

Sim/Recon DBD Editors Report

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SiD Workshop

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Software Chain for the DBD

- Event Generation
 - Whizard, pythssim, Guineapig
- Detector response simulation (slic)
- Event Reconstruction
 - Event overlay
 - Icsim tracking
 - slicPandora PFA
 - LCFI vertex finding
- Analysis
 - LCFI+ flavor tagging
 - Everything else

Simulation

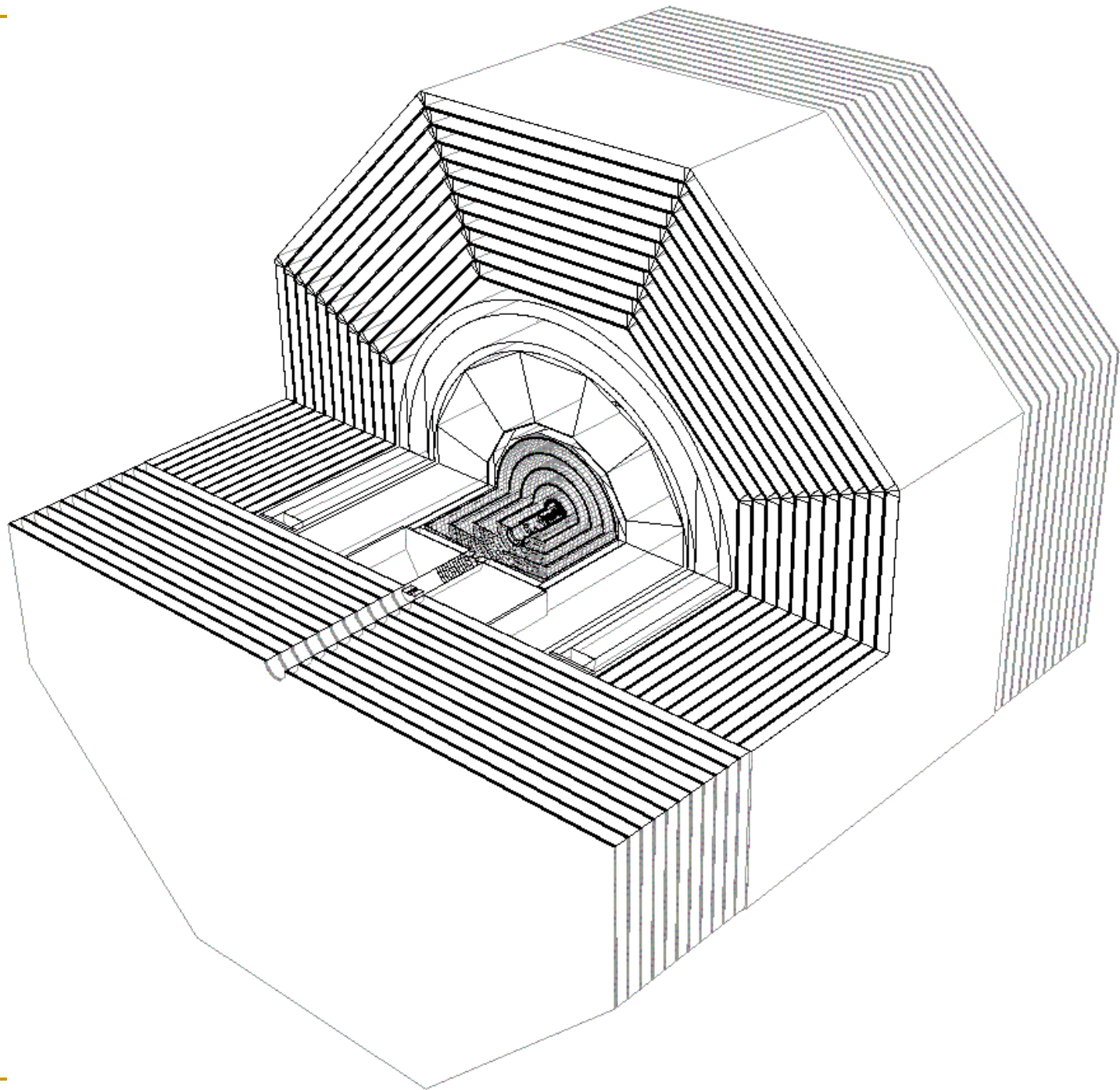
- Geant4 9.5, QGSP_BERT
- Latest version of slic
 - LCIO 2.0
 - Applying z smearing of event vertex at runtime.
 - Applying boost to simulate crossing angle
- sidloi3 detector for DBD Physics benchmarking
 - Detector variants for comparative performance studies

