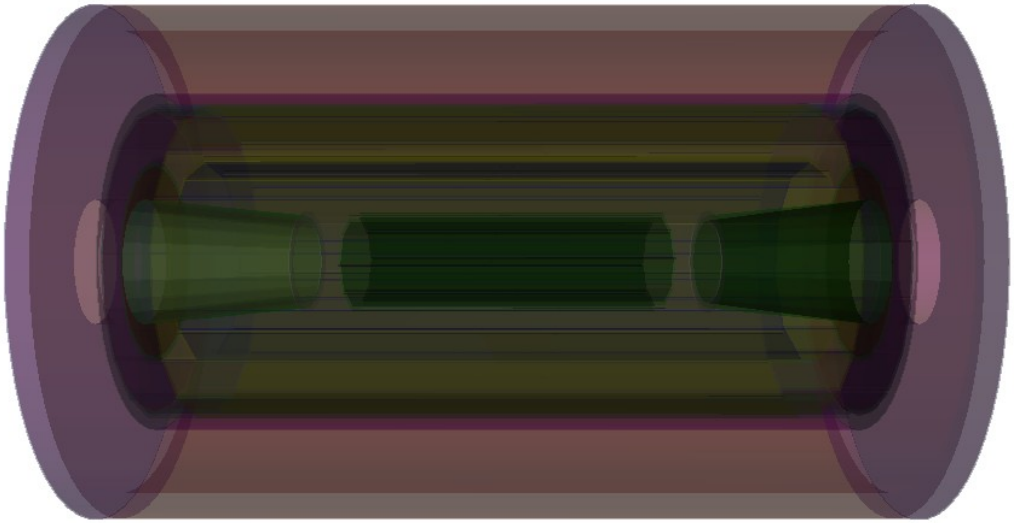


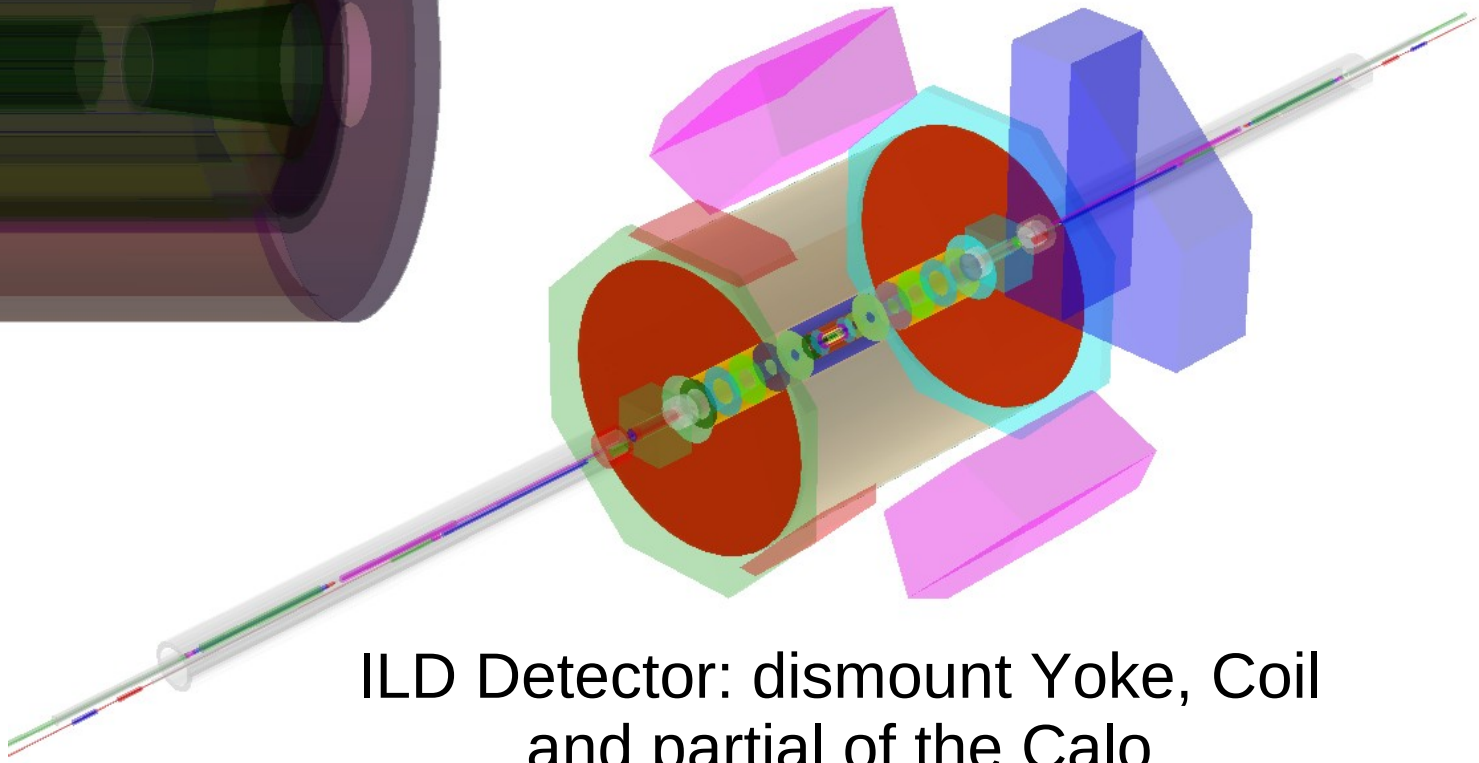
Simulated 10GeV Muon event with TBCern1006

