

# News on iLCSoft

## recent developments in core software

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Software WG Phone meeting  
DESY, August 24th, 2011

# Outline

- LCIO v2
  - v01-60
    - data model extensions
  - v02-00-pre
    - new data classes for TrackerHits
    - extended Track
- Gear
  - ZPlanar parameters
  - FTD parameters
- Marlin
  - command line parameters
- CED (CEDViewer, MarlinUtil)
- iLCSoft release v01-12

# LCIO repository moved to SVN

svn webinterface:

The screenshot shows a web browser window with the URL `http://java.freehep.org/svn/repos/lcio/list/`. The browser tabs include "LCIO: EVENT-Track Class Refer..." and "sventon repository browser". The page title is "sventon subversion web client - http://www.sventon.org". The interface includes a "Go to revision" field with "HEAD" selected and a "Go to path" field with "/" selected. Below this, it shows "Rev: HEAD (1215) - svn://svn.freehep.org/lcio /". The main content area is a "Repository Browser" showing a table of entries:

Name	Size (bytes)	Revision	Author	Date
branches		1215	tonyj	3/22/11 5:57 PM
trunk		1212	gaede	3/21/11 9:52 AM
tags		1183		11/22/10 3:34 AM

Below the table, it says "Total: 3 entries" and has a "toggle" button. The status bar at the bottom says "Done".

checkout released versions:

```
svn co svn://svn.freehep.org/lcio/tags/v01-60
```

checkout pre-release versions:

```
svn co svn://svn.freehep.org/lcio/branches/v02-00-pre00
```

checkout HEAD version:

```
svn co svn://svn.freehep.org/lcio/trunk trunk
```

(old CVS still works for checkout of old versions )

# LCIO v01-60 - new features

- v01-60 - intermediate release towards LCIO v2:
- count events (and runs) in LCIO files
  - `LCReader::getNumberOfEvents()`
  - `LCReader::getNumberOfRuns()`
  - new tool: `$LCIO/bin/lcio_event_counter`
- added optional storing of the position where the energy deposition (step) occurred in `SimCalorimeterHit`
  - `float[3] SimCalorimeterHit::getStepPosition( int i )`
  - needed for SDHcal digitization
- other extensions:
  - `Cluster::getEnergyError()`
  - `float[3] MCParticle::getSpin()`
  - `int[2] MCParticle::getColorFlow()`
  - `int (Sim)TrackerHit::getCellID0()`
  - `int (Sim)TrackerHit::getCellID1()`
- other improvements and fixes (see release notes for details)

# v02-00-pre00: Track & Trackstates

- Track now has multiple TrackStates
- canonical TSs:
  - IP, inner/outermost hit, Calo
- TS returned either by
  - identifier
  - or closest to given point
- mostly backward compatible (isReferencePointPCA dropped)

virtual	<b>~TrackState</b> ()	<i>Destructor.</i>
virtual int	<b>getLocation</b> () const =0	<i>The location of the track state.</i>
virtual float	<b>getD0</b> () const =0	<i>Impact parameter of the track in (r-phi).</i>
virtual float	<b>getPhi</b> () const =0	<i>Phi of the track at the reference point.</i>
virtual float	<b>getOmega</b> () const =0	<i>Omega is the signed curvature of the track in [1/mm].</i>
virtual float	<b>getZ0</b> () const =0	<i>Impact parameter of the track in (r-z).</i>
virtual float	<b>getTanLambda</b> () const =0	<i>Lambda is the dip angle of the track in r-z at the reference point.</i>
virtual const <b>FloatVec</b> &	<b>getCovMatrix</b> () const =0	<i>Covariance matrix of the track parameters.</i>
virtual const float *	<b>getReferencePoint</b> () const =0	<i>Reference point of the track parameters.</i>

	<i>The tracks that have been combined to this track.</i>
virtual const <b>TrackStateVec</b> &	<b>getTrackStates</b> () const =0 <i>Returns track states associated to this track.</i>
virtual const <b>TrackState</b> *	<b>getClosestTrackState</b> (float x, float y, float z) const =0 <i>Returns track state closest to the given point.</i>
virtual const <b>TrackState</b> *	<b>getTrackState</b> (int location) const =0 <i>Returns track state for the given location - or NULL if not found.</i>
virtual const <b>TrackerHitVec</b> &	<b>getTrackerHits</b> () const =0 <i>Optionally ( check/set flag(LCIO::TRBIT_HITS)==1) return the hits that have been used to create this track.</i>