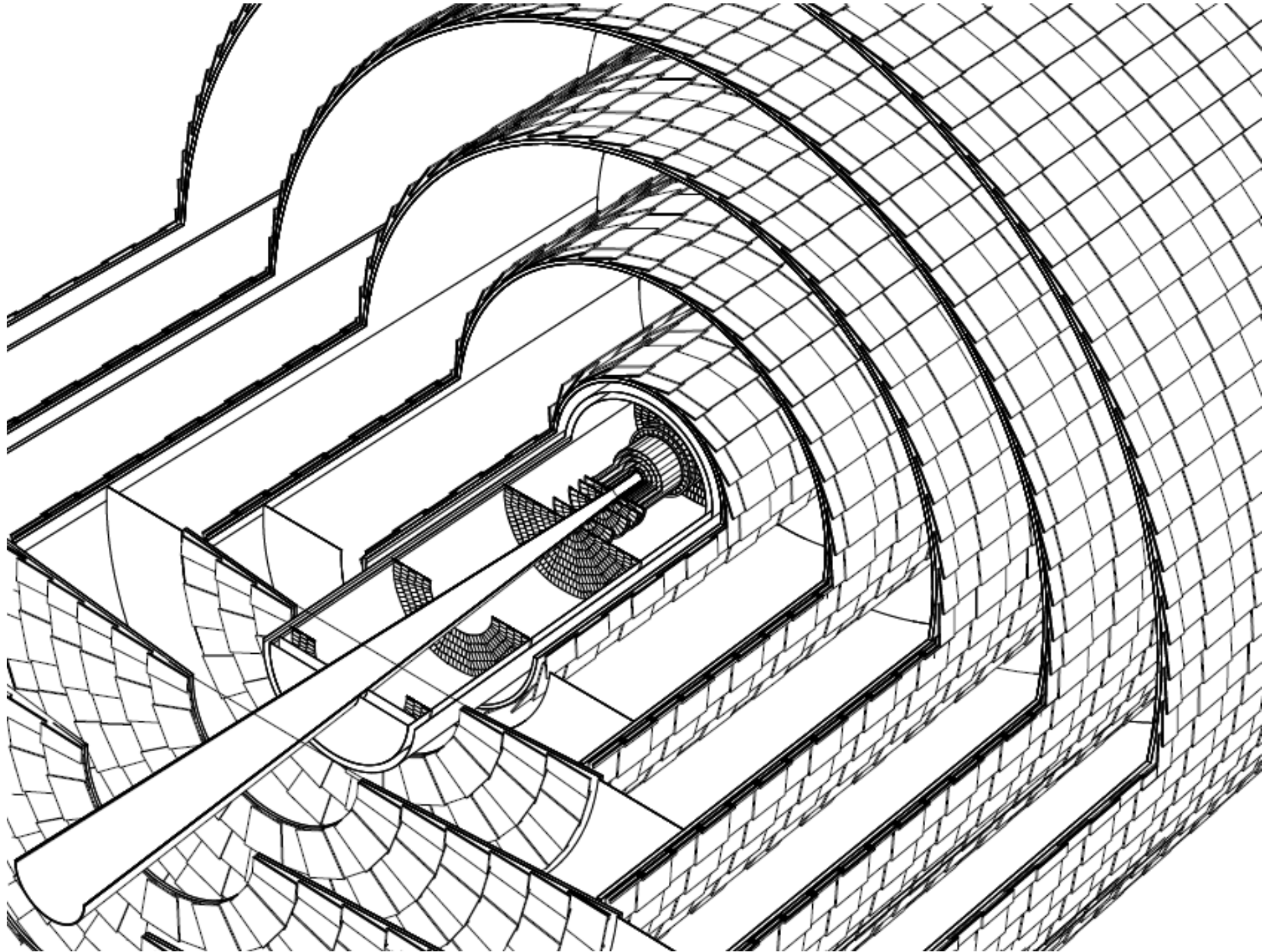
MCDI (Monte Carlo – Detector Interface)

