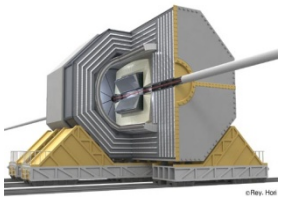
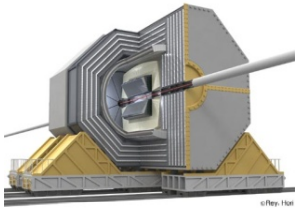
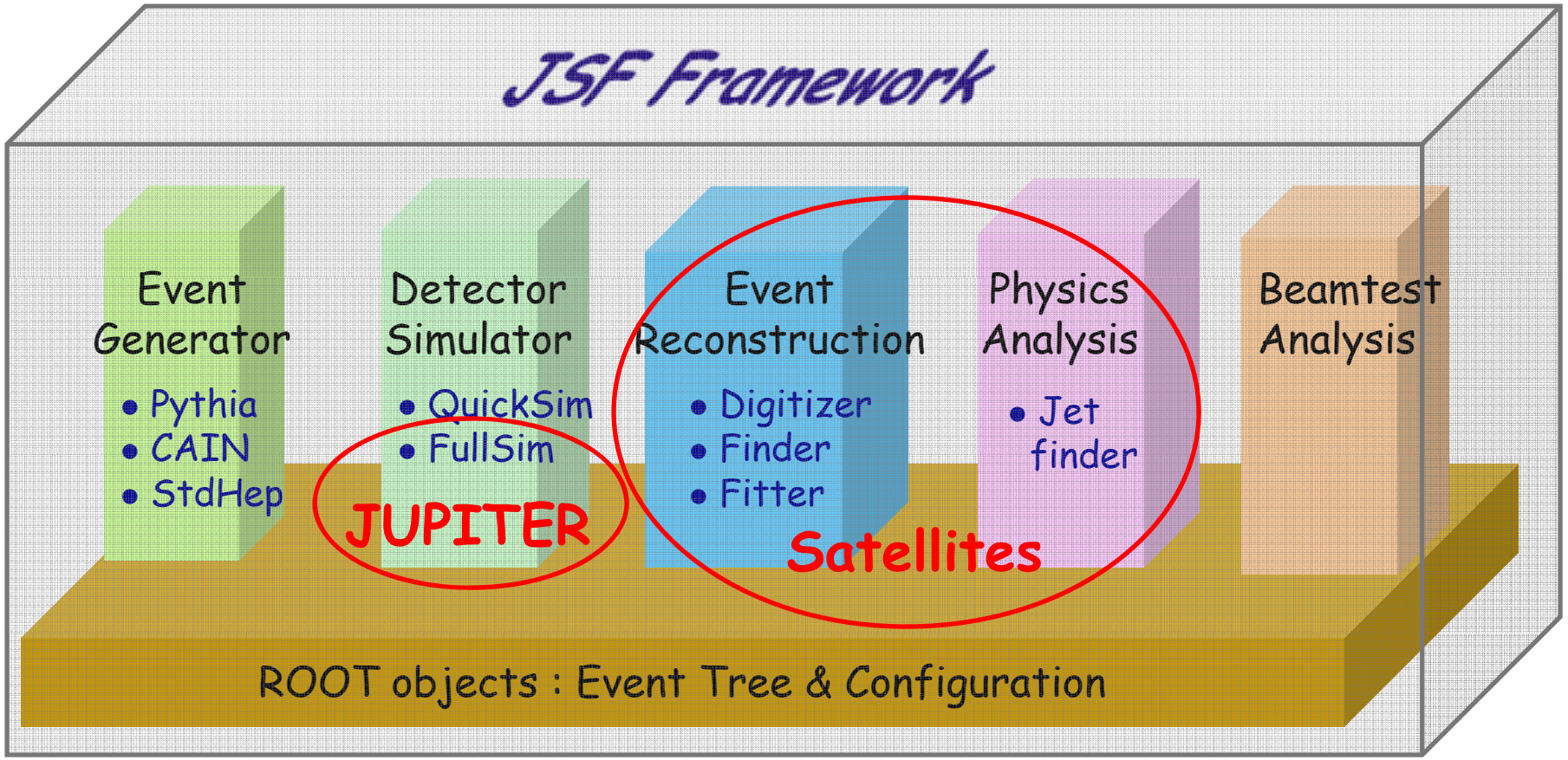


