



LCC Physics and Detector

- Status and Way Forward -

Hitoshi Yamamoto

SiD Meeting, Tokyo
September 3, 2014



- 2013 - 2016
 - Negotiations among governments
 - Accelerator detailed design, R&Ds for cost-effective production, site study, CFS designs etc.
 - Prepare for the international lab.
- 2016 – 2018
 - ‘Green-sign’ for the ILC construction to be given (in early 2016)
 - International agreement reached to go ahead with the ILC
 - Formation of the ILC lab.
 - Preparation for biddings etc.
- 2018
 - Construction start (9 yrs)
- 2027
 - Construction (500 GeV) complete, (and commissioning start)
(250 GeV is slightly shorter)



2014

2016

2018

2020

Deliberation by the Expert Committee
International Talks

ILC lab established

Detector Proposals:
Call, Submission, and Review

TDR completion

Construction



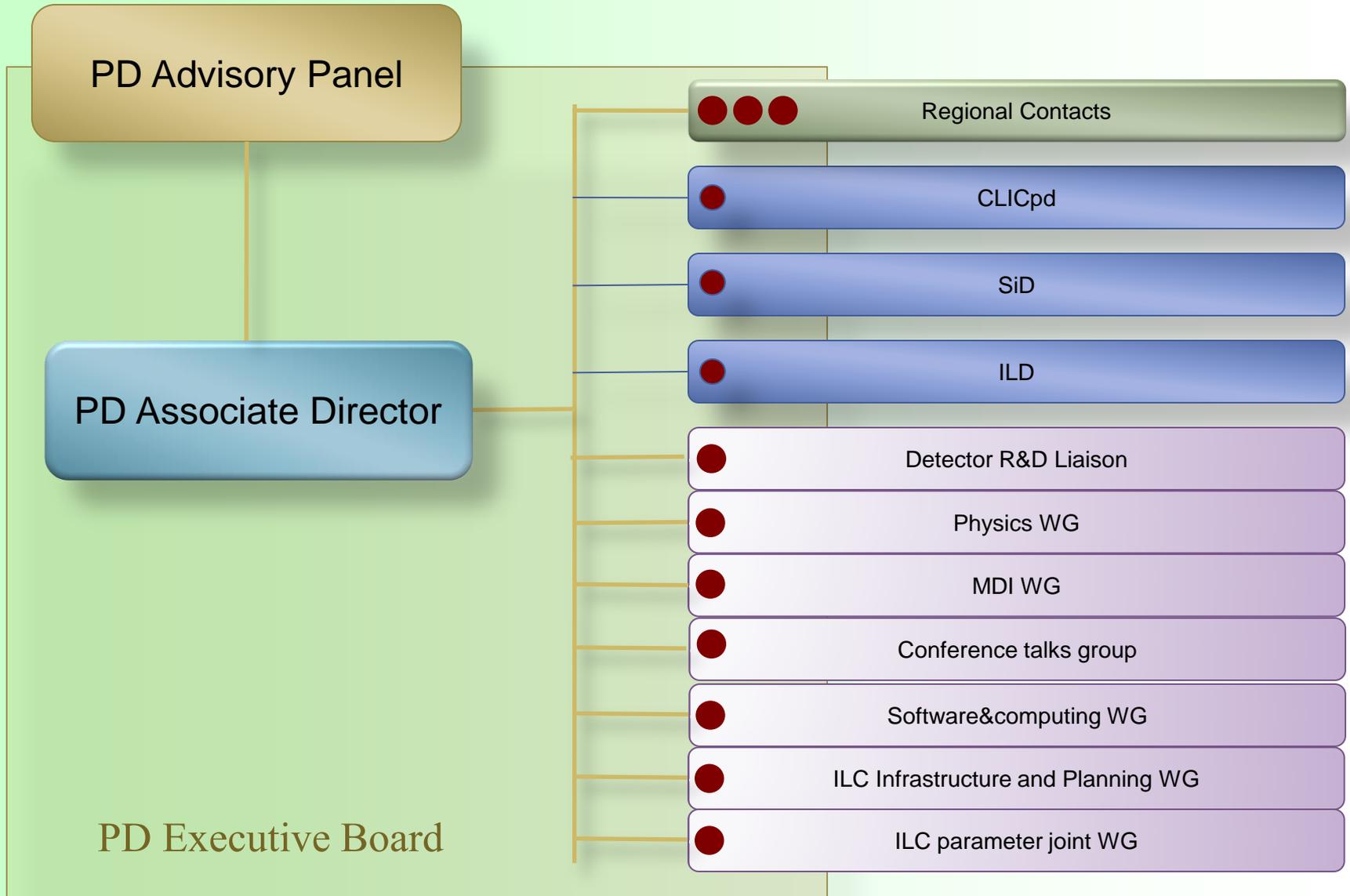
- Support the political developments in Japan
 - Science Council of Japan
 - MEXT expert committee and its subcommittees