- ❑ All MC events generated at (0,0,0)
- ❑ ILC 1000 B1b has gaussian luminous region in z with $\sigma=225\mu\text{m}$
 - Simulate “physics” events at $z=0$ (for technical reasons)
 - Simulate backgrounds with $\sigma_z=225\mu\text{m}*\sqrt{2}$
- ❑ Apply 7mr boost to give 14mr crossing angle.
- ❑ Events generated for all four polarization states.
 - SiD has generated “mixed” samples corresponding to the expected 80% e^- and 20% e^+ polarization.
 - Simplifies bookkeeping, provides some protection against missing or incorrect mixing at analysis stage
 - Missing files means missing luminosity, not important channels.

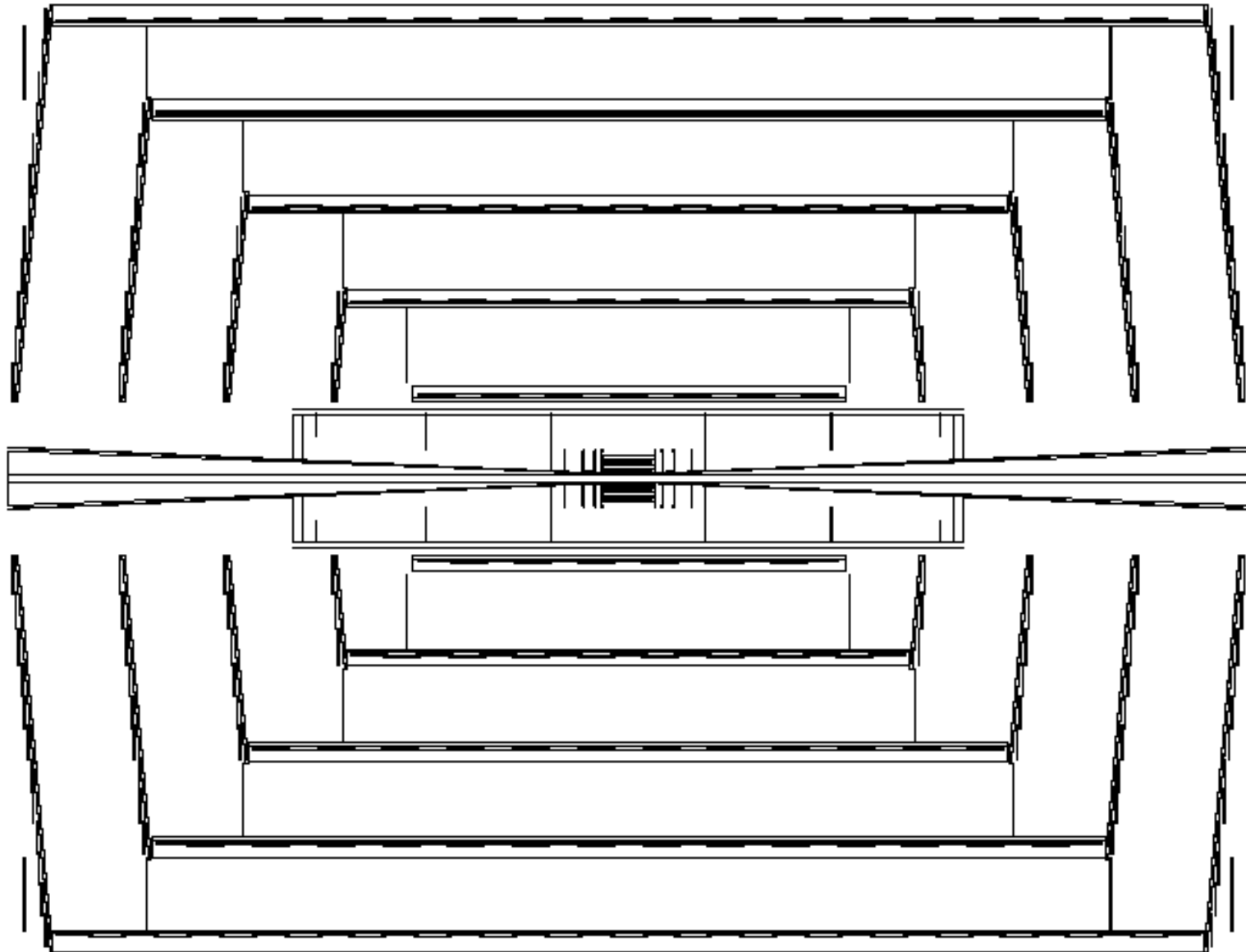
sidloi3

- Essentially the detector described in the LOI, with reasonably complex detector geometry.
- <http://lcsim.org/detectors/sidloi3.html>





Tracking Detectors



Overlay Driver

- Merging of LCIO files after full simulation and before digitization
 - Merge collections
 - Displace hits/entries in time
 - One bunch crossing
 - Multiple background files
 - GuineaPig pairs
 - $\gamma\gamma \rightarrow$ hadrons (Poisson-distributed, mean of 4.1)

Digitization

- After overlaying of SimTrackerHit and SimCalorimeterHit collections, need to digitize.
- Tracker digitization simulates the charge deposition, sharing, shaping and readout to produce TrackerHit objects.
- EM Calorimeter hits convert measured energy to deposited energy using Sampling Fractions
