

News from Japan and IDT WG3

Keisuke Fujii

KEK

Project Status

Hurdles

set by MEXT

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

Where we are?

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

March 7, 2019

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***Master Plan published
in Jan. 2020
→ Next page***

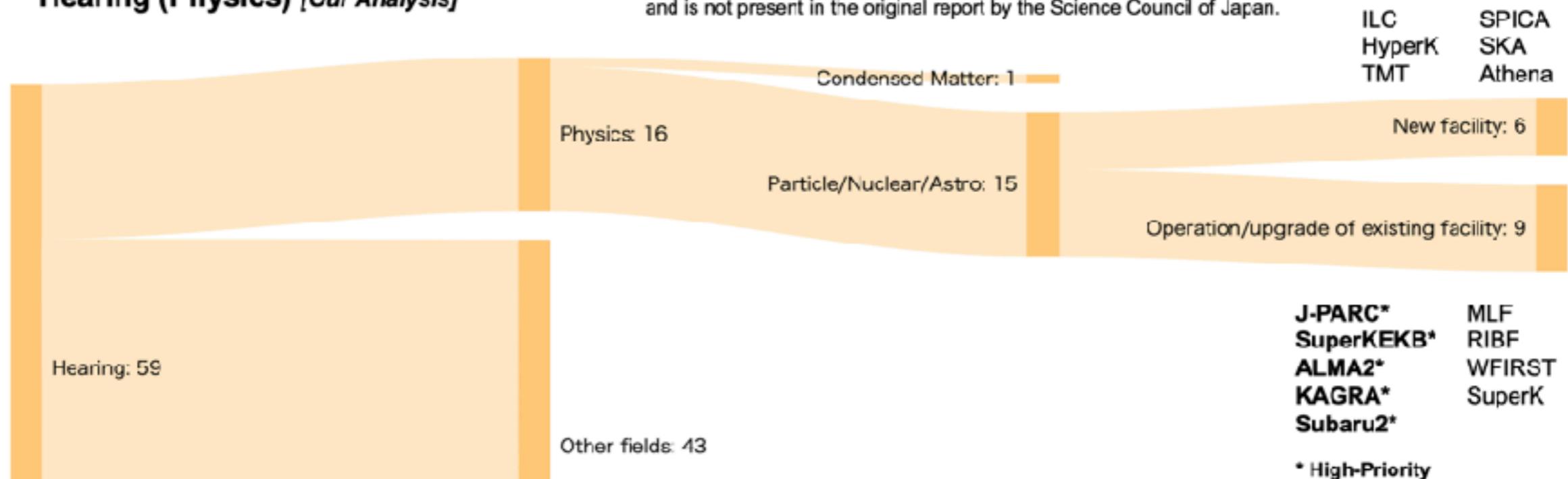
SCJ Master Plan open to public on Jan. 30

- Out of about 150 projects, 59 advanced to the hearing stage including 15 projects from our fields (particle/nuclear/astro-physics). ILC was selected as one of the 15.
- Nine of them propose the operation and/or upgrades of existing facilities. Only five out of the nine, namely J-PARC, SuperKEKB, ALMA2, KAGRA, and Subaru2, were listed in the final short list.
- After all, none of the remaining six proposing new facilities, namely ILC, HK, TMT, SPICA, SKA, and Athena, could make it to the final short list.

Data source: <http://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-24-t286-1.pdf>

Master Plan 2020 – At a Glance Hearing (Physics) [Our Analysis]

Note: The breakdown of new facility vs. existing facility is based on our analysis and is not present in the original report by the Science Council of Japan.



About HyperK: projects appearing on the high-priority three times in a row but not yet implemented is required to be reset and re-evaluated. Thus HyperK had to resubmit its proposal this time.

Comments by MEXT minister, Mr. Koichi Hagiuda, January 31, 2020

I understand that the ILC Project was not selected to be among the High-Priority Large Research Projects in the Master Plan 2020 published yesterday by the Science Council of Japan. **This has been put together from the viewpoint of people representing the academic community, and we believe that it will serve as a reference for future discussions within the government.** Being an international project, the ILC project requires broad support from both inside and outside the country. **In light of the outcome of the Master Plan 2020, and observing the progress of other discussions such as the European Strategy for Particle Physics, we would like to carefully carry forward the discussions.**

It should be stressed that the ILC project is not a domestic project that we can do alone, but it is an international project. **It is often difficult to inform you of its prospects because the discussions of the financial cooperation from each country are yet to take place.** For this reason, at this stage, I think that it is not so surprising that the ILC project was not included in the high- priority list.

We will cooperate firmly with international organizations. There are pending issues such as overall merits of the project, whether or not to host the project in Japan, and, if we decide in the affirmative, the location of the site. We would like to carefully examine these issues.

Unofficial translation by Tomohiko Tanabe



Comments by minister of state for S&T policy, Mr. N. Takemoto, Jan. 31, 2020

[On the Master Plan 2020]

To put it simply, the project made it through the first round of evaluations, and there were about 60 such projects. In the second round, 31 projects were selected, and the ILC was not among them. However, **this is a viewpoint of the Science Council. When considering the possibilities going forward, MEXT will look at high- priority research topics, and I hear that the ILC will be included in the list of these topics.** I think how the project will be evaluated at this stage will be important next.

[On the cost of ILC]

The issue is that the ILC project requires a vast sum of money, which some say is close to 1 trillion yen. The cost is to be shared among many countries, but some say that Japan needs to shoulder most of it. Even if these are the presumptions, I personally think we should strongly ask for realizing the project. It will effectively contribute to regional revitalization. It will give back hope to people who have suffered greatly by the [Great East Japan Earthquake]. Furthermore, it will give Japan's technology an advantage to have an important share in the area of the world's scientific research. **Considering these aspects, I think we should firmly consider the project in the affirmative direction.**

SCJ MP process has been completed.

→ **This opened up the path for the next political process.**

[On the funding for ILC]

This project can be only realized by putting together budget from many places, such as regional development and other things. [..] The value of the collider could be that it will become a beacon of hope that will bring back the liveliness among the people. I believe the project cannot be realized without considering various ways of funding and various viewpoints.

[..] After all, my role is inter-ministry coordination. For each ministry's budget, my position allows me to say for example that the budget for certain things need to be increased. I intend to proactively give my opinion on what methods should be taken for the project to succeed.

MEXT will be performing the next considerations for the ILC. We intend to give our opinion to this process that we should proactively engage in this project, not only from the viewpoint of promoting science and technology, but also from the viewpoint of regional development and other things.

