ILD Tracking Overview

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ILD Software and Integration Workshop 2010 – DESY
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Overview

- Biggest single software issue for ILD
- DBD↔AIDA – differences in time frame
- For the ILD DBD we need to maintain a somewhat practical approach

Fitters

- To move forward with ILCSoft, we need to make a Kalman Filter easily accessible and familiar to everybody using Marlin

Fitters

- KalTest
  - ROOT based Kalman filter C++ library
  - Being brought into MarlinTPC by the LCTPC Group
  - Currently implementing a Combinatorial Kalman Filter
- Genfit
  - Generic track fitting package written for the Panda Experiment
  - ROOT based C++
  - Currently being introduced into Marlin for Belle II
- Broken Lines Fitting Algorithm
  - written by V. Blobel at DESY
  - C. Kleinwort is currently working on bringing this to C++ for CMS, and hopes to then be able to use it for LCTPC

Fitters

- To move forward with ILCSoft, we need to make a Kalman Filter easily accessible and familiar to everybody using Marlin
  - currently two initial implementations exist
    - Kaltest – Li Bo and Keisuke
    - GenFit – Andreas Moll
- Given the support for Kaltest within ILD, I would recommend to use the interface to Kaltest

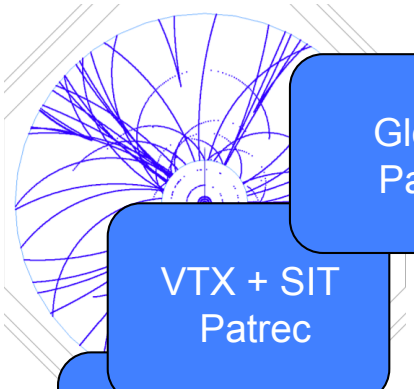
Tools – Longer Term

- In the context of Aida, started to look at generic tracking packages available:
  - Kaltest
  - GenFit
  - Atlas Tracking
- While they are certainly all well written: as they are, none of them really fits the bill, mainly due to their dependencies
- Take the best of these as a starting point…

Tracking EDM

- Started to put down some criteria for creating a more extensive tracking EDM
  - The tracking framework will need a non persistent tracking model to work with (The tracking EDM in LCIO is not applicable here)
  - support for 1D, 2D, and 3D position measurements
  - hits need a close coupling with their measurement surface, which themselves need to be fleshed out
  - extended track classes for different track models
  - some form of hit association collection for use during patrec – convenient for adding and removing hits, with some form of intelligent ownership awareness

Tools



Global Patrec

Fwd Patrec

VTX + SIT Patrec

TPC Patrec

Fast Fitter

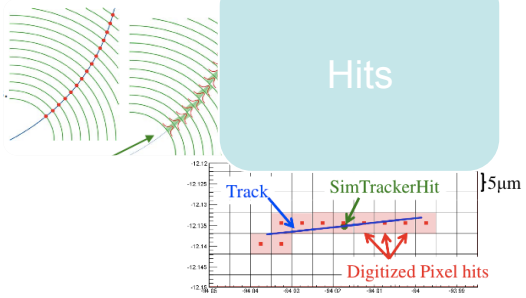
(C) Kalman Fitter

GSF Fitter?

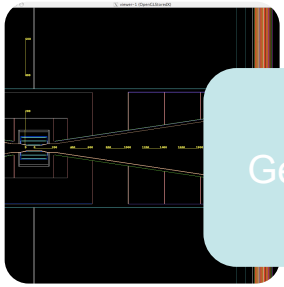
DAF Fitter?

