

Opening Comments

2019/12/06

Keisuke Fujii

WG Objectives

- On July 4, 2012, ATLAS and CMS announced the discovery of a Higgs-like boson with a mass of about 125GeV and the data that followed strongly indicates that it is a Higgs boson indeed. The world has changed since then. The discovery has vaulted the question of its properties on the top of the list of questions in HEP. The 125GeV boson is a window to BSM physics and ILC is the best machine to use it.

So far no additional new particles or new phenomena have been found in the LHC Run 2, suggesting that there seem to be no easily discoverable new particles, which enhanced the importance of the precision measurements of H125 and loophole-less searches at ILC more than ever. There can be a zoo of new uncolored particles or new phenomena that are difficult to find at LHC but can be discovered and studied in detail at ILC.

We need to demonstrate that ILC will advance our understanding of particle physics qualitatively beyond the information that will be available from the results expected from the future stages of the LHC. The MEXT ILC Advisory Panel says "it is necessary to closely monitor, analyze and examine the development of LHC experiments". We did and proposed ILC250 as a JAHEP agreement on July 22, 2017.

- With the LCB and ICFA statements on the ILC250, together with the LCC physics case report on ILC250, the MEXT re-reviewed ILC physics case and cost/technological readiness and finally finished their review process. The SCTJ, being asked by the MEXT, reviewed it and produced their assessment of ILC250, pointing out remaining issues and concluding that they could not support ILC250 at this point while appreciating its academic significance. The MEXT showed its position on March 7, which was discussed at the Lausanne meeting on April 8-9. The LC community attended the Granada meeting on May 13-16 together with a Lausanne statement and a set of new inputs. The next important event for us is Feb. 20 LCB meeting at SLAC.

Situation in Japan

MEXT's view in regard to the ILC project Executive Summary

March 7, 2019

Research Promotion Bureau, MEXT

- ***Following the opinion of the SCJ, MEXT has not yet reached declaration for hosting the ILC at this moment. The ILC project requires further discussion in formal academic decision making processes such as the SCJ Master Plan, where it has to be clarified whether the ILC project can gain understanding and support from the domestic academic community.***
- ***MEXT will pay close attention to the progress of the discussions at the European Strategy for Particle Physics Update.***
- ***The ILC project has certain scientific significance in particle physics particularly in the precision measurements of the Higgs boson, and also has possibility in the technological advancement and in its effect on the local community, although the SCJ pointed out some concerns with the ILC project. Therefore, considering the above points, MEXT will continue to discuss the ILC project with other governments while having an interest in the ILC project.***

highlight in red by KF

- **Governmental level Discussion Groups with France and Germany have been set up and starting. The IWG Report includes *technical preparation plan*. The IWG report is to be used for their discussions.**

- **Melinda's talk at LCWS2019 is now available from**

[https://agenda.linearcollider.org/event/8217/contributions/44502/attachments/35114/54363/Sendai ILC draft remarks-final for Jim.pdf](https://agenda.linearcollider.org/event/8217/contributions/44502/attachments/35114/54363/Sendai_ILC_draft_remarks-final_for_Jim.pdf)

→ **The strong support from the US government should be widely communicated!**

- **Hon. Shionoya's talk at LCWS2019 is also available from**

[https://agenda.linearcollider.org/event/8217/contributions/44436/attachments/35112/54360/LCWS2019 Hon.Shionoya Ryu EN.pdf](https://agenda.linearcollider.org/event/8217/contributions/44436/attachments/35112/54360/LCWS2019_Hon.Shionoya_Ryu_EN.pdf)

