

# IDAG Report

Michel Davier  
LAL-Orsay

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# IDAG agenda in Geneva

- Discussion with RD: monitoring of CTGs, DBD requirements
- ILD status
- SiD status
- Detector CTG and R&D status
- Software CTG
- Discussion and recommendations

# Toward Detailed Baseline Document

- IDAG advising RD in the transition period between the LOIs and the end-2012 date for the DBD
- DBD coincident with the machine TDR
- full ILC case available (accelerator, physics, detectors) when first LHC results could reveal evidence for new physics phenomena

# Recall DBD guidelines

<http://www.linearcollider.org/physics-detectors/Research-Director%27s-report/2009/20-August-2009---Planning-for-the-next-steps>

1. Demonstrate proof of principle on critical components.  
When there are options, at least one option for each subsystem will reach a level of maturity which verifies feasibility.
2. Define a feasible baseline design.  
While a baseline will be specified, options may also be considered.
3. Complete basic mechanical integration of the baseline design accounting for insensitive zones such as the beam holes, support structure, cables, gaps or inner detector material.
4. Develop a realistic simulation model of the baseline design, including the identified faults and limitations.
5. Develop a push-pull mechanism, working out the movement procedure, time scale, alignment and calibration schemes in cooperation with relevant groups.
6. Develop a realistic concept of integration with the accelerator including the IR design.
7. Simulate and analyse updated benchmark reactions with the realistic detector model. Include the impact of detector dead zones and updated background conditions.
8. Simulate and study some reactions at 1 TeV, including realistic higher-energy backgrounds, demonstrating the detector performance.
9. Develop an improved cost estimate.

# Costing issues

- at Beijing meeting IDAG recommended that costing of the two detectors be done with common methods and common unit costs
- RD response: common costing group set up
- the 2 detectors follow different optimization process on performance vs cost  $\Rightarrow$  disparity in (preliminary) costing at this moment.
- 1-TeV benchmarks offer a new possibility to compare functionalities
- further iterations may require more specific cost guidance

# Reaching DBD goals

- Who will read the DBD ? ILCSC, HEP community
- Initial guidance of 100 pages may be too restrictive, but should not exceed 150 pages/detector
- By the time of the next IDAG meeting, some specific effort should be made by the concept groups and the RD management to further improve the understanding of the DBD contents
- IDAG would like to monitor progress in reaching the goals early enough
- At next Eugene workshop 19-23 March 2011, IDAG requests the two concepts to present their detailed DBD outlines with sufficient explanation of what will be covered (and what not covered) within existing resources in addressing the 9 goals

# ILD and SiD

- good and measurable progress on sub-detector R&D
- uncertainties and shortcomings in funding
- progress on cooperation: push-pull (convergence expected in Spring 2011 on the platform/no platform issue), MDI and hall design, detector R&D (FCAL, vertex, HCAL), common software frameworks
- IDAG looks forward for further close collaboration
- clear that detector R&D needs to be pushed further after 2012
- Tight schedule for new physics benchmarks: event production with realistic simulation foreseen for the later part of 2011

# ILD/SiD and CLIC collaboration

- approach of CLIC CDR created a phase transition in detector collaboration
- IDAG pleased to see this new situation
- detector concepts developed for CLIC based on ILD and SiD
- good collaboration between CLIC and ILC detector groups on the ground
- solid engineering efforts engaged at CERN help ILC detectors: layout of experimental hall, push-pull design
- some shift of resources into CLIC detector design: expectation that help in the other direction will occur after CLIC CDR for DBD work. IDAG hopes that this expectation will be met.
- CLIC and ILC both need benchmark simulations at 1 TeV
- software now largely in common: this efficient way to proceed should be maintained in the longer term
- overall, extremely positive development



# Software CTG

- IDAG heard a presentation by A. Miyamoto
- satisfactory progress on updating and enlarging common software tools (LCIO event data model)
- Generator subWG formed to share work for common event samples
- worry about human resources to carry out the requested studies for DBD
- good communication should be maintained between ILC and CLIC communities to avoid conflicts in computing and human resources in coming months