- Prepare the detector efforts toward real detectors
 - Guide re-organizations of detector groups
 - Site(Kitakami)-specific designs
 - Compiling detector R&D efforts

- Keep high visibility of LC globally
 - At conferences etc.



Updated LCC PD Structure





Support the political developments in Japan



(Requested by MEXT; Report submitted on Sep 30. Official translation)

The conclusion of the report included:

- The Committee suggests that the government of Japan should (1) secure the budget required for the investigation of various issues to determine the possibility of hosting the ILC, and (2) conduct intensive studies and discussions among stakeholders, including authorities from outside high-energy physics as well as the government bodies involved for the next two to three years.
- In parallel, it is necessary to have discussions with the research institutes and the responsible funding authorities of key countries and regions involved outside of Japan, and to obtain clear understanding of the expected sharing of the financial burden.

These recommendations creates a chicken and egg situation.



- MEXT has requested \$0.5M for investigatory study which was approved on Dec 24, 2013.
 - Will be doubled next year (i.e. ~ \$1M)

- An expert committee was established under MEXT
 - 13 members (could increase)
 - A few particle physicists included
 - No 'ILC proponents'
 - Report to be completed by FY2015 (i.e. end of March 2016)
 - Kickoff meeting held on May 8, 2014
 - Next meeting: Nov 14, 2014

Japanese government is waiting for the report.
It is talking to other governments, and other governments are waiting for Japan to make a definitive move.



- The topics to be evaluated includes:
 - Physics case of the ILC
 - Physics WG
 - Total budget/international cost sharing, and prospects for securing necessary human resources during construction and operation
 - ILC infrastructure and planning WG (the detector part)
 - Domestic organization for the ILC
 - Social and economic effects by siting the ILC in Japan

- Two subcommittees started: reports in ~ 1 year
 1. On the ILC physics case with respect to other future projects
 2. On the project readiness including human and financial resources (the 'TDR' subcommittee)

Material are begin prepared by the ILC community



■ Conveners

- Keisuke Fujii, Christophe Grojean, Michael Peskin

■ Members:

- (North America)

- Tim Barklow, Maxim Perelstein, James Wells, Jaehoon Yu

- (Europe)

- Roberto Contino, Jenny List, Juergen Reuter, Frank Simon

- (Asia)

- Shinya Kanemura, Hyungdo Kim, Mihoko Nojiri, Tomohiko Tanabe, Yuanning Gao

■ Observer

- Hitoshi Murayama (LCC deputy director)

■ For the MEXT subcommittee:

- Preparing material presented to the MEXT subcommittee

- Together with the Japanese group (a large overlap of membership)



Questions from the MEXT subcommittee

- What can be accomplished in the first 5 years?
 - What more is learnt by the ILC about the origin of mass?
 - How does the ILC measurement of top mass determines the SUSY scale?
 - What is meant by 'the ILC can determine if the universe is stable?'
 - If Higgs is a probe to new physics, how is it compare to flavor physics?
 - and many more ...
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- The LCC physics WG is working intensively with a Japanese group to prepare answers to these (in Japanese)