- 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

# Examples

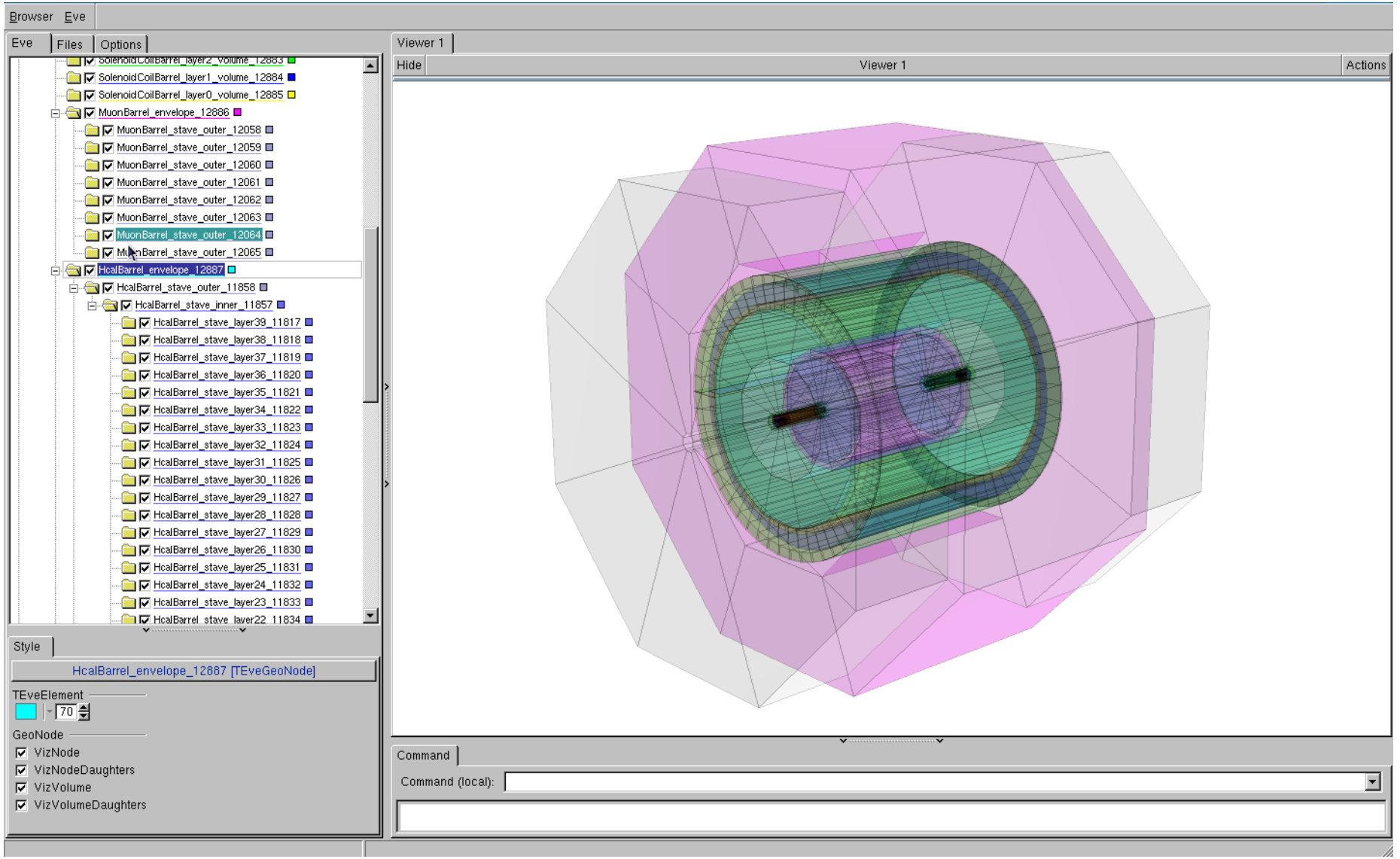
Inner Detector of ILD: Vtx, SiD
(*Num of Volumes > 700*)...