# v02-00-pre00: 1d and 2d TrackerHits

- originally agreed to introduce six new TrackerHit classes – now simplified to two new types:
- **TrackerHitPlanar**
  - $x, y, z$  - 'space point'
  - $u(\theta, \phi), v(\theta, \phi)$  - measurement directions (spanning vectors in the plane)
  - $du, dv$  - measurement errors
  - $\rightarrow$  to be used for 1d and 2d ( $dv$  is strip length in 1d case)
- **TrackerHitCylindrical**
  - $x, y, z$  - 'space point'
  - $R, X_c, Y_c$  - cylinder parameters (parallel to  $z$ )
  - $d\phi, dz$  - measurement errors
  - $\rightarrow$  to be used for 1d and 2d
- these also implement the **TrackerHit** interface ( $x, y, z, cov$ ) for backward compatibility and code reusability (eg in event display)
- currently under test by ILD and SID tracking experts

# v02-00-pre00 - ILDCellIDs

- added UTIL/ILDConf.h
- central place for definition of ILD tracking cellIDs in Sim, Digi and Rec:
  - ILDCellID0::encoder\_string = "subdet:5,side:-2,layer:9,module:8,sensor:8"
  - ILDCellIDEncoder
    - enforces that above encoding is used for cellID0
    - should be used in Mokka drivers
  - ILDDetID
    - define common ids for ILD sub detectors:
      - ILDDetID::VXD, ILDDetID::SIT, ILDDetID::TPC, ...
- adding this to lcio will make it easy to adopt existing code in Mokka and Marlin for the new tracking

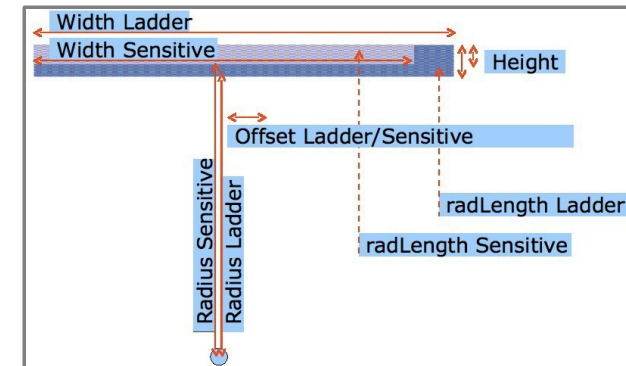
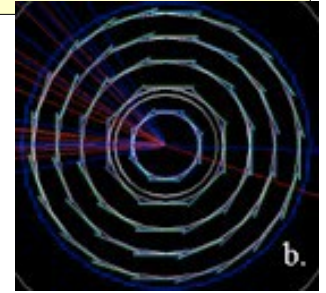
# GEAR - new features

- added **SIT** and **SET** parameters - similar to VXD

- describe (silicon) planar wafers along z-axis with phi-symmetry in placement and support material

- renamed VXDParameters and VXDLayerLayout to **ZPlanarParameters** and **ZPlanarLayerLayout**

- should be backward compatible through typedefs...



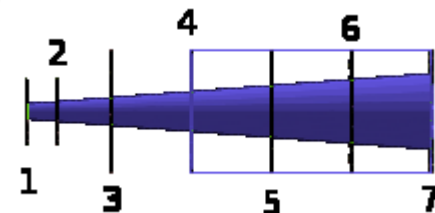
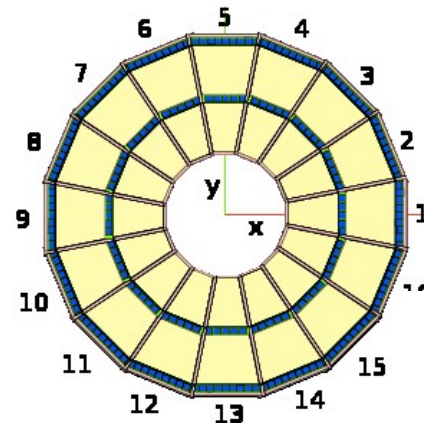
- added new **FTDParameters** and **FTDLayerLayout** (J.Duarte)

- describe (silicon) disk detectors

- made from petals

- allow for tilting of petals (discouraged) or

- staggering in z (preferred)



- both are needed for the new ILD tracking code



# CED event display (v01-03-pre)

- many new features in CED (H.Hoelbe)  
(and CEDViewer, MarlinCED) :

