Physics Coordinator Report

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February 5, 2019

Situation in Japan

SCJ Review

SCJ's Report on ILC

SCJ EB Meeting on Dec. 19 (10:00-12:00)

- **As expected *the SCJ EB endorsed the report from the SCJ's ILC committee. The report was sent back to MEXT immediately after that.***
- ***The ILC part of the meeting ended in 15 minutes and Mr. Iye commented that the decision belongs to the government. He also confirmed that the scientific significance of the ILC.***

From an article by K. Nakanishi that appeared in FNN prime

http://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-24-k273.pdf

SCJ's Official English Translation of the Executive Summary

Now available as

http://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-24-k273-en.pdf

No serious difference from the unofficial translation by KEK available from LC Newsline:

http://newsline.linearcollider.org/2018/12/21/

Emphasis in red by KF

Executive Summary of the Science Council of Japan's Report

OVERALL ASSESSMENT

While the 250GeV ILC project requires a long-term commitment to huge budget allocation for its construction and operation, the expected scientific outcome is that if a certain deviation from the standard model prediction is found upon the precision measurement of Higgs coupling, it may provide a suggestion for the future direction of particle physics. The Committee and the Subcommittee are not yet convinced that the prospective scientific outcome (possible indication of future direction) is sufficient to justify Japan's large share of the overall cost required for the project implementation. In regard to the technical feasibility of the 250GeV ILC, considerable hurdles remain to be cleared. As such problems are left to be solved in the adequate preparatory period of the project, they constitute matter of concern for the implementation of the project. The uncertainty surrounding proper international cost-sharing with respect to the long-term commitment to large budget allocation is another matter of concern.

Judging from the plan and preparatory status of the project presented at the moment, the Science Council of Japan does not reach a consensus to support hosting the 250GeV ILC project in Japan. The SCJ considers that government should be cautious regarding a decision to announce its commitment to host the ILC in Japan.

Particle physics in pursuit of the fundamental structure of natural world has made marvelous developments thanks to the coordinated efforts of theoretical studies and accelerator experiments, and accomplished the monumental establishment of the standard model. The central issue at the moment is the exploration of “physics beyond the standard model.” which is also the target of the ILC project. As the desired way of promoting the accelerator-based high energy physics experiment in the near future, it is envisioned to realize a high-luminosity lepton collider somewhere in the world, which plays a complimentary role to the hadron collider (the Large Hadron Collider and its future upgrade). On the other hand, in view of the finite resources available to humanity, the research style that presupposes and ever-growing scale-up of gigantic experimental facilities would eventually reach the limit of sustainability. The future way of “big science” is a theme to be deliberated by the whole academic community.

KF’s assessment of the report

Significant improvement from the Nov. 14 draft.

Misunderstandings of facts have been corrected.

Some good points are also made.

The report appreciates the ILC’s academic significance.

It is not vetoing EoI from the government.

Clarifications on the report from the Science Council of Japan regarding the ILC

The purpose of this note is to provide clarifications on the report from the Science Council of Japan (SCJ) regarding the International Linear Collider (ILC), which was released on December 19, 2018.

The Ministry of Education, Culture, Sports, Science and Technology (MEXT) examined the ILC project through the ILC Advisory Panel, and subsequently called for an external evaluation from the SCJ in July 2018. The SCJ is an organization consisting of Japanese scientists, and it conducted a detailed review of the ILC proposal by establishing a special panel. The report was submitted to the MEXT and published after a review in the executive meeting of the SCJ. While acknowledging the scientific case for the ILC, the panel concluded that it did not support at this time that Japan host the ILC due to issues yet to be resolved. One of the reasons pointed out is that the international negotiation on cost-sharing has not been proven to be successful.

It should be noted that, in the decision-making process by the Japanese government, the SCJ report will be taken into account along with other factors such as merit to the society. We strongly hope that an official statement by the Japanese government on its position towards the ILC will be available in a timely manner for full consideration in the European strategy process. KEK, in collaboration with many Japanese and international associates, is working diligently in maintaining the progress and making the ILC a reality in Japan. Therefore, your continual support is highly appreciated and solicited.

21 December 2018

Planning Office for the ILC at KEK

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From KEK: Regarding the "Assessment of the revised International Linear Collider Project"

We would like to express our gratitude to the review committee of the revised International Linear Collider (ILC) project of the Science Council of Japan (SCJ) for their prompt and detailed evaluation. We here present our opinions in response to the final report published by the Science Council of Japan.

The SCJ appreciated the scientific significance of the ILC project, the "pursuit of new physics beyond the standard model," but also pointed out issues concerning the hosting of the ILC project in Japan, in particular the cost-sharing as an international project and the international project organization and management. To address these issues, we ask the Japanese government to promptly convey a forward-looking position regarding the implementation of international discussions toward the realization of the ILC.