Unofficial translation by Tomohiko Tanabe

ILC Symposium on Feb. 8



Main Venue @ U.Tokyo

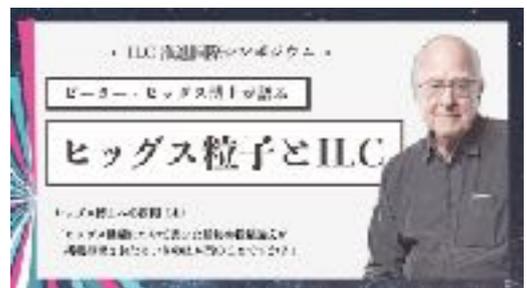
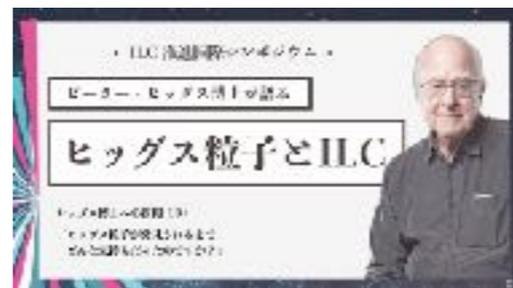
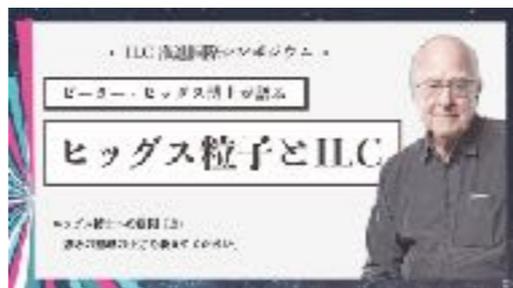
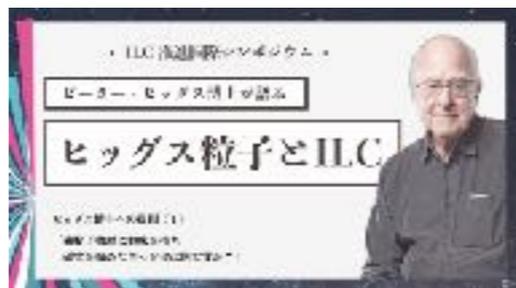
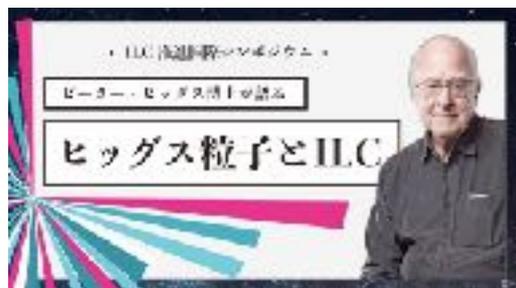
Prof. Higgs answering questions read by Lyn on behalf of Japanese students (recorded on Feb. 5)



Sendai satellite venue shown on the main screen of the main venue



Panel discussion by Makoto Kobayashi, Sachio Komamiya and Higashi Murayama



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- MEXT will pay close attention to the progress of 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.***

Master Plan published in Jan. 2020: ILC is in the long list

ESU completed in Feb. 2020, approved and published by CERN Council in June 2020

MEXT attended to the LCB meeting on February 20 at SLAC, and updated the statement there.

ICFA Statement on the ILC Project

February 22, 2020

ICFA was encouraged by the reports from **Mr. H. Masuko, Deputy-Director General, MEXT Research Promotion Bureau** and **Hon. T. Kawamura, Chairperson of the Federation of Diet Members for the ILC**, at the ICFA meeting held at the SLAC National Accelerator Laboratory, Stanford, USA, on the 20th February 2020.

Based on these reports:

- **ICFA reconfirms the international consensus for a Higgs factory and wishes to see the timely construction of the ILC in Japan.**
- **ICFA acknowledges and welcomes the inter-governmental discussion** between Japan, the United States and European nations, to advance international collaborative activities for the ILC.
- **ICFA notes the need for a preparatory phase** ahead of the establishment of the ILC laboratory and the construction of the ILC in Japan.
- **ICFA advocates establishment of an international development team to facilitate transition into the preparatory phase.**
 - The development team should be **hosted by KEK, with leadership chosen with the help of ICFA.**
 - The team would develop a plan for the preparatory phase for the construction of the ILC, including technical, organizational and governance issues. It also would be tasked with understanding the activities and resources required in the preparatory phase. **The process of developing the plan should involve the interested laboratories and community.**
 - ICFA anticipates that these development activities could **be completed in approximately one year**, at which point it would be possible **to launch the preparatory phase for the ILC, provided Japan expresses intent to do so together with international partners.**
- In view of progress towards realisation of the ILC in Japan, **ICFA encourages the interested members of the high energy physics community, laboratories, and nations, to support and participate in these preparations aimed at the successful establishment of the ILC.**

EPPSU

***approved and published by CERN Council
on June 19, 2020***

→ Maxim's talk for details

My Brief EPPSU Summary

- ***An e+e- Higgs factory is the highest priority next collider. Among 4 candidates (ILC, CLIC, FCC-ee, CEPC), ILC and FCC-ee are mentioned.***
- ***By the next ESU (=after 7 years), feasibility studies for a 100 TeV class hadron collider (FCC-hh) will be completed regarding its technical and financial aspects.***
- ***FCC-ee is an option for a first phase of FCC-hh. HL-LHC will operate until 2038 and FCC-ee construction would take 10 years. Hence **the startup of FCC-ee would be at earliest around 2050.*****
- ***The timely realization of the electron-positron International Linear Collider (ILC) in Japan would be compatible with this strategy and, in that case, the European particle physics community would wish to collaborate.***
- ***CERN's role when this happens was clearly stated.***

MEXT's view in regard to the ILC project

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- MEXT will pay close attention to the progress of the CERN European Strategy for Particle Physics Update.***
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- 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 economic impact on the local community, although the SCJ pointed out the risks associated with the ILC project. Therefore, considering the current situation, MEXT will continue to discuss the ILC project with other governments while having an interest in the ILC project.***
***IWG report in Oct. 2019
G-J, F-J Discussion Groups, Strong support from US. → Maxim's talk***

Strong Support from the US triggered a kind of phase transition!

May 13, 2020 from a Yomiuri news paper article

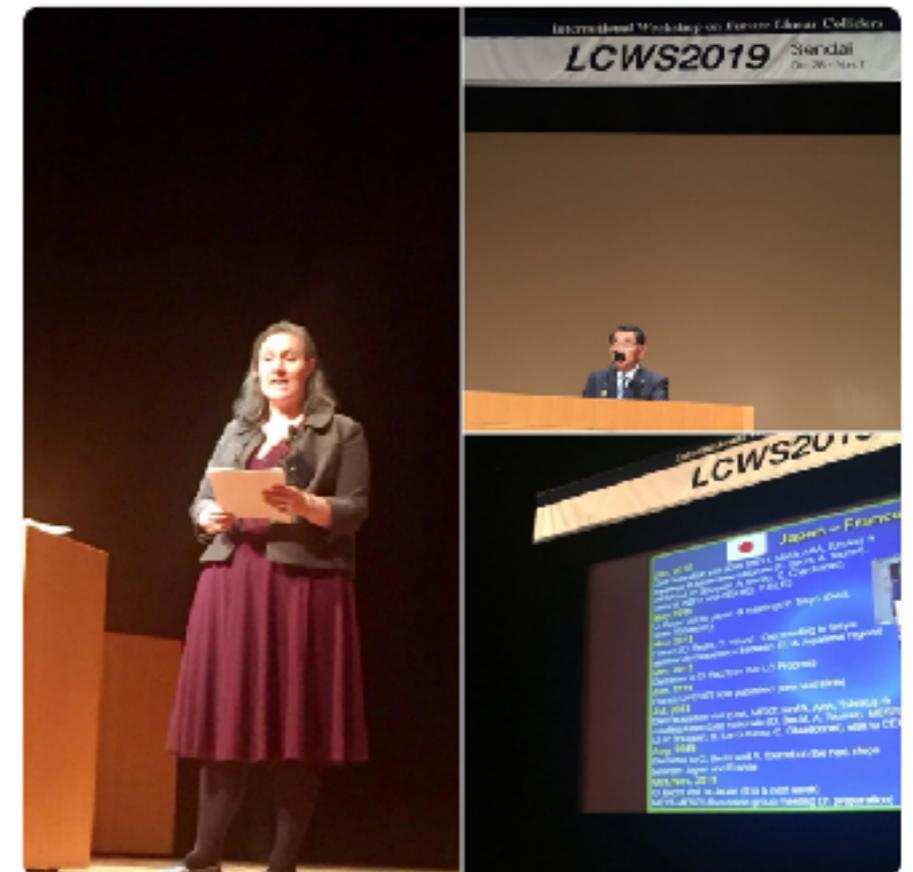
We would like to share with you the following news about the ILC project. It was reported recently (May 13) by Japan's largest newspaper (Yomiuri) that **a letter was sent from the U.S. Deputy Secretary of State to Japan's Foreign Minister** back in February.

