# Status of software developments in Asia

Presented by Akiya Miyamoto, KEK
at UTA, 11-Jan-2003

based on works done by ACFA Soft group
for details, please see http://acfahep.kek.jp/subg/sim/index.html

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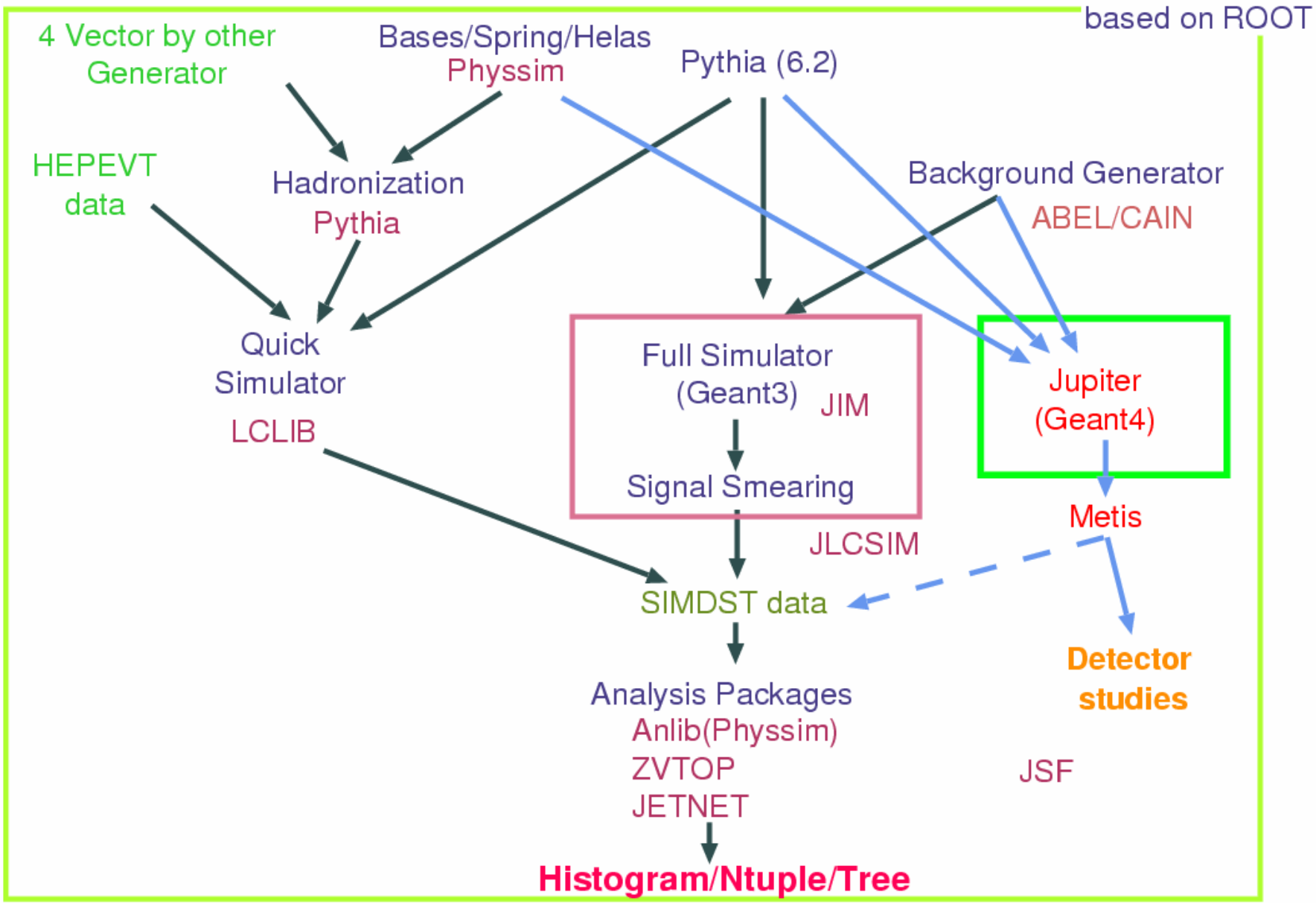
# Software packages for JLC study

- LCLIB: Quick Simulator and old fortran utilities
- JLCSIM: Geant3 based full detector simulation
- JSF : JLC Study Framework based on ROOT
- Physsim: Event generators based on HELAS and
  Analysis packages consists of Jet Clustering and
  four vector manipulation
- Jupiter: Geant4 based full simulator

Package information : http://acfahep.kek.jp/subg/sim/softs.html

Latest versions are availabe at CVS repository ( jlccvs.kek.jp )

# JSF and related packages



# JSF Features - 1

1. JSF is based on ROOT
   - ☛ User needs to lean just one language, C+

2. JSF provides a framework for modular analyses
   - ☛ Common framework for event generation, detector simulation, and analyses.
   - ☛ Same framework for beam test data analysis