Jupiter and Satellites

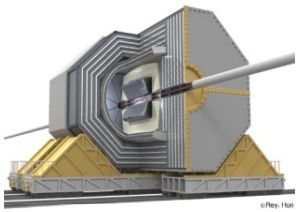
Akiya Miyamoto
4 March 2008
TILC08



Jupiter and friends



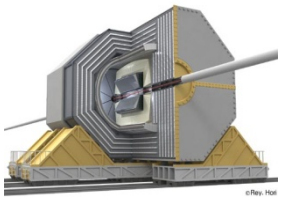
- Link to various tools at http://acfahep.kek.jp/subg/sim/soft
- GLD Software at http://ilcphys.kek.jp/soft
- All packages are kept in the CVS. Accessible from http://jlccvs.kek.jp/



JSF

- Framework: JSF = Root based application
  - All functions based on C++, compiled or through CINT
  - Provides common framework for event generations, detector simulations, analysis, and beam test data analysis
  - Unified framework for interactive and batch job: GUI, event display
  - Data are stored as root objects; root trees, ntuples, detector configuration in Jupiter run.

- Release includes other tools QuickSim, Event generators, beamstrahlung spectrum generator, etc.

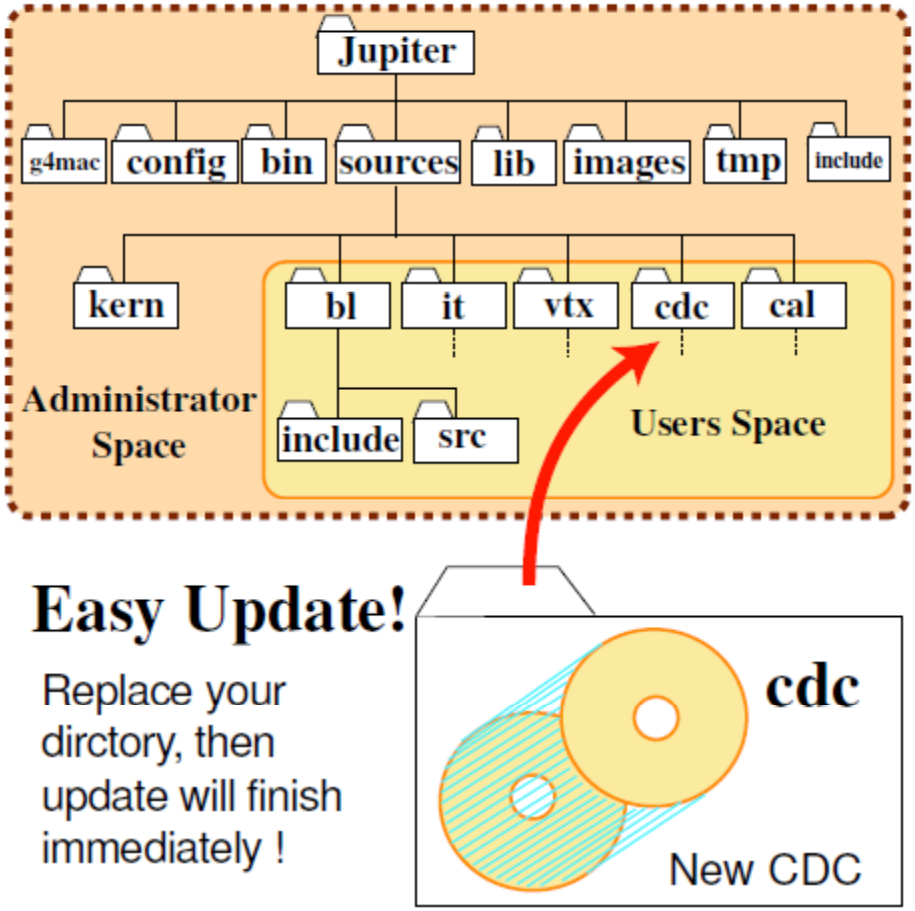


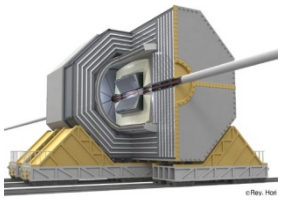
Jupiter feature - 1

- Currently using Geant4 9.1p1
  Physics List: LCPysicsList(Default)

- Modular structure
  ➔ easy installation of sub-detectors

- Geometry
  - Simple geometries are implemented
    (enough for the detector optimization)
  - parameters (size, material, etc) can be modified by an input ASCII file at run time
    → Parameters are saved as a ROOT object for use in Satellites later

