Simulation & Reconstruction Summary

5 sessions.

1. ***Software Overview (4)***
2. ***LOI Benchmark Sim. and Reco. (5)***
3. ***Particle Flow and Reconstruction (5)***
4. ***Calorimetry Focussed (4) (joint with jet/photon)***
5. ***Tracking and Dual Readout (5)***

Conveners: Norman Graf, Akiya Miyamoto, GWW

Graham W. Wilson, Univ of Kansas

Software Overview

- 1. Software Common Task Report
- 2. Mokka/Marlin (ILD)
- 3. org.lcsim (SiD)
- 4. CLIC group experience with 2+3.

LOI Benchmark Sim & Reco

Summary

Strategic decisions concerning software, taken long before the LOI process appeared on the horizon, have allowed a very considerable amount of work to be done in a short time under a fair amount of pressure.

Creating modular frameworks to work in, coupled with the provision of common software tools such as LCIO, allowed groups, as well as single authors, to contribute effectively to a complete, detailed and realistic software chain.

Centralised production of Monte Carlo data still remains necessary to effectively utilise the computing resources offered by the GRID. Whilst solutions are at hand which may alleviate this, it remains a man power intensive procedure.

Some form of testing and validation suite would have been invaluable.

"*The ILD efforts on simulating the physics benchmark processes have been impressive.*"
IDAG Report on the Validation of Letters of Intent for ILC detectors

S. Aplin (DESY)

Summary

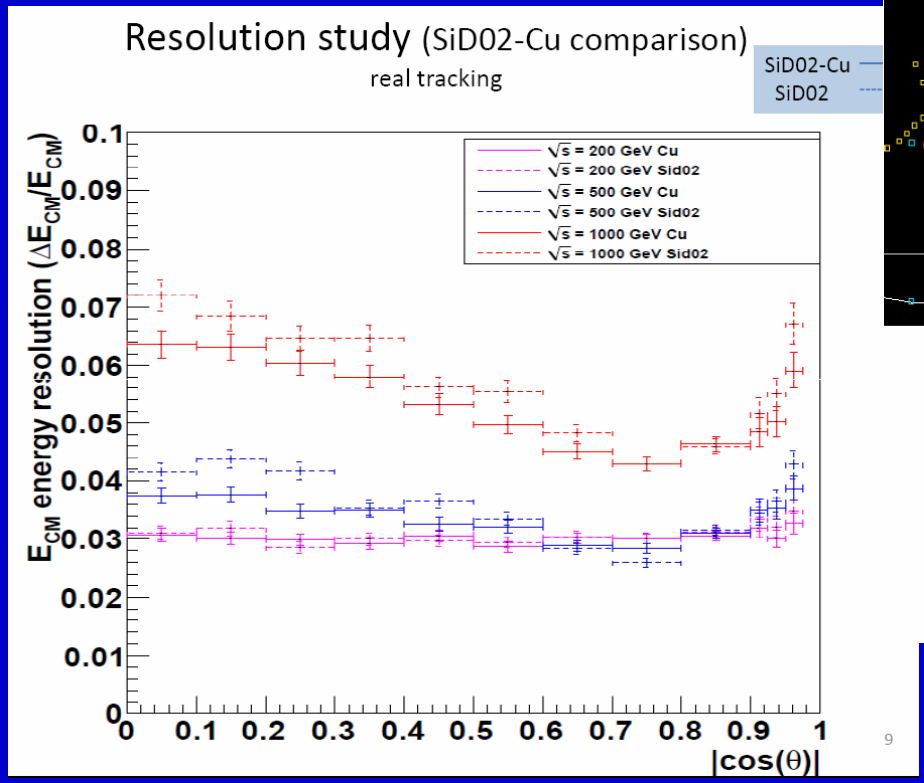
- With a lot of hard work by a very small number of individuals we were able to simulate the detector response of SiD to the benchmark physics processes and to then reconstruct the events to provide input to the analysis groups.
- Work is already ongoing to improve both the detector model and the reconstruction code necessary to accomplish the goals of the 2012 Work Plan.
- New groups and individuals are welcomed.

