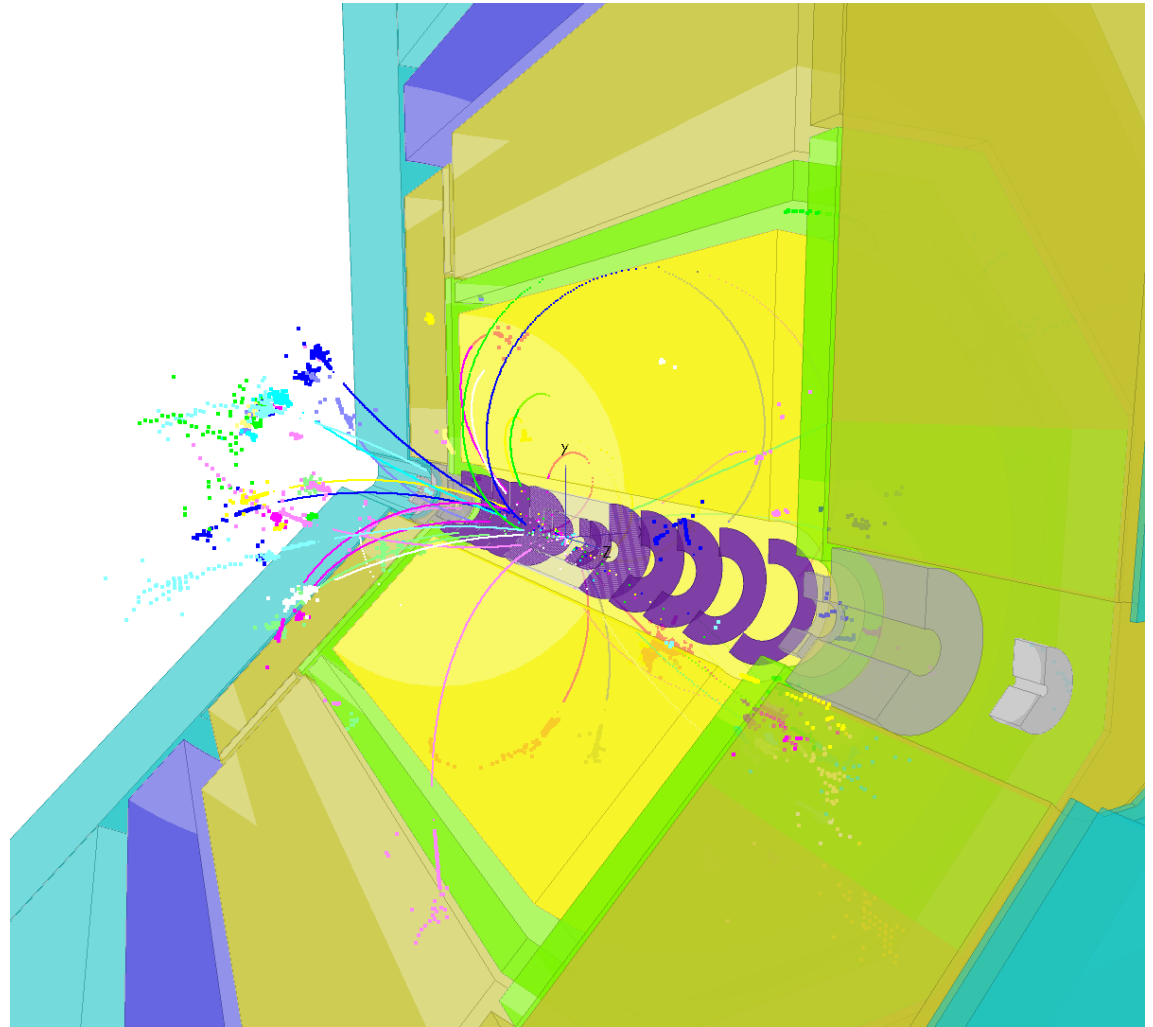


Status of ILD simulation and reconstruction tools

Frank Gaede, DESY
ILD Meeting @ LCWS 2011
Granada, Spain, Sep 26-30, 2011

Outline

- Sw-Timeline
- Core Software
- Grid production
- Simulation
 - Mokka models
- Reconstruction
 - PFA
 - Flavor Tag
 - Tracking
- Summary



