

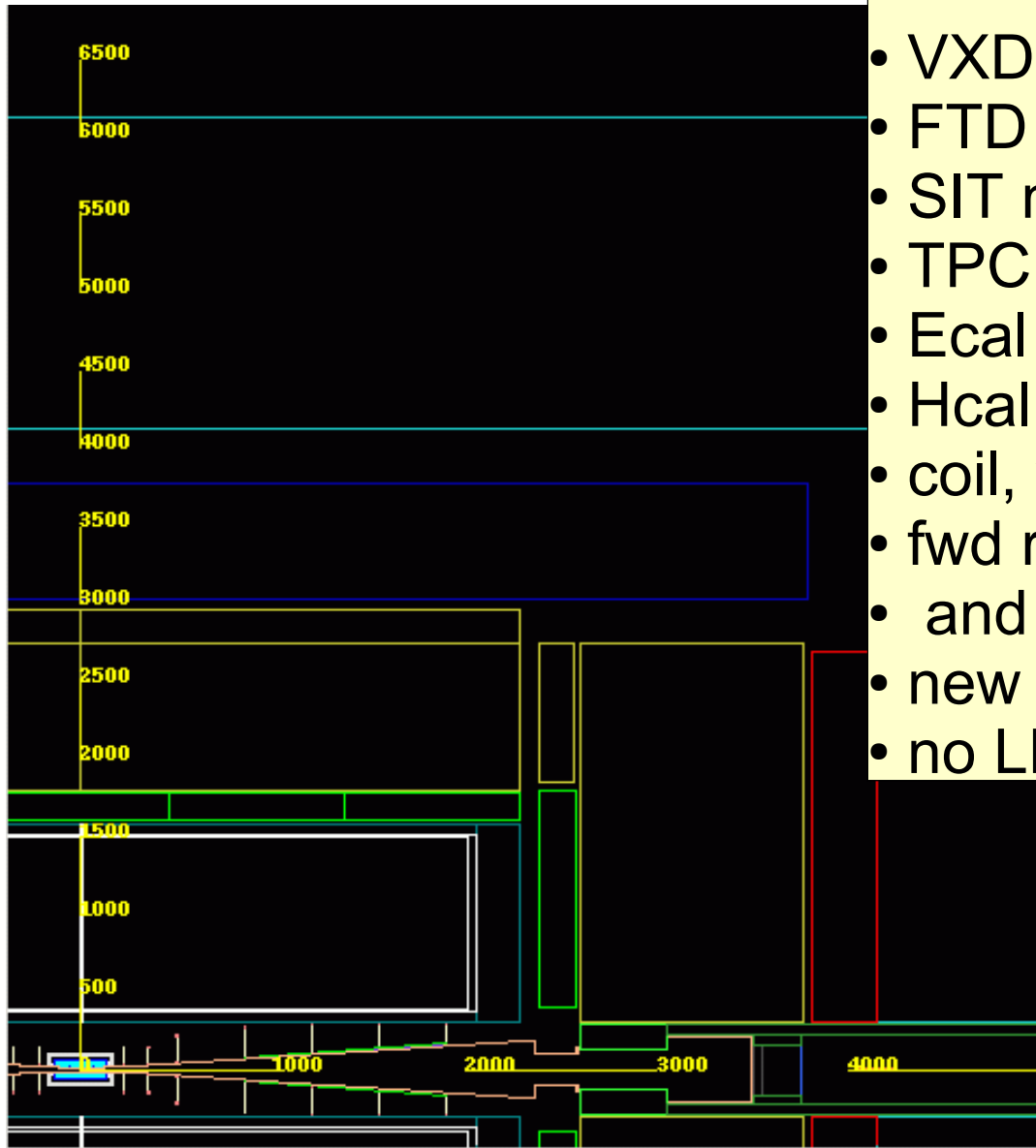
# Discussion: Software Status and plans for MC production

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ILD Meeting, Zeuthen,  
14-16 January 2008

# LDC01\_05Sc detector model

Frank Gaede, ILD Meeting, Zeuthen, Jan 14-16, 2008



LDC01\_05Sc :

- VXD detailed w/ ladders
- FTD simple discs – proper material
- SIT new driver – proper material
- TPC new driver w/ max step size
- Ecal new driver w/ fibres, rings,...
- Hcal new driver incl. endcap ring coil, yoke – old drivers
- fwd region – new with proper mask and instrumented LCal
- new EcalPlug
- no LHcal yet

a lot of people have contributed in the last months to create, test and fix this model

# Mokka model browser

Frank Gaede, ILD Meeting, Zeuthen, Jan 14-16, 2008

Mokka Detector Model Database Browser - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://www-flc.desy.de/ldcoptimization/tools/mokkamodels.php?model=LDC01\_05Sc

