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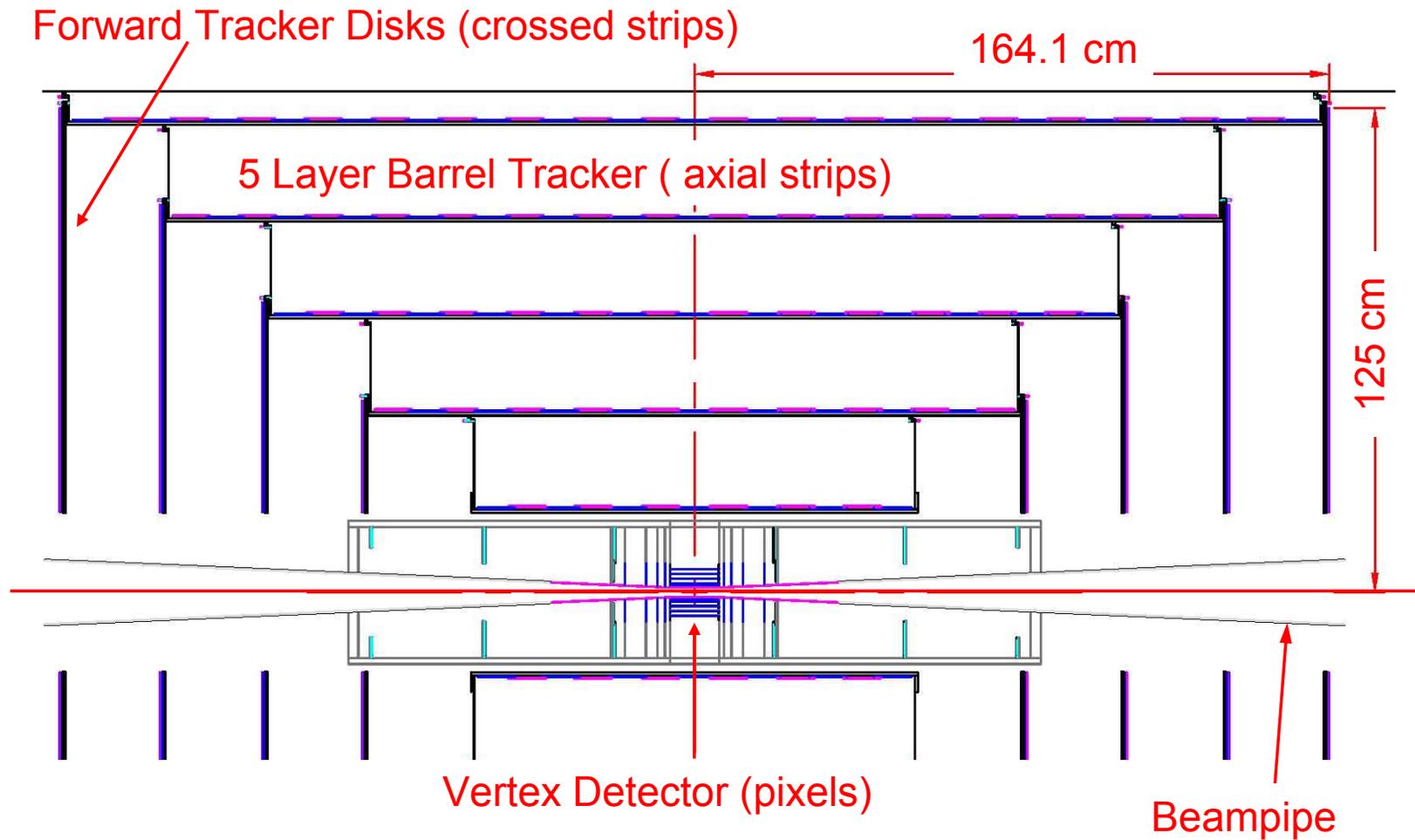
SiD Simulations and Benchmarking