ILD software timeline

5 month	Analysis and Writing	13 month
t0 - 5m	Monte Carlo production finished	
5 month	Grid Production	
t0 - 10m	start Monte Carlo production	
3 month	Test, Debug and release ILDsoft	
t0-13m	freeze ILDsoft development	~20 month
>1 month	implement baseline in simulation	
t0-x	ILD baseline defined	
	evaluate technology options develop tracking package develop geometry LCIOv2 improve simulation realism improve reconstruction study machine backgrounds	

- agreed timeline for ILD software:
 - have major MC production 10m before hand-in of DBD
 - freeze software 3m earlier
 - **-> this is end of November !**

- sw-mgmt group has created quite large SW-Task-List
- presented and discussed in ILD-SW-WG phone meeting
- many action items **done** some still **ongoing/open**

status of core tools (iLCSoft v01-12):

- **LCIO v02-00 !**
 - multiple TrackStates per Track (@ IP, first/last hit, calo)
 - 1D and 2D TrackerHits (Plane, ZCylinder)
 - spin/color flow for MCParticle, step position for calo hits, cellIDs for tracker hits
 - utility to encode **subdetector, side, layer, module, sensor**
- **Gear**
 - ZPlanar parameters to describe VXD, SIT and SET
 - FTD parameters - petal based, staggered (J.Duarte)
 - SimpleMaterial(name, A, Z, density, radL, intL)
- improved CED, Marlin, sw tests,...

=> the core tools are effectively ready for the DBD*

*except bug fixes of course

DBD Monte Carlo production

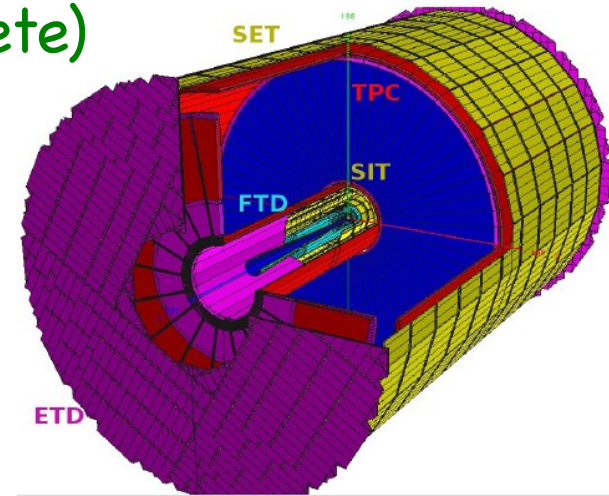
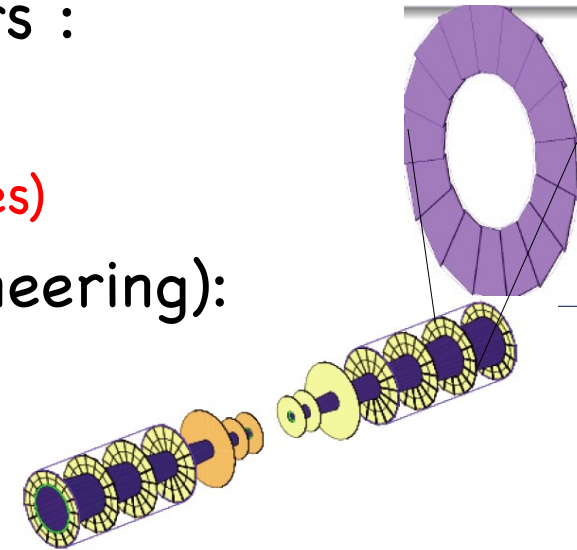
- have developed a Grid production system at DESY based on experience in LOI to be used for DBD
- **offer from CLIC group to contribute to production with DIRAC system (used in CDR)**
- had short meetings here at Granada to discuss how to best share the task:
 - ILD (core software) group will focus on processing benchmarks
 - CLIC group will focus on generator and on special samples
 - adjust as needed, depending on progress and needs
 - will make sure that we either have one data catalogue or synchronize between two
- **need to get estimate of needed CPU & storage soon**
in order to put in requests to major Grid sites
- **=> need to decide what is needed (backgrounds !)**

recent developments in Mokka

- major rewrite of some sub detector drivers :
 - SIT, SET, ETD - FTD - Muon
 - increased level of detail and realism (incl. services)
- made existing drivers more realistic (engineering):
 - TPC, AHCAL, Ecal
- new drivers (technology options):
 - SDHCAL, SciEcal
- added overall services and cables (still incomplete)
- new models under development:

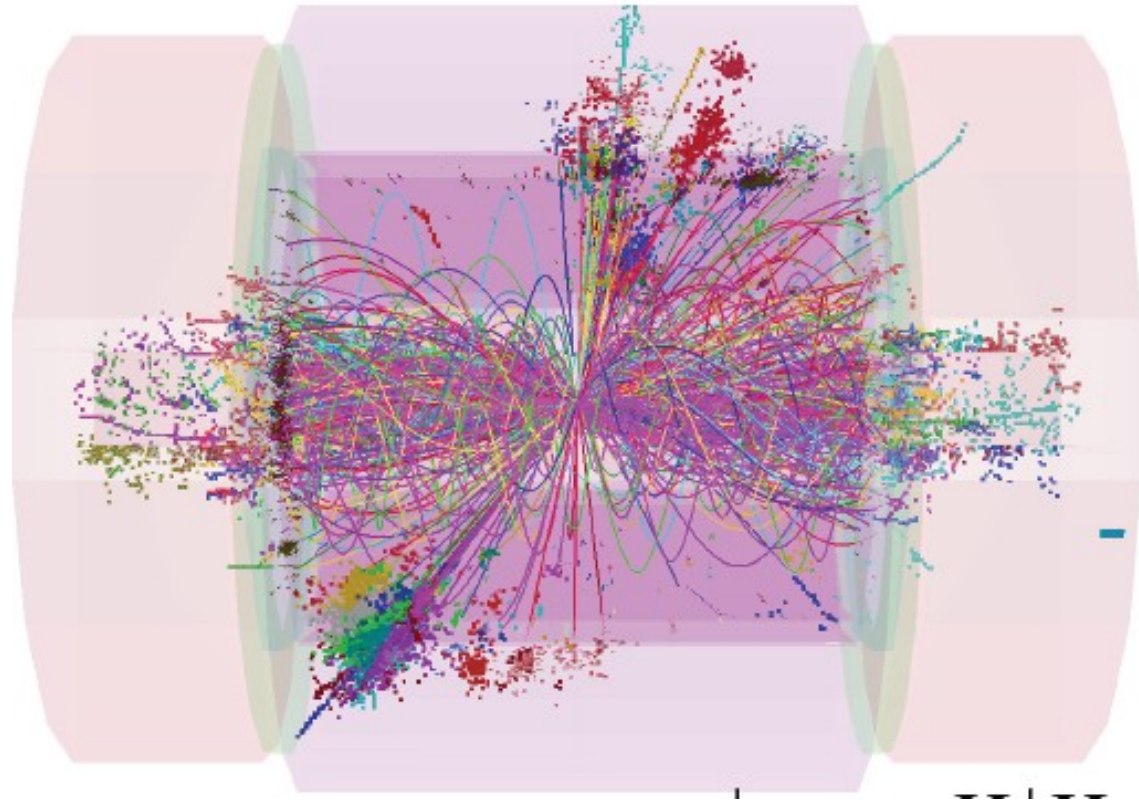
ILD_01_pre02	- AHCAL and Si-Ecal
ILD_01_SDH_pre00	- SDHCAL and Si-Ecal
ILD_01_SciW_pre00	- AHCAL and Scintillator-Ecal

- next steps:
 - finalize and debug these models
 - adopt new Gear materials



PandoraPFA

- PandoraPFANew has been continuously improved
- and successfully applied at 3TeV for the CLIC CDR to ILD_CLIC