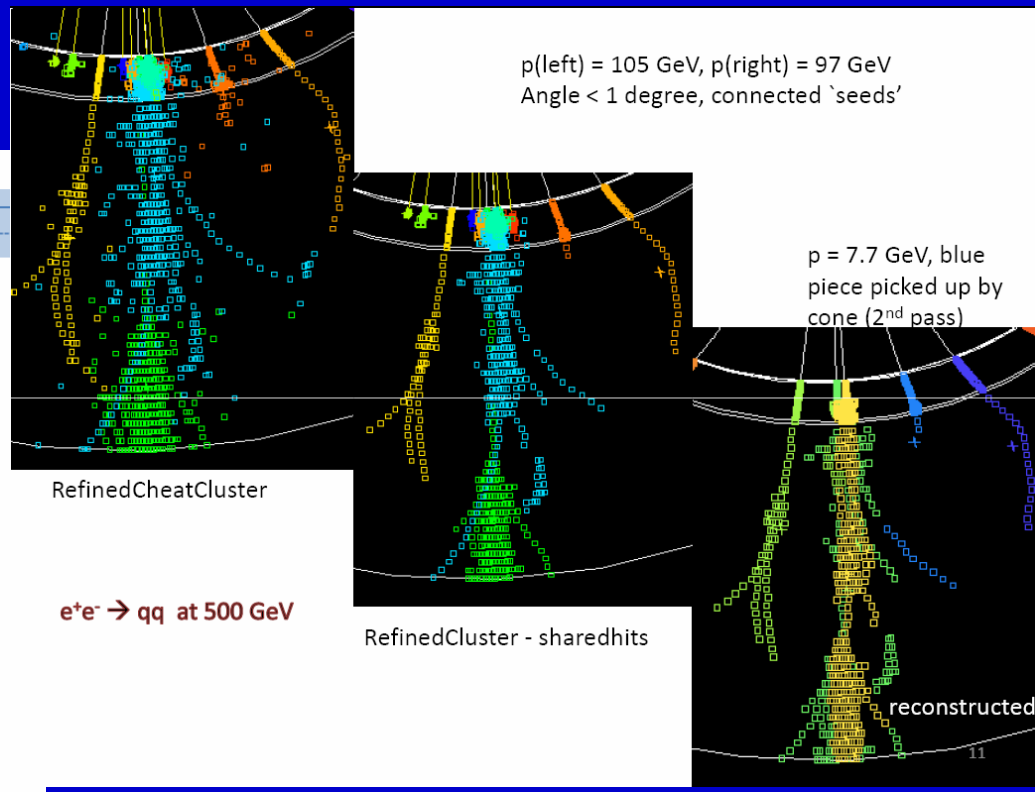
N. Graf (SLAC)

A great success. We learned the systems worked with a lot of hard work (and availability of computing resources).

Particle Flow and Reconstruction

SiD study





Leakage important.