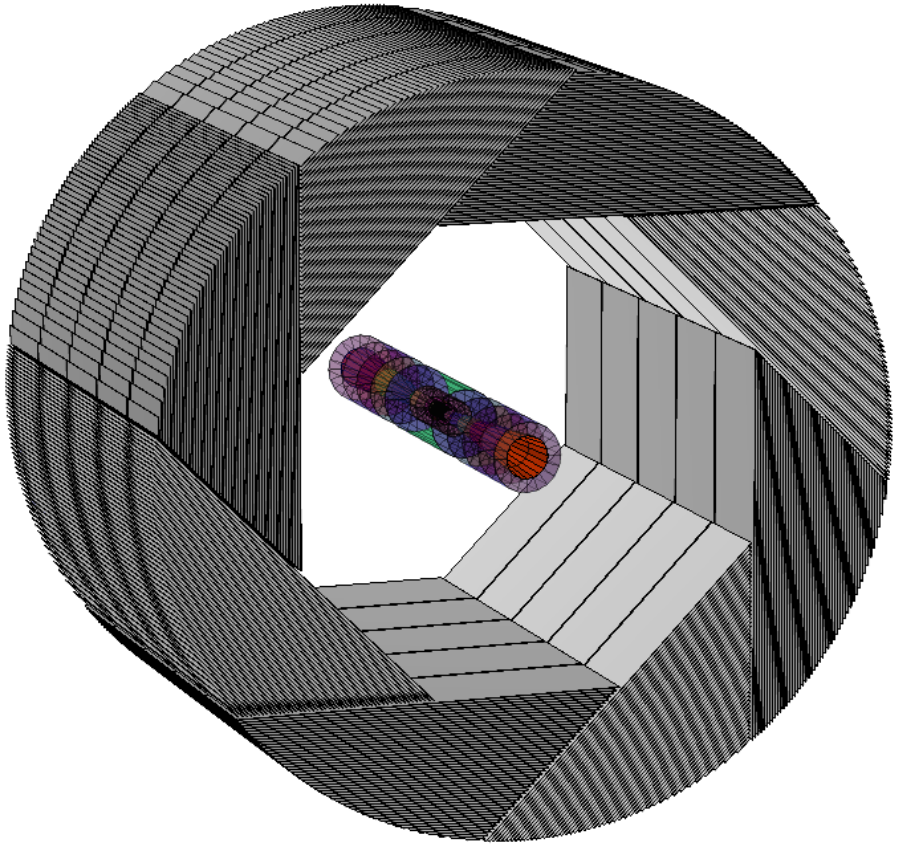
ILD Detector: dismount Yoke, Coil and partial of the Calo

