

SiD software and computing

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The state of SiD computing

- ▶ SiD was the first LC concept to really use the global LCG
- ▶ Experience with hand-crafted scripts during LOI influenced fundamentally the development of ILCDIRAC
- ▶ Dedicated storage at SLAC
- ▶ Dedicated CPU and storage at PNNL (partially supported by US-Japan)
- ▶ Opportunistic CPU and storage (traditionally claimed by SiD) at RAL
- ▶ Opportunistic CPU in OSG

- ▶ Summary: The state of SiD computing is strong
- ▶ Enough resources for large-scale production exists
 - Sharing to be negotiated with co-inhabitants of the ILC VO

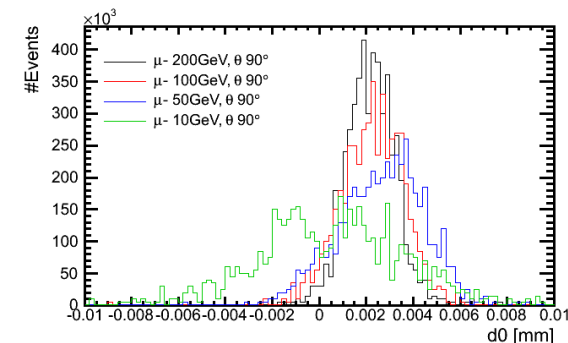
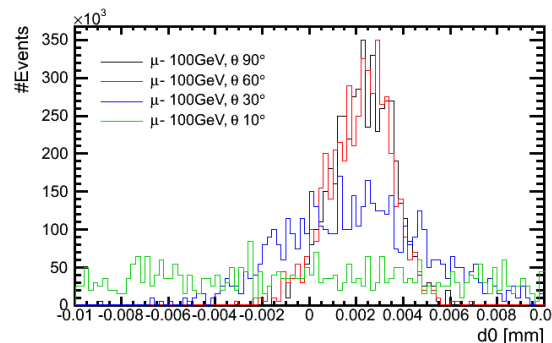
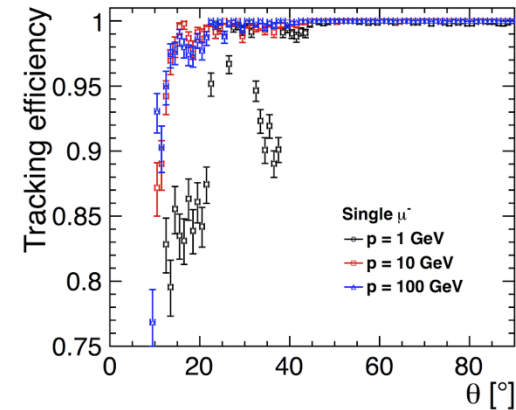
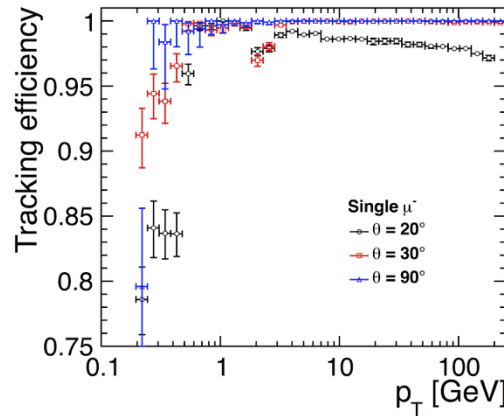
The state of SiD software

- ▶ Common Event Generator: Whizard (2)
- ▶ Common Event data model and I/O: LCIO
- ▶ Simulation: SLIC
- ▶ Track digitization, pattern recognition, global helix fit: lcsim
- ▶ Calorimeter digitization, calibration, particle flow: PandoraPFA (slicPandora)
- ▶ Jet clustering to remove background: FastJet (standalone or MarlinReco)
- ▶ Vertex finding, jet clustering: LCFIPlus (MarlinReco)
- ▶ Analysis: pyLCIO, lcsim, jas, Marlin, ...