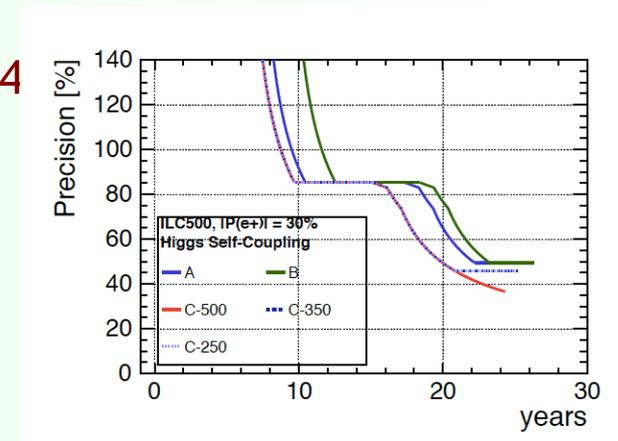
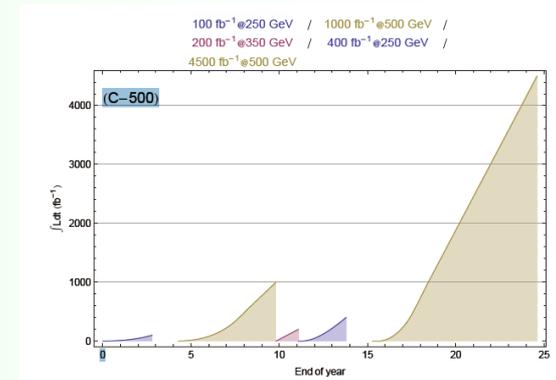


■ Members

- **Physics/Detector:** Tim Barklow, Jim Brau (co-convener), Jenny List, Keisuke Fujii
- **Accelerator:** Gao Jie, Nick Walker (co-convener), Kaoru Yokoya

■ Process for an 'official' running scenario:

- **ILC parameter WG will produce a few scenarios**
 - A draft is have been produced, being reviewed by the physics WG and LCCPDeb
- **LCC and LCB review the draft**
- **Then, ask comments from community at LCWS14**
 - A special session is planned
 - Agree on an single official scenario





■ Members

- Sakue Yamada (chair), Kiyotomo Kawagoe, Yasuhiro Sugimoto, Frank Simon (Mary-Cruz Fouz:deputy), Karsten Buesser, Marcel Stanitzki, Marty Breidenbach

■ Charge

- Studies the time-profiles of the human and budgetary needs of the ILC detector activities.
- Proposes the organizational structure where the detector groups interact with the ILC laboratory.

■ Inputs to the MEXT subcommittee

- The 'TDR' subcommittee is to review the detector issues in Feb, 2014

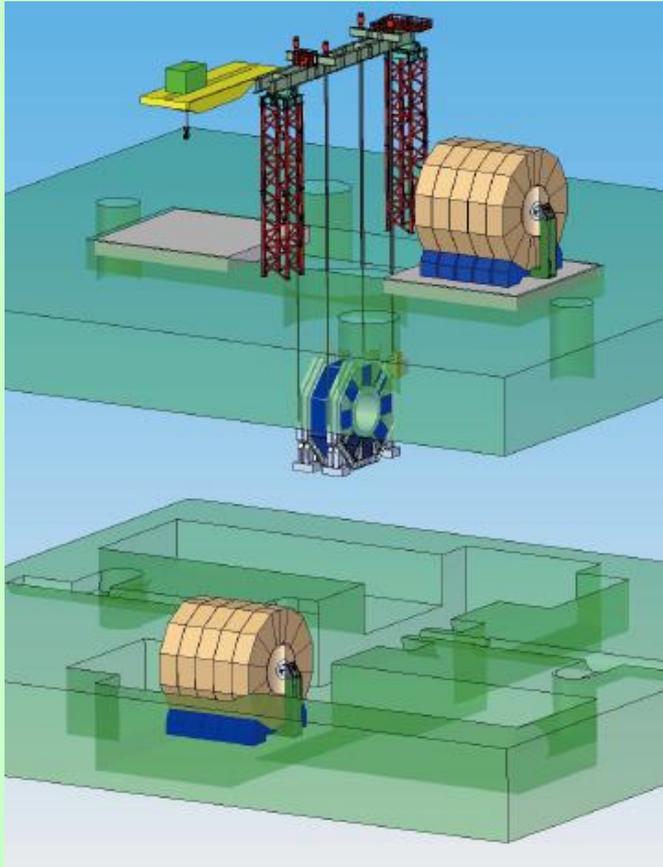
■ Inputs to the LCB subcommittee on governance and management



