



# Status of ILC Experimental Program

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EUDET meeting, NIKHEF, 2008.10.7



# GDE Timeline 1

- TDP I : 2010
  - ▶ Risk reduction (technical/cost)
    - ▶ SCRF linac technology
    - ▶ Electron cloud effect in DR
    - ▶ Final focus
  - ▶ Start re-baselining discussion ('minimum machine')
    - ▶ RDR is the starting point



# GDE Timeline 2

- TDP II : 2012
  - ▶ New baseline design
    - ▶ SCRF R&D: one RF unit test
    - ▶ Detailed technical design
    - ▶ Update value estimate and schedule
    - ▶ Remaining critical R&Ds
  - ▶ Develop project implementation plan
    - ▶ Siting
    - ▶ Industrialization
    - ▶ Governance
    - ▶ Funding plan etc.



## Some Funding Developments

- US
  - ▶ ILC R&D
    - ▶ FY08: 60M\$→15M\$
    - ▶ DOE's proposed budget for FY09: ~30M\$
  - ▶ SCRF: cut, but proposed to be revived (~25M\$, separate from ILC).
- UK
  - ▶ Key personnel retained (nominally for generic R&Ds).

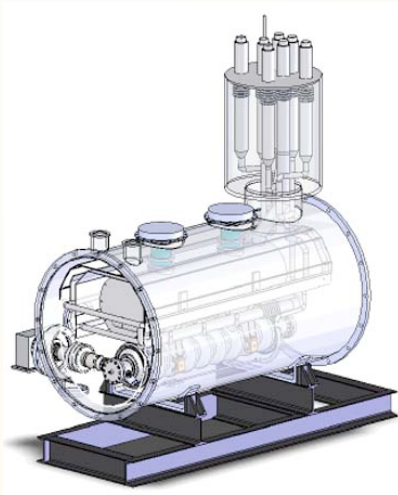


## DOE on detector R&D funding (Howard Nicholson @SiD meeting Sep 08)

- In the long term, the view at DOE is that ILC accelerator technology must be determined first and that **major** funding for detailed ILC detectors is not needed until
  - ▶ the machine technology is determined, and
  - ▶ a decision has been reached to proceed with the construction of the accelerator.
- Until then we will support generic detector research which could be applicable to a lepton collider at a level consistent with available funding and other program priorities.



## Good News



- Situation in Europe seems to be reasonable (for now)
- China
  - ▶ Obtained 1.5M€ for SCRF research
- Japan
  - ▶ Establishment of the supra-partisan federation of diet members for ILC and advanced accelerator science
  - ▶ Advanced accelerator technology forum was inaugurated (60 industries+30 institutions)
- Spain, India
  - ▶ Joined the common fund



## Re-baselining (Minimum Machine: MM)

- ◆ No change in luminosity&energy ('for now')
- ◆ Possible savings:
  - Double → Single tunnel ?
  - Shallow site ? (Dubna, Russia)
  - Smaller dumping rings ?
  - Low-P parameter (improved) ?
  - etc.
- ◆ Done 'openly in full coordination with experimentalists'  
(Barry Barish)