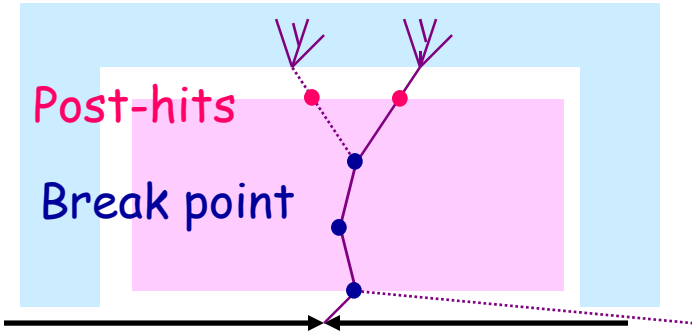




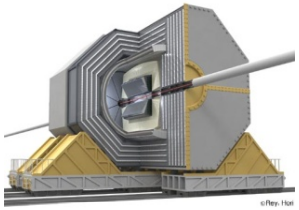
Jupiter feature - 2

- Input:
  - StdHep file(ASCII), HepEvt, CAIN, or any generators implemented in JSF.
  - Interface to StdHep: Prepared as a JSFModule, using StdHep 5.06.01
- Output:
  - Exact Hits of each detectors (Smearing in Satellites)
  - Pre- and Post- Hits at before/after Calorimeter

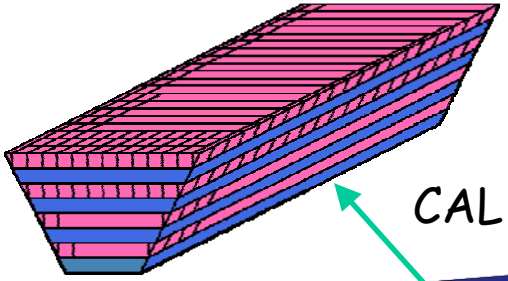
    Used to record true track information which enter CAL/FCAL/BCAL.
  - Break points in tracking volume
  - Output in LCIO Format is through a JSFModule



- Run mode:
  - A standalone Geant4 application
  - JSF application to output a ROOT file.

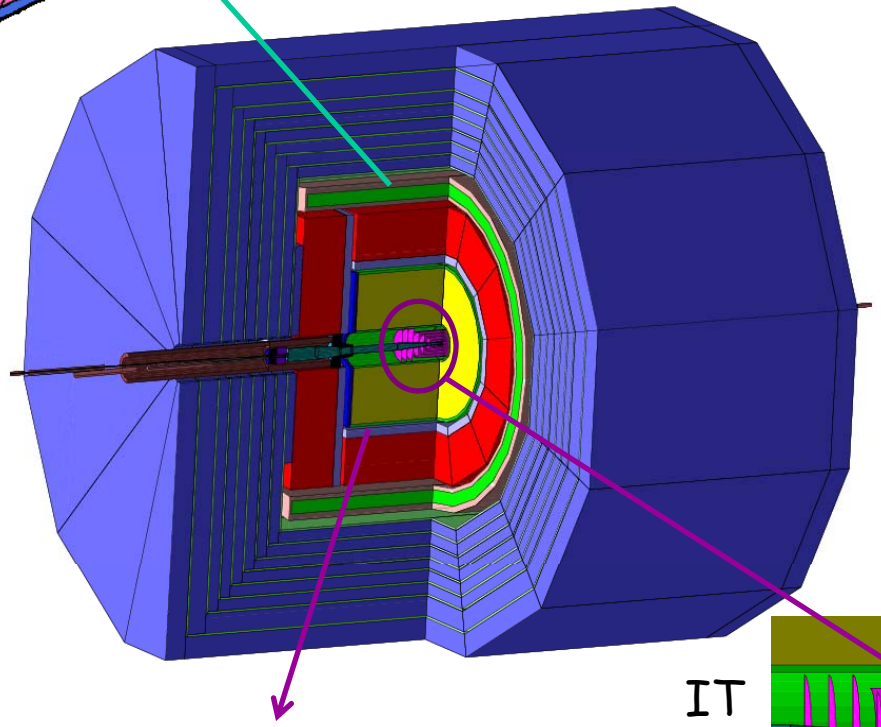


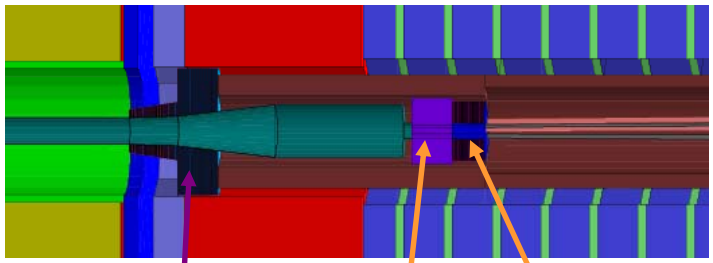
GLDPrime_v03 in Jupiter



- Updates since since GLDPrime_v02 (Jan 08)
  - Parameters for VTX, TPC, CAL, Coil, MUD are updated.