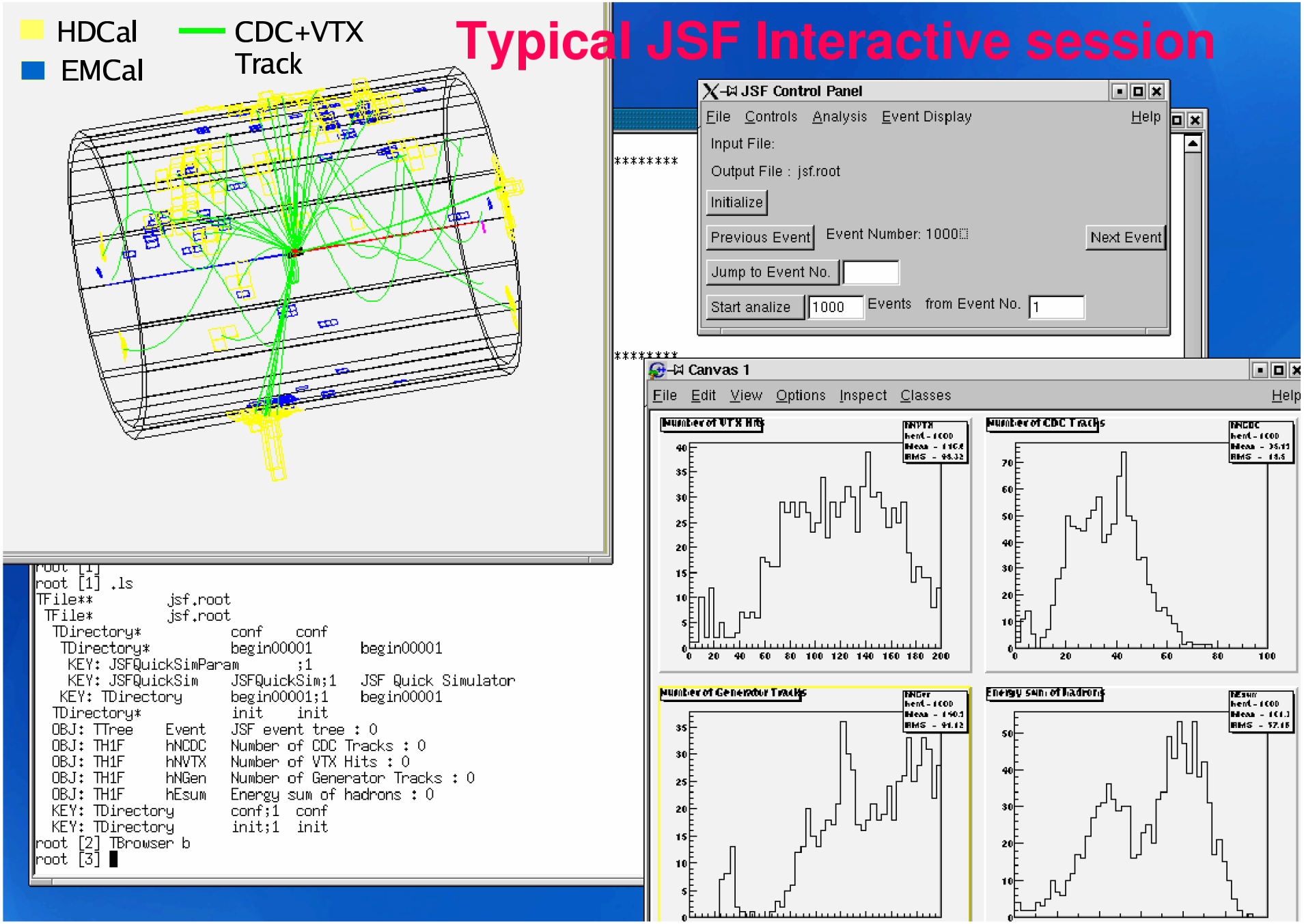
3. Unified framework for interactive and batch jobs
   - ☛ GUI for control of an interactive run
     Histogram and event display packages included
   - ☛ A file similar to .rootrc is used to set parameters
     Default values an be overidden by command line argument at run time.

# JSF Features - 2

1. Object I/O
   - ☛ Each modules can save/read their event data as branches of a root tree.
   - ☛ Job parameters, histograms, ntuples and private analysis tree can be saved in the same file

2. Packages
   1) Included in the release
      - ☛ Pythia6.2, Bases/Spring++, ZVTOP, JETNET, BSGEN
   2) Provided as separated packages
      - ☛ Physsim (Event generators and analysis utilities)
      - ☛ LCLIB (QuickSim, Helas)
      - ☛ JIM (Geant3)
      - ☛ Jupiter (Geant4)