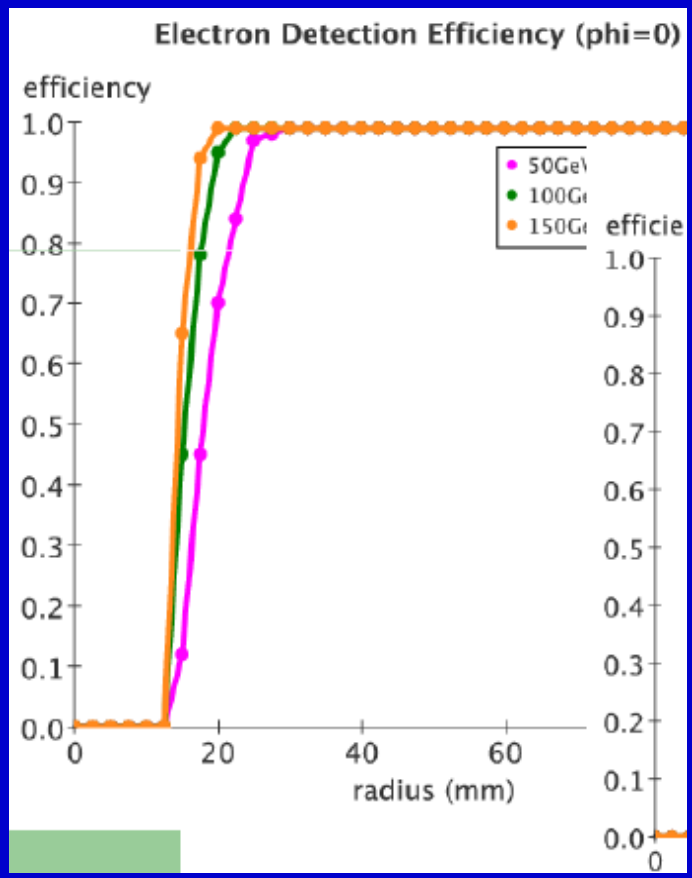
Renewed focus on pattern recognition issues (confusion reduction)

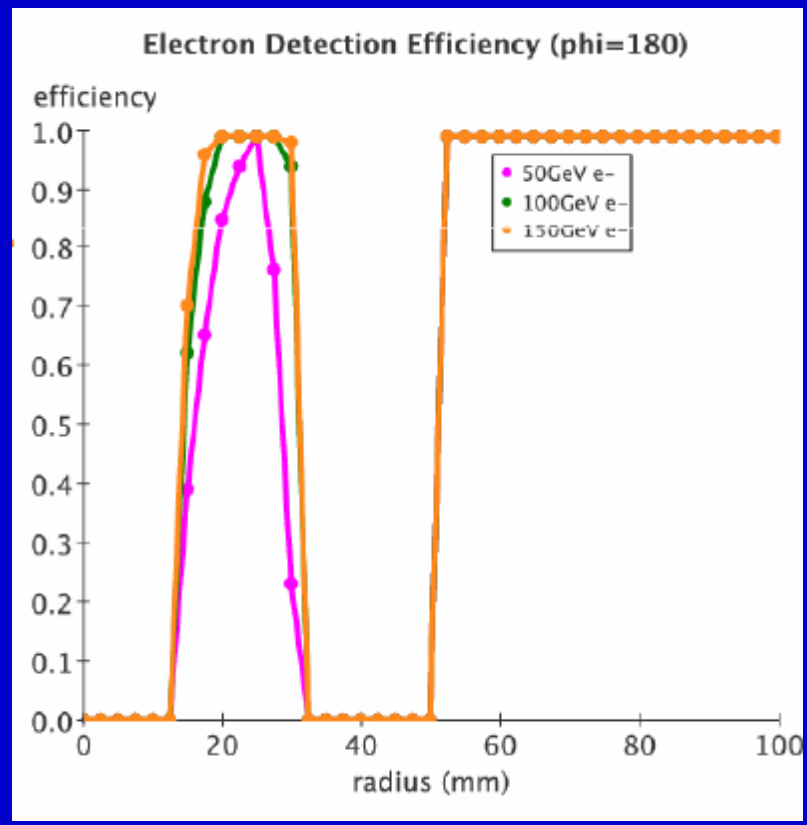
R. Cassell, U. Mallik, T. Kim,C. Pahl, M. Charles

Particle Flow and Reconstruction

SiD BeamCal Study. G. Oleinik (U. Colorado)

(z=2950mm)





Excellent electron finding efficiency with 13% veto inefficiency.