- added a New View with
  - 3d transparent surfaces
  - cut open detector
  - save display settings
  - turn on/off detector components
- new projections:
  - r-phi ("F")
  - r-z ("S")
  - toggle view of axes
  - ...
- detailed [User Manual](#)

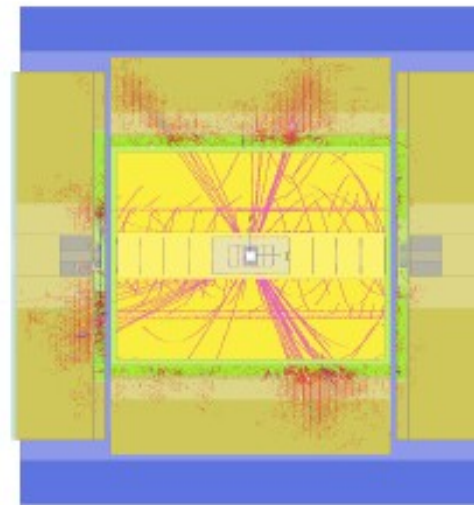
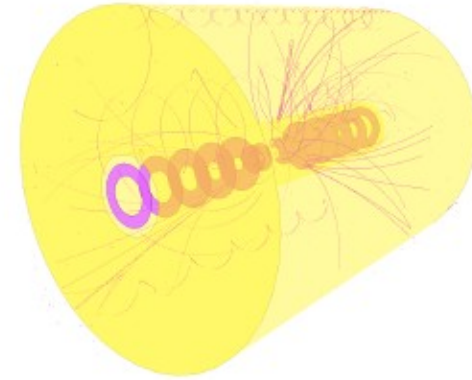