- ▶ Automated testing, bug reports, tool support, wiki
- ▶ Extremely modern infrastructure 10 years ago
 - Has not kept up with developments

Work items identified: Tracking

- ▶ Low-pt tracking performance
- ▶ Track momentum resolution changed between LOI and DBD
 - Found when looking at jet energy resolution for DBD
 - Source unclear
- ▶ Charge asymmetry of impact parameter resolution
 - Effect on physics probably small, but unclear



Work Items identified: Calorimetry

- ▶ RPC Digitization in mass productions was rudimentary
- ▶ PandoraPFA tuning for digital calorimeter was rudimentary
- ▶ Performance was good enough for LOI and DBD

- ▶ Going forward, PandoraPFA API changed, needs updates to slicPandora

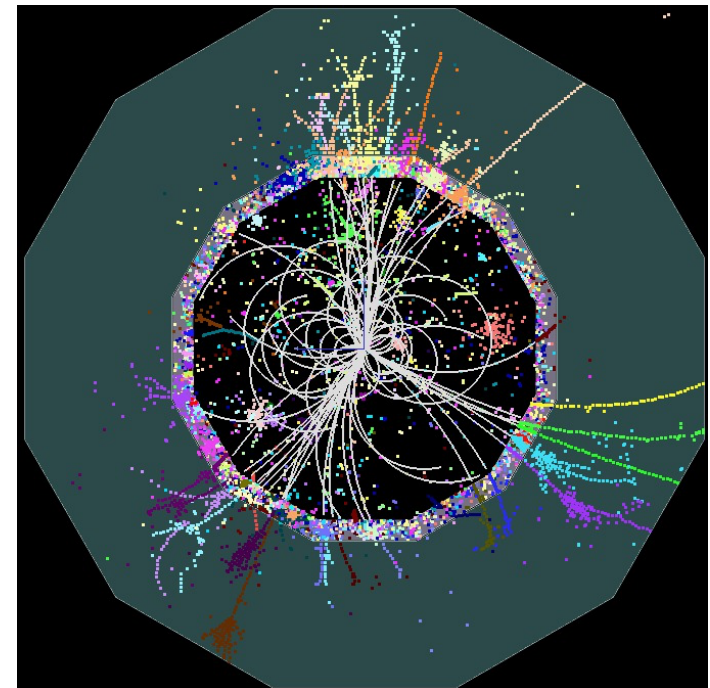
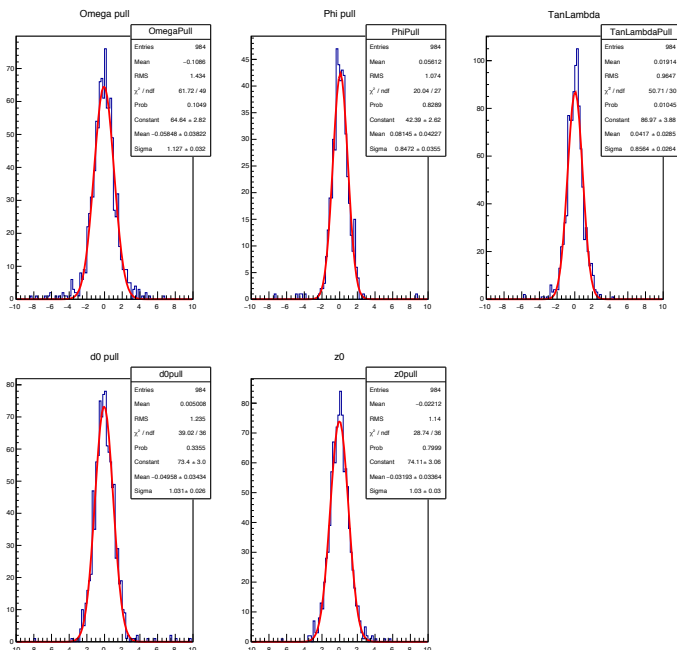
- ▶ Scintillator simulation is currently rudimentary, needs to be validated

- ▶ Beam Cal needs new place due to L^* change
 - Orientation changed in lcdd, no support for change in compact.xml
- ▶ Tracking region needs to be changed so it doesn't overlap with the lumi cal
 - Current studies have turned off the tracking disks

Software status summary

- ▶ Dedicated studies of the forward calorimeters, vtx, tracker, ECAL can continue with existing infrastructure
- ▶ HCAL studies need investment before optimization can be continued
- ▶ LumiCal needs to be either moved out of the tracking region, or tracking region needs to be changed
- ▶ Detailed tracking studies would probably benefit from a Kalman filter, which needs to be implemented
- ▶ PandoraPFA and LCFIPlus will move to the new geometry interface from DD4HEP (lcgeo). Response from SiD is needed mid-term.
- ▶ Large investments needed before a new mass production can commence

- ▶ End product remains LCIO. User analysis code does not need to change
- ▶ Implementing a first stage of the detector in the new framework is not for free. First steps easy, but validation will take a while
 - Might be able to share most, but maybe not all detectors with clicdp





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Discussion