The letter reportedly conveyed **strong support for advancing the ILC project**, confirming, at a much higher level, the view expressed by the U.S. government in a speech given at the **Sendai LCWS (by Melinda Pavek, US Embassy in Tokyo)**.



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

Nov. 1, 2019

Development in the Political Sector

On June 5, 2020, the **National Diet (parliament)** of Japan passed a series of bills related to the recovery efforts after the Great Eastern Japan Earthquake of 2011, including a **10-year extension of the Reconstruction Agency**, which is now set to expire in March 2031. The special annual budget allocated for the recovery efforts will also be sustained.

At the house special committee meetings held prior to the voting, supplementary resolutions were adopted, containing **a supplementary resolution about the ILC project** (see below), out of a total of approximately 25 supplementary resolutions. As per the tradition, a response by the government was given by the Minister of Reconstruction at the end of the committee meetings, who stated that **the contributions by the committee members and the intent of the supplementary resolutions will be duly respected.**

衆議院附帯決議

5 「新しい東北」に資する国際リニアコライダー等の国際研究開発プロジェクトが我が国で実施される場合には、被災地に誘致されるよう関係機関と連携、協力すること。

Supplementary Resolution #5 by the House of Representatives (unofficial translation)

*In cases where international research and development projects, such as **the International Linear Collider** which will contribute to the creation of a “New Tohoku”, are to be implemented in Japan, coordination and cooperation should be done with relevant organizations so that the projects can be hosted in the disaster-stricken areas.*

参議院附帯決議

26 国際リニアコライダー計画は東北が世界的候補地になっていることから、その推進は福島イノベーション・コースト構想と並んで東北をフィールドとした科学イノベーションの創出による「新しい東北」に資するものであり、国内誘致に向け関係機関と検討を進めること。

Supplementary Resolution #26 by the House of Councillors (unofficial translation)

*Since the Tohoku area is the world’s candidate site for **the International Linear Collider** project, its implementation will contribute, alongside the Fukushima Innovation Coast Framework, to the creation of a “New Tohoku” by becoming a breeding ground for scientific innovation; considerations towards hosting in Japan should proceed together with the relevant organizations.*

**Where are we
going?
- required actions -**

New Framework for ILC Promotion - Domestic -

http://www.jahep-ilc.org/files/ILC_JP_update_20210113_e.pdf

ILC Promotion Framework in Japan: *as of Jan. 2021*



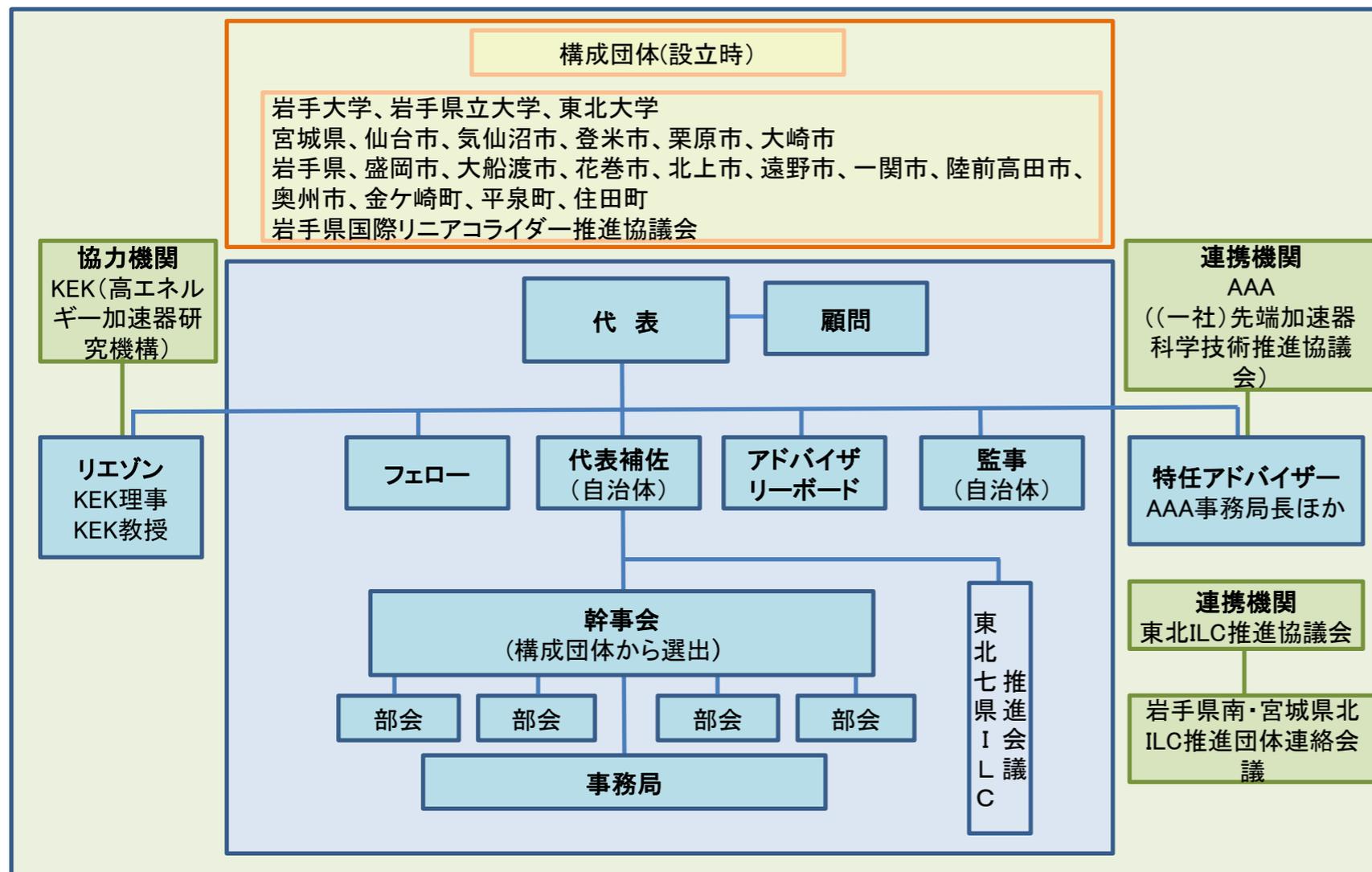
from JAHEP ILC Steering Panel's report, Jan. 2021

Local Activities in Tohoku

Tohoku upgraded its ILC promotion organization on Aug.6.