# Typical JSF Interactive session

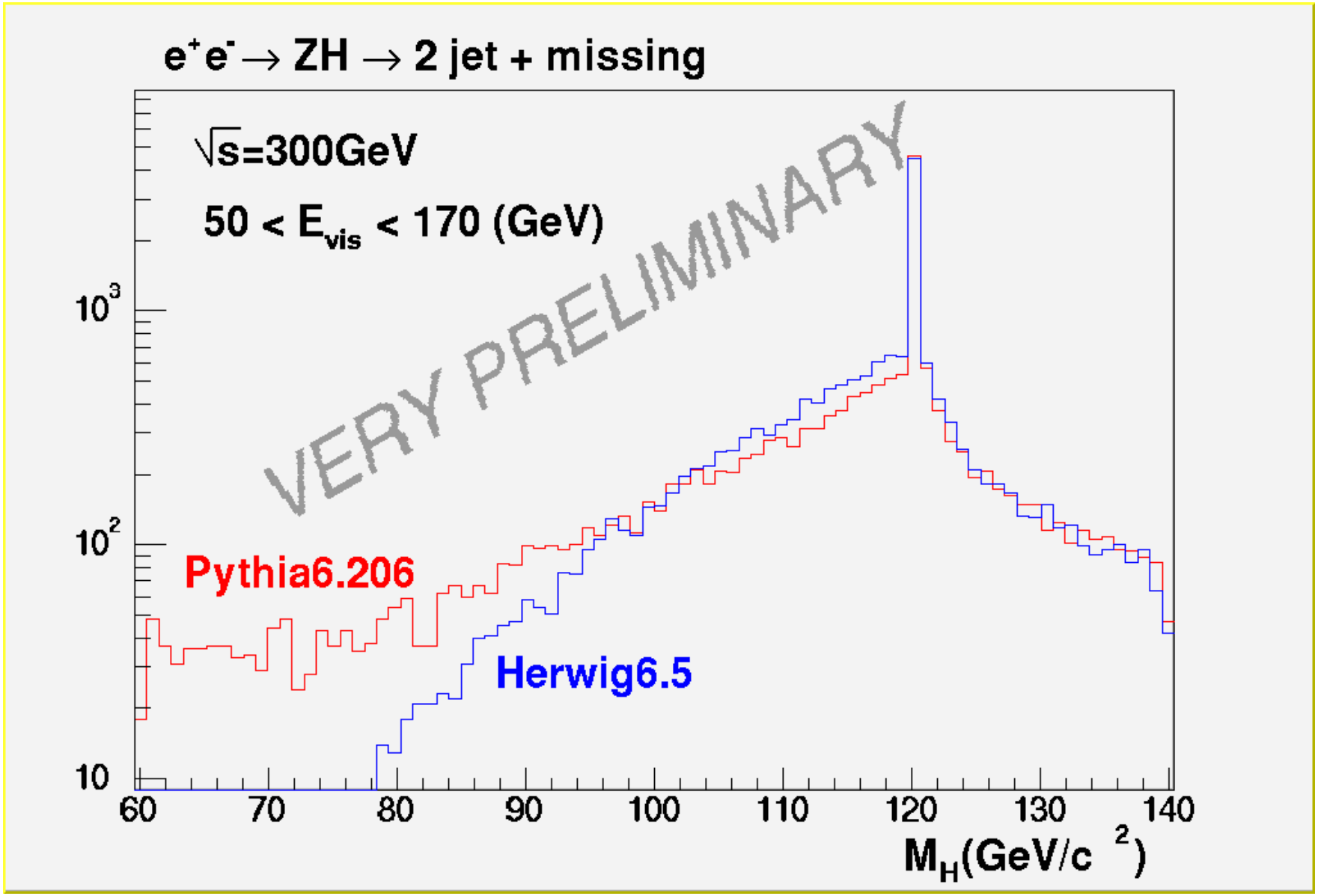


# JSF: Recent updates and plan

JSF is stable and very few modifications

1. Adapt RedHat 8.0 : gcc2.96 → gcc3.2
2. Automated Package Valitator
   - Currently test a build on RedHat7.2 automatically when a change in CVS is detected in every morning.
   - Planning to run also on AIX, MaxOS, and RedHat 7.2
   - Planning to run a test job
3. Implementing interfaces to generators
   - Interface to HERWIG6.5 has been installed, need validations and comparisons with other generators.
   - Interface to GRACE is in progress.
4. JSF and Quick Simulator is started to run in Java enviroment. Thanks to M.Ronan.

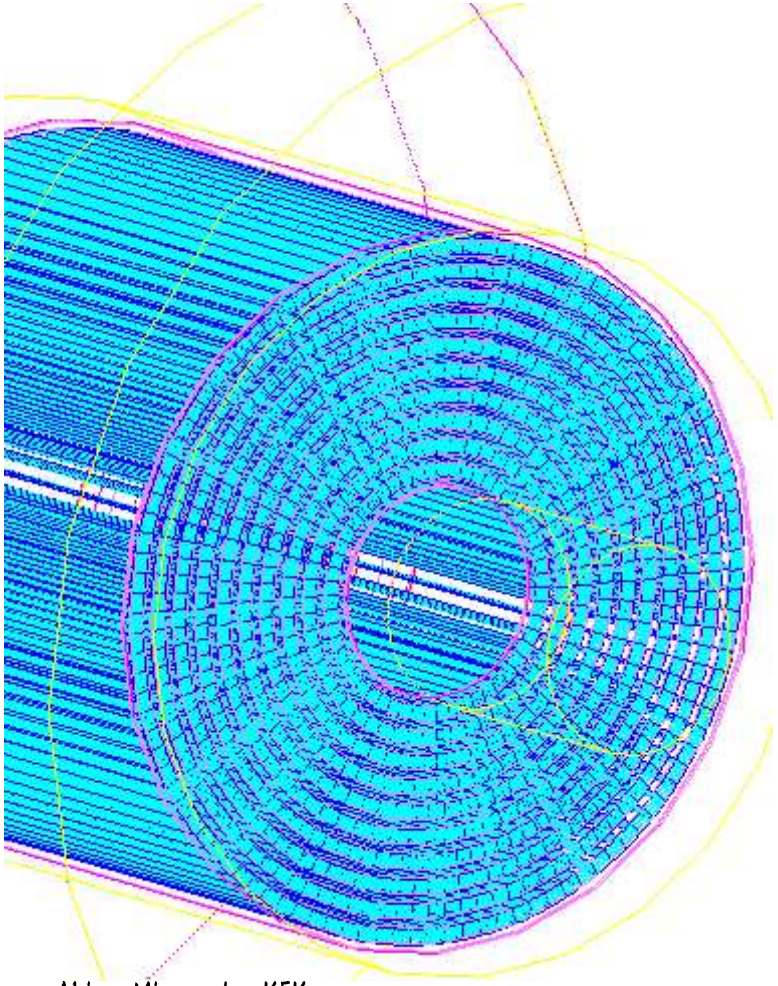
# Higgs/Pythia comparison



# JUPITER

## JLC Unified Particle Interaction and Tracking EmulatoR

Core Developper: K.Hoshina and K.Fujii



- Role
  Generate Monte-Calro Truth
- Features
  - Modular structure for easy update and install/uninstall of sub-detectors
  - Unified class interfaces to assemble, install and switch on/off sub detectors
    →easy to update sub-detector configurations
- Status
  - CDC Streo wire geometry has been developped
  - BDS, IR, VTX : Full geometry
    by T.Aso, M.Iwasaki,
  - CAL, IT : dummy
- Future plan
  - Parameter setting using XML