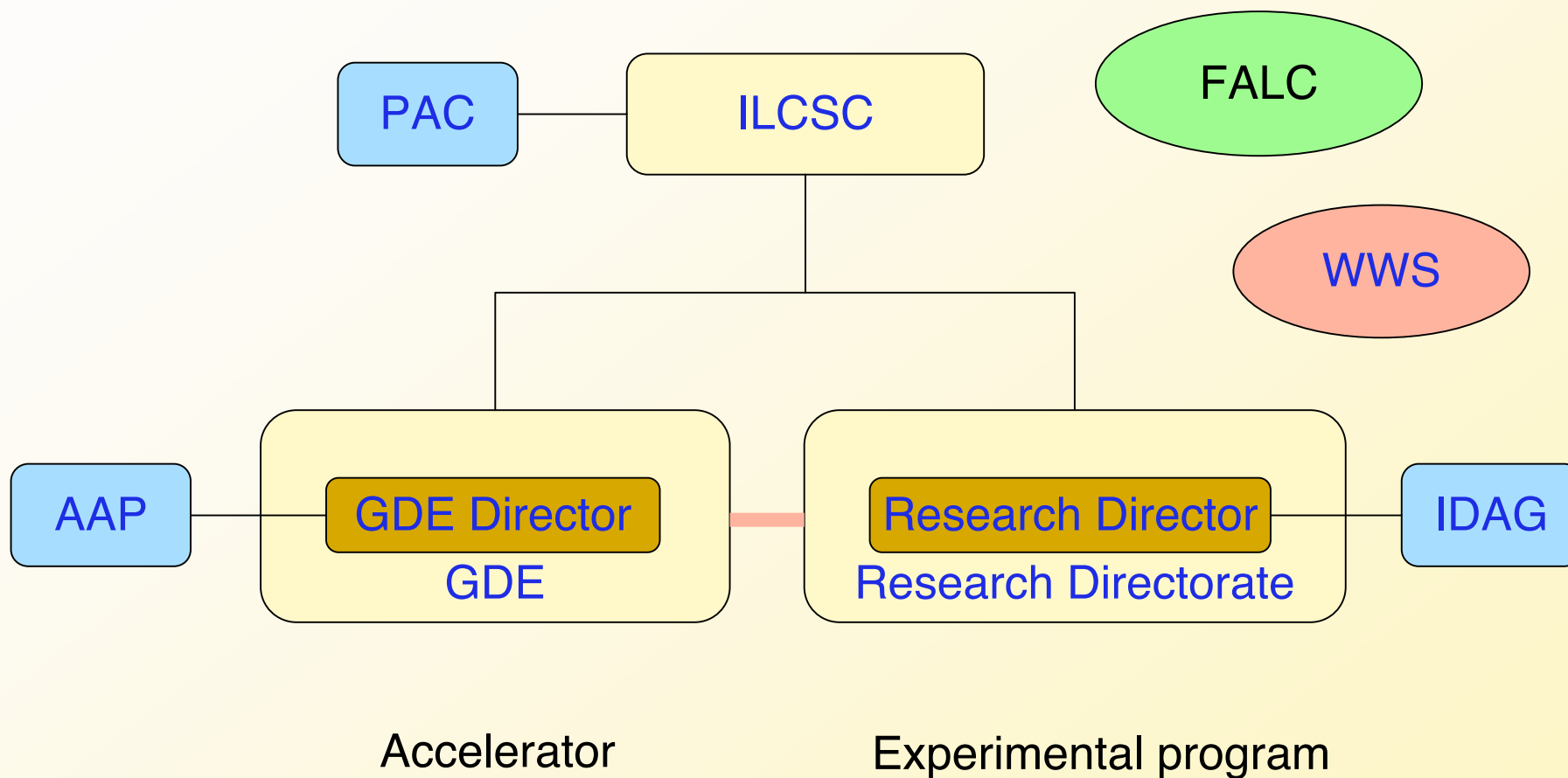
## Possible Implications of MM

- Energy and luminosity
  - ▶ LHC results
- Low-P
  - ▶ Beam backgrounds, heating
  - ▶ IP beam instrumentation ('traveling focus')
- LEP measurements
  - ▶ Upstream/downstream only?
- Assembly scheme
  - ▶ Shallow site