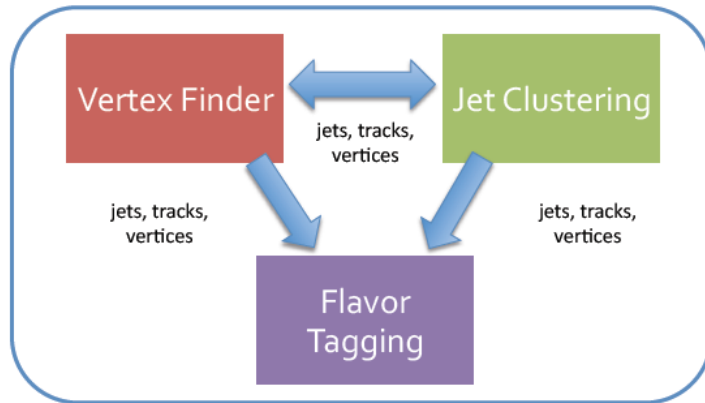


- expect to also work nicely for ILD_01 @ 1TeV
- will probably need calibration and tuning to new calorimeter drivers
 - improved realism (Ecal, AHcal)
 - new technology options (SDHcal, SciEcal)

new LCFIVertexPlus

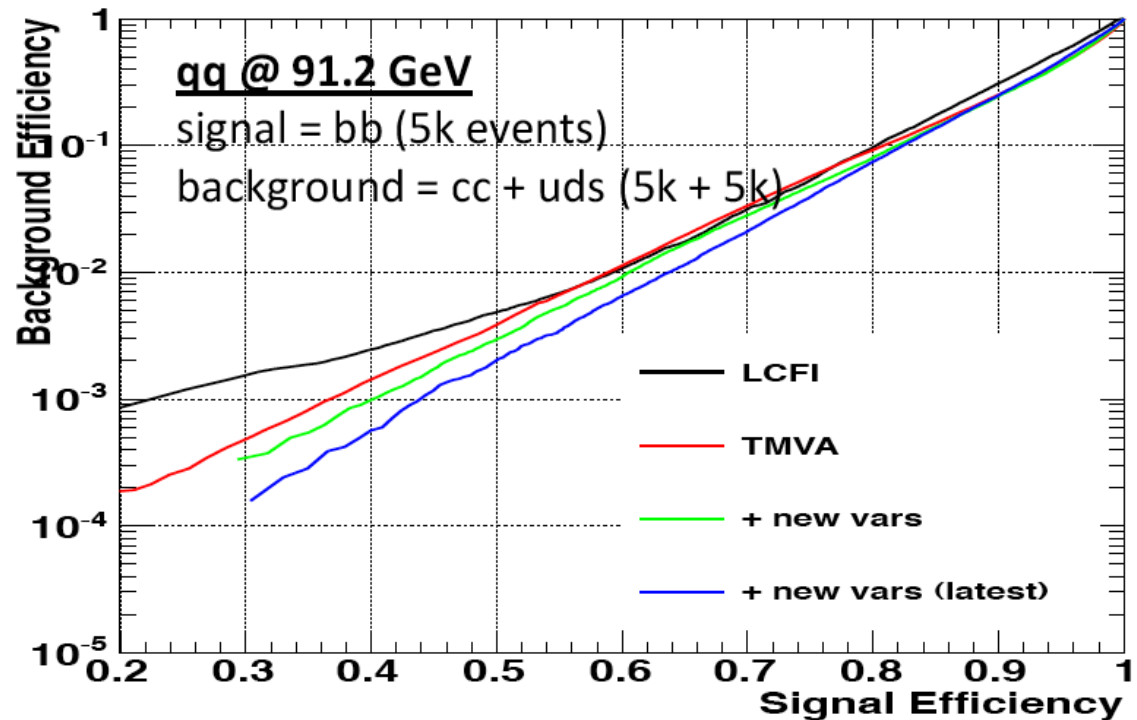
improvements in **vertex finding, jet clustering, flavor tagging** in a unified way

- creation of a new framework suited to this task
 - data types: event, track, neutral, mcparticle, jet, vertex
 - algorithms: vertex finding, jet clustering, flavor tagging



- new – additional – Marlin package LCFIVertex+
- should eventually replace existing LCFIVertex