# Vertex Detector Designs

- Vertex detector consists of (Fig.1)
  - Layer – **Ladder** – **Sensor** –Epitaxial/Substrate- **PixelArea-Pixel**
- Parameters in ParameterList class
  - Size of sensors , number of pixels
  - Number of layers / ladders / Sensors
  - Radius of layers
  - Tilt angle of ladder
  - Sensitive detector choice

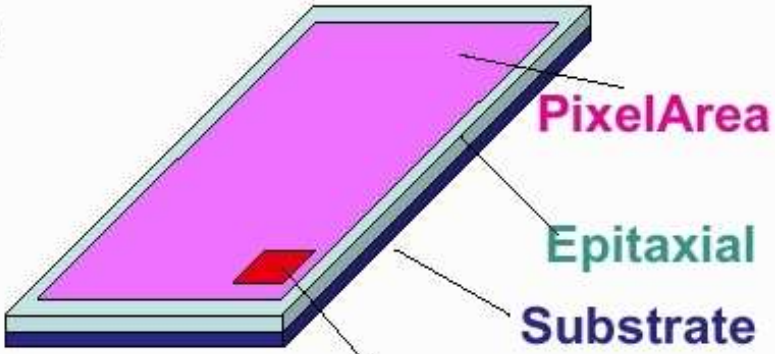


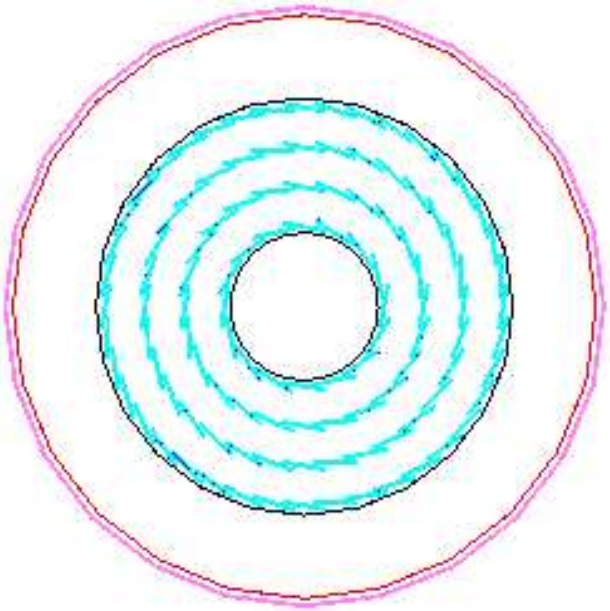
Fig.1 Sensor

- Easy to change into different configuration,
  Study items

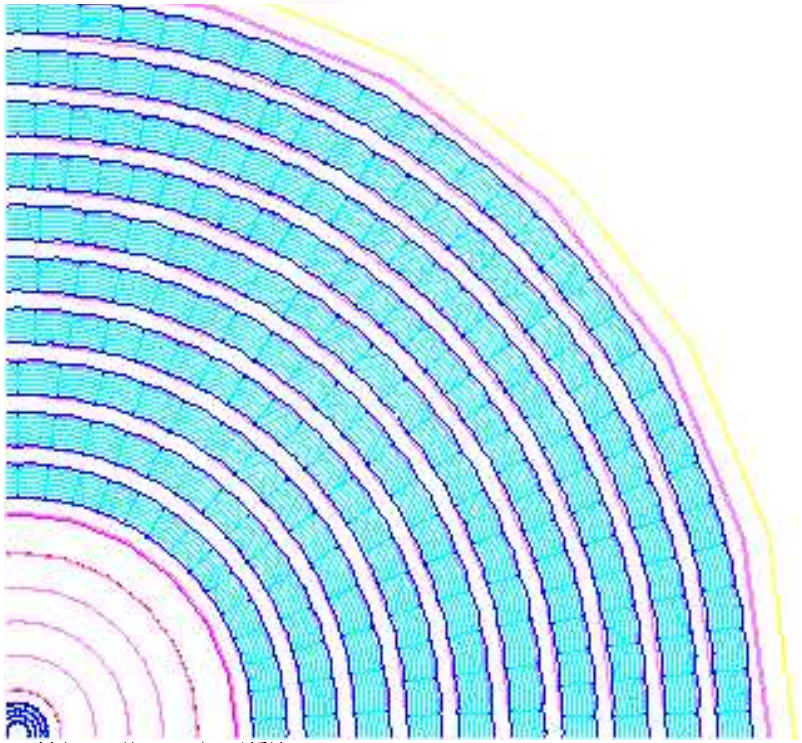
  Smaller radius of inner layer
  4 layers or 5 layers
  Thin/Thick materials etc… (Fig.2 next slide)