Mokka Detector Model Database Browser

LDC01\_05Sc Select

**Detector Model "LDC01\_05Sc"**

Description	LDC baseline version 5
Status	unstable

**Detector Concept "LDC Extended"**

Description	The LDC detector concept, extended in length
World Box	7500 x 7500 x 12600 mm <sup>3</sup> (octant)
Tracker Region	r < 1700 mm,  z  < 2500 mm
Calo Region	r < 2854.85521187 mm,  z  < 3415.5 mm

**Subdetector "vxd01"**

Description	The realistic vertex detector geometry based on TESLA TDR
C++ Driver	SVxd01 (superdriver for vxd01)
MySQL Database	<a href="#">vxd01</a>
Parameters	<a href="#">TUBE_central_inner_radius</a> , <a href="#">TUBE_central_thickness</a> , <a href="#">VXC_active_silicon_thickness</a> , <a href="#">VXC_crvostat_option</a> , <a href="#">VXC_end_electronics_thickness</a> , <a href="#">VXC_inner_radius</a> , <a href="#">VXC_ladder_number</a> , <a href="#">VXC_outer_radius</a> , <a href="#">VXC_support_ladder_material</a> , <a href="#">VXC_support_ladder_thickness</a>
Build Order	20

**Subdetector "sit01"**

Description	New sit implementation by Hengne Li from LAL
C++ Driver	sit01
MySQL Database	<a href="#">sit01</a>
Build Order	30

**Subdetector "SFtd02"**

Description	FTD superdriver with new z positions
C++ Driver	SFtd01 (superdriver for ftd00)
MySQL Database	<a href="#">ftd02</a>
Parameters	<a href="#">TUBE_opening_angle</a>
Build Order	40

**Subdetector "SEca02"**

Description	A scalable LDC Ecal driver without database, just parameters.
C++ Driver	SEca02
Parameters	<a href="#">Ecal_Alveolus_Air_Gap</a> , <a href="#">Ecal_Slab_shielding</a> , <a href="#">Ecal_Slab_copper_thickness</a> , <a href="#">Ecal_Slab_PCB_thickness</a> , <a href="#">Ecal_Slab_gluo_gap</a> , <a href="#">Ecal_Slab_ground_thickness</a> , <a href="#">Ecal_barrel_number_of_towers</a> , <a href="#">Ecal_barrel_half</a> , <a href="#">Ecal_guard_ring_size</a> , <a href="#">Ecal_front_face_thickness</a> , <a href="#">Ecal_support_thickness</a> , <a href="#">Ecal_lateral_face_thickness</a> , <a href="#">Ecal_fiber_thickness</a> , <a href="#">Ecal_si_thickness</a> , <a href="#">Ecal_radiator_material</a> , <a href="#">TPC_outer_radius</a> , <a href="#">Ecal_Tpc_gap</a> , <a href="#">Ecal_radiator_layers_set1_thickness</a> , <a href="#">Ecal_radiator_layers_set2_thickness</a> , <a href="#">Ecal_radiator_layers_set3_thickness</a> , <a href="#">Ecal_cells_size</a> , <a href="#">Ecal_cables_gap</a> , <a href="#">Ecal_endcap_center_box_size</a> , <a href="#">Ecal_endcap_extra_size</a> , <a href="#">Ecal_nlayers1</a> , <a href="#">Ecal_nlayers2</a> , <a href="#">Ecal_nlayers3</a> , <a href="#">Ecal_Slab_H_fiber_thickness</a>
Build Order	90

Done

check details of Mokka models online:  
<http://www-flc.desy.de/ldcoptimization/tools/mokkamodels.php>  
(tool by A. Vogel)

# LDCPrime

Sub-Detector	Parameter	GLD	LDC	GLD'	LDC'
TPC	$R_{\text{inner}}$ (m)	0.45	0.30	0.45	0.30
	$R_{\text{outer}}$ (m)	2.00	1.58	1.80	1.80
	$Z_{\text{max}}$ (m)*	2.50	2.16	2.35	2.35
Barrel ECAL	$R_{\text{inner}}$ (m)**	2.10	1.60	1.85	1.82
	Material	Sci/W	Si/W	Sci/W	Sci/W
Barrel HCAL	Material	Sci/W	Sci/Fe	Sci/Fe	Sci/Fe
Endcap ECAL	$Z_{\text{min}}$ (m)***	2.80	2.30	2.55	2.55
Solenoid	B-field	3.0	4.0	3.50	3.50
VTX	Inner Layer (mm)	20	16	18	18

- LDC01\_05Sc is a scalable model
- -> first variation: LDCPrime\_01
- Mokka release 6.5.p02
- will use both models for initial MC production (see later)

# Status of LDC models

- LDC01\_05Sc has been tested rather thoroughly
  - currently no known issues
- LDCPrime\_01 test is ongoing
  - some issues reported w/ Ecal hit positions (need verification)
  - #TPC layers too large for existing TPC LEPTracking
    - -> need fix
- Silc collaboration has modified drivers for SIT, ETD and FTD w/ new materials and thicknesses
  - -> how and when can this go in ?
- need to iterate through tests again
- -> need for automated tests !!