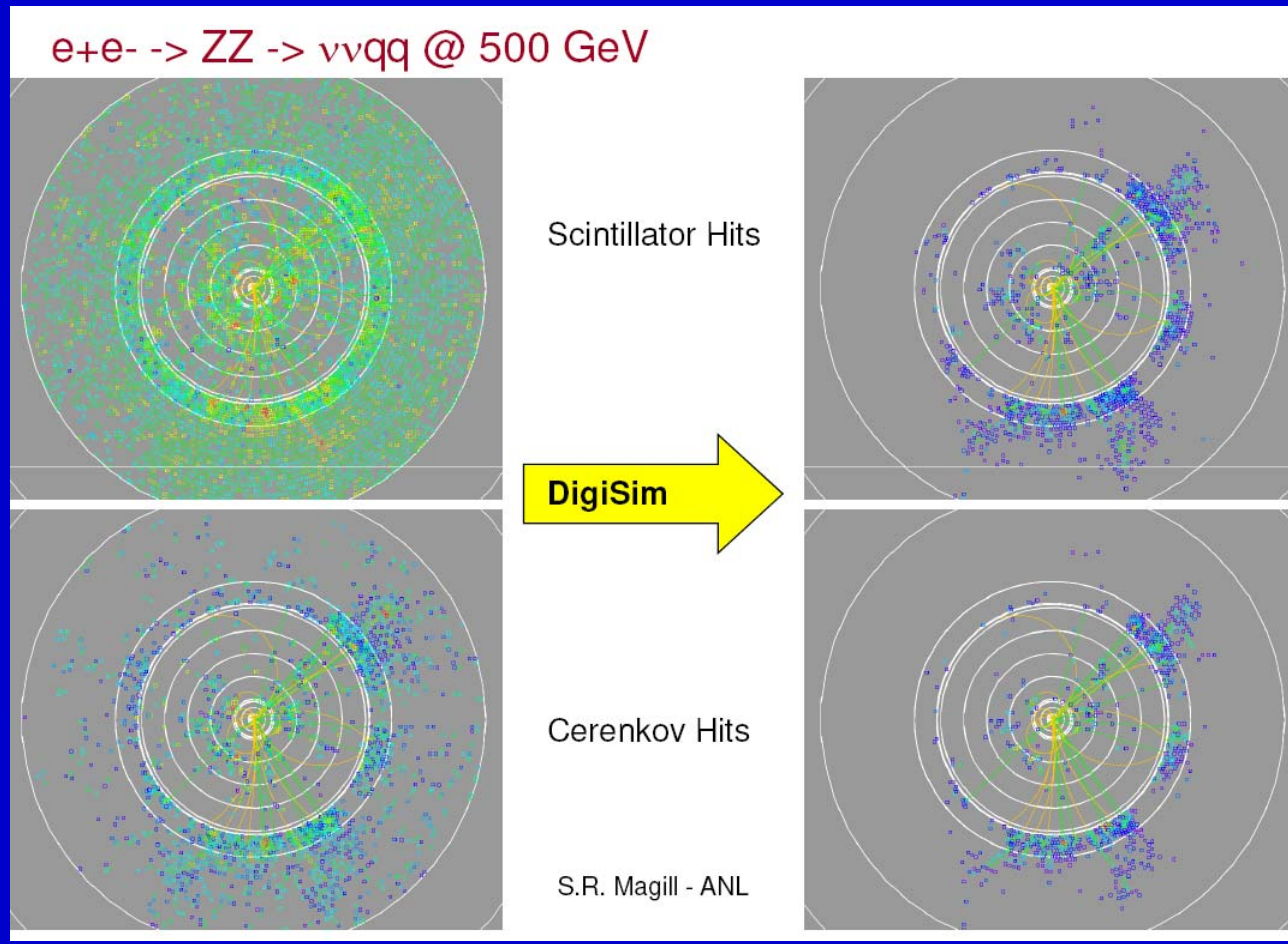
Calorimetry Simulation

Applying SLIC / org.lcsim framework to SiD study with dual readout crystals

(Magill, Wenzel)

Idealized simulation.

Needs input from future HW R&D or sensible "working assumptions" to be more realistic.