Rob Kutschke, CD/IDS
ILC Coordination Forum
July 17, 2007

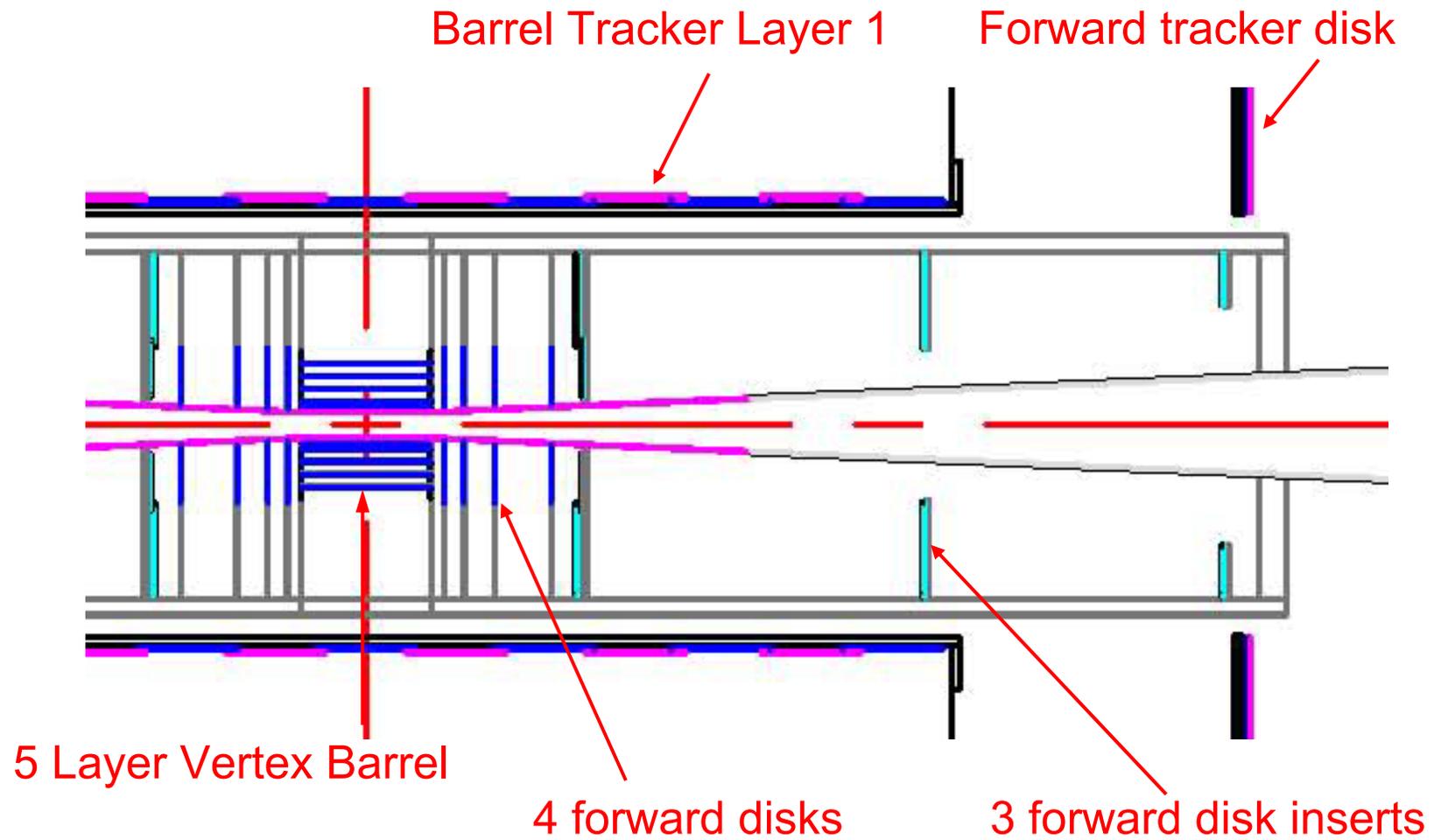
This Talk is about Names in Red

| | |
|---------------------|---|
| Lynn Garren | System admin; software deployment, maintenance and development; web site development. |
| Mark Fischler | Planning and oversight. |
| Rob Kutschke | Tracking and vertexing reconstruction software; benchmark analysis. |
| Adam Para | Survey of calorimeter technologies. |
| Hans Wenzel | SiD forward tracking software. Sim and reconstruction. |
| G.P.Yeh | 4th concept. |
| Summer Students: | |
| Francisco Ruiz | FNAL student from IPN Mexico; working with Hans. |
| Daniele Barbareschi | INFN Lecce (4th concept) paid by PPD; working with Hans. |
| Related people: | |
| Caroline Milstene | PPD finishing papers on physics with muons. Plus a summer student. |