# Display depth

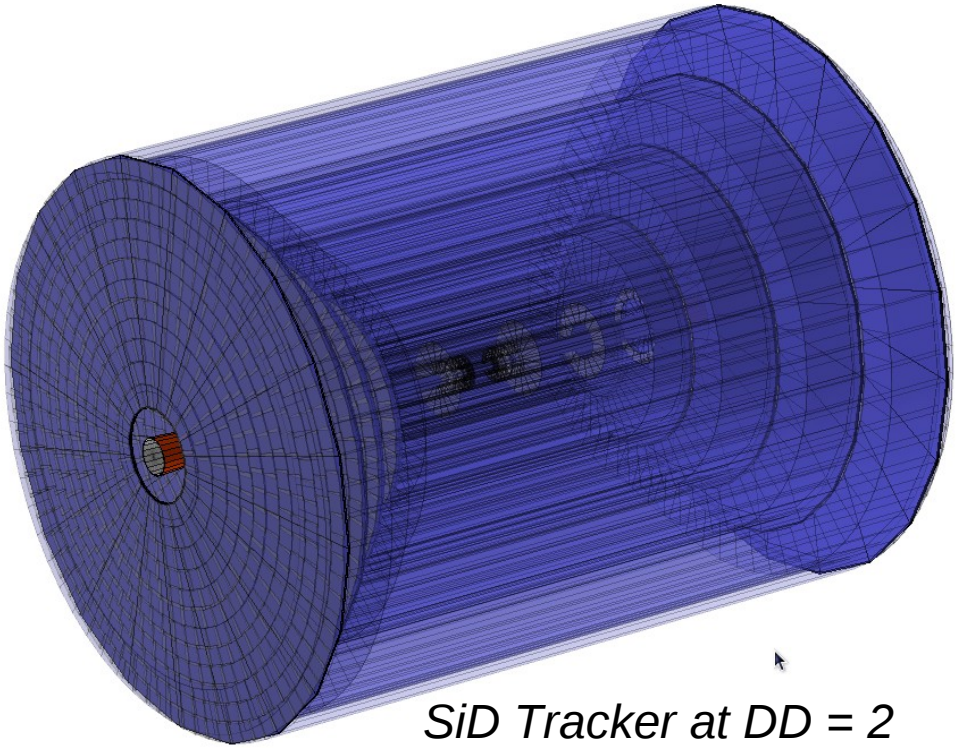



Hierarchy of geometrical volume in gdml file. Higher Depth = More detailed info

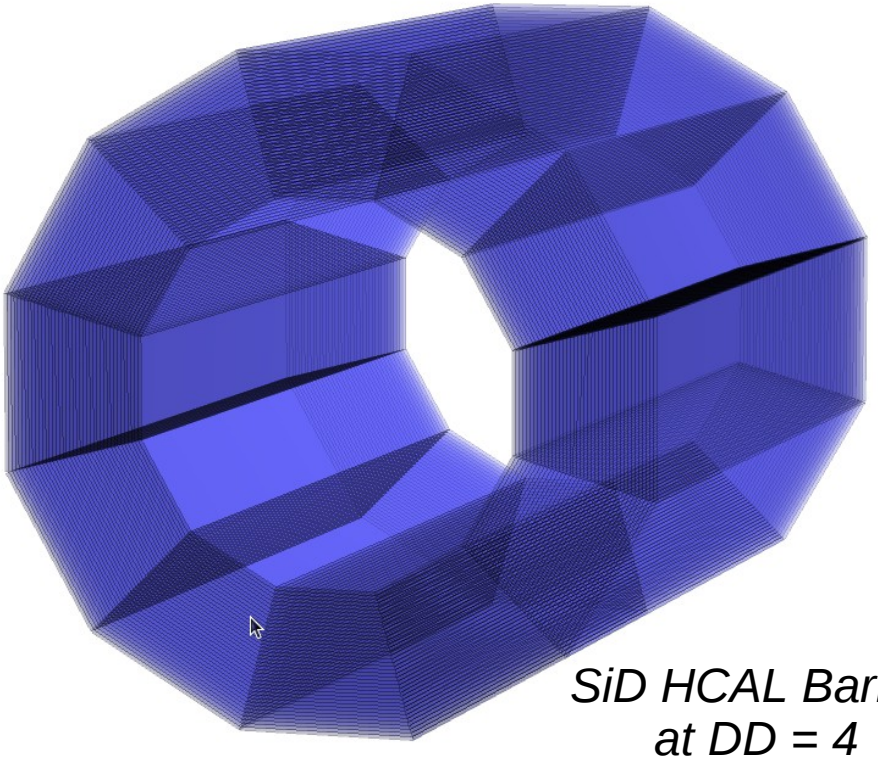
# Examples



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