Figure 2: Side view projection

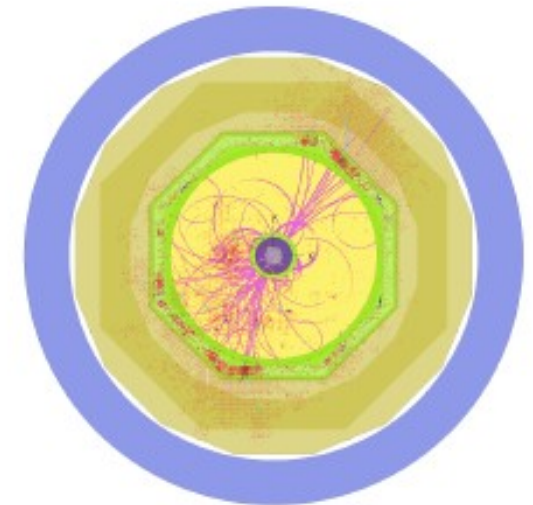


Figure 3: Front view projection

# CED event display (v01-03-pre)

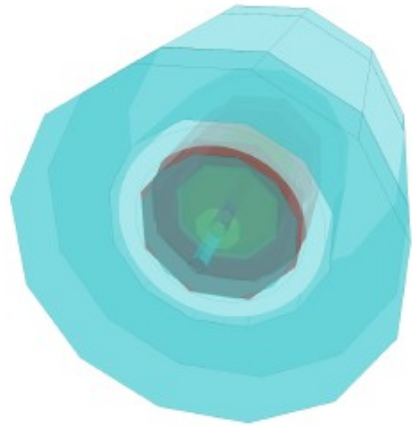


Figure 6: *Phi cut 0*

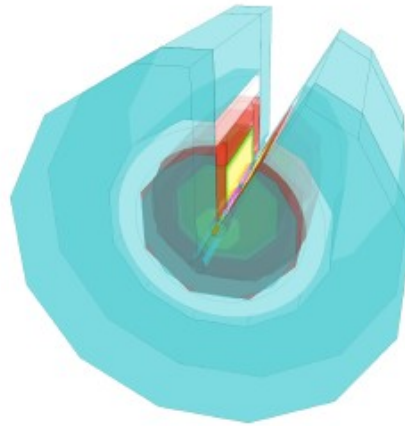


Figure 7: *Phi cut 30*

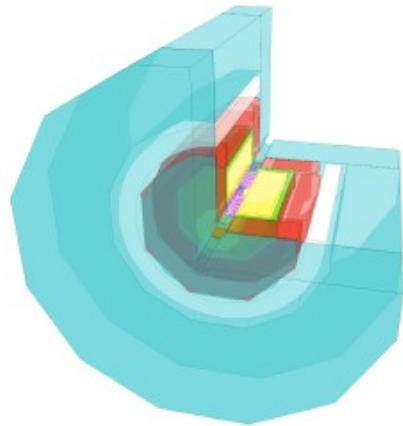


Figure 8: *Phi cut 90*

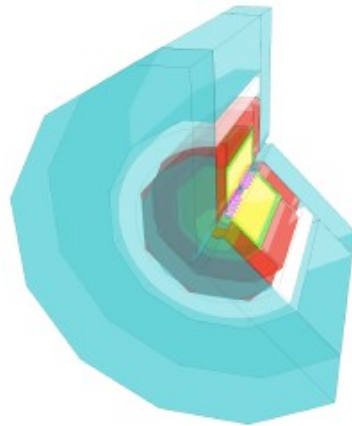


Figure 9: *Phi cut 135*

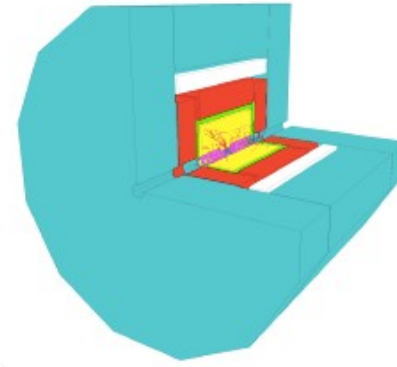


Figure 17: *Transparency 0%*

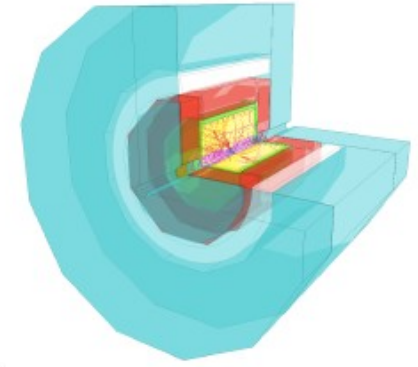


Figure 18: *Transparency 60%*

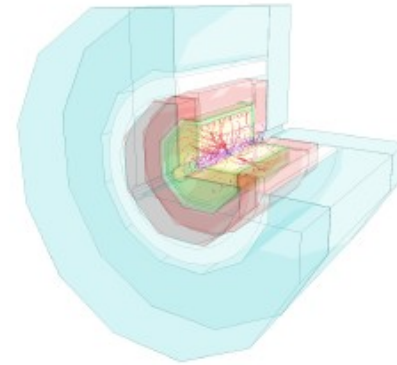


Figure 19: *Transparency 90%*

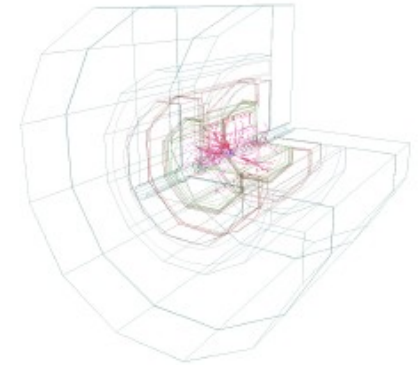


Figure 20: *Transparency 100%*

# Marlin v01-01-pre

- added **command line parameters** (J.Engels)
  - long standing feature request ...
- Marlin -h

Dynamic command line options may be specified in order to overwrite individual steering file parameters, e.g.:

```
Marlin --global.LCIOInputFiles="input1.slcio input2.slcio" --global.GearXMLFile=mydetector.xml  
--MyLCIOOutputProcessor.LCIOWriteMode=WRITE_APPEND --MyLCIOOutputProcessor.LCIOOutputFile=out.slcio steer.xml
```

- can overwrite every parameter from steering file with
- useful for batch processing scripts, etc.

# towards iLCSoft v01-12

- plan to release iLCSoft v01-12 mid September, i.e. before Granada workshop
- hopefully with many more new features and packages:
  - ILD\_01 models in Mokka
    - Si-Trackers, SDHcal, FPCCD,....
  - new tracking package: MarlinTrk
  - Clupatra TPC patrec
  - LCFIPlus
  - Silicon digitizers
  - ....
- expert and developers pre-release installation at:  
[/afs/desy.de/project/ilcsoft/sw/x86\\_64\\_gcc41\\_sl5/v01-12-dev01](/afs/desy.de/project/ilcsoft/sw/x86_64_gcc41_sl5/v01-12-dev01)

- would like to have presentations of tools that should be included in v01-12 in next SW WG meeting on September 07th