- **Tohoku ILC Project Development Center**
- **Now actively promoting ILC**

東北ILC事業推進センター 組織及び推進体制



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- To develop detailed design for ILC construction together with IDT, KEK, AAA
- To develop detailed plan for the Tohoku regional matter regarding ILC
- To resolve issues to be resolved by the Tohoku region together with related organizations

https://www.iwate-pu.ac.jp/research/ilc/tipdc_top.html

Tohoku ILC Facility Plan

[https://tipdc.org/assets/uploads/2020/12/Tohoku ILC shisetsu.pdf](https://tipdc.org/assets/uploads/2020/12/Tohoku_ILC_shisetsu.pdf) (in Japanese, 85MB)

Geological & ground condition Survey

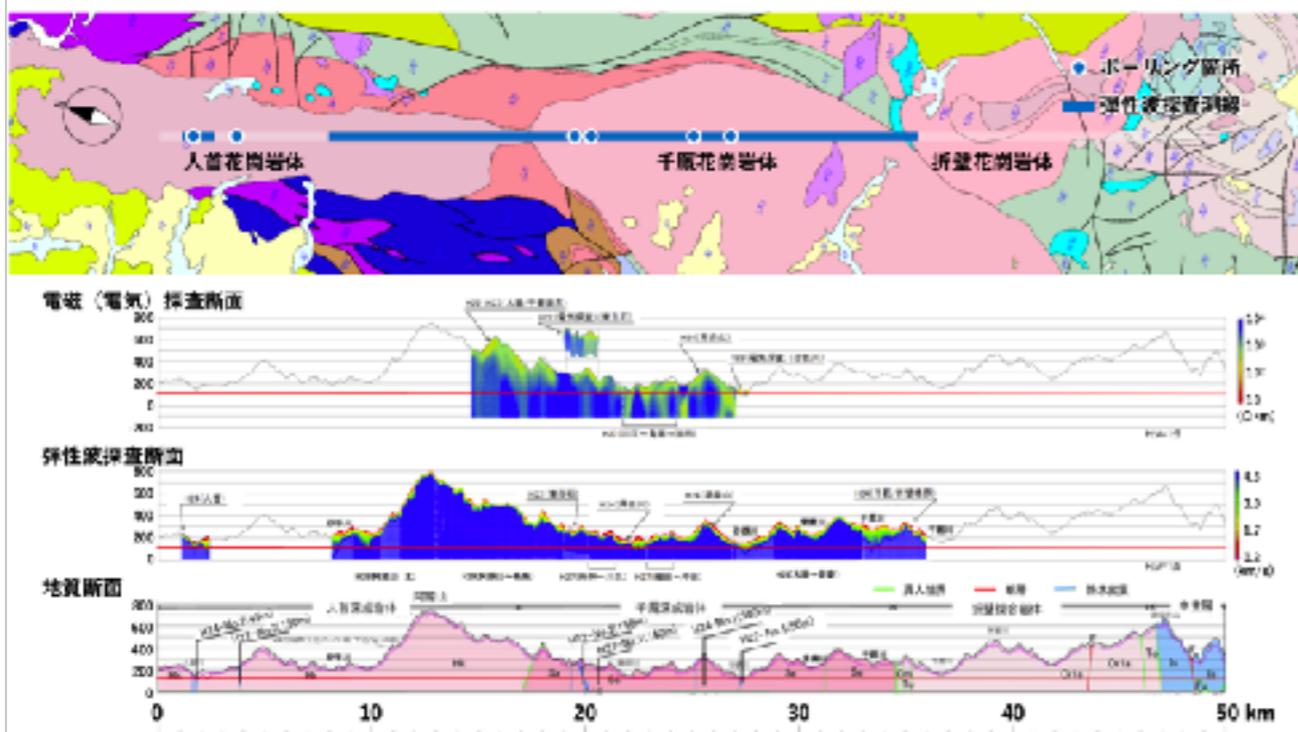


図 4.1: 地質調査結果概要

Reviewed and validated by Evaluation Subcommittee for ILC Civil Engineering Facility in Tohoku of Rock Mechanics Committee in Japan Society of Civil Engineers, Feb. 20, 2020

http://www.rock-jsce.org/index.php?plugin=attach&refer=ILC_subcommittee_2th&openfile=evaluation.pdf (in Japanese)

Core samples



H24-2 (人首花崗岩体; 孔口標高 146m)



H22-3 (人首花崗岩体; 孔口標高 210m)



H22-2 (千厩花崗岩体; 孔口標高 214m)



H27-1 (千厩花崗岩体; 孔口標高 231m)



H24-1 (千厩花崗岩体; 孔口標高 346m)



H22-1 (千厩花崗岩体; 孔口標高 128m)



H22-1' (千厩花崗岩体; 孔口標高 130m)

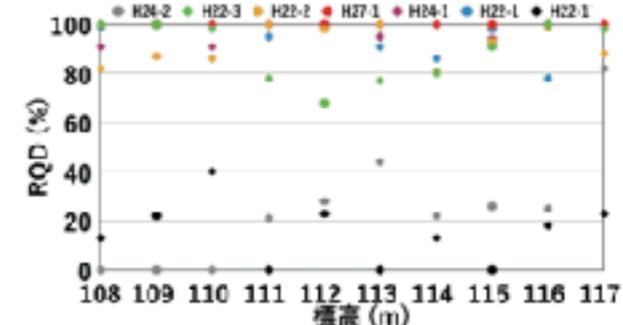


図 4.3: 標高 110m 付近のコア写真及び RQD (コア写真の数値は深度 (m) を示す)

Oct. 6: Excerpt from the Joint Statement by Tohoku Economic Federation & Japan Business Federation: <https://www.keidanren.or.jp/policy/2020/090.html> (in Japanese)

...

東経連と経団連は、2018年7月に「震災復興の加速」「成長戦略の推進」について[共同声明](#)以降、次世代放射光施設を核としたリサーチコンプレックスの形成や**国際リニアコライダー (ILC) の日本誘致**など、復興・再生やSociety 5.0の実現に向け強力に連携してきた。以上の認識を踏まえ、コロナを契機に両団体の連携を改めて深化させ、下記の活動を積極的に展開していく。

Since the joint statement in July 2018 on "acceleration of recovery from the earthquake disaster" and "promotion of growth strategy", Tohoku Economic Federation (Tokeiren) and Japan Business Federation (Keidanren) have been strongly joining forces to achieve reconstruction / revitalization and Society 5.0, including formation of a research complex centered on next-generation synchrotron radiation facilities and **realization of the International Linear Collider (ILC) in Japan**. Based on the above recognition, with COVID19 Pandemic as a trigger we will further strengthen the cooperation between the two organizations and actively develop the following activities.