Humankind has so far revealed the extreme microscopic world by studies using accelerators. However, there remain big questions regarding the natural world that remain unanswered, and it is the greatest challenge of modern physics to elucidate them. There is broad consensus among particle physicists that the Higgs particle holds the key. Precision studies of the Higgs particle have the potential to expand the horizon of humankind's understanding of nature. The Linear Collider is an important project that can be a major turning point in deciding the "direction of physics" for the next 50 to 100 years.

The scientific significance of the ILC project is widely accepted, but the significance and consequences of Japan taking on a major part of the ILC project should be discussed not only from the academic but also societal points of view. Investigations of the project by researchers have now reached the stage at which further progress requires international discussions by the government. If, in the course of these discussions, it becomes clear that international and domestic conditions are not satisfied, the project will be canceled. We will advance the ILC project, establishing worldwide consensus, including on its budget, while gaining support from both academic circles and society at large.

As for the identified technical issues, the global community will cooperate, combining resources to resolve them. Based on our experience and achievements at LHC, KEKB, European XFEL, and other research facilities, we are convinced that we can solve them.

— this article has been previously released on the KEK website in Japanese.

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Message from politicians in response to Science Council of Japan's final report

We wish to express our sincere gratitude for the intensive discussions conducted at the Science Council of Japan. It is extremely important that the scientific merits of the ILC and the significance of Japan contributing to international collaborative research have been recognized.

The ILC has a far-reaching impact on a wide range of national policies, such as science and technology innovation, diplomacy and national security, industrial development and growth, and regional revitalization and post-disaster reconstruction. We believe that it is our political mission to push forward the ILC project as a national priority.

Japan has been and will remain a science and technology-oriented nation. We will continue to seek public understanding for the ILC project and will work to address the issues raised by the Science Council of Japan.

The Federation of Diet Members for the ILC and the Liaison Committee for Realizing the ILC will be working at full strength to ensure that the Japanese government reaches a positive decision to realize the ILC project in Japan.

Unofficial Translation by KEK

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Takeo KAWAMURA

Chairperson, Federation of Diet Members for the ILC

Chairperson, Liaison Committee for Realizing the ILC, Liberal Democratic Party*

*In September 2018, the Liberal Democratic Party, created a new organization, called the Liaison Committee for Realizing the ILC. The Liaison Committee brings together various strategic groups involved in making important policies, such as science technology and innovation, regional revitalization, reconstruction from natural disasters, and national resilience.

MEXT Minister's Press Conference on Dec. 21

MEXT Minister's Press Conference (Dec. 21, 2018)

- Regarding the ILC Report of the Science Council of Japan -

◆Journalist

Recently, the Science Council of Japan delivered a report on the International Linear Collider (ILC) to the Ministry of Education, Culture, Sports, Science, and Technology (MEXT). The report states "the Science Council of Japan cannot reach a consensus to support hosting the ILC." How will MEXT respond to this report and what are its next steps?

■MEXT Minister

We asked the Science Council of Japan (SCJ) to consider the International Linear Collider following the issue of a report in July by MEXT's ILC Advisory Panel. On December 19th, we received the SCJ's response to our request. The project was thoroughly discussed in the SCJ by researchers from diverse academic fields. I am grateful to those researchers for their work. Now MEXT will consider government's response, taking into account the SCJ's report. The SCJ's summary acknowledges the scientific significance of the ILC in the field of elementary particle physics, but also expresses concerns. The main concerns are the prospects for international cost sharing and the availability of human resources. We would like next for the government to proceed with careful consideration of the ILC, while paying attention to these concerns. Regarding the schedule, the key international research organization acknowledged on December 5th that it is unrealistic to expect the Japanese government's expression of its position on the ILC in 2018. They requested a statement from the Japanese government by the beginning of March, 2019. While carefully monitoring such international developments, we will consider how the government should respond, after carefully reviewing the contents of the SCJ's report.

Unofficial Translation

Emphasis in red by KF

◆Journalist

Today, the governors of the Miyagi Prefecture and the Iwate Prefecture said the government should consider societal significance as it makes a decision on the ILC. What do you think of this?

■MEXT Minister

I think a comprehensive examination taking into account such viewpoints is necessary. We will consider more factors now, including intra-government coordination.