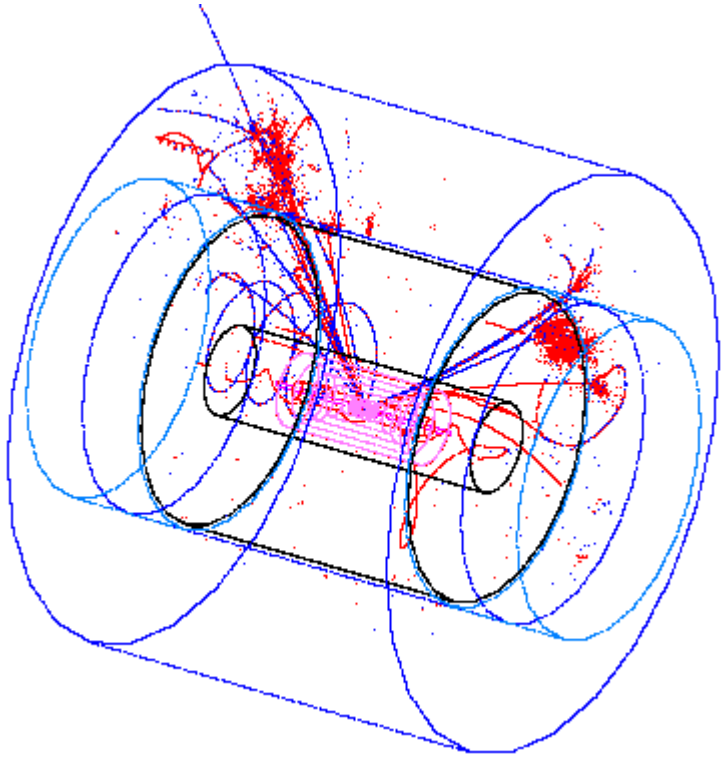
T.Aso

# Detector figures



## R-Phi section of VTX





**CDC**
**Layer 10**
**Cell 36~108/Layer**
**Wire 5/Layer**
**r=15um**

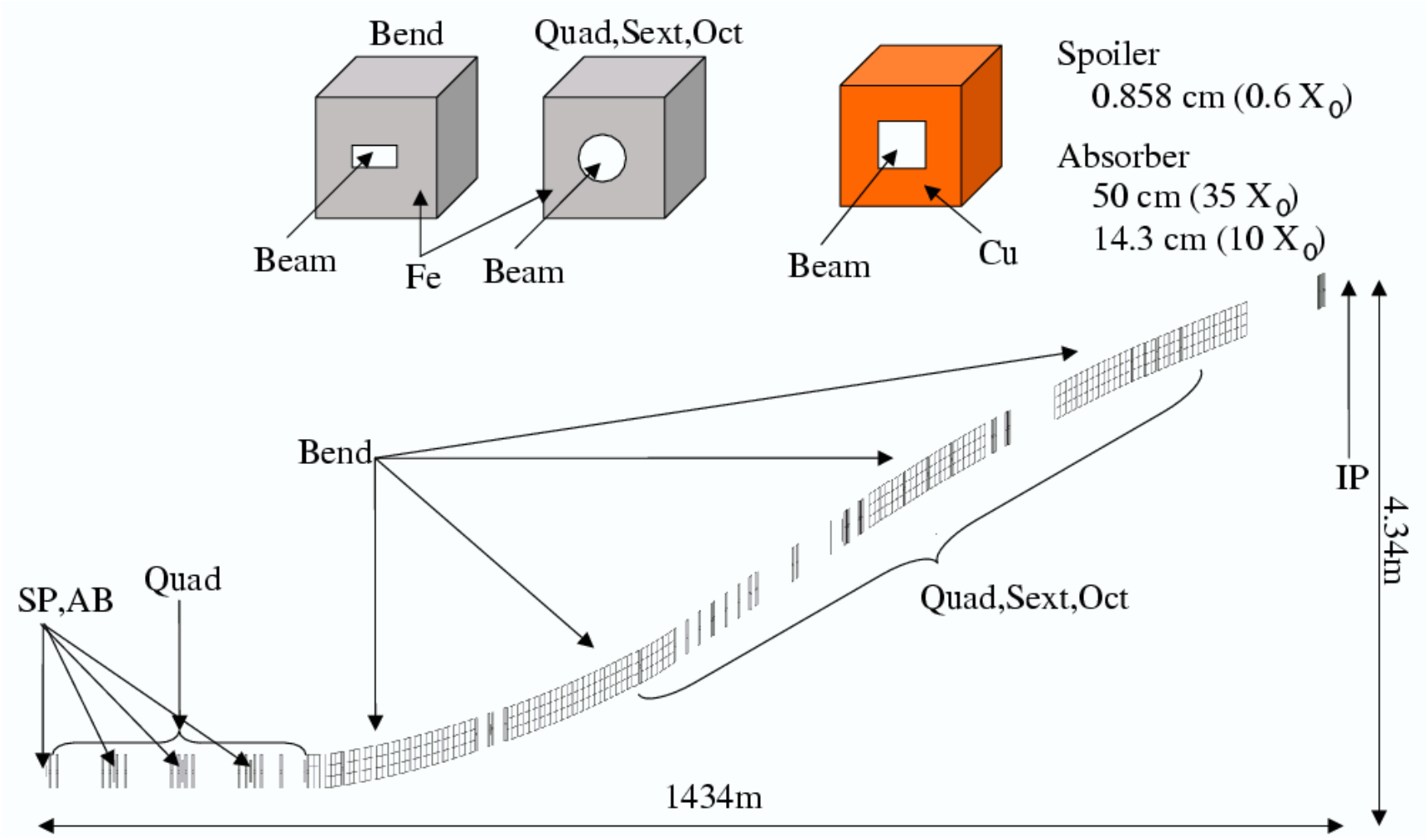
Event display of
e+e- => Z0H
E = 350GeV

# Beam Delivery System

K.Tanabe and M.Iwasaki

Geometry codes are generated from a SAD file for FFIR optics

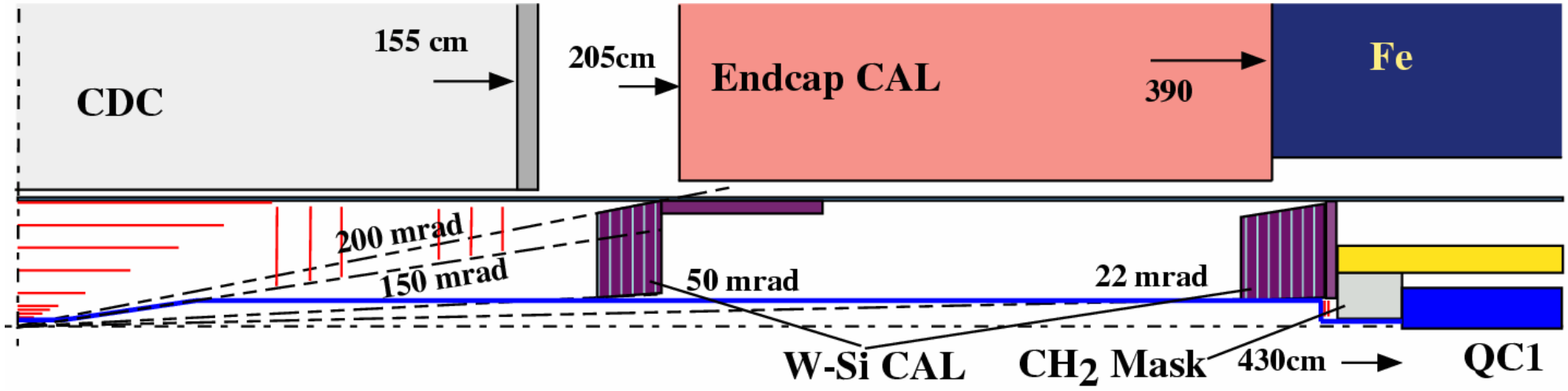
Particle transportation from the entrance of FF to IP have been confirmed using Geant4