...

復興庁をはじめとする関係者との密接な連携のもと、福島イノベーションコースト構想の推進や**ILC誘致実現をはじめ**東北地方の活性化・産業振興、風評払拭に資する活動を展開し、復興を着実に推進していく。

In close cooperation with the Reconstruction Agency and other related parties, we will steadily implement reconstruction by promoting activities that contribute to the revitalization of the Tohoku region, industrial promotion, and dispelling rumors, including the promotion of the Fukushima Innovation Coast Framework and **the realization of ILC in Japan**.

JAHEP ILC Steering Panel

HEPC representing JAHEP established JAHEP ILC Steering Panel on Oct. 28.

The mandate of the Panel is to lead the high energy physics community in Japan to advance the ILC project towards its timely realization , including:

- developing coherent promotion strategies and putting them into action,
- in promotion of the ILC project, cooperating with other scientific communities, government authorities, legislators, corporate leaders, regional governments, and media, as well as international communities and authorities,
- cooperating closely with the IDT and KEK.

The Panel will regularly report its activities to the HEPC. Important decision items will be discussed by the HEPC and shared in the high energy physics community in Japan.

Members of the JAHEP ILC Steering Panel

Shoji Asai (University of Tokyo)

Kazunori Hanagaki (KEK)

Toru Iijima (Nagoya University)

Kiyotomo Kawagoe (Kyushu University)

Sachio Komamiya (Waseda University)

Shinichiro Michizono (KEK)

Toshinori Mori (University of Tokyo)

Hitoshi Murayama (UC Berkeley/Kavli IPMU, University of Tokyo)

Yutaka Ushiroda (KEK)

Hitoshi Yamamoto (Tohoku University/IFIC Valencia)

Satoru Yamashita (University of Tokyo) – *Chair*

Members include those who had not been proactively participating in ILC promotion before.

<http://jahep-ilc.org/en/>

New Framework for ILC Promotion - International -



August 2, 2020

ICFA announces a new phase towards preparation for the International Linear Collider

At its 86th meeting held today, ICFA approved the formation of the International Linear Collider International Development Team as the first step towards the preparatory phase of the ILC project, with a mandate to make preparations for the ILC Pre-Lab in Japan.

A description of the mandate and structure of the ILC International Development Team was also approved by ICFA today.

The Team will commence its work immediately and is expected to complete it by the end of 2021.

The ILC International Development Team will work towards making a timely realization of the ILC possible.

ICFA thanks the Linear Collider Collaboration led by Dr. Lyn Evans for its excellent work over the past several years.

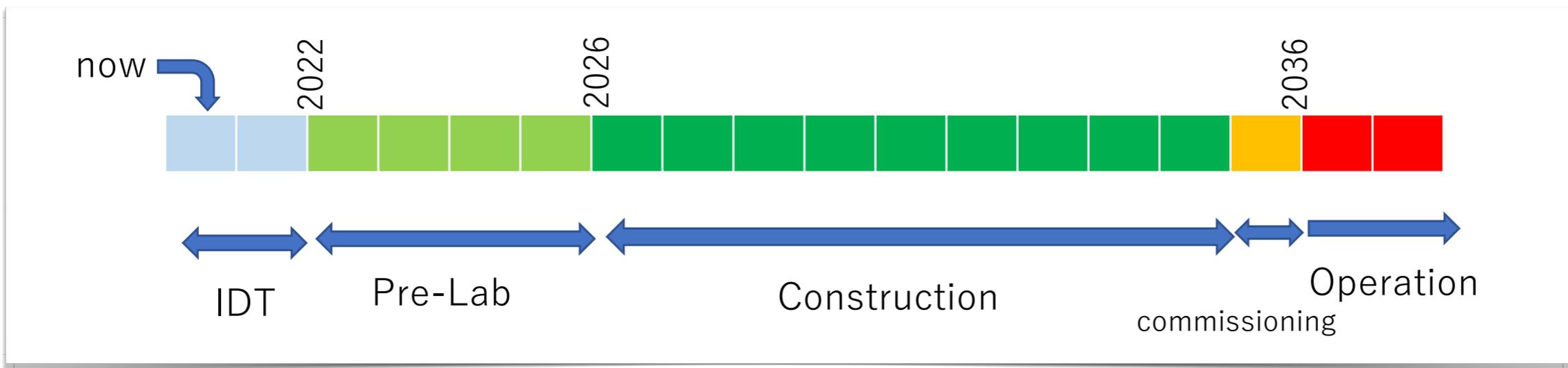
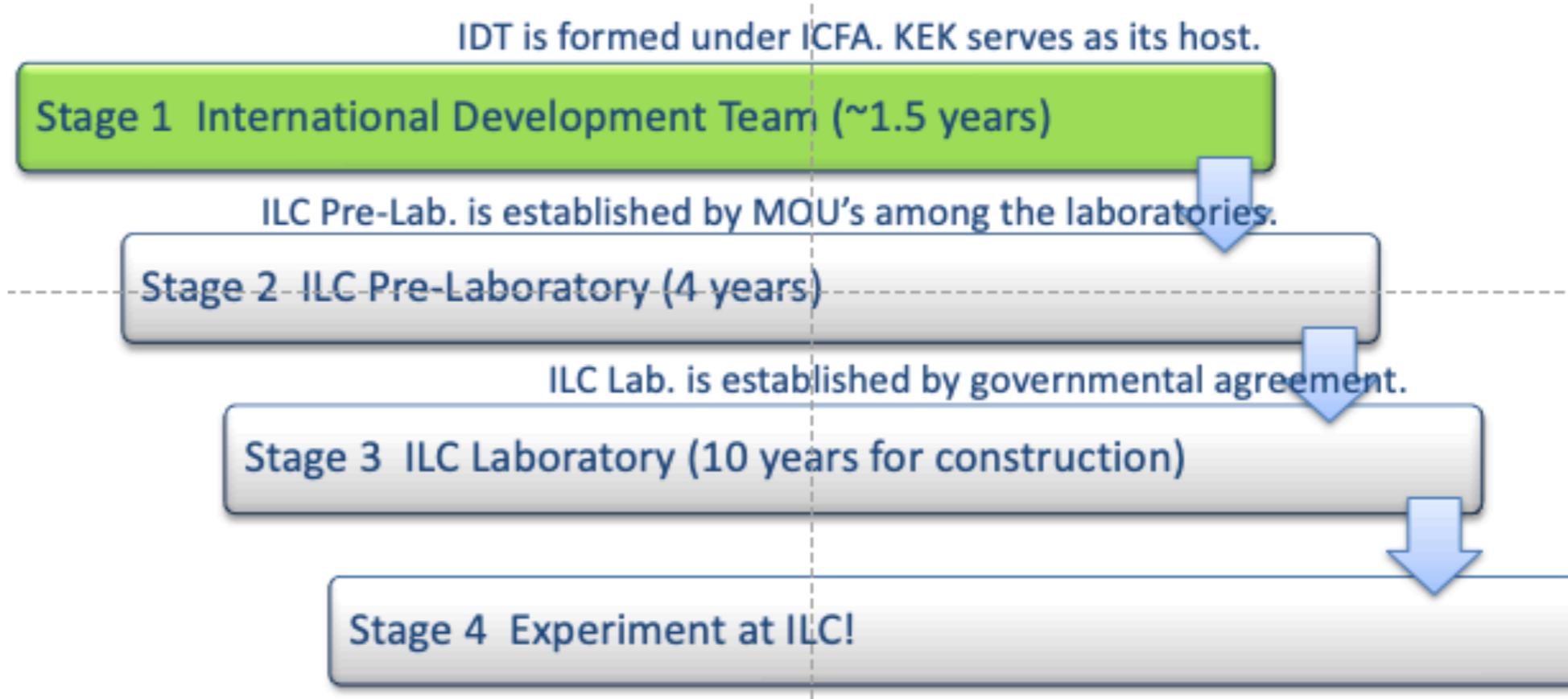
Contacts:

Geoffrey Taylor (ICFA, Chair) - The University of Melbourne

Tatsuya Nakada (Chair, Executive Board, ILC International Development Team) - EPFL, Lausanne

Steps to ILC

from M. Yamauchi,
this workshop



Geoffrey Taylor (U. Melbourne), Moving Forward with the ILC, AWLC2020

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Geoff Taylor at AWLC2020

Our next milestone = ILC Pre-Lab

ILC newsline

September 25 Issue

<http://newsline.linearcollider.org>

A team effort for a new collider: Tatsuya Nakada

After seven years of work, the Linear Collider Board (LCB) and Linear Collider Collaboration (LCC), which were established by the International Committee for Future Accelerators (ICFA) completed their term in June 2020. Taking into account the recent increase of political support in Japan for the ILC, ICFA concluded that the ILC project should take a step towards the preparatory phase for a future ILC laboratory. To help this move, **ICFA established the ILC International Development Team (ILC-IDT)** whose mandate is to prepare for the creation of the ILC Pre-laboratory. Unlike LCB and LCC who were promoting a linear collider in general, **the ILC-IDT focuses on the ILC with Japan as the host country.**

There is a clear pressure from the high-energy physics community to move fast. The recent update of the **European Strategy for Particle Physics** has underlined the European interest to collaborate with ILC if it were realised in a timely fashion. **The goal of the IDT is to complete the preparation for the ILC Pre-laboratory in a timescale of 1.5 to two years**, which is extremely ambitious. There is a lot of work to be done: making a proposal for the organisation and governance of the Pre-laboratory, establishing a scheme where the national and regional laboratories worldwide can contribute to the work during the Pre-laboratory phase so that all the technical specifications for the ILC project being completed and ready for the construction phase, and much more. However, the members of the ILC-IDT Executive Board, who took office in August, are very motivated to tackle this challenge with a support from KEK who is hosting the ILC-IDT. In parallel to our activities, we hope that the effort by the Japanese colleagues will result in a positive move by the Japanese government that is equally essential for establishing the Pre-laboratory.

Lastly, I would like to express our sincere and deepest appreciation to the members of LCB and LCC, in particular the LCC Director, Lyn Evans and his management team as well as the first Chair of LCB, Sachio Komamiya, for their long lasting effort which made it possible to make this new step.

ICFA and the ILC's International Development Team: Geoff Taylor

<http://newsline.linearcollider.org/2020/09/25/icfa-and-the-ilcs-international-development-team/>



→ *Maxim's talk for WG1 and WG2*

LCC/PD → *IDT/WG3*

Jim Brau



Hitoshi Murayama



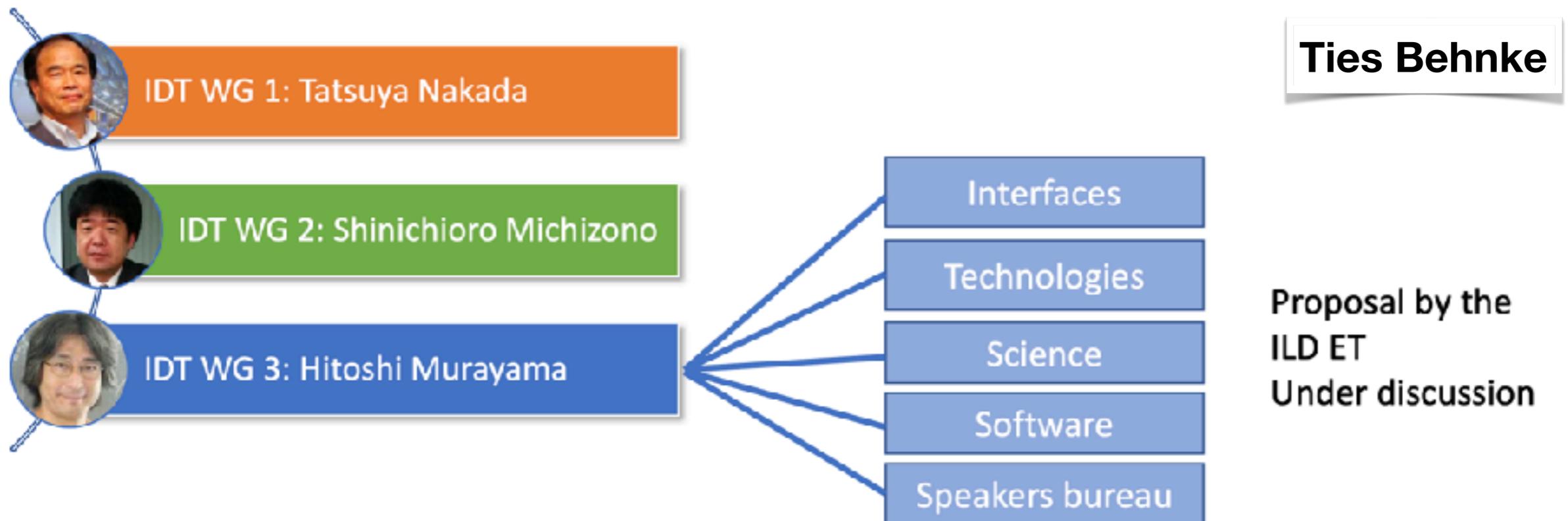
- All previous members of LCC/PD have been invited to join IDT/WG3 together with some new young and active persons.
- Expect some more members added for investigating multi-purpose use of ILC facility.

***ILC is now moving into
a new phase.***

***We need to expand the
ILC community further
to get the Pre-Lab
funded in time.***

IDT WG3 Subgroups

IDT WG3 substructure is *being formulated*, triggered by a proposal from ILD



Snowmass Process

A big chance to expand the ILC community
in particular in the U.S.!

ILC Snowmass TF (=LCC Physics WG+a) published “ILC Study Questions”

DESY 20-122,
KEK Preprint 2020-8,
IFIC/20-34, LCTP-20-14
SLAC-PUB-17543
July, 2020

<https://arxiv.org/abs/2007.03650>

ILC Study Questions for Snowmass 2021

LCC PHYSICS WORKING GROUP

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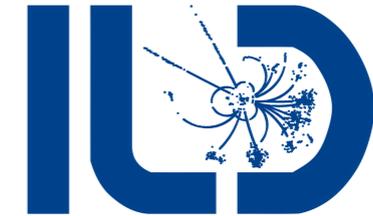
ABSTRACT

To aid contributions to the Snowmass 2021 US Community Study on physics at the International Linear Collider and other proposed e^+e^- colliders, we present a list of study questions that could be the basis of useful Snowmass projects. We accompany this with links to references and resources on e^+e^- physics, and a description of a new software framework that we are preparing for e^+e^- studies at Snowmass.