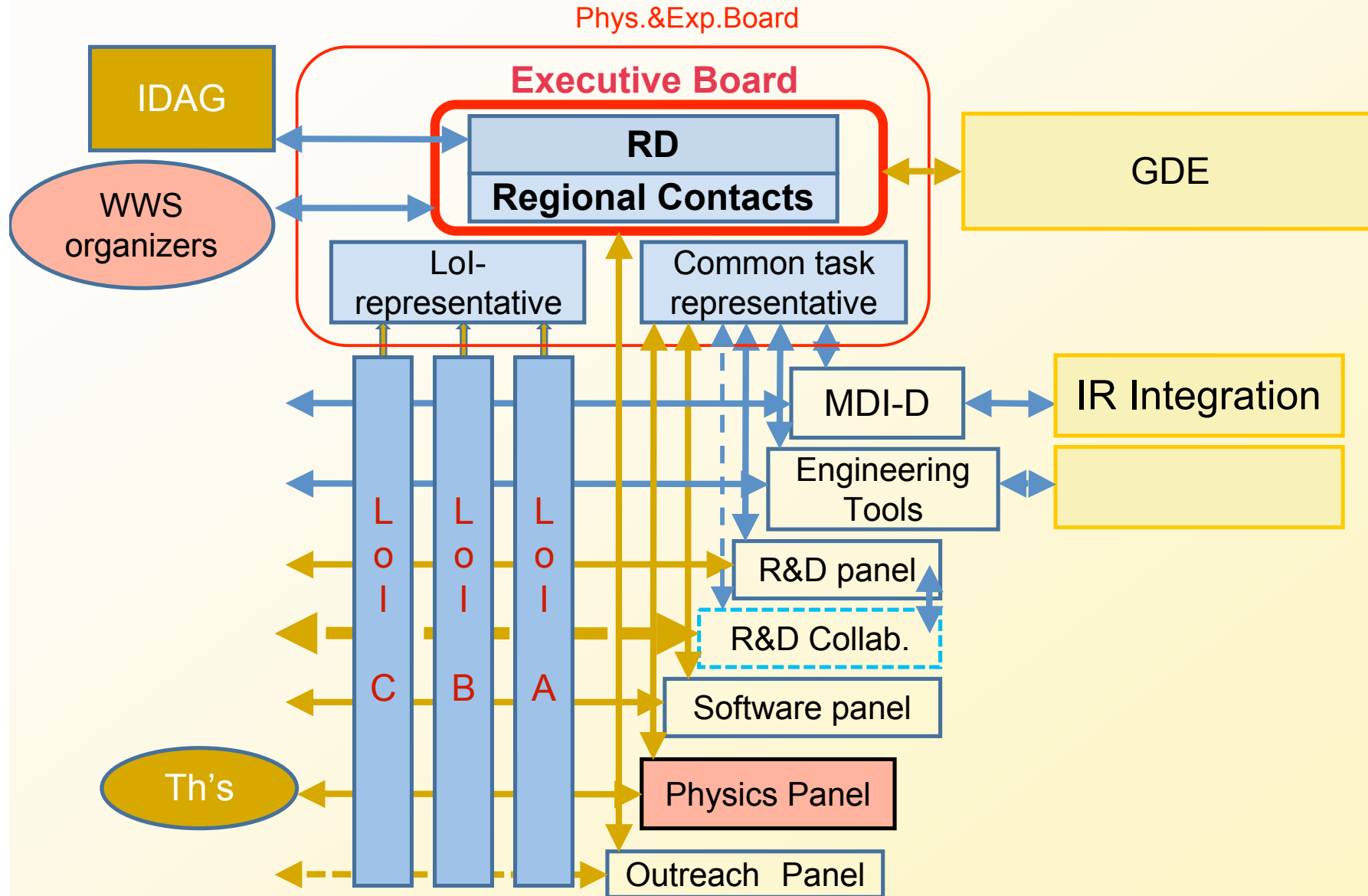


# ILC management structure





# Research Directorate Structure





# Physics Panel

Members:

- **Michael Peskin (convener, TBC)**, Keisuke Fujii, Klaus Desch, Andrei Nomerotski, Tim Barklow, Franco Bedeschi, Aurore Savoy-Navarro, Stewart Boogert, Seong-Youl Choi, Yanning Gao, Georg Weiglein, Jae Yu

Should play an important role in solidifying and updating the physics program of ILC.



# Common Task Groups

- Members have mostly been decided  
(except for outreach)
- Conveners are being selected
- Some groups have a similar panel in WWS
  - ▶ R&D, MDI, and software
  - ▶ Replace the WWS counterparts which will cease its activities
- WWS will continue to exist representing the wide community of physicists interested in linear collider
  - ▶ e.g. WWS organizes international linear collider workshops



# GDE-RD Communication

- GDE-EC
  - ▶ ~once/month: RD and 3 regional contacts are invited to chat at GDE-EC
  - ▶ Limited by 30min cutoff
  - ▶ e.g. No in-depth discussion of 'minimum machine' so far
- Better framework is being discussed:
  - ▶ Limited number of people:
    - ▶ GDE director + 3 PMs and RD and 3 regional contacts ?
  - ▶ Dedicated mtg
    - ▶ No 30-min cutoff



