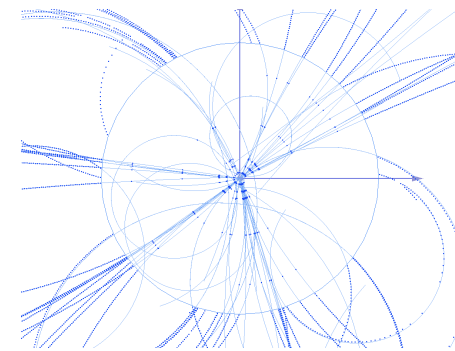


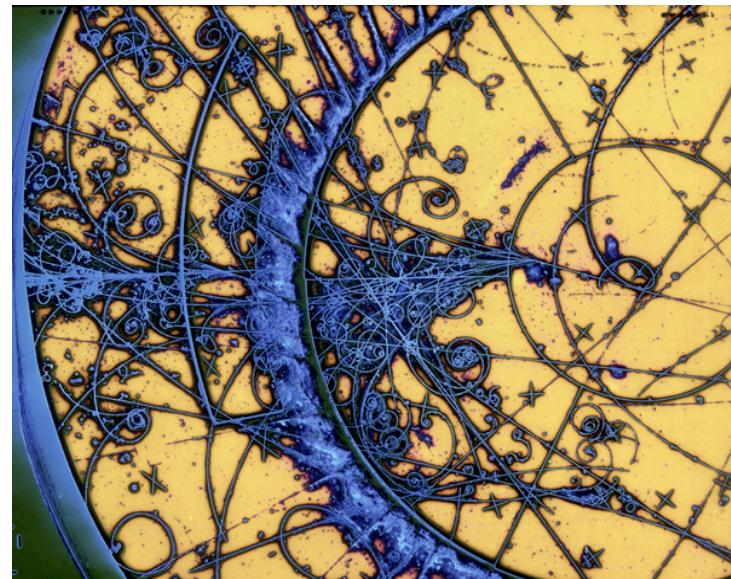
# Tracking Plans at DESY

Steve Aplin  
Deutsches Elektronen Synchrotron

WP2 Meeting at AIDA Kick-Off  
17<sup>th</sup> February 2011



- Motivation
- Plans
- Summary



# Current Tracking Activities in LC Studies

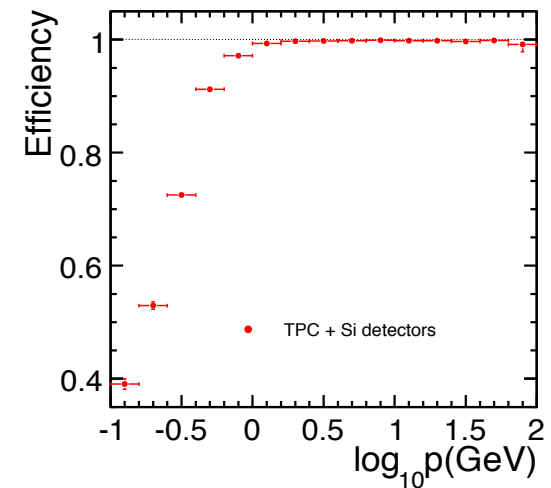
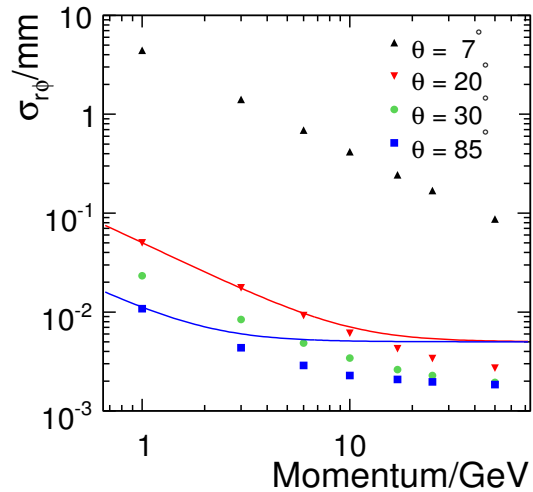
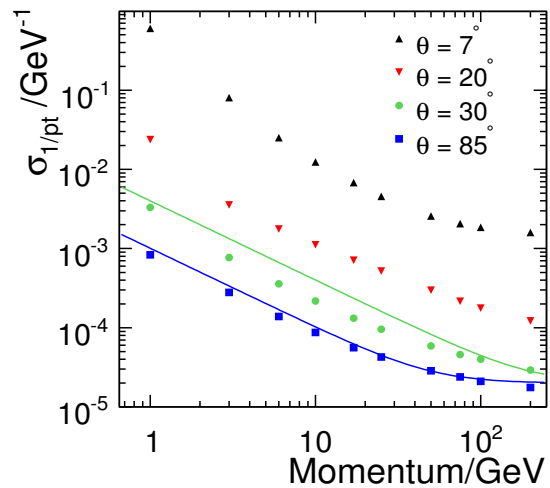
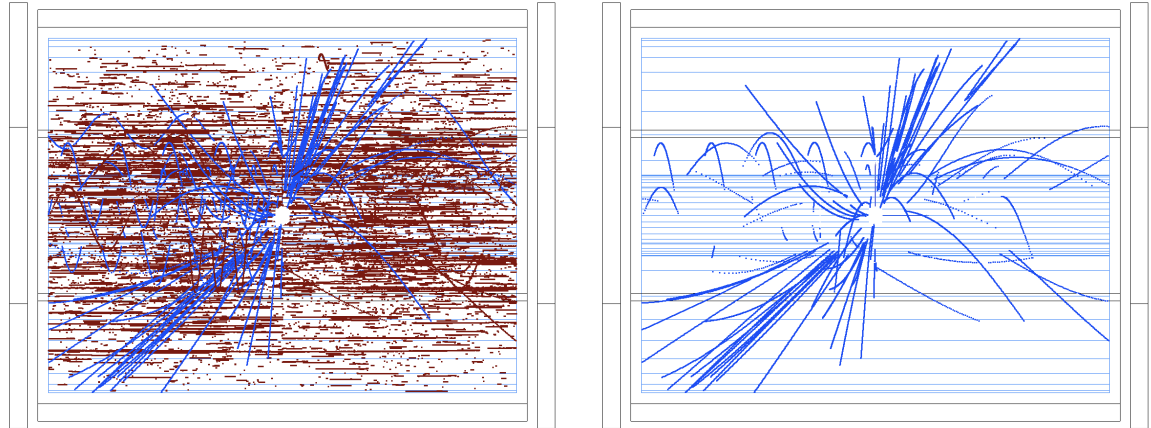
- Detectors Optimised for Particle Flow Approach to event reconstruction – reconstruction of individual particles.
- The implication is that during this detector optimisation stage it is important to investigate the detector performance using full reconstruction, rather than simply relying on fast Monte-Carlo.
- This makes realistic tracking software a requirement.