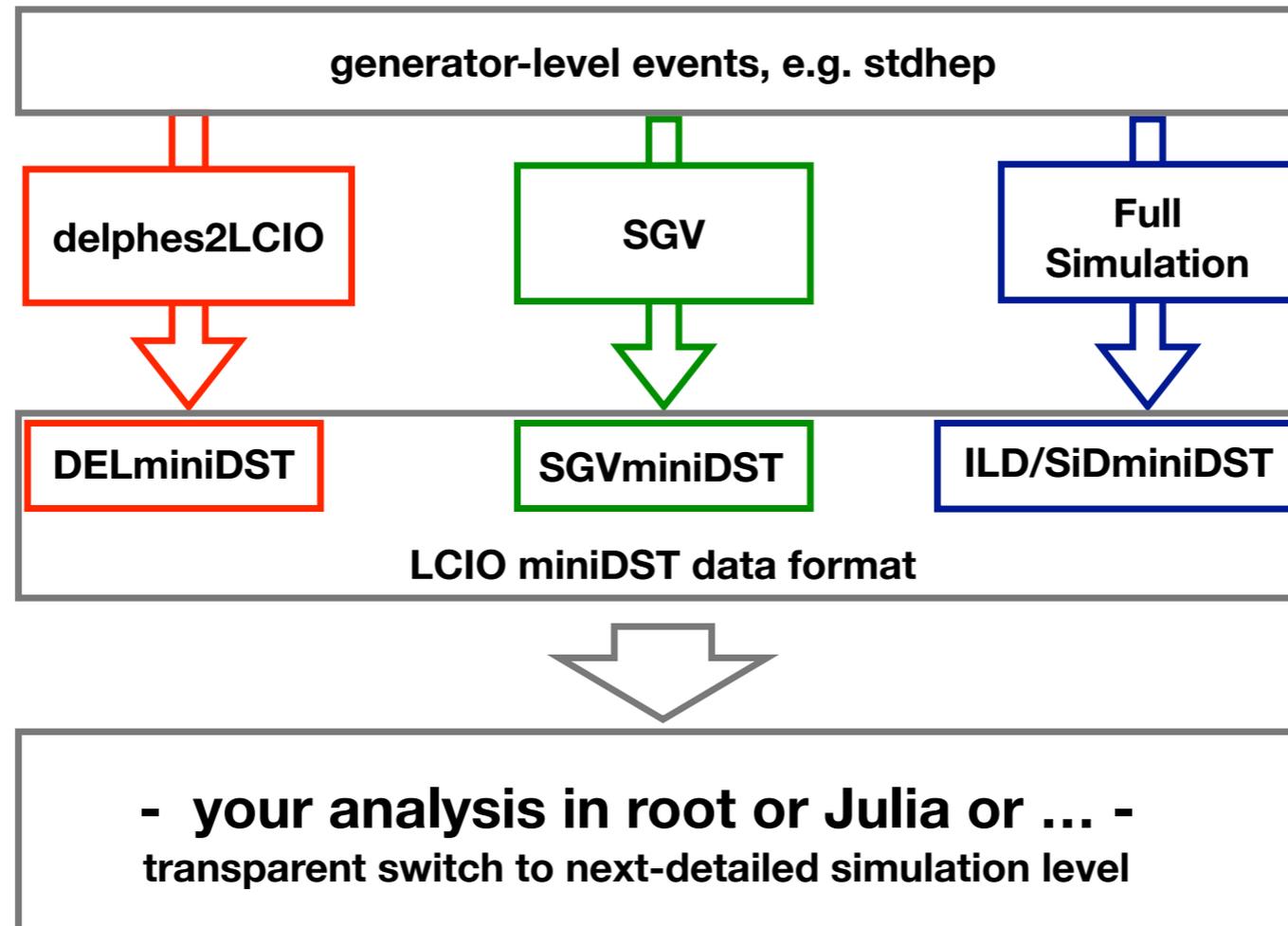
- July 20: Michael Peskin reported on this document in ***the July 20-22 Snowmass EF WS*** (<https://indico.fnal.gov/event/43963/timetable/#20200720>)

List of ~90 questions to be studied during the Snowmass 2020 process with references to current work

Need to provide easy to use tools for new comers



Three flavours of miniDST



analysis programmed against miniDST can switch transparently between different levels of detail!

ILD Guest Membership

ILD's response to the Snowmass process

- For Snowmass, a fast MC will be prepared and made available
- For people wanting to do more, ILD will offer ***a guest membership:***

- ▶ A guest membership gives access to fully simulated and processed MC data files from ILD,
- ▶ Access to internal documentation (technical, other) can be granted upon request
- ▶ Application to the ET, which decides fast
- ▶ GM follow in particular the ILD rules on publications and conference talks
- ▶ GM are for 2 years, after which
 - ▶ They terminate
 - ▶ The group/ person asks for full membership
 - ▶ No extension is possible

Snowmass Tutorial for ILC Studies

Aug. 31: Snowmass Lol deadline: many from us!

Aug. 28: 1st Snowmass Tutorial

<https://indico.fnal.gov/event/45031/overview>

Sep. 28: Snowmass Tutorial: Whizard for e+e-

<https://indico.fnal.gov/event/45413/>

Oct. 5-8: Snowmass Community Planning Meeting

<https://indico.fnal.gov/event/44870/overview>

Oct. 14: 2nd Snowmass Tutorial

<https://indico.fnal.gov/event/45721/>

A New Long Writeup for Snowmass

Purposes:

- 1. To assemble the full ILC story for the benefit of the Snowmass conveners and P5.**
- 2. To provide a vehicle for many members of the US community to sign and hopefully contribute.**

Schedule (See next page)

Snowmass has been delayed by one year so does the schedule for the document!