Akiy

# New IR Geometry

QC1: 2m → 4.3m



# Accelerator components

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**Detector Model**

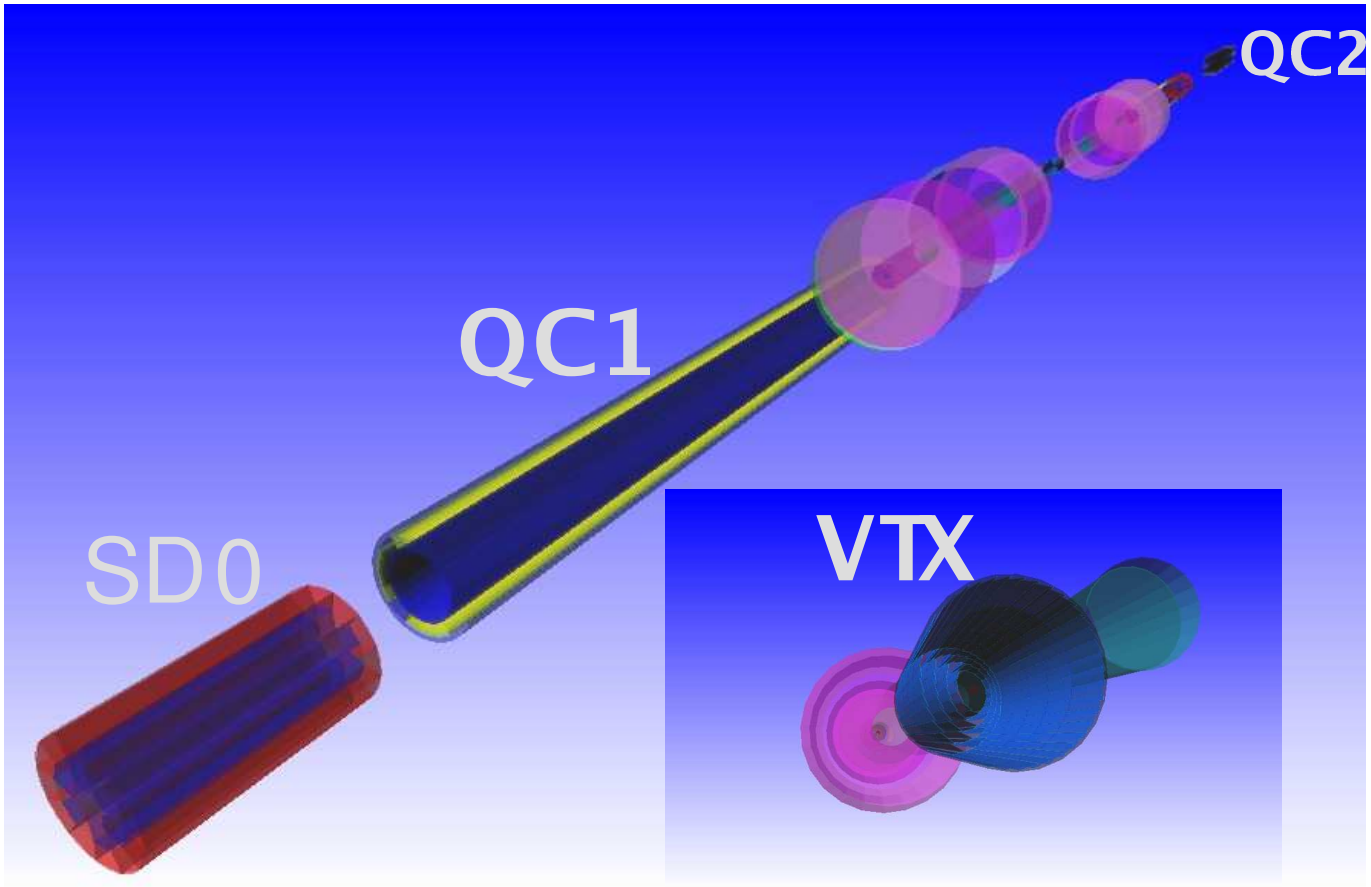
**Model d)**

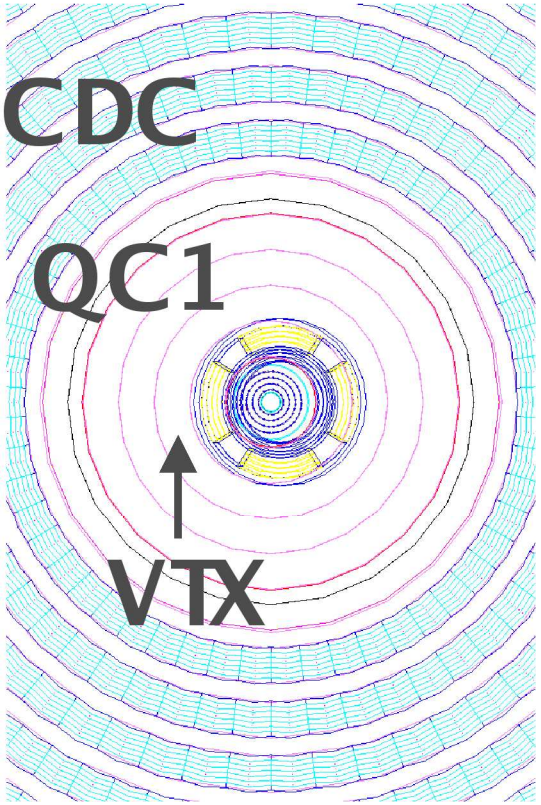