CAL module



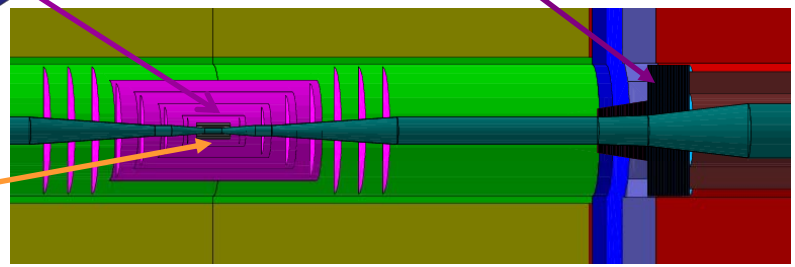


FCAL

CH2mask

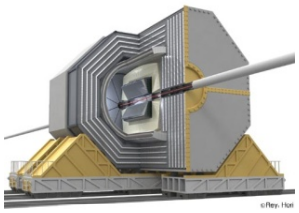
BCAL

IT

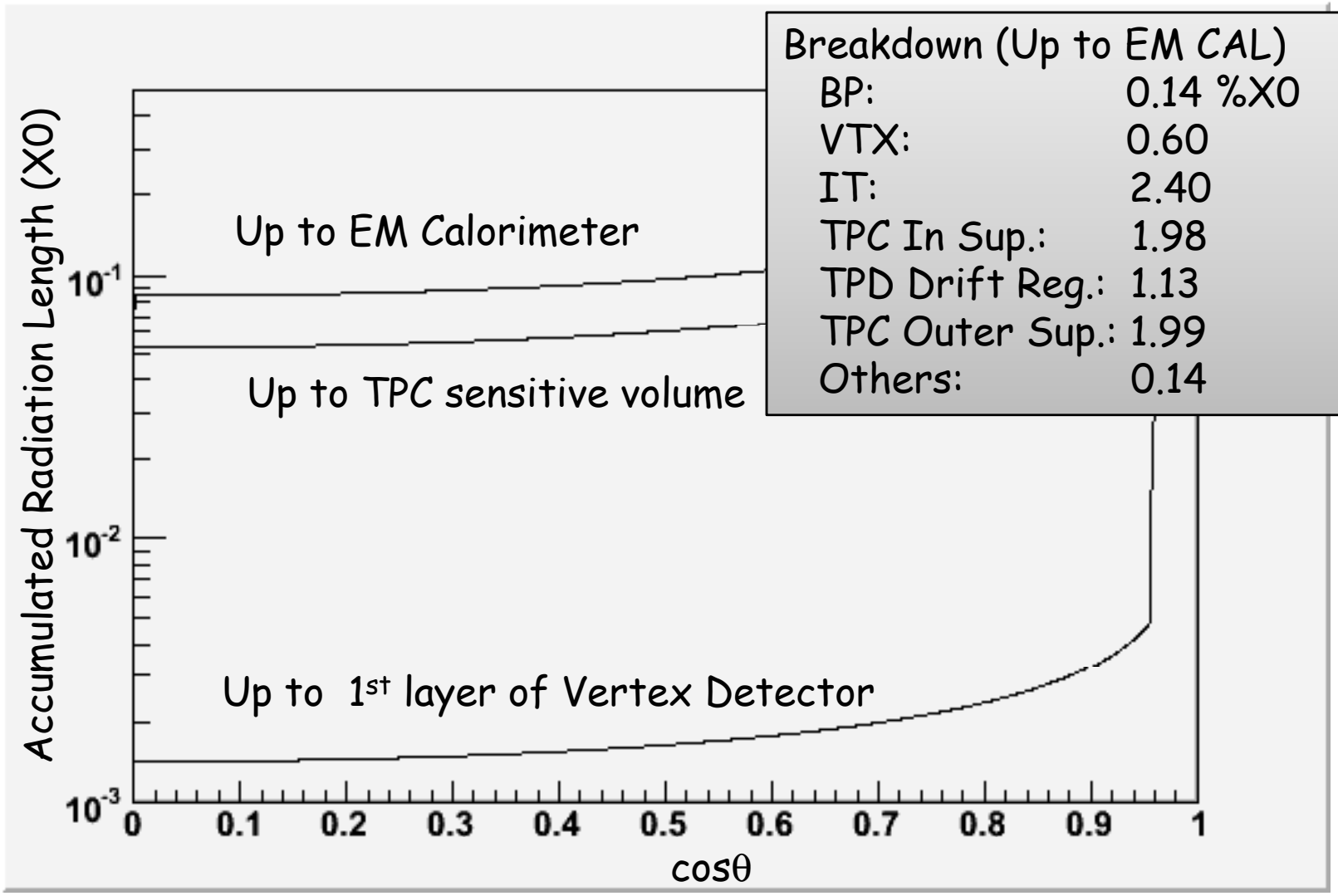