Michael Peskin

New Schedule for the document

- Feb. 15, 2021** Due date for the editors to write some basic material in each section, so that one can have an idea of the scope of the document and of additional studies needed for Snowmass.
MP will edit these materials, to have a first basic -- though very incomplete -- version ***to present at LCWS 2021 (March 15-19, virtual)***.
- Oct. 25, 2021** Target date for a complete first draft of the report, ***to be presented at the Tsukuba ILC EOI Workshop (Oct. 26-30)***.
- Jan. 2022** arXiv posting of v1, submission ***to the Snowmass Energy Frontier conveners*** ; beginning of a drive for signatures
- Jun 2022** arXiv posting of v2
- Aug 2022** ***final version***, which will also be a reference document for the upcoming US P5 and National Academy panels

- 1 Introduction
- 2 Outline of the ILC Physics Case
- 3 Route to the ILC
 - 3.1 International Design Team
 - 3.2 ILC Pre-Lab
 - 3.3 ILC Laboratory
 - 3.4 Timeline for ILC Detectors
- 4 ILC Accelerator
 - 4.1 ILC Accelerator Design
 - 4.1.1 Design evolution since the TDR
 - 4.1.2 SuperconductingRFTechnology
 - 4.1.3 Accelerator design
 - 4.1.4 Upgrade options
 - 4.1.5 Civil engineering and site
 - 4.1.6 Cost and schedule
 - 4.2 ILC Staging up to 1 TeV
 - 4.3 ILC Scope Beyond 1TeV
 - 4.3.1 Gradient status for the ILC baseline 250 GeV
 - 4.3.2 High Gradient (45MV/m) SRF for Upgrade Paths to 1 TeV
 - 4.3.3 Toward 60 MV/m-Advanced Shape Cavities
 - 4.3.4 Nb₃Sn
 - 4.4 Issues for ILC Accelerator R&D
 - 4.5 Opportunities for US contributions
 - 4.5.1 SuperconductingLinac
 - 4.5.2 Electron and Positron Sources
 - 4.5.3 Damping Ring, Beam Delivery System, and Beam Dump
 - 4.5.4 Summary
- 5 General Aspects of the ILC Physics Environment
 - 5.1 Key Standard Model Processes
 - 5.2 Energy and Luminosity
 - 5.3 Beam Polarization

- 6 ILC Detectors
 - 6.1 Detector Requirements for the Physics Program
 - 6.2 The ILD Detector
 - 6.2.1 Detector description and capabilities
 - 6.2.2 R&D issues for the ILD design
 - 6.3 The SiD Detector
 - 6.3.1 Detector description and capabilities
 - 6.3.2 R&D issues for the SiD design
 - 6.4 New Technologies for ILC Detectors
 - 6.4.1 Tracking
 - 6.4.2 Calorimetry
 - 6.4.3 Vertex Detector
 - 6.4.4 Forward Detectors
 - 6.4.5 Muon System
 - 6.4.6 Timing Elements
- 7 ILC Detector Simulation
 - 7.1 ILC Fast Simulation Frameworks
 - 7.2 ILCSoft Framework
 - 7.3 ILC SM Background Samples
- 8 ILC Physics Measurements at 250 GeV
 - 8.1 Higgs – Conventional Decays
 - 8.1.1 Hadronic decays
 - 8.1.2 Leptonic decays
 - 8.1.3 EW-bosonic decays
 - 8.2 Higgs – Exotic Decays
 - 8.3 W Boson
 - 8.4 4-Fermion Processes
 - 8.5 Precision QCD
 - 8.6 Dark Sector

9 ILC Precision Electroweak Measurements

9.1 Radiative Return to the Z

9.2 Z Pole Program

9.3 W and Z Boson Masses

10 ILC Physics Measurements at 350, 500, and 1000 GeV

10.1 Top Quark

10.1.1 Top Quark Mass

10.1.2 Current state of the art and (HL-)LHC prospects

10.1.3 Top Quark Electroweak Couplings

10.2 Higgs

10.2.1 WW fusion

10.2.2 Higgs Self-Coupling

10.2.3 Top Quark Yukawa Coupling

10.3 W Boson

10.4 4-Fermion Processes

10.5 New Particle Searches – DarkSector

11 ILC Fixed-Target Program

11.1 Nuclear Physics with Electron and Positron Beams

11.2 Beam-Dump Experiments

11.3 Dedicated Secondary-Beam Experiments

11.4 ILC as an Accelerator Test-Bed

12 Precision Tests of the Standard Model

12.1 Precision Standard Model Theory for ILC

12.2 Frameworks for Effective Field Theory

12.3 Expectations from a Unified SMEFT Analysis

12.4 Expectations for CP-Violating Operators

12.5 Expectations for Heavy-Quark Operators

13 Big Physics Questions Addressed by ILC

13.1 Can the Standard Model be exact to very high energies?

13.2 What is the energy scale of new physics?

13.3 Why is electroweak symmetry broken? (weak-coupling models)

13.4 Why is electroweak symmetry broken (strong-coupling models)?

13.5 Why is there more matter than antimatter?

13.6 What is the dark matter of the universe?

14 ILC Probes of the Big Questions

14.1 Higgs boson: tests for violation of the Standard Model

14.2 Higgs boson: the Higgs Inverse Problem

14.3 Electroweak sector

14.4 Top Quark

15 Long-Term Future of the ILC Laboratory

15.1 Future Accelerators in the ILC Tunnel

15.1.1 Very High Gradient Superconducting RF

15.1.2 Very High Gradient Copper Accelerators

15.1.3 Plasma-Wake field and Dielectric Accelerators

15.2 Physics Opportunities at Multi-TeV

15.3 Physics Opportunities at Multi-10 TeV

16 Conclusions

***New areas that need
your inputs!***

LC Workshops

- 1. LCWS 2021 organized by Europe, with session on experiments, new ideas, ... *March 15-19, 2021, fully virtual***
- 2. EOI WS, intended to be a community engagement workshop on Experiments, *October 25-29, 2021, hopefully in person in Japan***

→ *Maxim's talk for more about the LCWS 2021*

Detector Timeline

Discussions on going
Proposal in AWLC2020

Pre-lab physics and detector activities

- Preparing the ILC physics programme by
 - Setting up the ILC Committee (ILCC) as a programme committee for the ILC at the start of the Pre-lab.
 - Call for Expressions of Interest (Eols) after ~0.5 year for experiments covering a broad physics spectra which can be done at the ILC.
 - Call for Letters of Intent (Lols) about one year after the Eols. The ILCC will select a subset of Lols to proceed for the next step.
 - Call for a Technical Proposal/Technical Design Report shortly before the transition to the ILC Laboratory, where the final approval of the experiments will be made by the ILC Laboratory.
- Approving and monitoring of the progress for the detector R&D programme by the ILCC.
- Organising physics workshops to reflect on the ongoing progress relevant for the ILC physics.

This timeline is the current IDT thoughts and the actual implementation will be led by the Pre-lab directorate

- **The political environment about ILC is now very good, thanks, in particular, to strong US support. A new deputy-MEXT minister, Ms. Takahashi, responsible for S&T policy is from Iwate, very supportive. Multiple discussion sessions held.**
 - **Remaining hurdle: how to secure financial resource outside the ordinary S&T budget.**
- **The climate change: The first stage of the ILC is 250 GeV but, now studies on energy upgrade even above 1 TeV is encouraged. Discussions on non-colliding beam experiments using the ILC facility starting.**
- **In spite of the recent resurgence of the COVID19, KEK is operating in the new normal mode, and various ILC promotion activities are on-going.**
- **The International Development Team (IDT) took over LCC/LCB:**
 - **IDT Membership is open to public since Sep.11, substructure being formed.**
 - **Working on Snowmass process to expand the ILC community.**
 - **Preparation on-going for JFY2022 budget request to establish Pre-Lab.**
- **JAHEP ILC Steering Panel has been established to lead the HEP community in Japan to advance the ILC project towards its timely realization.**
- **Tohoku upgraded its ILC promotion organization, Tohoku ILC Project Development Center, on Aug.6.**
 - **Now actively promoting ILC.**