- Hadron Calorimeter hits are 1:1 mapping of MC hit to CalorimeterHit.
 - Charge sharing, efficiencies, etc. not yet in.
 - Can be used for detector performance studies, but will not be included in benchmarking studies.

Track Reconstruction

- Using ab initio track finding and fitting.
- Debugged and tested in action by CLiC CDR
- Final testing, tuning (e.g. new strategies) and characterization underway (primarily Christian Grefe)
 - (see Jan's talk)

PFA

- Using slicPandora as interface to PandoraPFA
- Tested, debugged during CLiC CDR
- Final QA after changes were made to the interface and new functionality added for ILD
- Generating detector performance plots (e.g. efficiencies, resolutions) as part of QA process.
- PandoraPFA has some particle ID built in, but will most likely be running final ID of our own.
 - Need to locate, update, implement code used during LOI studies

LCFI+

- Combined vertex finding/fitting and flavor-tagging
- Will only run first part in production reconstruction.
 - CPU intensive, and common
- Flavor-tagging part of analysis
 - Neural nets are final-state dependent
 - Training and application will be done by each analysis group.

DST

- Full reco files will be written out, but all physics analyses should target the DST files.
- Essentially list of Particle Flow Objects (PFOs) and Vertices.
- Small enough to fit on laptop, making analysis portable.