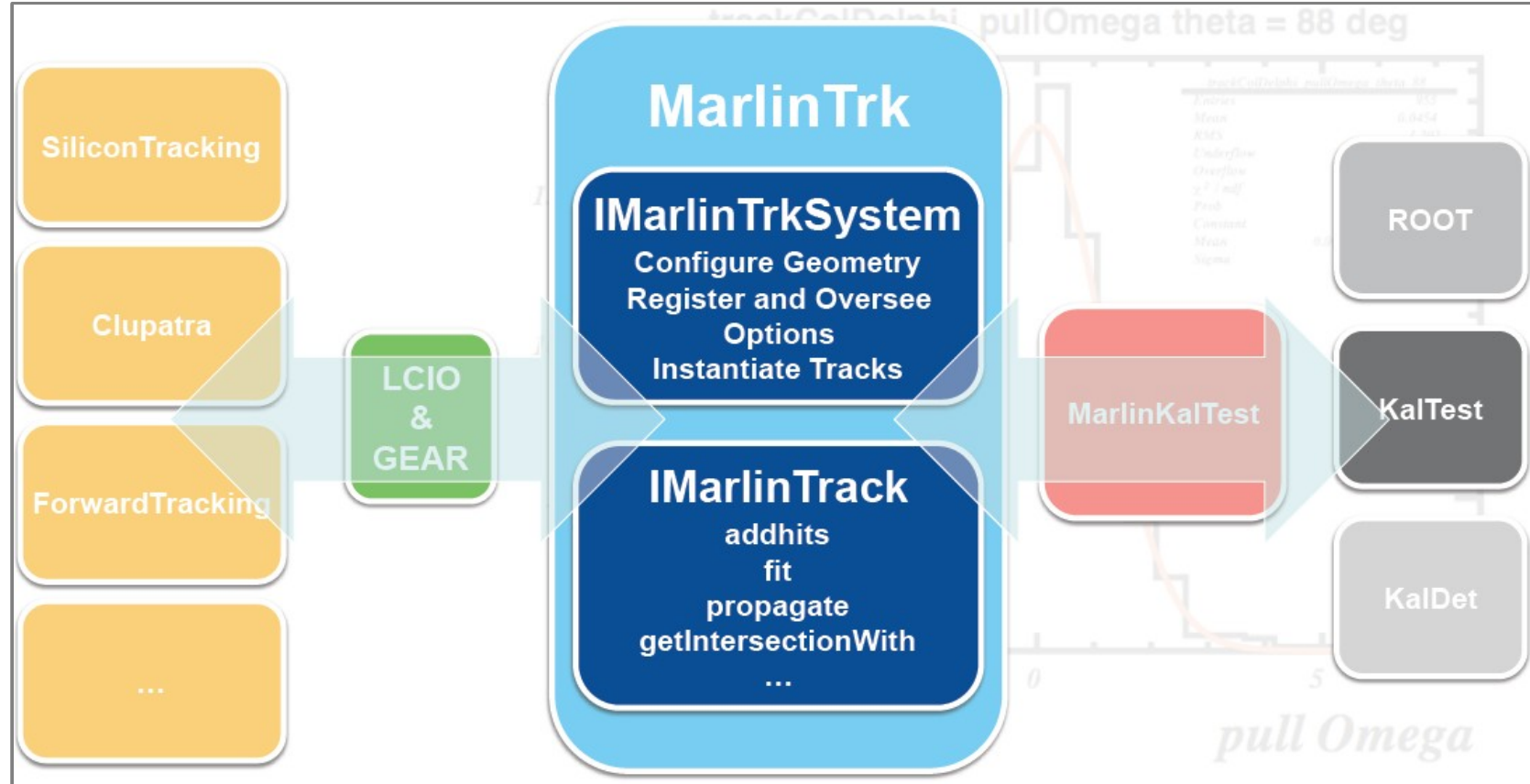
- considerably improved performance
- first release soon
- flavor tag will be run by users on DST !



Si-Tracking activities

- issues identified at Orsay ILD meeting now addressed:
- need **digitization code** for new Si-trackers
 - > currently addressed by two groups
 - (A.Charpy/K.Androsoy, J.Duarte)
 - adopted detailed digitizer for Belle2 (Z.Drasal)
- KalTest fitter had no code to deal with '**bounded planes**'
 - > now solved by KalTest developers
 - (D.Kamai,K.Fujii) implemented track fitting for arbitrary bounded planes and examples for VXD, FTD
- **FTD design fixed (for simulation) to have:**
 - non-rotated staggered petal layout
 - shallow angle stereo layers

new MarlinTrk package



- developed patrec&fitting interface IMarlinTrack/TrkSystem
 - decouple patrec from details of actual fitting code used
- implemented using KalTest/KalDet (S.Aplin)
- to be used in Marlin for developing patrec code