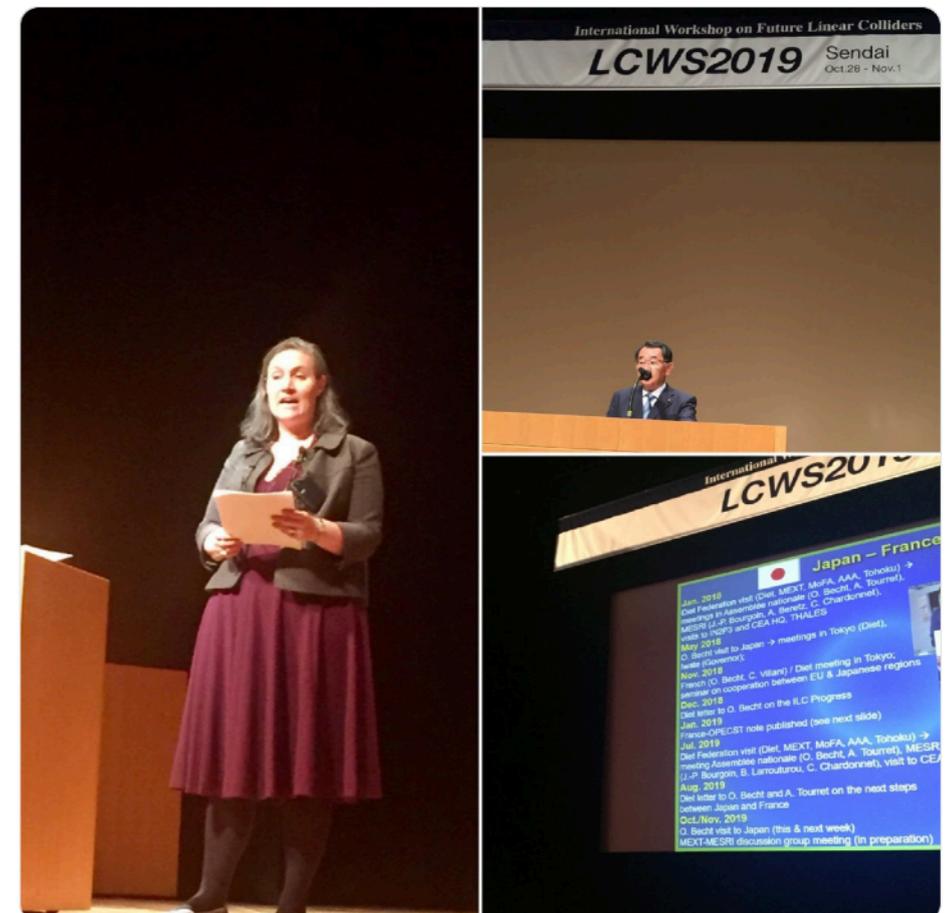
- **Lyn, Goeff, Masa, and others visited MEXT after LCWS2019.**



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@usembassytokyo

フォローする

Embassy speaker Melinda Pavek emphasized U.S. support for Japan hosting the International Linear Collider (ILC). The ILC facility is the critical next step to advance humanity's understanding of matter, energy, and the origins of the universe.



19:05 - 2019年11月4日

- **Inputs from Japan (JAHEP) to ESG on Nov. 6:**
http://www.jahep.org/files/ESG_Japan_Nov06_signed.pdf
- **Preparation is on-going for further inputs from Japan to ESG on Dec. 13,** regarding local developments and regional efforts.
- **Expert panel for “Strategic Environmental Assessment” on going.**
- **Joint committee with Japan Society of Civil Engineers for CFS review on going.**
- **Study group for “Economic Ripple Effects” set up and working.**
- **ILCSupporters rebooted. More outreach events in the pipeline.**

Science Agora 2019

Nov. 16-17, Tokyo



KEK Booth



Iwate Booth



Hitoshi lecturing to ~200 people

A letter from JAHEP to ES Group

highlight by KF

To: European Strategy Group

I am writing as Chair of High Energy Physics Committee (HEPC), which represents Japan Association of High Energy Physicists (JAHEP) -- the Japanese HEP community, to communicate our thoughts regarding the recent note prepared by the Strategy Update Secretariat, "Towards an update of the European Strategy for Particle Physics" (CERN/ESG/05b). The following points summarize our discussion at a recent HEPC meeting.

- The European Strategy is critically important for the future developments of worldwide high energy physics beyond Europe.
- We sincerely appreciate that ILC was highly regarded as one of the important future projects in the previous European Strategy Update in 2013. **The strong support for ILC by the European community expressed in the Strategy Update 2013 built the firm basis** for the following developments of the project and serious supports by various sectors in Japan including the government.
- We fully agree that **a Higgs Factory is the most important next large-scale particle physics facility. ILC is the most advanced candidate** to the best of our knowledge.
- We therefore would like to **ask for the European community's continuing support for ILC**. We are committed to further strengthening our efforts and activities in Japan towards its realization.
- We also consider it crucial to start preparations for a next-generation hadron collider beyond LHC. **The Japanese community intends to contribute to important R&D such as those for superconducting magnets.**
- **Global cooperation is essential.** The Japanese community wishes to continue exploring the future of particle physics together with our friends in Europe and other regions with a global vision.

Toshinori MORI Chair,
High Energy Physics Committee ICEPP,
The University of Tokyo

MEXT's view in regard to the ILC project Executive Summary

March 7, 2019

Research Promotion Bureau, MEXT

- ***Following the opinion of the SCJ, MEXT has not yet reached declaration for hosting the ILC at this moment. The ILC requires further discussion in formal academic decision processes such as the SCJ Master Plan, where it has decided whether the ILC project can gain understanding and support from the domestic academic community.***

Master Plan to be published in Jan. 2020

- ***MEXT will pay close attention to the progress of the CERN European Strategy for Particle Physics Update.***

ESU in Feb. 2020, to be approved by CERN Council in May 2020

- ***The ILC project has certain scientific significance in particle physics particularly in the precision measurements of the Higgs boson, and also has possibility in the technological advancement on the local community, although the SCJ pointed out the difficulty with the ILC project. Therefore, considering the above, MEXT will continue to discuss the ILC project with other countries having an interest in the ILC project.***

***IWG report in Oct. 2019
G-J, F-J Discussion Groups, Strong support from US.***

MEXT will come to the next LCB meeting on February 20 at SLAC, and update the statement there.