**Prepare the detector efforts toward
real detectors**



Detector Assembly Scheme



Vertical Access
(CMS-like. Kitakami site allows this)

‘The only game in town now’
(Tom Markiewicz)

→ MDI-CFS mini workshop
Sep 4~6, 2014, Ichinoseki



- Liaison:
 - Maksym Titov, Jan Strube (deputy)

- Immediate task
 - Produce a document describing current detector R&Ds relevant to LC
 - Would elucidate overlaps and holes
 - Those who may want to newly join the LC effort can identify area of possible contributions.
 - A ~70 p draft is mostly ready
 - Release draft at LCWS14 (Belgrade, Oct 2014)
 - At a detector plenary on the 1st day (by Maksym Titov)



Coordination with ILC Accelerator



- A set of well-defined rules for changing the baseline design
- Change Management Board
 - **Members:**
 - The ILC accelerator technical board members
 - Two from the physics and detector community
 - Jenny List (ILD, Physics)
 - Tom Markiewicz (SiD, MDI)
 - The physics and detector AD can escalate change requests to LCC.
 - The 1st change management item maybe:
 - Vertical shaft access to the detector hall ?



- * P5 recommends at least some level of the ILC participation or all budget scenarios (Scenarios A,B,C)
- * **What is really needed is Scenario C (the unconstrained) for the ILC.**
- * Immediate necessity is 'some' budget for the ILC (in particular for the detector activities < support by physics community)
- * Many in the US (Harry W, Mike H, Dimitri D, Jim B. ...) are now working hard to make sure the US follows the P5 recommendation above.

AD's message to DOE (Jim Siegrist)

Dear Jim (cc Glen and Abid)

Even though I could not be on the HEPAP when P5 presented its report, I was gratified that the report acknowledged the physics case of the ILC and that it recommended US participation in the ILC effort at some level regardless of the budget Scenario. Here I would like to offer some observations from the viewpoint of the physics&detectors associate director of the LC collaboration.



1. Timeline of the ILC detectors:

The detectors take about the same time to assemble and get ready for commissioning as the machine. In the TDR, the time required for the ILC accelerator for construction is said to be 9 years, while the corresponding time for the ILD detector is quoted to be 8 years. In previous estimations, the time needed for construction of detector and that for machine came out to be about the same. Detector of this size takes a long time to assemble and commission - the ATLAS detector took 14 years from the start of assembly to commissioning. So, the detectors should be able to start assembly approximately when the machine starts construction

2. Readiness of R&Ds

In order to extract expected physics results from the ILC, the detectors are required to have resolutions far exceed the state-of-the-art of, for example, the LHC detectors. About 10 times better resolutions for momentum and impact parameter, and 2 times better for jet energy resolution. The last one requires high granularity in calorimeter - about three orders of magnitude in number of channels.

In order to achieve them, new technologies are being developed, such as advanced pixel detectors, TPC with micro-pattern gas detectors, and Silicon-Tungsten calorimeters etc. Many of these are still in pre-production R&D stages and require further R&D efforts.



3. Physicists to participate in the ILC

In the US, many of those who used to work on the ILC physics and detectors are now gone. It was acutely apparent at the American Workshop on Linear Colliders 2014 held at Fermilab last month where the ILD session in One West was full of people with many standing at the back while the SiD session was attended by about 10 people only. In order to make possible any reasonable level of US participation in the ILC, this situation needs to be changed for better as soon as possible. Even though there will be a large influx of people to the detector efforts when and if the ILC is approved, the current efforts around ILD and SiD will be the core of the organization, and in order to participate in any significant way in the future, it is important that the US have a good foothold in the current detector efforts.

Considering the above points, I would like to stress that it is critically important that the US efforts in this area be restored as soon as possible to the level close to the level before the so-called black December.

I hope that the above observation would be useful for DOE in considering how to respond to the P5 recommendation on the ILC. Please do not hesitate to ask if you have any further questions on this matter.

Best regards
Hitoshi Yamamoto
LCC Physics and Detector Associate Director