ILD patrec activities

- **FPCCD**

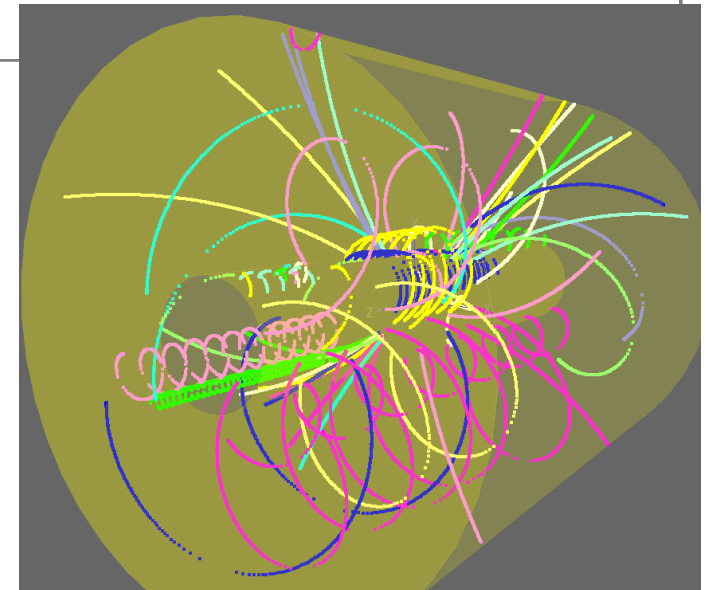
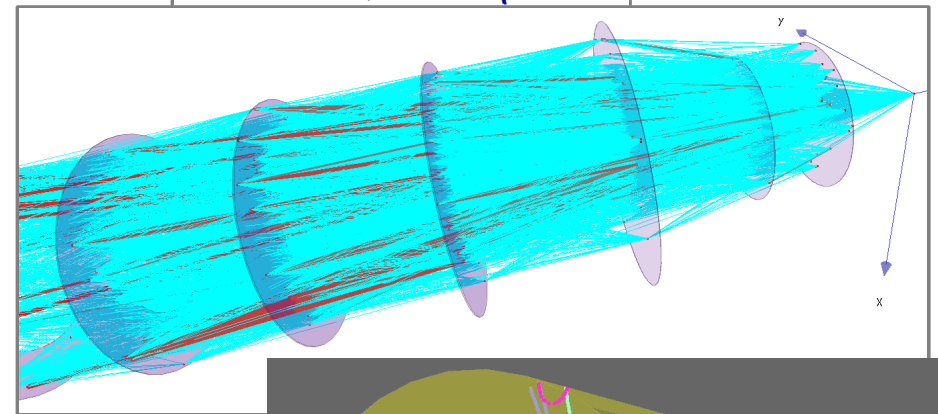
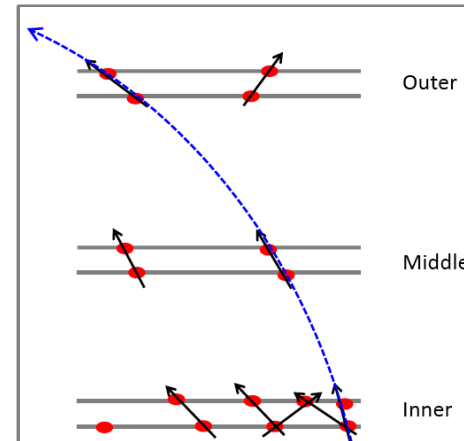
- recently finalized digitization
- started to work on patrec (mini-vectors)
(D.Kamai et al)

- **FTD**

- started new forward tracking patrec
- using cellular automaton
(R.Glattauer)