# CLIC-ILC Collaboration

- CLIC-ILC working groups established.
  - ▶ CFS
  - ▶ BDS
  - ▶ Cost&schedule
  - ▶ Beam dynamics
  - ▶ Detectors
    - ▶ Conveners:
      - ▶ L. Linssen, D. Schlatter (CERN)
      - ▶ F. Richard, S. Yamada



# Detector Timeline

- Detector Design Phase I : 2010
  - ▶ Focus on critical R&Ds
  - ▶ LOI validation by IDAG
  - ▶ Update physics performance
  - ▶ Prepare for LHC physics
  
- Detector Design Phase II : 2012
  - ▶ Re-formulate physics program based on LHC results
  - ▶ Confirm physics performance
  - ▶ Complete necessary R&Ds
  - ▶ Complete technical designs with costing



# LOI validation

- Submission deadline
  - ▶ March 31, 2009
- Validation
  - ▶ NOT a down-selection to two detectors
- LOI group members
  - ▶ Signing LOI do not indicate a formal commitment to the detector concept (not a collaboration yet)
- Time scale of validation
  - ▶ Not well-defined yet. ~ 1/2 year?





## LOI Guideline (October 3, 2007)

(rearranged)

With the LOI, a group **expresses its interest to develop a design for a detector at the ILC.**

Enable the reader to judge the **potential of the detector concept, the capacity and the seriousness of the groups** to carryout the work.

The group submitting the LOI should **define its position and role in the ongoing international research and development for a detector at the ILC.**

The overall length of the LOI **should not exceed 100 pages.**



## LOI Guideline cont'd

### LOI CONTENTS:

- ◆ Its overall **philosophy**, its **sub-detectors** and **alternatives**, and **how these will work in concert to address the ILC physics** questions.
- ◆ State of technological developments for the different components. **Alternative technological options** should be elaborated. **Missing R&Ds, timelines and milestones.**
- ◆ **Structure of the group, resource needs and their evolution in time.**
- ◆ Preliminary **cost estimate** for the detector.



# IDAG additional questions

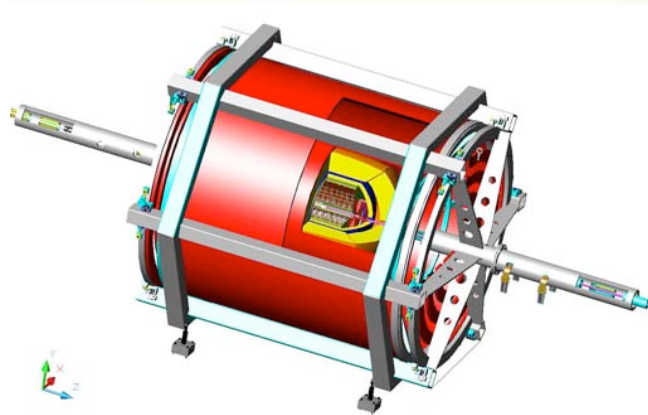
(preliminary - given to LOI reps by RD)

- Sensitivity of different detector components to **machine backgrounds** as characterized in the MDI panel
- **Calibration and alignment** schemes
- Status of an **engineering model** describing the support structures and the dead zones in the detector simulation
- Plans for getting the **necessary R&D results** to transform the design concept into a well-defined detector proposal
- **Push-pull** ability with respect to technical aspects (assembly areas needed, detector transport and connections) and maintaining the detector performance for **a stable and time-efficient operation**
- A short statement about the energy coverage, identifying the deterioration of the performances when going to **energies higher than 500 GeV** and the considered possible detector upgrade
- **How was the detector optimized**: for example the identification of the major parameters which drive the total detector cost and its sensitivity to variations of these parameters