Our Group's Activities

Status & Next Step

Symmetry Breaking & Mass Generation Physics

- ZH : $H \rightarrow bb, cc, gg$ → EPJ C (2013) 73:2343, Ono+Miyamoto: IDR: Kurata
 $H \rightarrow WW^*$ anomalous coupling: publication: Takubo → P.R.D88,013010(2013)
→ $H \rightarrow WW^*$ to be reexamined: Liao Libo, Mila, Uli
 $H \rightarrow$ other modes (AA, $\mu^+\mu^-$) + Kawada/Tanabe/Suehara/Daniel, ($\tau^+\tau^-$) → publication → EPJC (2015) 75:617., $H \rightarrow Z\gamma$: Kazuki Fujii
- Recoil mass: Jacqueline → P.R.D94,113002(2016), Suehara (qq), CP mixing in $h \rightarrow \tau^+\tau^-$: Daniel
→ accepted for publication in PRD, HVV couplings: Ogawa, Yumi Aoki (Hgamma)
direct mH reconstruction: Junping
- EFT: EFT vs BSM, EFT fit on top EW couplings: Junping
- Zgamma: Takahiro Mizuno
- ZHH : full simulation of the $H \rightarrow bb$ & $Z \rightarrow$ all modes, fast simulation of $nnuHH$: finished: Junping + Takubo (Ph.D thesis: done) → New analysis with improved analysis tools: Junping + Claude + Suehara + Tanabe, Jet-clustering: Kurata, Shaofeng Ge, LCFIPlus: Suehara, Yonamine
New analysis: $ZHH \rightarrow ZbbWW^*$: dE/dx: Kurata, Systematic Error: Tim, EFT: Junping, ZHH paper draft: Junping, Masakazu, Claude
- nnHH : full simulation @ 1TeV, done for DBD: Junping → publication
- nnH, eeH : precision measurements of HVV couplings, $m_h = 125 \text{ GeV}$: Junping
BR measurements: Ono, Christian
- TTH : quick simulation studies with NRQCD corrections
→ P.R.D84,014033(2011) → full sim. @ 0.5 & 1 TeV: (Yonamine left) Tanabe + Sudo
- TT Threshold : Top Yukawa measurement: Horiguchi + Ishikawa + Tanabe, Theory: Kiyo + Sumino → publication? (cf. a recent significant theoretical development!): Ozawa → Yuto Eda
- W mass (m_W) : Koya Tsuchimoto → Kotera (controlling systematic uncertainties) → Kotera
- AA → HH : quick simulation studies, so far $H \rightarrow bb$ and WW BG
→ P.R.D85,113009(2012) : Kawada, Theory: Harada

Status & Next Step

Beyond the Standard Model

- SUSY : full simulation studies for LOI → publication
 - **EWkino** (Compressed Spectrum Case): Jacqueline→Tomohiko →analysis finished.
- Extra U(1) (Z' tail), Compositeness, Extra Dimensions, etc.
 - **TT** : full simulation studies for LOI → **New study with MELA**: Yo Sato, **vertex charge**: Okugawa
 - **tau tau** : full simulation studies (benchmark process) → Keita Yumino
 - **2f: full simulation study**: Hiroaki Yamashiro → Yuto Deguchi, Uesugi
- Hidden Sector / XD : **P.R.D78, 015008 (2008)**
- LHT : **P.R.D79, 075013 (2009)**
- Model discrimination: Saito + Suehara .. : **P.R.D84, 115003 (2011)**
- R-handed neutrinos: Saito : **P.R.D82, 093004 (2010)**
- LHT: Kato (exp) + Harigaya (th): ZHZH finished, working on eHeH, nHnH, ..: Draft (n-1)?
- Very light gravitino: Katayama (Master's thesis), Tanabe (exp) + Matsumoto (th)
--> 1st Draft --> Takuaki Mori (Tokyo) → ?
- Quasi stable stau: Yamaura (Master's thesis) + Kotera + Kasama → reactivated?
- **Higgs portal/h→Invisible**: Honda → Yamamoto → Ishikawa, Ogawa, Junping → Yu Kato
- W-H+/W+H-: (Shinzaki), Ishikawa (exp) + Kanemura, yagy (th)
- **Generic DM search (mono-photon)**: Tanabe → Yonamine
(exotic higgs decay): Kurata, **Special theory guest**: Shigeki Matsumoto
- Other projects
 - Heavier Higgs bosons?: Yokoya, (Abhinav) → Christian Drews
 - X(750) : Junping → published in PRD (**Phys.Rev. D94 (2016) no.9, 095015**)
 - **h→cc, bb, bs QFV decays**: Hidaka
 - **Kinematical Fitter** : kajiwara
 - **pair monitor** : Ahmed

Short Term Schedule

- Weekly Meeting
 - Every Fri. at 14:00 (conf. ID: to be announced)
- General Meeting
 - 10:30 on **Fri. Mar. 6, 2020 ?**
- **LCB Meeting on Feb. 20, 2020 at SLAC**