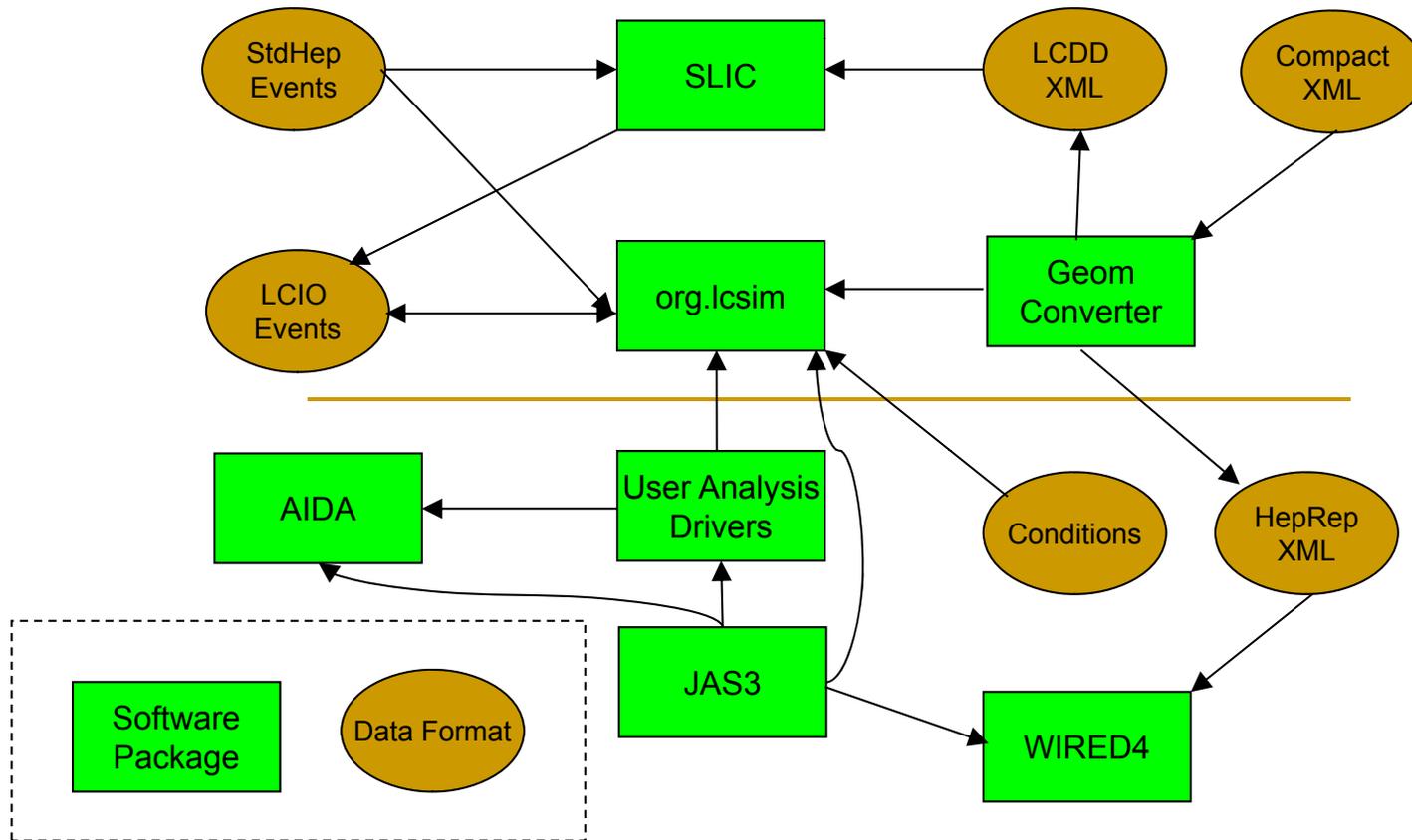
SiD Detector Vertical Section



Detail Near Beamline



SiD Software Overview



SiD Software

- SLIC:
 - G4 based simulation system.
- org.lcsim
 - Java based framework for reconstruction and analysis.
- Wired 4 based event display.
- GeomConverter:
 - Reads “Compact Detector Description” XML.
 - Native format for org.lcsim.
 - Can write:
 - HepRep XML for Wired-4
 - LCDD XML for SLIC
- Data formats: StdHep and LCIO.

org.lcsim

- Java based.
- Not a full featured framework.
 - Good enough for a small group with documentation by lunch, coffee and beer:30.
- All key reconstruction codes live in user areas.
 - Historically user codes do not play well together.
 - Hit and Track classes are deficient so everyone makes private extentions.
- Native histogram/tuple environment:
 - aida + JAS3 as a viewer.
 - Much poorer than root.
- Weak release/distribution model.