Barrel-Endcap
10cm gap

VTX

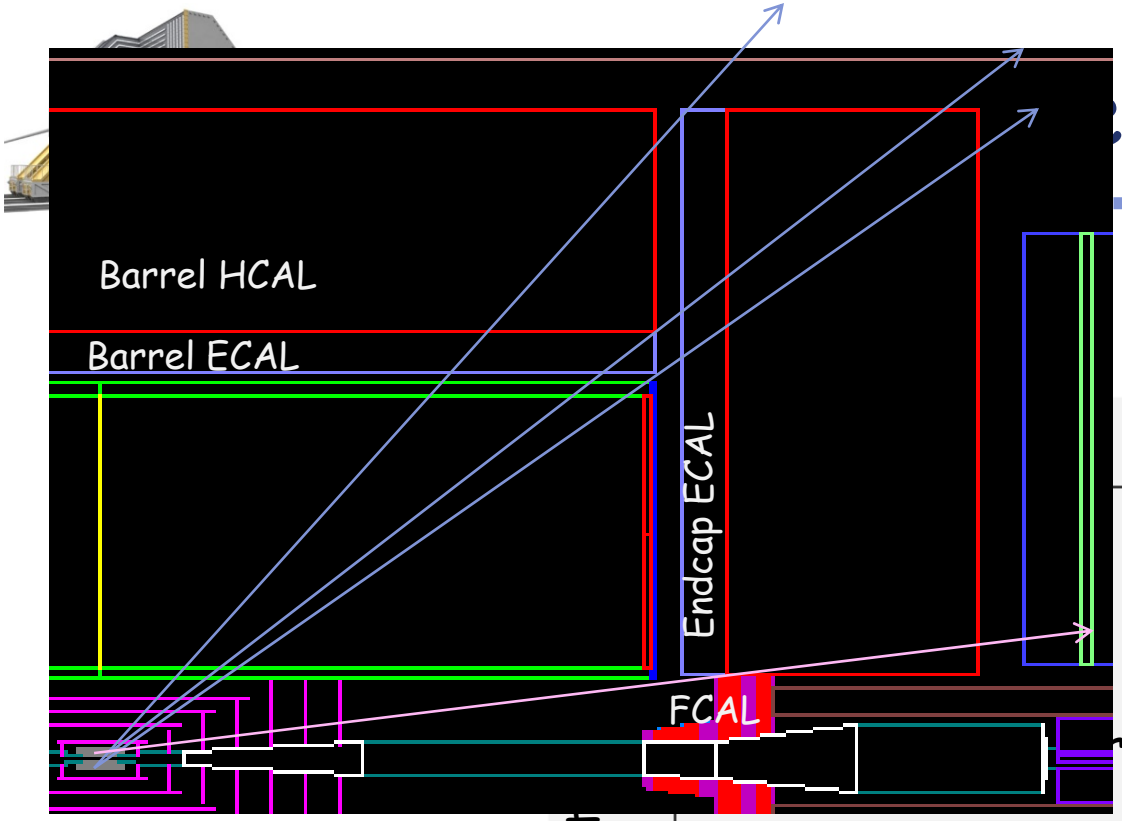


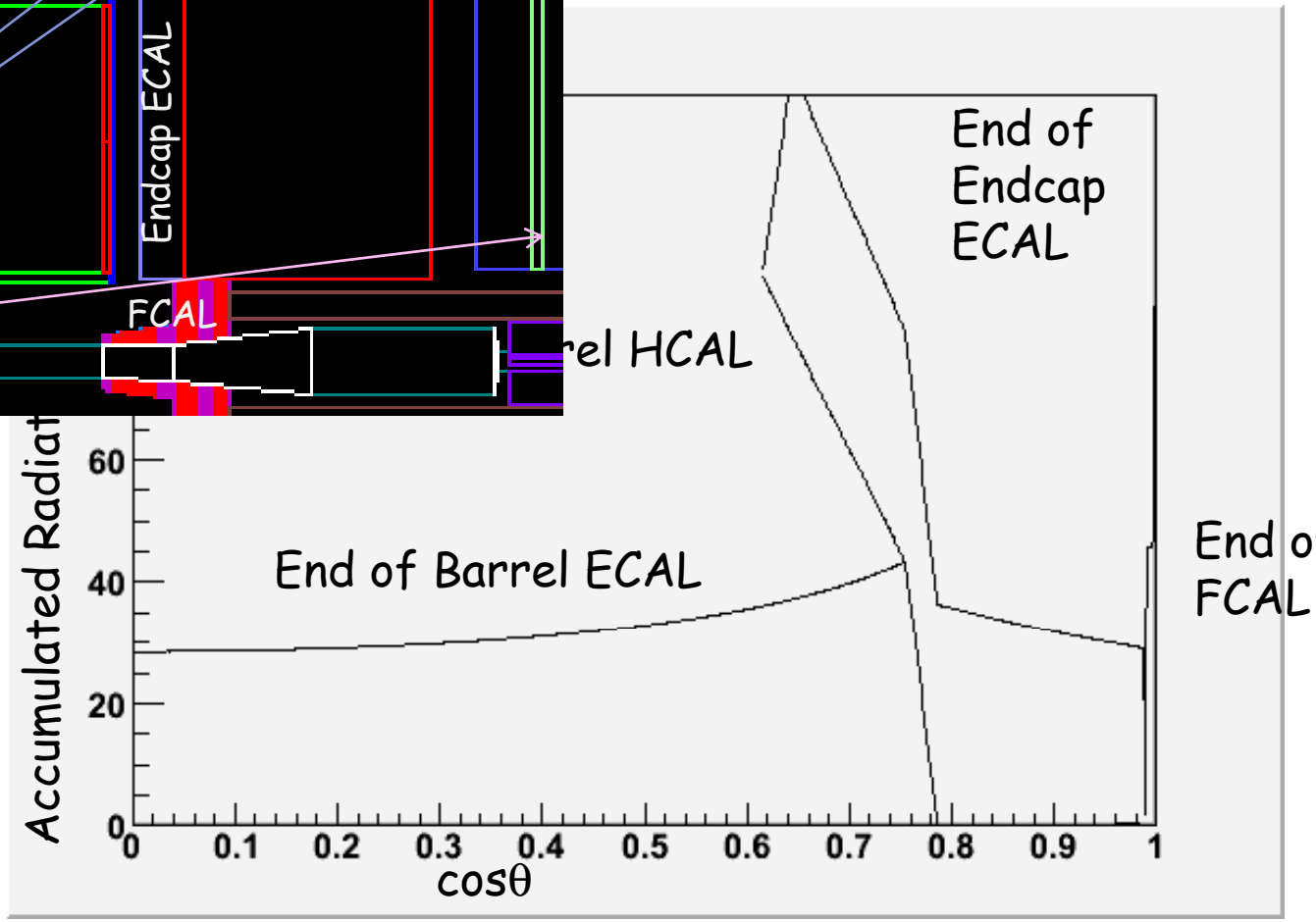
GLDPrim: Materials in X0

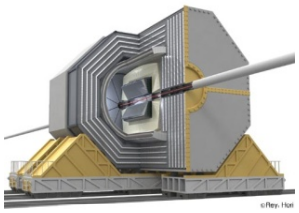


Breakdown (Up to EM CAL)	
BP:	0.14 %X0
VTX:	0.60
IT:	2.40
TPC In Sup.:	1.98
TPD Drift Reg.:	1.13
TPC Outer Sup.:	1.99
Others:	0.14