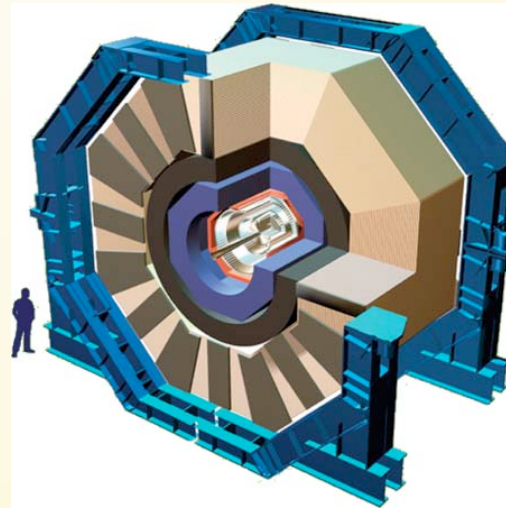


# LOI Groups

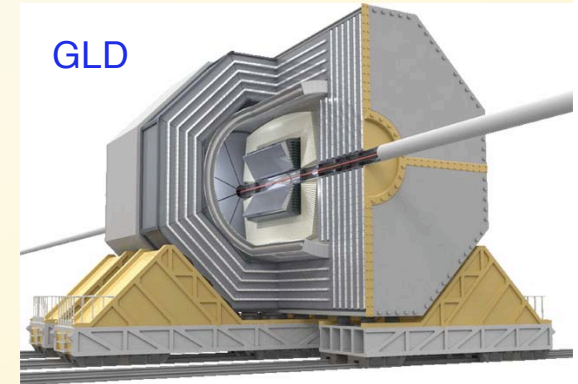
- So far, 3 groups submitted EOIs to ILCSC



4th

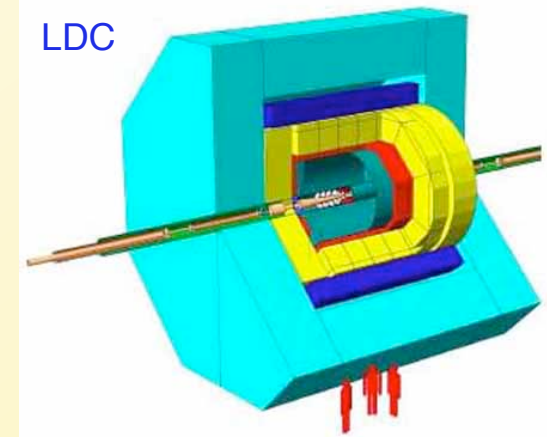


SiD



GLD

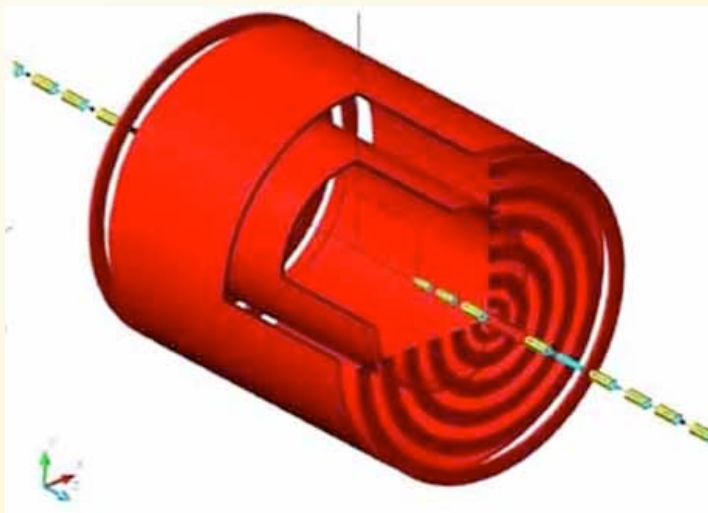
+ (2007 summer)