**L*=4.3 m**

**3T (Solenoid)**

**Crossing**

**3mrad**



# Background simulation by Jupiter

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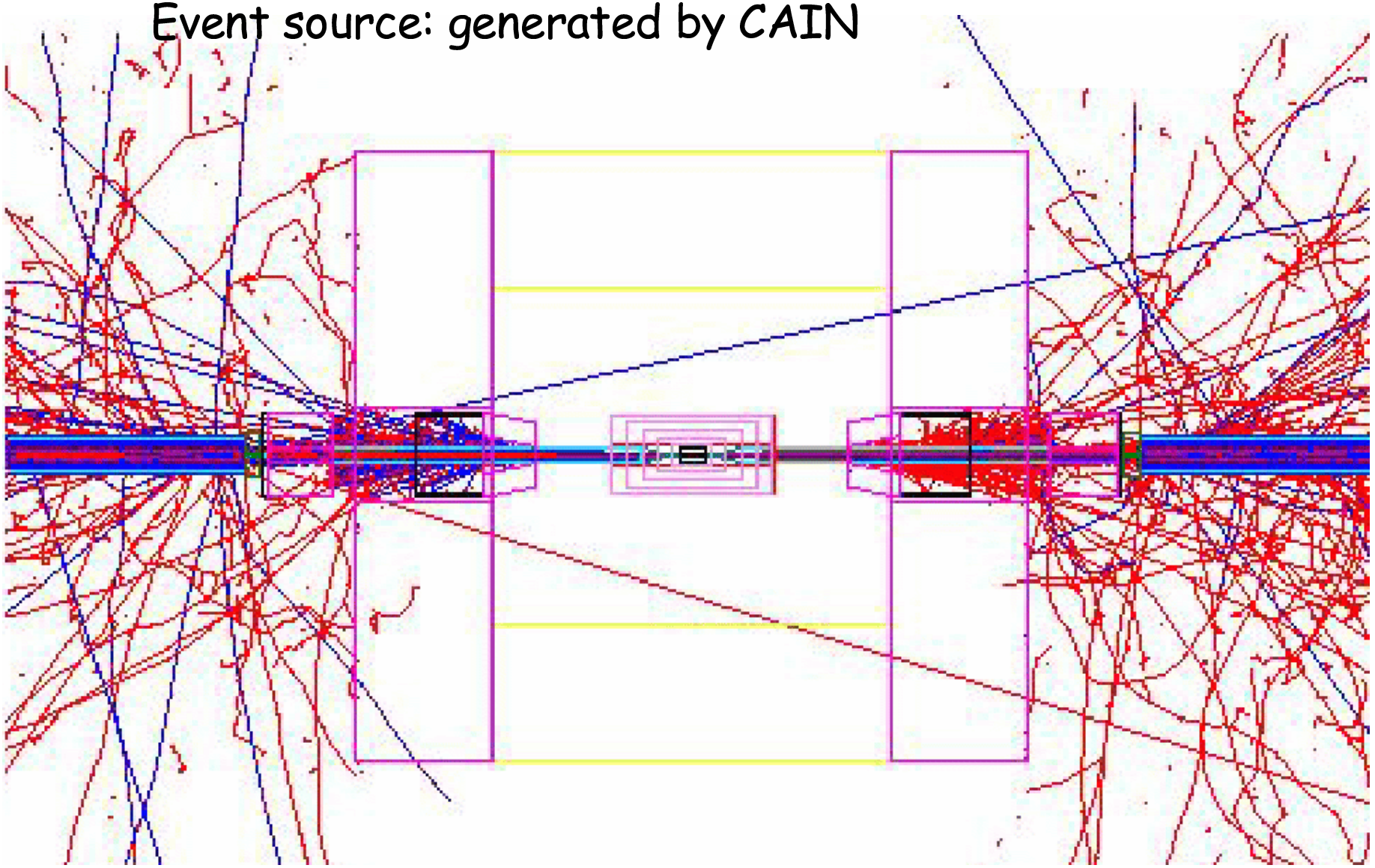
Event source: generated by CAIN