SiD Detector Models

- sid00
 - Complete but simplified sensitive volumes.
 - Barrel vertexer and tracker are pure cylinders.
 - Endcaps are annulus of disk.
 - Lots of existing MC needed by PFA people.
- sid01
 - As above but more detail of dead material.
 - Added forward tracker.
 - Current official model.
- New model under development.
 - Tracking elements made from wafers.
 - Will need several variations, especially in forward region, including variations of dead material.

Our Jobs

- Study occupancies in forward detector using existing detector models.
- Help to define the new detector model,
 - Forward vertexing, forward tracking and related dead materials.
- Real tracking in forward region.
 - Includes pattern recognition and fitting in presence of backgrounds.
- Simulated analyses.
- FNAL web site. Tutorials etc.

Plus whatever infrastructure work is implied

Our Jobs - Next Level of Detail

1. Study occupancies in forward detector using existing detector models.
2. Bookkeeping and Infrastructure improvements:
 - Hits, Clusters, Used Hits, Tracks, Run time config ...
3. Kalman filter, both old and new detector models.
4. Enhancements to org.lcsim
 - Help to define new detector model.
 - Real pattern recognition in forward region.
 - Vertexing/Jet Finding/Jet Flavor Id/
 - Port to new bookkeeping and infrastructure.
5. Simulated Analyses
 - $B(H \rightarrow b \bar{b})$ and $B(H \rightarrow c \bar{c})$.
6. FNAL web site.

Our jobs

- A few more pages with added details and names.
 - Leave details of all forward tracking stuff to Hans' talk.
 - Includes details on hits, used hits ...
 - Rob's work:
 - collaboration on infrastructure design
 - Learn to run codes that already exist. Needs to be sequential.
 - kalman filter
 - vertexing
 - jet finding
 - LCFI flavor id
 - Collaboration with Lynn on web site.
 - Lynn's work.

Relevant Deadlines

- ALCPG October 22-26, 2007 at FNAL
 - First pass at one benchmark study for CDR.
- Spring 2008
 - Software for CDR benchmarks essentially complete.
 - CDR benchmark studies underway.
 - Start writing CDR.
- Fall 2008
 - Submit CDR.

Deadlines with Added Detail

- ALCPG October 22-26, 2007 at FNAL
 - Occupancy studies and most infrastructure done.
 - Kalman filter working.
 - First release of detector built of wafers sometime in the summer.
 - First pass on one simulated analysis.
- Spring 2008
 - Our software working well enough for general use.
 - Several simulated analyses underway.
 - Start writing CDR.
- Fall 2008
 - Submit CDR.

Summary

- We have agreed to a list of jobs
 - Lots of forward tracking.
 - One simulated analysis.
 - Precursor infrastructure.
- We have a rough outline of who is doing what with specific deadlines for the October ALCPG meeting and less specific details for afterwards.

Backup Slides

org.lcsim

- Java based.
- Can be run standalone or within JAS3.
 - Documentation/examples are JAS3-centric.
- Framework runs the event loop and executes a list of “drivers” specified by the user.
- Driver:
 - What other frameworks call a module.
 - Callable from the framework:
 - Detector change; process event; end of data ...
 - Can read event and add collections to the event.
 - Can overwrite/delete collections in an event.
- Native histogram/tuple environment: aida.
 - Display tools not as rich as root.

org.lcsim (2)

- Reconstruction code lives in user areas and is not vetted by anyone.
- Little discipline among users to ensure that their codes cooperate.
 - Predefined classes are not rich enough for the job.
 - So everyone makes their own private extensions.
 - Can add these objects to the event - but no persistency.
- No method to stop my histograms or collections from stomping on yours.
- Various “full” reconstruction codes are advertised:
 - Some ran in JAS2 and are not yet ported to JAS3.
 - Documentation by calling the author.
 - I have not yet run any of them.

org.lcsim (3)

- Release model
 - Infrequent releases.
 - Users: copy current .jar files from SLAC
 - Developers: build the head
 - You just gotta know when the head is/was in good shape.
- Each user keeps current .jar files in ~/.JAS3
 - Deploying a new release clobbers the old one and you cannot backtrack unless you saved a copy ahead of time or know the check out time of the old version.
- Presumes that you always have internet access.
 - It does cache things but you may need to know in advance if you need to force caching.