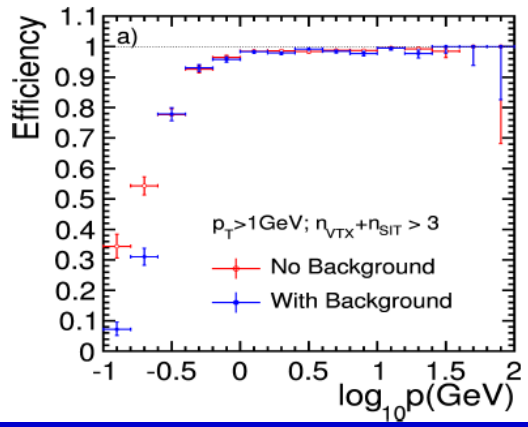


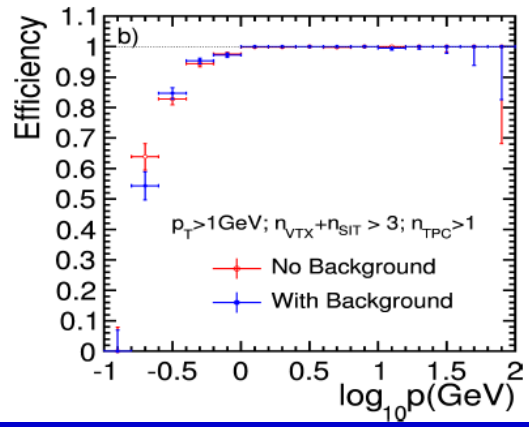
Tracking

ILD Study

Tracking Efficiency

- effect of overlayed background and VTX hit inefficiencies studied for $t\bar{t} \rightarrow 6\ jets$ events (for CME 500 GeV)
  - track efficiencies for p_T < 300 MeV reduced
  - for p_T < 1 GV inefficiency less then 0.1%
    - track efficiency 98.8%
  - for tracks that deposit energy in TPC and with p_T < 1 GV efficiency is > 99.9%
- track efficiencies not significantly degraded in by nominal level of BG



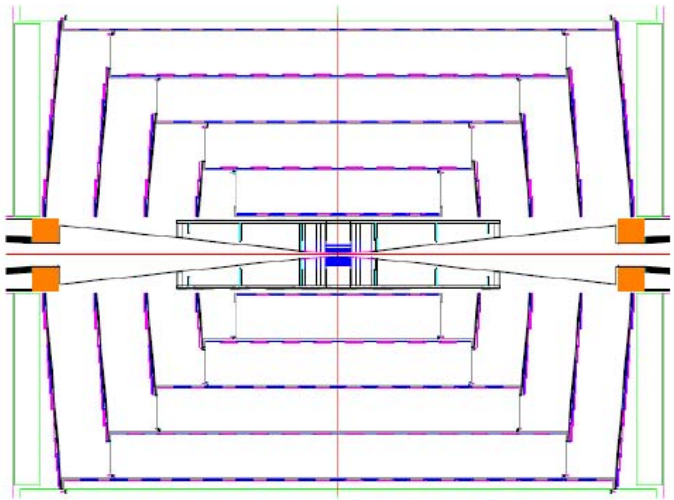


K. Wichmann (DESY)

Tracking

Overview

- LOI shows good tracking performance for baseline SiD tracker
  - 5 barrel + 7 disk pixel inner vertex detector
  - 5 barrel (axial strip) + 4 disk (stereo strip) outer detector
  - ~10 precision hits per track



Goals:

- Provide quick review of LOI performance studies
- Describe new efforts to improve fidelity of tracking simulations

Assumes single-bunch time-stamping in VTX

Also see talk by D. Onoprienko on integrated tracking-clustering

R. Partridge (SLAC)

Concluding Remarks

- Software and Reconstruction Frameworks are now battle-tested
  - Flexible tools also being applied to related problems (eg. CLIC studies, dual-readout studies)
  - Growing realism → convincing detector designs.
  - Require significant support and are results of small dedicated teams.
- At T-N years from first collisions, the depth of the studies are unprecedented compared to peer experiments.
  - We have an opportunity to advance the detector design and the physics case in the coming years.
  - Need to wisely target new goals and continue to collaborate effectively.