# Results of simulation

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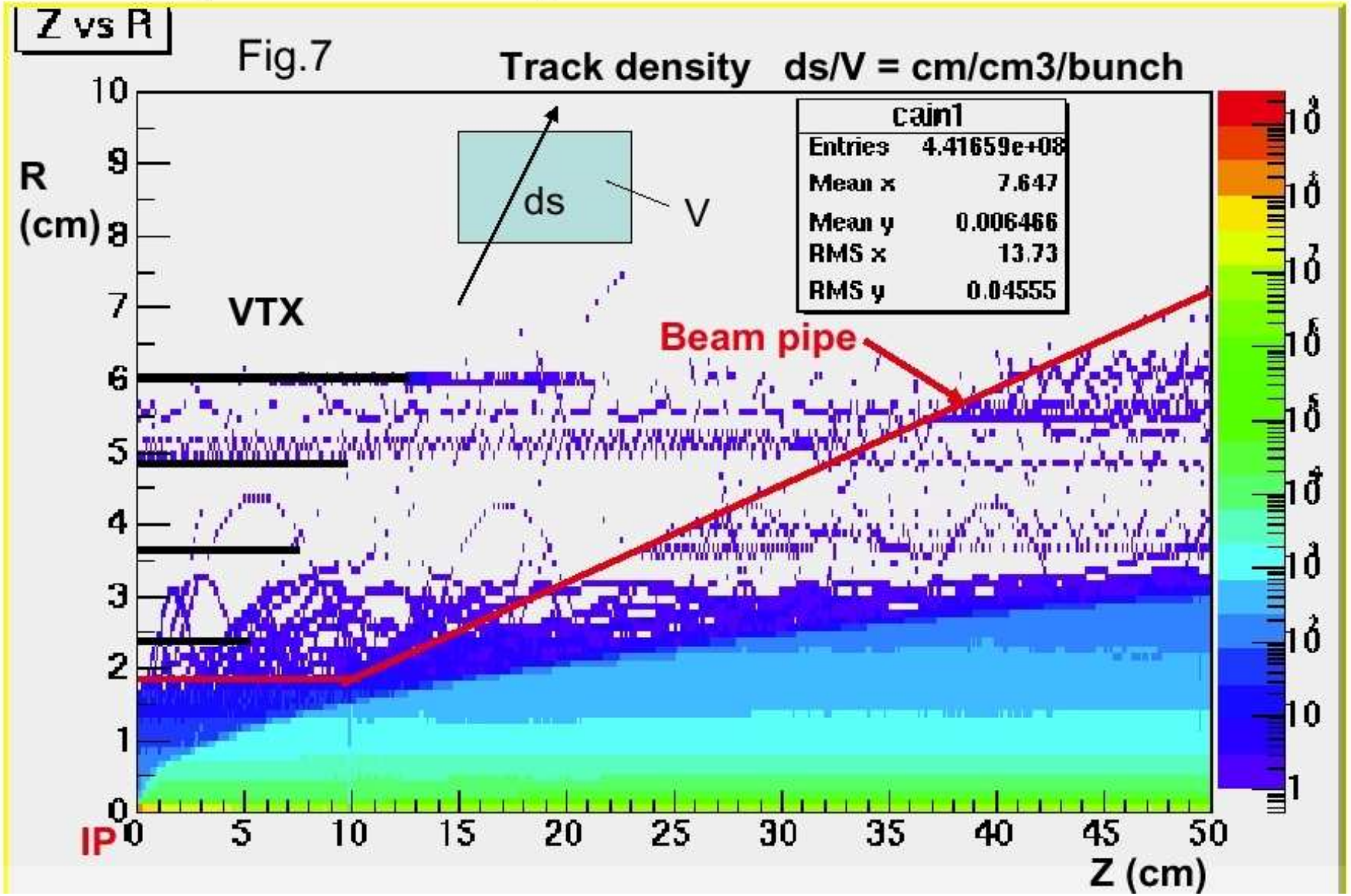
## Track density at L*=4.3m, 6 mrad crossing,3Tesla Solenoid,TRC500

- Simulated condition
  - Geant4.1.1+pacth01 / gcc-2.95.3
  - Include Synchrotron radiation / PhotoNuclear process



# Summary

1. Root based software packages have been developped and used for physics studies.

2. Geant4 based full simulator, Jupiter, has ben developed for studies of CDC performances and backgrounds.

3. JSF and Quick Simulator can/will be executed in Java environment.