*SiD Tracker at DD = 2*



*SiD HCAL Barrel*
*at DD = 4*

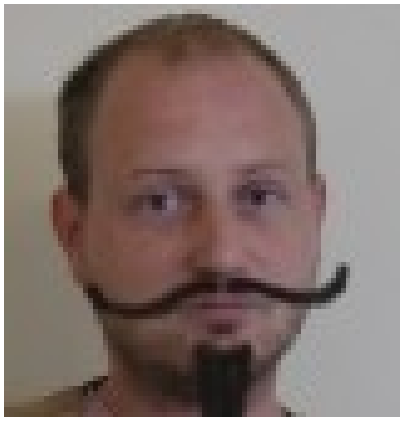
# Summary

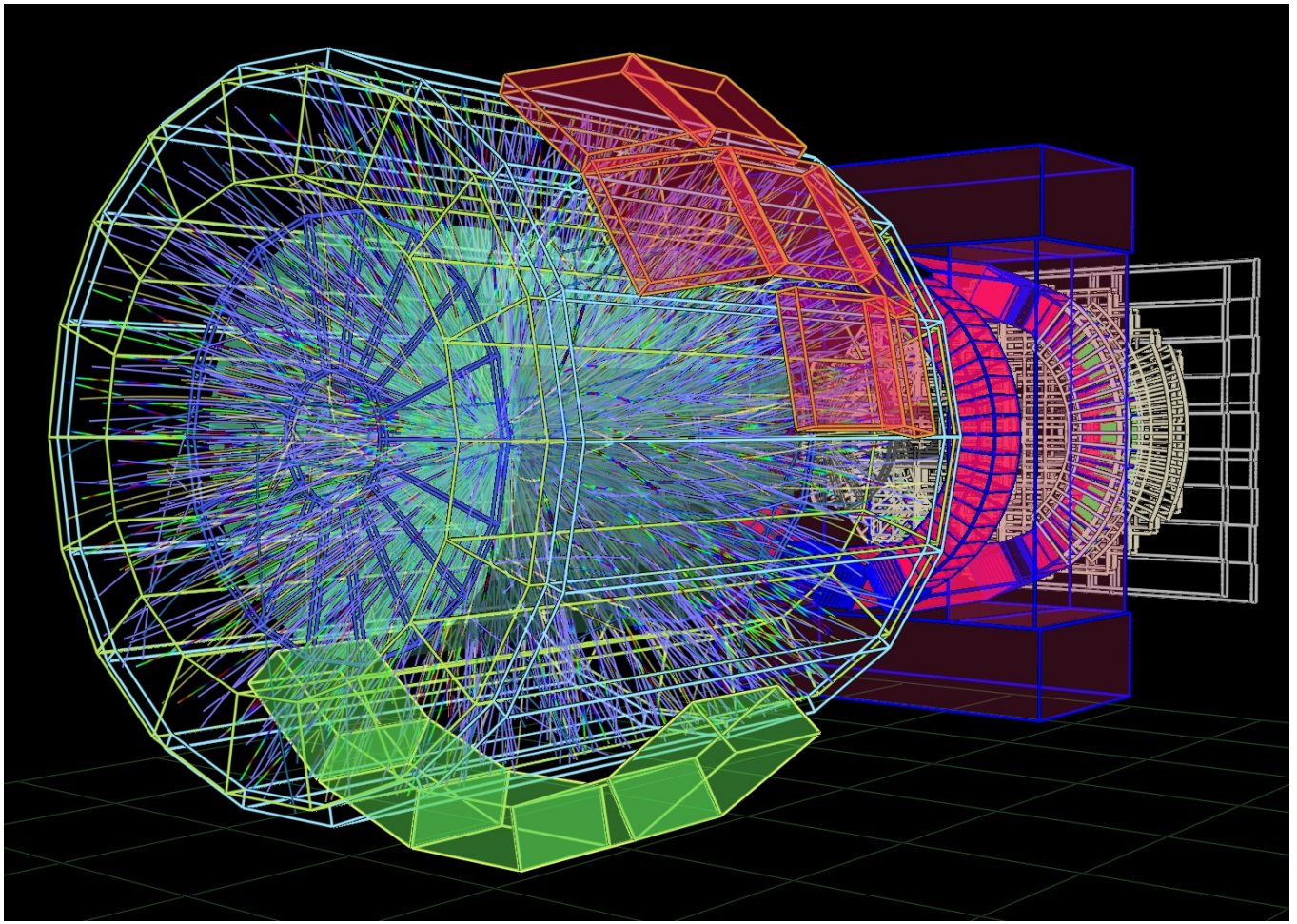
- **Druid is ready:** to visualize event information & detector geometry
  - Better understand event and reconstruction algorithm performance
  - With the gdml file, detector geometry could be visualized to simulation level

- Availability
  - DESY SVN server: svn co https://svnsrv.desy.de/svn/Druid/trunk Druid
  - LLRforge: svn co 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