# Detector CTG and R&D

- detector CTG set up to monitor tasks which are common to the 2 concepts
- however most of the needed R&D is done in a “non common” way
- still some information flows to the CTG through representatives of independent R&D collaborations
- IDAG is charged with the monitoring of the two concepts toward the DBD phase
- so it was felt necessary to go much beyond the review of the CTG activity and to understand the whole R&D picture relevant to ILD and SiD

# R&D review

IDAG heard the following presentations:

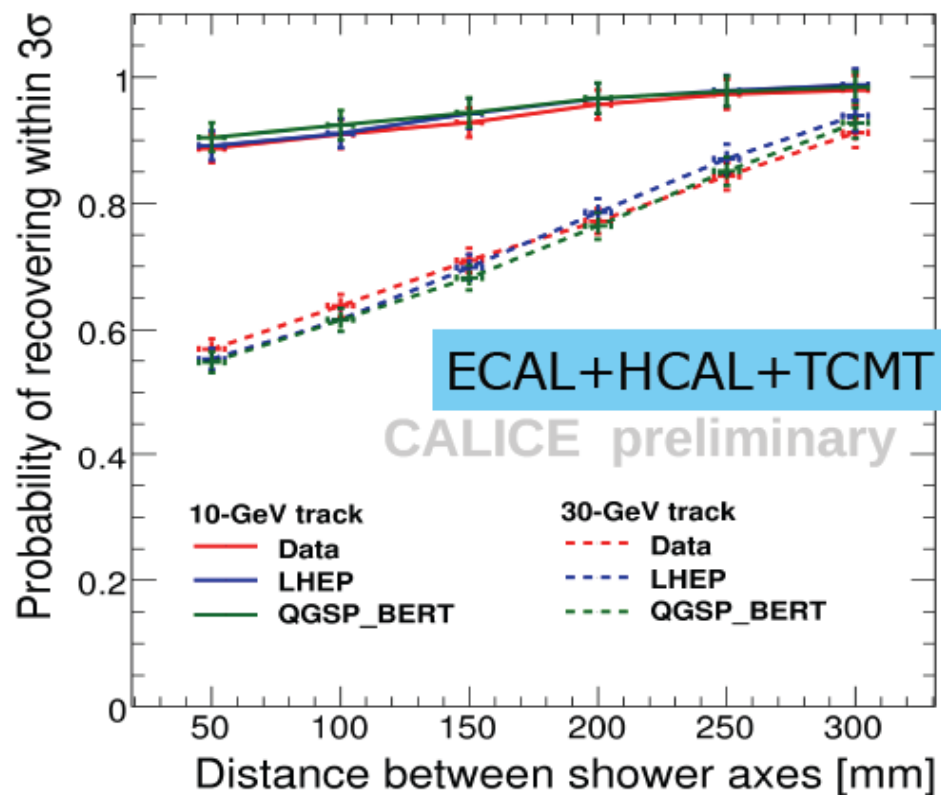
- introduction to detector CTG (M. Demarteau)
- CALICE R&D collaboration (F. Sefkow)
- LPTPC (J. Timmermans)
- SILC (A. Savoy-Navarro)
- FCAL (W. Lohmann)
- vertex detector R&D (R. Lipton)
- SiD R&D (A. White)
- reflections on detector R&D (M. Demarteau)
- discussion with CTG members and ILD/SiD representatives

# R&D general assessment

- truly impressive activity done by the R&D collaborations
- the larger part of the effort is devoted to the ILC detectors
- major results obtained which validate expected detector performance
- 3 beautiful examples:
  - precision achieved in LCTPC (ILD)
  - software energy compensation and progress on PF (shower overlays) (ILD)
  - 1 m<sup>3</sup> digital HCAL under test (SiD)
- pixel development research appropriately broad for this stage
- Serious worry as level of funding/support is shrinking