Realizing the ILC as National Project with Cross-Cutting Policies

Established on Sep. 18

Headquarters for Overcoming Population Decline and Regional Revitalization

Chairperson:
Hon. Takeo KAWAMURA

Comprehensive Research Commission on the Establishment of the Disaster Resilient Japan

Chairperson:
Hon. Toshihiro NIKAI

Research Commission on Science, Technology and Innovation Strategy

Chairperson:
Hon. Kisaburo TOKAI

Headquarters for Accelerating Reconstruction after the Great East Japan Earthquake

Chairperson:
Hon. Fukushiro NUKAGA

Research Commission on Intellectual Property Strategy

Chairperson:
Hon. Akira AMARI

Liaison Committee for Realization of ILC

(Chairperson: Hon. Takeo KAWAMURA)

(Cross-Party Group)
Science and Technology Group

Chairperson:
Hon. Hiroyuki HOSODA

Advanced Accelerator Association Promoting Science and Technology

Chairperson:
Mr. Takashi NISHIOKA

Senior Advisors

Hon. Hiroya MASUDA
(Former Minister of Internal Affairs and Communications)
Prof. Satoshi FUJII
(Special Advisor to Cabinet)
Prof. Atsushi SUNAMI
(Vice President, GRIPS)

Tohoku ILC Promotion Council

Chairpersons:
Prof. Hideo Ohno
Mr. Hiroaki TAKAHASHI

(Cross-Party Group)
Federation of Diet Members for the International Linear Collider

Chairperson:
Hon. Takeo KAWAMURA
Director-General:
Hon. Ryu SHIONOYA

ILC Committee of 100

ILC Supporters

The Committee made a resolution on September 18, 2018

- ✓ To position ILC as a cross-policy “national project”, covering not only science, technology and innovation but also many challenges faced by the national government;

- ✓ To secure the financial resources for the realization of ILC (beyond the Olympic Games) outside the ordinary science and technology, academic or university budgets; and in addition,

- ✓ To make sure that, as for the international agreement of ILC, certain critical decisions, such as the share of oversea investments be roughly half, be satisfied before the international agreement necessary for the start of construction of ILC is reached.

From Talk by Yasuhiro Okada at Annual ILC Japan Meeting (Dec.20-21)

From deliberations in the academic sector to the political decision-making process.

We will make all possible efforts to help the Japanese government so that it can give the statement in time for the LCB/ICFA meeting on March 2019, in Tokyo.

From Talk by Yasuhiro Okada at Annual ILC Japan Meeting (Dec.20-21)

LCC Physics WG

Finalizing an 80-page Support Document for the 10-page ESU Input

Linear vs Circular Discussion

Political support: ILC has been considered in depth over a number of years by the government of Japan, which is soon expected to make **an Expression of Interest to host the project**.

Politicians, governments, and funding agencies in Japan have been discussing the ILC with their counterparts in Europe and the US for a number of years, and have been encouraged by these discussions.

Other large collider projects have not yet reached a similar stage.

Technical maturity:

The RDR (CDR equivalent) for the ILC was published in 2007 and the **TDR in 2013**.

Circular collider projects have only recently published their CDRs.

The ILC's quoted performance and costs are deeply understood and thus reliable.

Timeline: Given a go-ahead, the ILC will very soon be ready to start construction. First collisions can occur within around 15 years from now.

According to current run plans, the ILC will complete its 2 ab-1 250 GeV run at about the time FCCee begins its ZH run.

Physics: Beam polarization is a powerful tool not available at high energy circular colliders.

When measuring Higgs couplings, **polarization compensates for the lower integrated luminosity at 250 GeV compared to FCCee (2 vs 5 ab-1)** not just by the increased rates but also by its power to remove some correlations among different EFT operators.

In the case that ILC observes new phenomena other than in the Higgs couplings, polarization will play an essential role in determining their chiral properties.

Polarization will also allow **systematic uncertainties** on many measurements **to be significantly reduced**.

Upgradeability: The ILC's collision energy can be readily upgraded to 500 GeV and above.

A technical design for a 500 GeV stage exists.

Likewise, **a technical design exists for upgrading the luminosity:**

- **by a factor 2 by doubling the number of bunches per pulse,**
- **another factor 2 by doubling the repetition rate.**

The ILC250 infrastructure is reusable. It provides long-term perspectives beyond current technologies (e.g. a plasma-based accelerator).