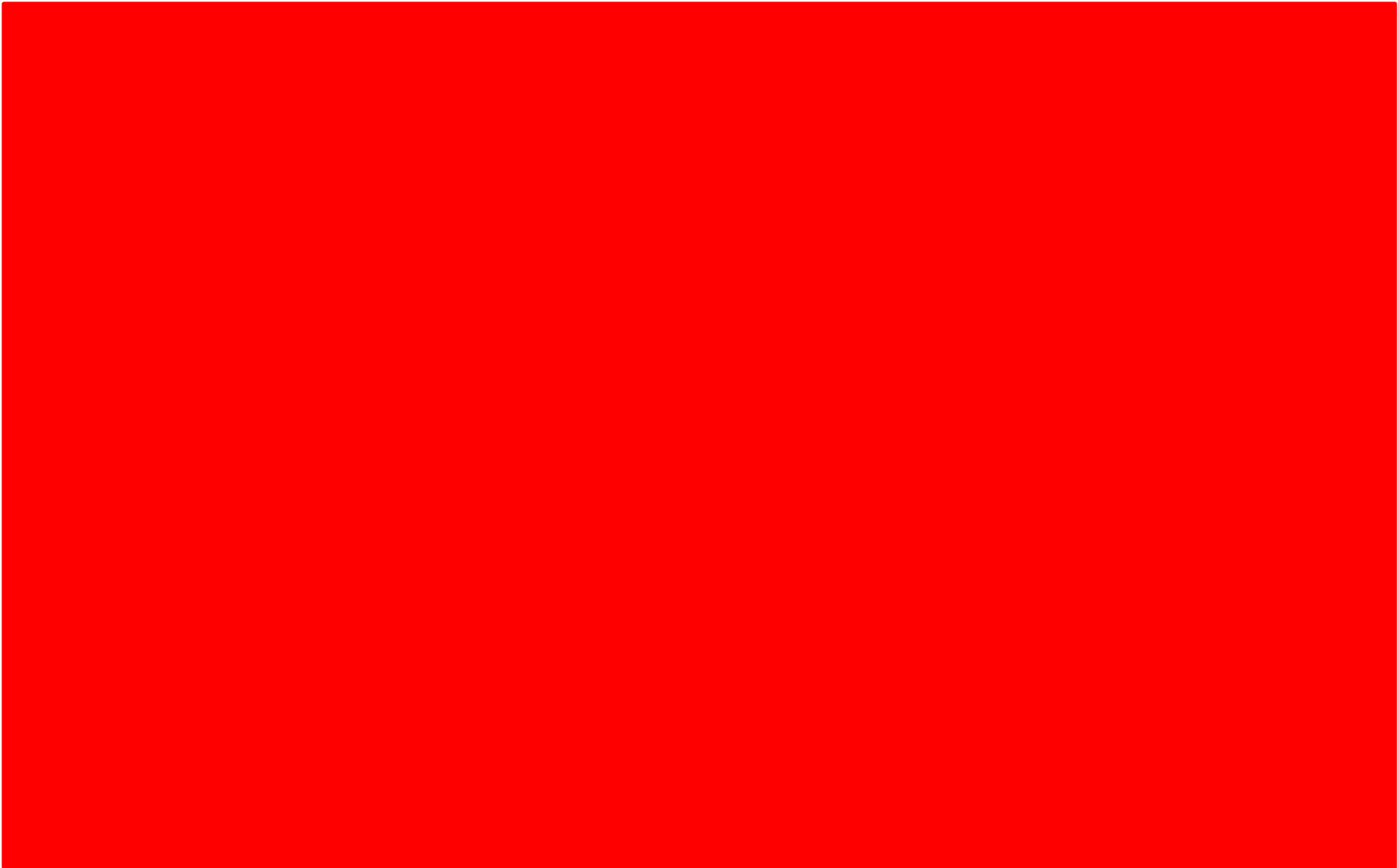
Data availability

- All files will reside on Grid Storage Elements (GSE), replicated at multiple sites.
- One of the sites is SLAC.
 - Disks are also accessible via anonymous ftp for those without Grid certificates or membership in ILC VO, or simply for convenience.

Production

- Using ILCDirac production management pioneered for CLiC CDR
 - Stephane Poss doing the heavy lifting
- Running on the Grid under ILC VO
 - Gentlemen's agreement with ILD not to step on each other's toes
 - Primarily using LCG resources (See Jan's talk)
 - Expect increase in OSG resources (See David's talk)
- Dashboard available at <https://confluence.slac.stanford.edu/display/ilc/DBD+Data+Samples>
- Many thanks to CERN group (Christian, Jan, Philipp, Stephane)
- Jeremy taking responsibility for prod czar.

Status of the DBD Chapter I



Status of the DBD Chapter II

- Busy writing code, production scripts, running jobs, identifying resources,...
- Will begin writing text in earnest next week.
- Will use LOI chapter and appendix as well as CDR chapters as basis.
- Will coordinate with other chapter editors on what detector performance plots will be generated and where they will be defined.
 - Tracking/vertex and calorimeter for subdetectors
 - Benchmarking for full-detector characterization.