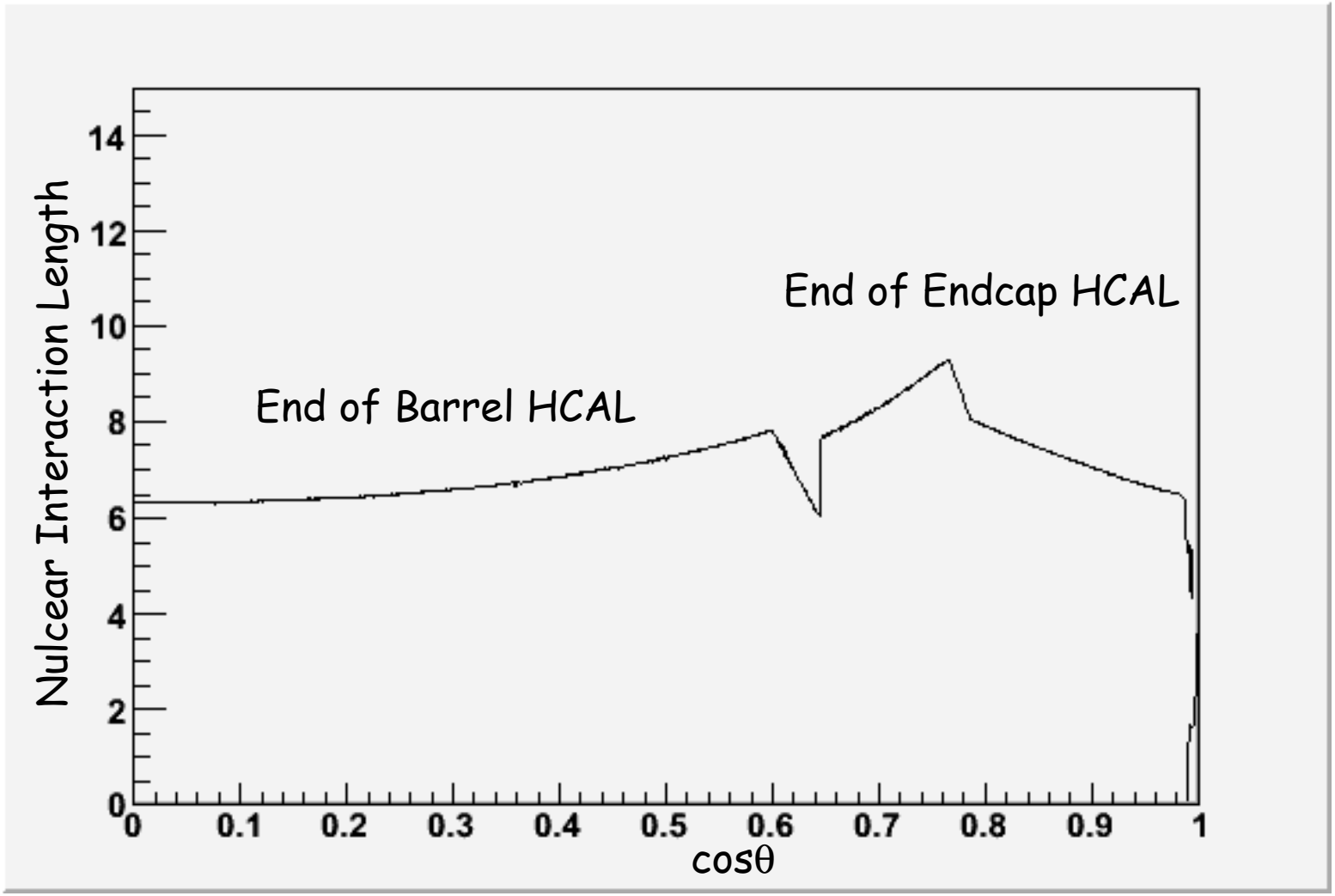
ss in GLDPrim

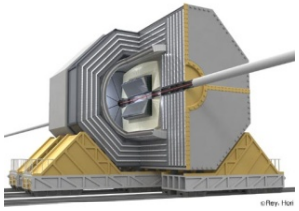




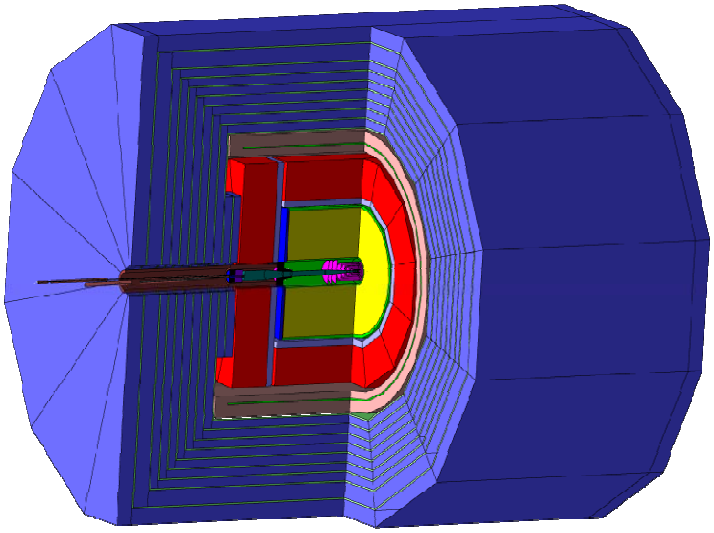


Nuclear Interaction Length

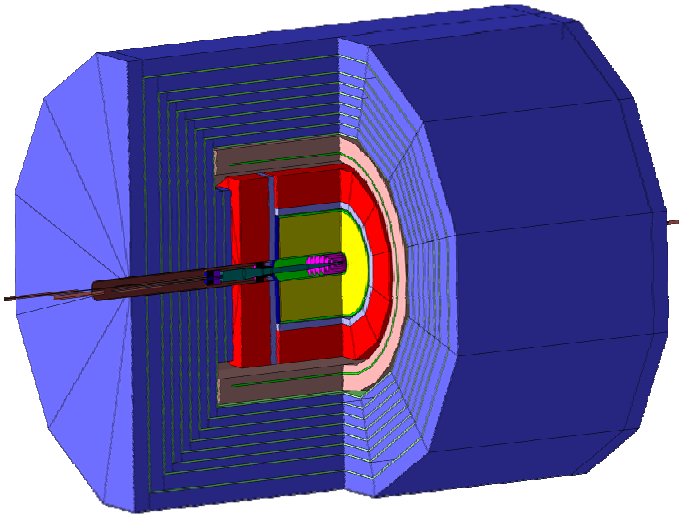




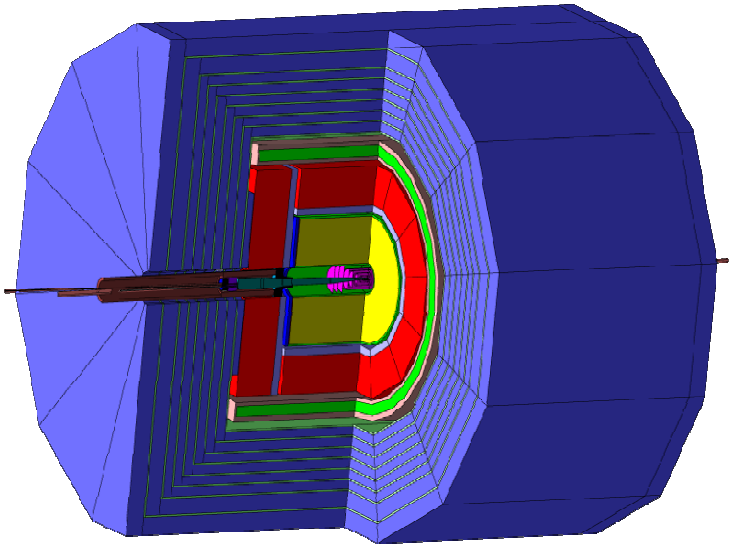
GLD/GLDPrim/J4LDC



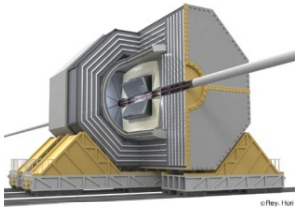
GLD
B= 3 Tesla
Rmin(ECAL)
=400cm



J4LDC
B=4 Tesla
Rmin(ECAL)=160cm



GLDPrim
B=3.5 Tesla
Rmin(ECAL)=185cm



Satellites package

- Satellites is a collection of reconstruction tools for Jupiter data.
- Run as a JSF module, i.e,
  - Jupiter data and reconstructed results are saved in a ROOT tree.
  - Each module is relatively independent, thus easy to implement different reconstruction algorithm according to user interests
- Package includes
  - IO: Geant4 objects to ROOT objects/ Interface to LCIO (Output)
  - Hit digitizer: Mostly simple smearing of exact hits

    CAL hit maker : include a cell signal merger for strip configuration
    Run Jupiter with 1cmx1cm tile size and merge cell signals in Satellites
  - Cheated track finder and Kalman fitter for TPC, IT, and Vertex
  - Cheated PFA
  - Realist PFA (GLD-PFA)
  - Jet clustering

LCIO Interface

T.Yoshioka

- An interface which converts Jupiter output to LCIO format has been implemented.

- Jupiter data reconstructed by ilcsoft v01-03. (includes LDCFullTracking and PandoraPFA v02-01)

Ejet	JER ($\cos\theta < 0.7$)
45 GeV	30.1 ± 0.3
175 GeV	45.9 ± 0.7