2018/10/21

Design Luminosity

Lumi-Up = # bunches x 2

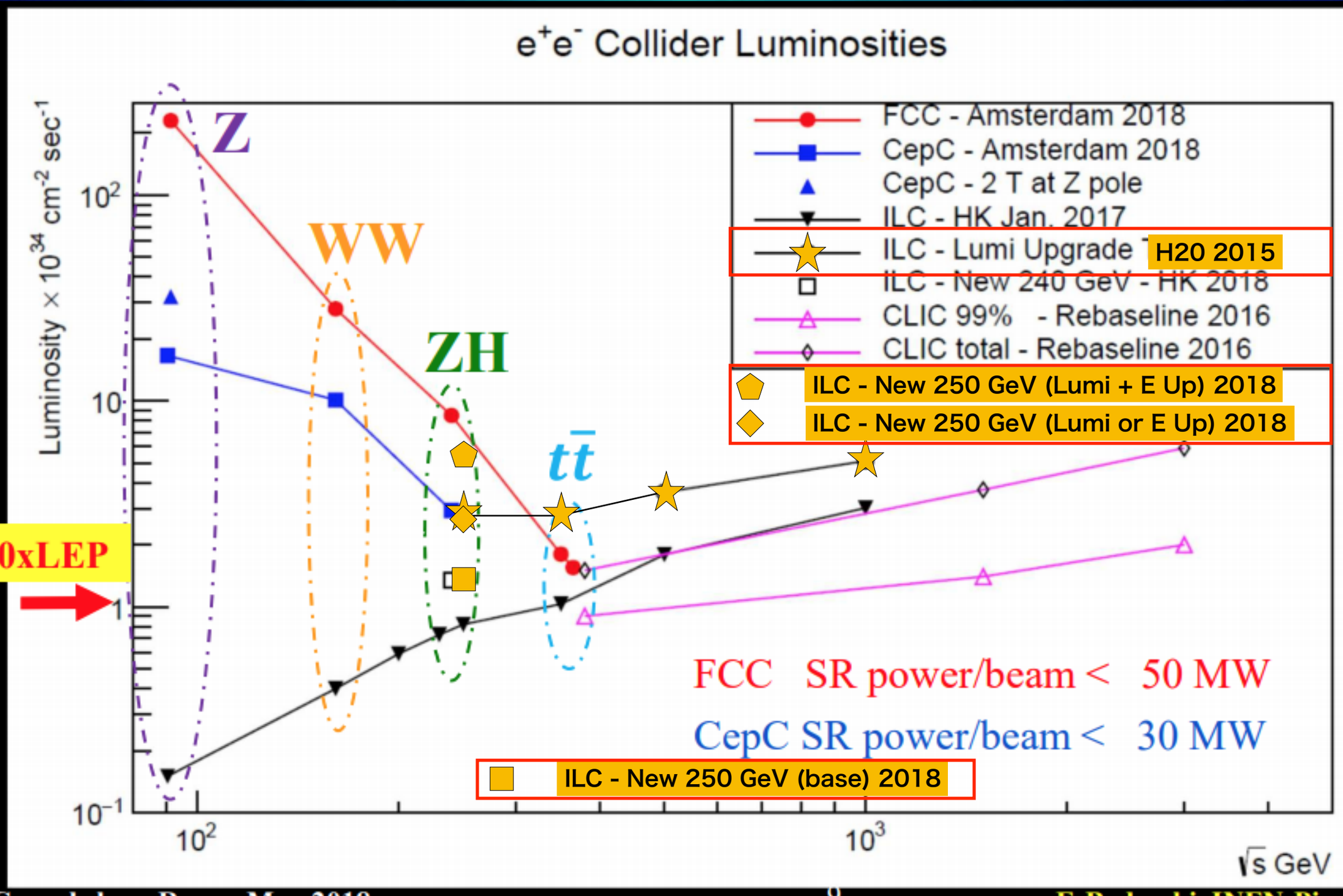
E-Up = E-Up to 500 GeV

	Base Line 1312 bunches (5 Hz)	Lumi-Up 2625 bunches (5 Hz)	(Lumi+E-Up) 2625 bunches (High Rep)
250 GeV (H20)	0.82×10^{34} (5 Hz)	1.64×10^{34} (5 Hz)	3.28×10^{34} (10 Hz)
350 GeV (H20)	1.0×10^{34} (5 Hz)	2.0×10^{34} (5 Hz)	2.8×10^{34} (7 Hz)
500 GeV (H20)	1.8×10^{34} (5 Hz)	3.6×10^{34} (5 Hz)	–
250 GeV (New)	1.35×10^{34} (5 Hz)	2.7×10^{34} (5 Hz)	5.4×10^{34} (10 Hz)

H20 numbers from arXiv: 1506.07830 with revision according to Change Request 5 (approved by Change Control Board in 2015)

250 GeV (New) numbers based on arXiv: 1711.00568

CepC, FCC, ILC, CLIC
luminosity comparison



ILD Physics WG Activities

Benchmark Analyses

We are working hard to meet the IDR timeline.

To facilitate the process, analyzers, please

Use github (ILDAnaSoft), produce analysis notes, and check the benchmark status spreadsheet.
Communicate with reviewers as well.

Another Round of ILD Benchmarking Days at KEK on Feb. 23-25

https://agenda.linearcollider.org/event/8086/overview

Expected Attendee

- physics and software conveners
- benchmark analyzers
- benchmark reviewers
- interested others

Proposed Format

- Follow the structure of Chapter 8 of the IDR
- 45 min. per benchmark analysis
  - 10 min. update by analyzers
  - 20 min. referee report
  - 15 min. discussions