Pattern recognition

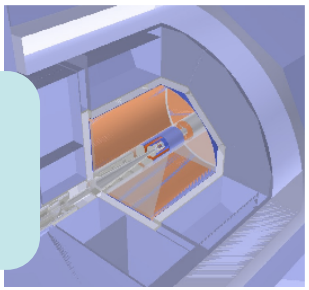
Track Parameter Determination

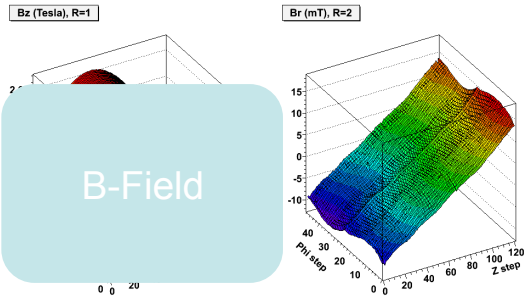


Hits



Geometery





B-Field

$$B = \{0,0,3.5\}$$

Coverage

- TPC – f77 removal
  - At DESY we have started to work on removing our f77 legacy
- VTX and SIT – background reduction
  - here we need to try and introduce the mini vectors
  - SIT 2 or 3 layers – standalone track links?
- SET and ETD – inclusion
  - needs fully implementing into tracking – studies needed
  - glad to see Alexander is making progress here
- FTD – life at the coalface …
  - really challenging in the face of background, glad to see that we have two groups presenting here

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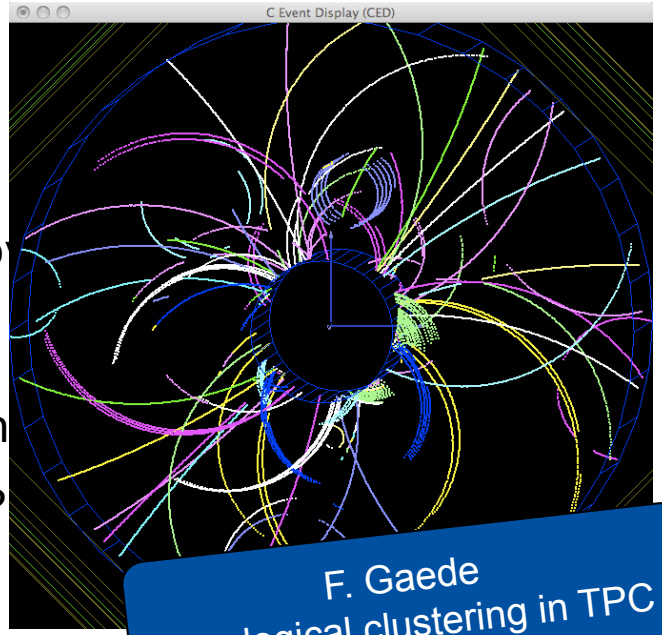

F. Gaede
topological clustering in TPC

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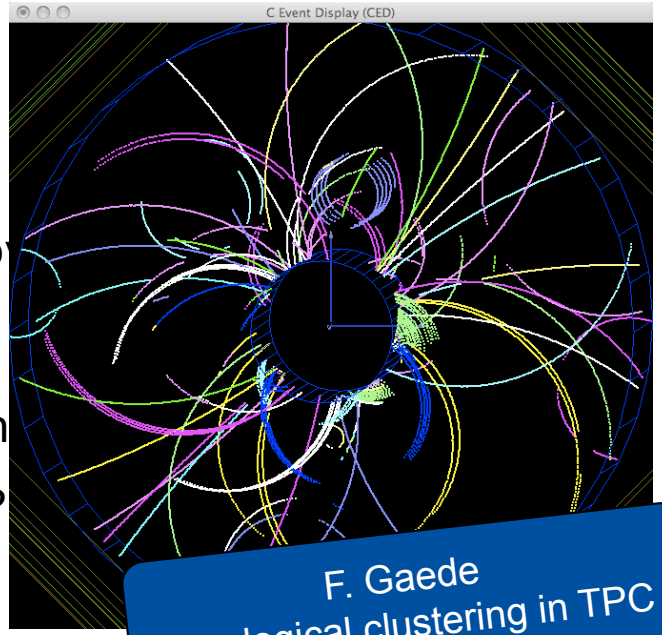

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Summary

- We must make use of abstract interfaces, thus ensuring freedom of implementation whilst protecting against the inherent problems of software dependency
- Nevertheless we need to maintain a practical approach so that people can get on
- I am very glad to see that the number of people contributing to tracking is increasing
- I hope that this workshop will be provide a good starting point to draw together the common effort

Summary

- Establish a Working Group to coordinate the effort within the AIDA WP
- As not of all of the people working on tracking will be working directly on the AIDA project, we must maintain an efficient work flow exchange between the detector groups and avoid duplication of effort
- Obviously it goes without saying that it is imperative to work extremely closely with the geometry project