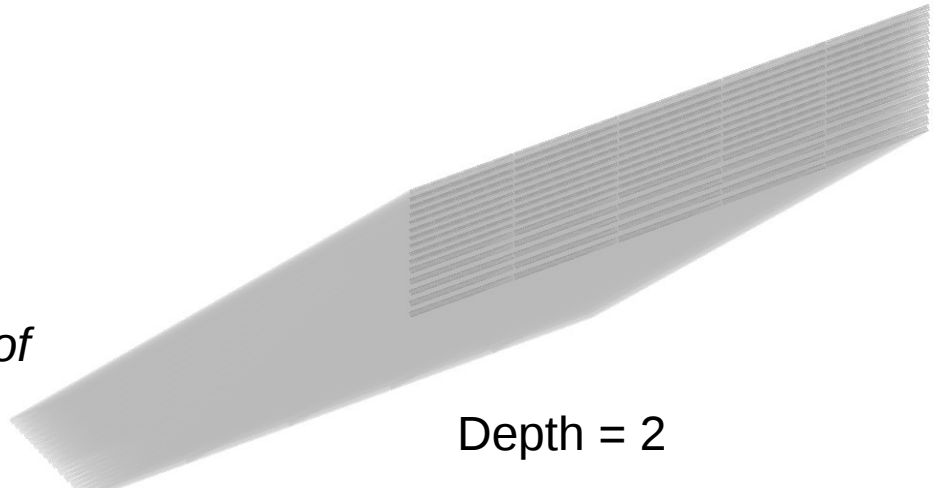
# Parameter managing

- 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*

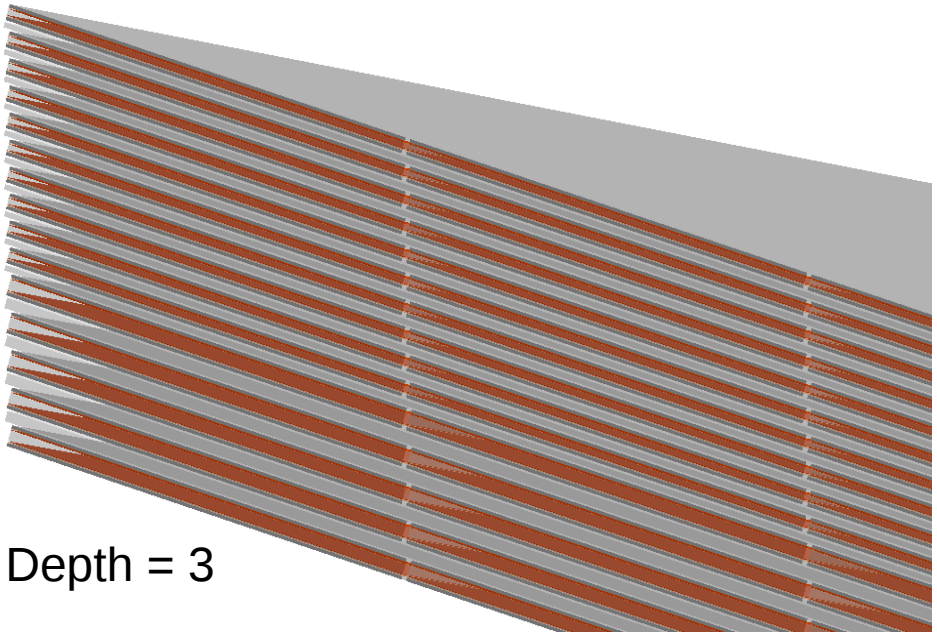
- Screen output with collection statistic and sub detector list

# Changing Display Depth

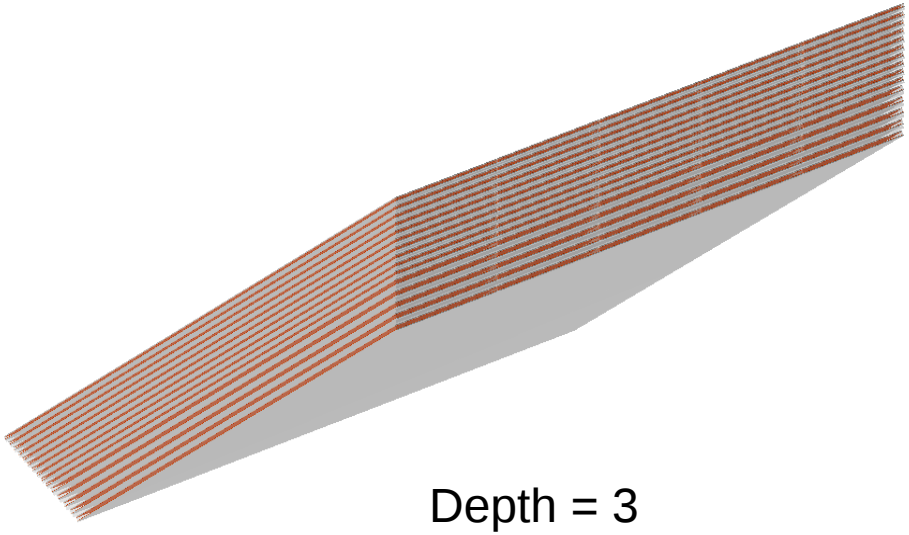
- ECAL Module:
  - *Depth = 1: Total Volume (fine for Event Display)*
  - *Depth = 2: Divided into different slabs*
  - *Depth = 3: Equip each slab with layers of different materials (simulation level)*



Depth = 2



Depth = 3



Depth = 3