LDC

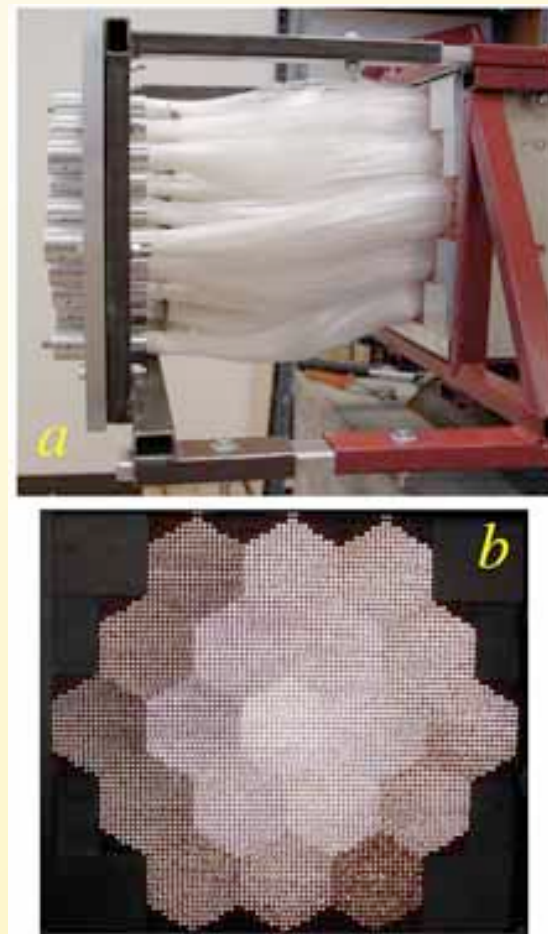
ILD

- Dual readout calorimeters (not PFA)
  - ▶ Scint+Cerenkov
- Iron-less solenoid (no return yoke)
  - ▶ Light
  - ▶ Good muon tracking



solenoid

Dream cal test





## ILD

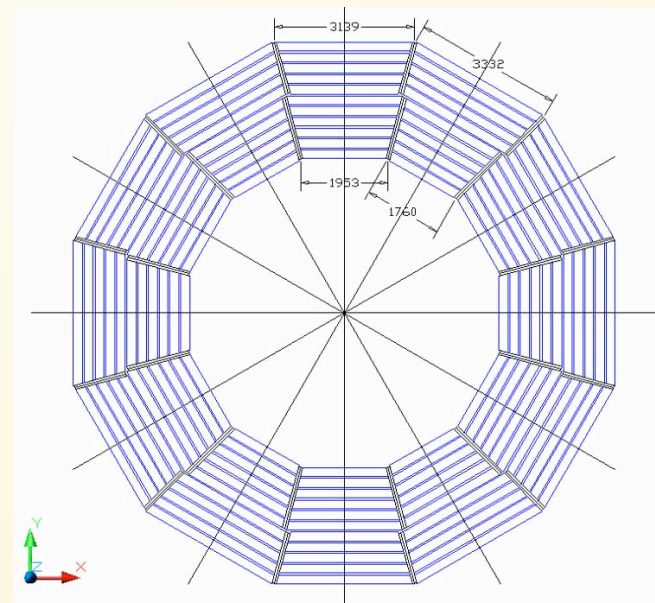


- Cambridge ILC meeting (9/11-13/08)
  - ▶ ILC reference parameters defined
    - ▶  $B = 3.5 \text{ T}$
    - ▶ ECAL  $R_{in} = 185 \text{ cm}$  etc.
  - ▶ Finally, GLD and LDC were unified!
    - ▶ Some options are clearly open and will be in LOI
      - ▶ ECAL technology
      - ▶ VTX configurations
      - ▶ etc.
  - ▶ Agreed to use a single software framework managed jointly.
    - ▶ Mostly based on MOKKA/Marlin
    - ▶ With good parts of Jupiter/Satellite



# SiD

- Boulder SiD meeting (9/16-19/08)
  - ▶ Engineering workshop
    - ▶ By the SiD engineering group
    - ▶ Beam tube, ECAL, HCAL designs
    - ▶ etc.
  - ▶ SiD workshop
    - ▶ Geared toward LOI planning
    - ▶ Benchmarking, PFA, optimization
    - ▶ Subdetector groups charged to answer IDAG questions
    - ▶ Detailed schedule made for LOI



## Plans for the LOI

Editors: Phil Burrows, Mark Oreglia, Hiro Aihara

- **November 15, 2008:** Deadline for subsystem/subgroups to provide reports, and addressing IDAG questions.
- **December 15:** : Deadline for first pass of physics benchmarking chapter. Editors to have given feedback on subsystem sections.
- **January 15 (SiD workshop?),** Revised subsystem sections that meet LOI length requirements. Editors will then work on combining material coherently.
- **February 15, 2009:** Complete draft LOI available for collaboration review.
- **March 15:** Final draft ready.
- **March 31:** Submission of LOI to Research Director.



## Summary

- ILC is surviving the funding crises in US/UK.
- Now preparing for LHC outcome while reducing risk/cost.
- Research directorate structure is being completed.
- Framework is in place for good GDE-RD communication.
- The LOI process initiated by ILCSC/RD is moving forward.
- LOI groups are making progress toward LOI.