# Initial MC production

- plan: have central production of LDC/ILD MC files
- need to test the machinery
  - job submission scripts
  - data catalogue (data base)
  - reconstruction code
- **start now with some simple events, e.g.: ?**
  - singles  $O(10k)$  of  $g, e, \mu^{+-}, \pi^{+-}, K_L, K_S$
  - $O(10k)$   $Z \rightarrow uds$  @ 90, 250, 500 GeV
  - $O(10k)$   $ZH$  @ 250, 500 GeV
  - both for LDC and LDCPrime
- -> use to put together and configure a std. reconstruction

# large MC production

- the large MC production for the ILD optimization should be done centrally
- DESY will serve as 'Tier0' for this
  - have grid resources and know how
  - have software expertise
- other labs are welcome to contribute
  - -> volunteers ?
- data files will be made available on the grid
- should think about replicas of the data sets in other countries/regions ?
  - Jupiter data available in Europe
  - Mokka data in Japan
  - ...

# standard reconstruction I

- current release of ilsoft v01-03 provides basis for standard reconstruction:
  - simple digitization – parameterized
  - LEPTracking(TPC) + standalone SiliconTracking
  - -> combined to FullLDCTracking
  - PandoraPFA
- need to properly calibrate and configure this (Marlin steering files)
- need lots of tests:
  - technical (does it crash)
  - physical (is the output meaningful)
  - -> start with initial samples



# standard reconstruction II

- should vertexing and flavour tagging be part of the standard reconstruction
- e.g. include JetFinder (y-cut) and run LCFIVertex package
  - -> is there a reasonable default configuration of these tools ?
  - do users want to run these tools at analysis stage ?

# standard reconstruction III

- which output files should we generate ?
  - one large LCIO files with everything:
    - sim hits, mcparticles
    - digi hits
    - tracks, clusters
    - reconstructed objects
  - -> most straight forward, allows to check and rerun everything - rather slow ( > 1MByte/event )
- write small files with:
  - mcparticles & reconstructed objects
  - relation between the two
  - -> faster, however some information missing (hard to access)



additional material

# recently resolved issues I

detector	Component	issue	fix	person	status
Ecal	SEcal02	hits in end caps have bad z values ( all +z)		PMF	done
Ecal	SEcal02	first sensitive layer before radiator numerated as 1 lets to troubles in reconstruction code	to split the hits collection or to numerate layer in Ecal starting from 0	PMF	done
field	fieldX01	this field has a detailed non-uniform field in the forward direction that causes the simulation to run 5-10 times slower	go back to old uniform field: Sfield01 – (detailed field only needed for dedicated bg studies)	PMF	done
Hcal	SHcal03	do we want 48 layers ? what are the side effects wrt size of the coil, muonsystem	agreed by Hcal experts to have 48 layers for LOI mass production		done
Hcal	SHcal03	Hcal_back_plate_thicknes set to 2mm – was 50 mm – what's the correct value	leave it for now		done
LCal	Sical01	SimCalorimeterHit.position is stored in zylindrical local coordinates	convert to global cartesian x,y,z	FG	done
LCIO MCPartic le weight	HepLCIOInte rface	the new stdhep files have an event weight that needs to be added to the LCIOEvent	update class HepLCIOInterface accordingly; use LCStdHepRdr from LCIO	FG	done
TPC	tpc05.cc	current code produces hits every maxStep size (5mm), ie. not on measurement surfaces which causes problem for TPCDigitize/LEPTracking	modify driver to create hits on measurement surfaces by introducing tube like volumes along pad rows (+ maxStep size) – created tpc08 subdetector model	SA	done
x-angle	HepLCIOInte rface	if a boost for the crossing angle is applied, it is not applied to the MCParticles in the LCIO output file	fixed in PrimaryGeneratorAction	FG	done

# recently resolved issues II

detector	Component	issue	fix	person	status
beam energy spread	HepLCIOInterface, PrimaryGeneratorAction	do we need the possibility to scale the generated particles to account for beam energy spread ?			open
Ecal	SEcal02	change orientation of the slab direction in endcap		PMF	open
Hcal		store digitization parameters needed for gear in Mokka db as model parameters ?	Hcal_cell_size		open
Hcal/Ecal	Shcal03, SEcal02	should the Hcal ring be part of the barrel – do we need an extended Ecal endcap (if so – how large ?)	need decision from calorimeter groups		open
Lcal	Scal01	the outer radius is too large wrt, LDCv5 (220vs350) related to outer part of lcal/inner part of ecal endcap			open
LCal	Scal01	missing outer part of the Lcal - round Lcal in box hole of ecal endcap ?			open
SIT	sit01	change in layout requested by Silc		MV	open
TPC	DB	need to include tpc08 in LDC01_05Sc		PMF	open
Hcal	SHcal03	the gear for the endcap has 48(42) layers plus 1 with negative thickness + 5 additional layers	due to Hcalring: need additional Gear parameter (Mokka), section for this – depends on decision about extended Hcal barrel...	KH FG (Gear)	in progress