# Current Tracking Activities in LC Studies

- Presently two detector concepts are being investigated for use at a Linear Collider, ILD and SiD, where a significant difference in terms of tracking between them is the use of a TPC by ILD.
- The term “Realistic” should be seen in context, here it means, no use of MC truth information in the patrec, representative material descriptions, as well of including appropriate levels noise and background.

# Tracking Performance of ILD

Current Performance reaches desired tracking requirements



# Current Tracking Activities in LC Studies

- For the ILD Lol submitted in 2009, the tracking software used was a mixture of newly written patrec for the inner silicon detectors, and old Fortran patrec and fitting code from Aleph and Delphi, interfaced to the main C++ reconstruction
- Whilst this worked well for studies without the inclusion of background, it proved unable to scale for background studies, as well as proving difficult to maintain.

# Current Tracking Activities in LC Studies

- The next stage in our activities the ILD “Detector Baseline Document” calls for the dedicated studies into the impact of accelerator induced background, as well as more accurate descriptions of detector descriptions.
- For this we have begun a program to replace the tracking software previously used, this of course included a search for a suitable replacement ...

# Plans for Tracking Package in Aida

- What we intend to do is to design this a way that it is generic enough such that it could be used for other such studies into detector R&D.
- This places the emphasis on providing a toolkit which includes the necessary building blocks needed to put together a realistic track reconstruction.
- Joint activity between DESY and OEAW.



# Milestones and Deliverables

## Deliverables

- D2.4, M12: Software design for tracking toolkit.
- D2.8, M38: Software toolkit with tracking algorithms.

## Milestones

- MS11, M18: Running prototype of tracking toolkit including some algorithms. Application to ILD-TPC simulation.
- MS14, M44: Integration of tracking toolkit into LC software framework. Validation of physics performance.

# Design aspects

- To date there are now several well established algorithms used for track reconstruction, covering both pattern recognition and parameter determination, e.g.
  - Hough Transform
  - Kalman Filter
  - Gaussian Sum Filter
  - Deterministic Annealing Filter
- Concept: provide these in an easily accessible way.

# Design aspects

- Bleeding edge performance is not the main criteria for such a toolkit. It is aimed at providing for detector studies and as such should place strong emphasis on flexibility, accessibility, transparency and extendibility.
- The design should follow a modular pattern based on common interfaces and an underlying common event data model.

# Summary

- It will be important for the Tracking Toolkit task to work closely with the Geometry Toolkit task.
- The Tracking Toolkit should allow people to efficiently create a track reconstruction application which allows them to perform design and optimisation studies for a detector at a future collider.