

Linear Collider Board
Report
LCWS2017, Strasbourg, France

Tatsuya NAKADA
Chair of Linear Collider Board
EPFL, Switzerland

In February 2012

- One of the Japanese HEP community statements:
“**Should a new particle such as a Higgs boson with a mass below approximately 1 TeV be confirmed at LHC, Japan should take the leadership role in an early realization of an e^+e^- linear collider.** In particular, if the particle is light, experiments at low collision energy should be started at the earliest possible time.”

In July 2012



Latest update in the search for the Higgs boson

Wednesday 4 Jul 2012, 09:00 → 11:00 Europe/Zurich

500-1-001 - Main Auditorium (CERN)



Video in CDS



Webcast

There is a live webcast for this event

CERN seminar
Higgs discovery

09:00	→ 09:45	CMS	🕒 45m
Speaker: Joseph Incandela (Univ. of California Santa Barbara (US))			
Slides			
09:45	→ 10:30	ATLAS	🕒 45m
Speaker: Dr. Fabiola Gianotti (CERN)			
Slides			
10:30	→ 11:00	Conclusion	🕒 30m
Speaker: Rolf Heuer (CERN)			
Slides			

In 2013

- January 2013 ICFA subpanel was created with a mandate:
“The Linear Collider Board (LCB), as a sub-panel of ICFA, **will promote the construction of an electron-positron linear collider and its detectors** as a world-wide collaborative project.”
as well as the Linear Collider Collaboration (ILC, CLIC and Physics&Detector).
- ILC TDR submitted in June 2013

The European Strategy May 2013

- “There is a strong scientific case for an electron-positron collider, complementary to the LHC, that can study the properties of the Higgs boson and other particles with unprecedented precision and whose energy can be upgraded. The Technical Design Report of the International Linear Collider (ILC) has been completed, with large European participation. **The initiative from the Japanese particle physics community to host the ILC in Japan is most welcome, and European groups are eager to participate. *Europe looks forward to a proposal from Japan to discuss a possible participation.*”**

An extract from Deliberation Paper on the update of the European Strategy for Particle Physics

submitted to the CERN Council in May 2013 by the European Strategy Group

- There is also a strong scientific case for an electron-positron collider that could initially study the Higgs properties with high precision, in a way complementary to the LHC, **and later be upgraded to higher energy. Already at energies around 250 GeV,** such a machine could perform precise and model-independent measurements of the Higgs branching ratios, with sensitivity to most decay modes at the percent level. At energies around **350 GeV,** such a machine could perform precision tests of the **top quark properties.** At energies of **500 GeV and higher,** such a **machine could explore the Higgs properties** further, for example the coupling to the top quark, the self-coupling and the total width. It could also search for colour-neutral new particles, for example some dark matter candidates that may have escaped detection at the LHC.

The Japanese initiative to offer to host the ILC opens a new window of opportunity in particle physics. European groups have already made several crucial contributions to the recently- completed Technical Design Report and are very interested in participating in the ILC project. Until now, it is the Japanese high-energy physics community that has expressed unanimous support for hosting the ILC in Japan. Nonetheless, much progress on the political side has been reported to the ESG meetings and Europe thus needs to be prepared in the event that the Japanese government comes forward with a clear plan for hosting the ILC in Japan and invites Europe to participate.

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P5 Report May 2014

- “The interest expressed in Japan in hosting the International Linear Collider (ILC) is an exciting development. Participation by the U.S. in project construction depends on a number of important factors, some of which are beyond the scope of P5 and some of which depend on budget Scenarios. **As the physics case is extremely strong, all Scenarios include ILC support at some level through a decision point within the next 5 years.”**

By the end of 2016...

- Three of four high priority items of European Strategy realised
 - HL-LHC approved by the Council.
 - CERN neutrino platform for ν detector R&D being constructed.
 - R&D for the future high energy machine: high field magnet, high gradient acceleration and design studies for CLIC and FCC.
- Many technical works are being carried out for the ILC, **but no visible progress in the political front.**

Recent development in 2017

- A new statement from the Japanese Association for High Energy Physicists:
“To conclude, in light of the recent outcomes of LHC Run 2, JAHEP proposes to promptly construct ILC as a Higgs factory with the center-of-mass energy of 250 GeV in Japan.”
- Cost evaluation of a 250 GeV machine by the Linear Collider Collaboration gives a reduction of up to ~40% compared to the TDR cost for the 500 GeV machine.

and LCB discussion in Guangzhou

- **LCB meeting on 9 August 2017 in Guangzhou discussed:**
 - ILC @ 250 GeV design and cost
 - Physics of ILC @ 250 GeV
 - Presentation of JAHEP statement
 - Status of the CLIC work

and LCB discussion in Guangzhou

- **Tentative conclusions are:**

“... Physics studies by the LCC Physics and Detector Group and the JAHEP make it clear that **there is a compelling physics case for the ILC built at 250 GeV.** And the cost of such machine is at a level of some of the existing large international scientific facilities. For these reasons, **the LCB strongly supports the JAHEP conclusion to promptly construct the ILC at 250 GeV in Japan and encourages the Japanese government to give their proposal very serious consideration with a favourable conclusion. ...**”

(“tentative” since information available was not yet publically accessible)

- **With an important remark:**
“One of the unique qualities of a linear collider is **the capability of increasing its operating energy** by improving the acceleration technology and/or extending the tunnel length, with much of the infrastructure such as the electron and positron sources already in place. . . ., **the design and implementation of a 250 GeV machine should not have any constraining elements for such energy upgrade**, so that after its successful construction and exploitation, an increase of machine energy could be discussed with well-justified physics goals.”

And, the LCB will continue to

- **follow the effort in Japan** toward the governmental declaration of their interest in hosting the ILC,
- **facilitate the community discussion** to maintain the wide support for the construction of the ILC at 250 GeV in Japan
- **to facilitate discussions among interested partners** making plans for how to approach their own governments.

In November

- LCB meeting on 7 November in Ottawa, **definitive conclusions should be reached** and given to the ICFA. All the required information is already available publically:
 - Japanese community statement
<http://www.jahep.org/files/JAHEP-ILCstatement-170816-EN.pdf>
 - Japanese community study on physics of 250 GeV machine
<http://www.jahep.org/files/ILC250GeVReport-EN-FINAL.pdf>
 - LCC study on physics of 250 GeV machine
DESY-17-155, KEK Preprint 2017-31, LAL 17-059, SLAC
PUB-17161
- or very close to be ready:
 - cost evaluation of the 250 GeV machine by the LCC

- It should **validate the tentative conclusions.**
(And updates if there are any to be added...)