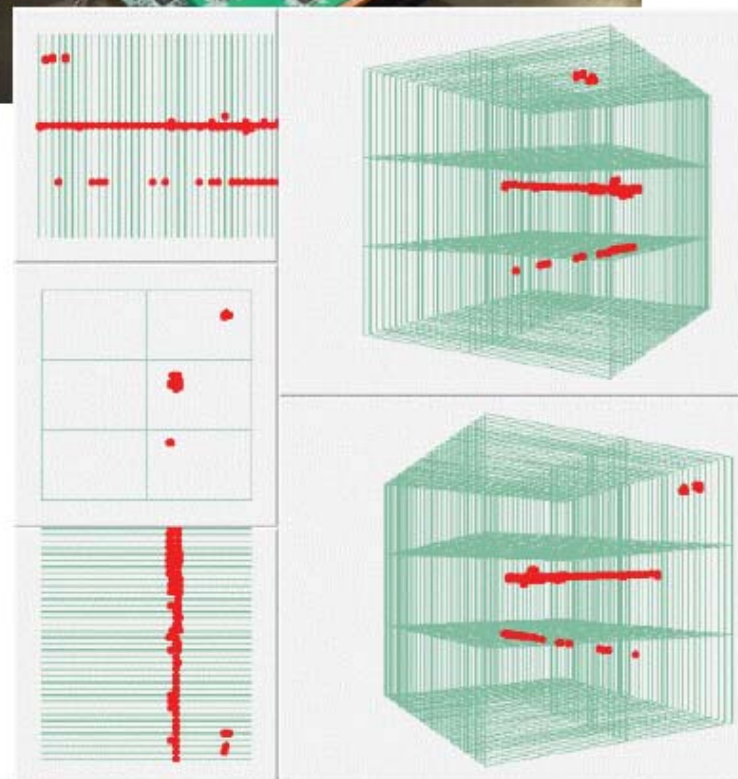
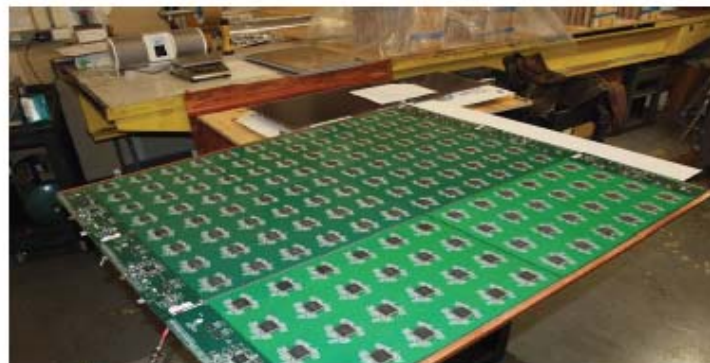
## PFLOW: two-particle separation

10 GeV track + 10/30 GeV close track



Data/MC comparison

## RPC DHCAL m3 at FNAL



# Suggestions on R&D

- in many areas applications outside ILC of ILC-motivated R&D have emerged: a document emphasizing these applications outside ILC and even outside HEP would be extremely valuable and could be used to encourage funding agencies to increase funding for detector R&D
- Some beginnings of power cycling tests, but still looking forward for more incisive investigations in the near future
- Encourage solutions to be found for the shortage of beam test facilities in 2012-13. They are critical for further sub-detector tests and progress

# Securing long-term support for R&D

- IDAG agrees that lack of funding stability is hampering progress for the ILC detector development, but HEP in general
- as discussions proceed to secure appropriate sources of funding beyond delivery of the GDE TDR, an equivalent case should be made for detector development. The detector R&D needs to continue. Making such detector support a part of a more generic detector R&D funding could well be appropriate.
- It is essential to convince funding authorities that long-term R&Ds are essential for our field. Such R&Ds also provide visible and very valuable spin-offs
- We note with interest a proposal to introduce more global or regional peer-review evaluation of generic detector R&D. We are in favour of calling for a dialogue in order to improve the climate for sustaining such generic R&D.

# Follow-up on physics benchmarks

- detectors should demonstrate that they can operate without major modification at 1 TeV
- Is magnet and calorimetry as designed for 500 GeV adequate?
- In response to IDAG suggestions in Beijing Physics CTG is going to produce a reduced list of processes to document adequately the 1-TeV case which is hopefully within the capability of the concept groups
- $t\bar{t}H$  study to probe physics with a high multiplicity of jets
- $ee \rightarrow WW$  process, involving the forward detection of jet pairs with rather small opening angles.
- $t\bar{t}$  asymmetry



# Next IDAG Meeting

- Eugene (Oregon), March 19-23 2010
- IDAG most likely on March 20, but not fixed yet
- ILD/SiD review with emphasis on the DBD outline and work plan
- Review of CTG on Engineering Tools

Thanks to everybody for the hard work!