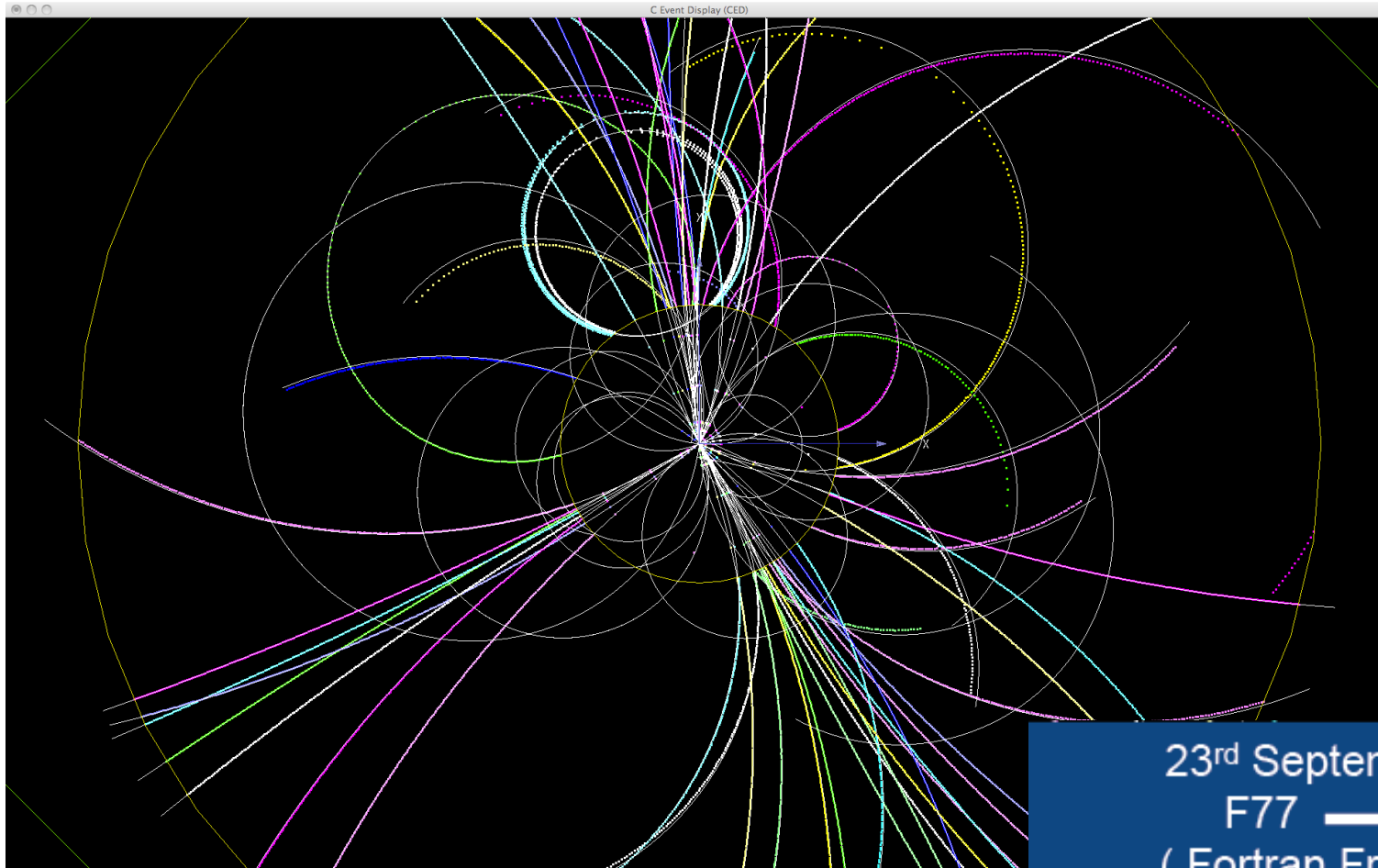
- **Clupatra**

- recently refactored:
- cleaned up code & algorithm
- use new IMarlinTrk/MarlinKalTest
- close to be finalized



Fortran free ILD-Tracking

Frank Gaede, LCWS11, Granada, Sep 26-30, 2011



$t\bar{t}$ @500GeV
fully
reconstructed
w/o f77

23rd September 2011
F77 → FFF
(Fortran Free Friday)

- re-factored SiliconTracking/FullLDCTracking to use MarlinTrk
- first prototype of new C++ tracking for ILD
- major milestone reached

Summary

- core software is ready for DBD
- simulation models for ILD_01 are getting there
 - level of realism improved, technology options available
 - definition and implementation of cables, services and support needed !
- PFA and flavor tag tools are in good shape – need some more work and finalization
- major progress in re-writing the tracking code
- -> plan to use new code for the DBD
- still many things need to be done to put everything together as final preparation for the MC production