

NEWSLINE

THE NEWSLETTER OF THE LINEAR COLLIDER COMMUNITY

AROUND THE WORLD



Explaining the ILC in an easy-to-understand way

by Rika Takahashi

Despite the largest typhoon in the year approaching, about 300 people braved the elements and gathered at a conference hall at University of Tokyo on 15 October. A symposium entitled “Can the ILC solve the mystery of the Universe?” was held, with representatives from the Linear Collider Collaboration (LCC) and specialists from various fields.

FEATURE

Industrialising the ILC

US members of the Linear Collider Collaboration make plans for a new stage of industrialisation studies.

by Julianne Wyrick



With the publication of the *Technical Design Report*, one stage of design and costing for the ILC is complete. Now, US members of the Linear Collider Collaboration must consider what ILC components the US might contribute—and how they will be produced.

DIRECTOR'S CORNER

LCWS13 – a timely linear collider workshop

by Hitoshi Yamamoto



it a very promising linear collider meeting, Hitoshi Yamamoto explains.

LCWS13 is the first International Linear Collider workshop after the completion of the ILC Technical Design Report, the European Strategy for particle physics, the ILC site evaluation committee of Japan announcement and the Science Council of Japan report. All converges to make

IMAGE OF THE WEEK



A physicist walks into a rice paddy...

The Linear Collider Collaboration management team visited the recommended site in the Kitakami mountains last week. Surrounded by local journalists, including several camera teams, they inspected the area that might one day host the International Linear Collider.

IN THE NEWS

from *Kahoku Shinpo*

22 October 2013

ILC構想の実現期待 グロス教授、仙台でシンポ出席

2004年のノーベル物理学賞を受賞した米カリフォルニア大のデビッド・グロス教授（72）＝理論物理学＝が21日、仙台市を訪れ、超大型加速器「国際リニアコライダー（ILC）」の構想実現に期待感を示した。(David Gross, the winner of the 2004 Nobel prize in physics, visited Sendai city on 21 October, and express his expectation on the realisation of the ILC)

from *IBC*

21 October 2013

子どもたちがILCを学ぶ

子どもたちが宇宙の成り立ちやILC＝国際リニアコライダーの役割について学びました。盛岡の城北小学校の5、6年生、およそ240人に授業を行ったのは、ドイツの国立マインツ大学で物理学を専門とする齋藤武彦教授です。(About 240 elementary school children in 5th and 6th grade learned about the ILC from Takehiko Saito of Johannes Gutenberg University Mainz, Germany)

from *The Economist*

19 October 2013

Small really is beautiful

Fundamental physics seems to have an insatiable appetite for bigger, more expensive machines. There may, though, be a way to shrink them radically

from *Mainichi Shimbun*

18 October 2013

国際リニアコライダー:「候補地選択は適切」 ILC国際組織が北上山地を視察

ディレクターのリン・エバンス氏らが奥州市のホテルで記者会見し、「候補地の選択は適切だ。北上山地に合わせて詳細な設計を進める。日本政府のはっきりした意思表示が必要」と強調した。(Lyn Evans said in the press conference that the Kitakami is suitable for ILC construction, and will start the site specific design. What we need is a statement from the Japanese government)

from *IBC*

17 Oct 2013

ILC建設候補地を視察

ILC＝国際リニアコライダー計画を進める国際的研究者組織の幹部が、きょう建設候補地である岩手の北上山地を初めて視察しました。(Executive members of the Linear Collider Collaboration visited Kitakami mountains, the ILC candidate site, on 17 October)

from *Tanko Daily*

16 October 2013

ILC計画 科学技術立国へ導く新たな道筋 (東京大学で国際シンポ)

国際リニアコライダー（ILC）計画の学術的意義や科学技術立国への新たな道筋について考えるシンポジウムが15日、東京大学で開かれた。(The symposium to discuss the road map toward the realisation of the ILC was held on 15 October in Tokyo)

from Yahoo News

15 October 2013

The Supercollider That Never Was

Many believe accelerator physics still has an important role to play, such as with a linear collider that will by necessity be a worldwide effort. "I do not believe that we can make significant progress without also pushing back the frontier of high energy," Nobel laureate Steven Weinberg wrote in an essay titled "The Crisis of Big Science" in The New York Review of Books last year. "So in the next decade we may see the search for the laws of nature slow to a halt, not to be resumed again in our lifetimes."

from Universcience TV

11 octobre 2013

Prix Nobel 2013 : le boson de Higgs

"avec des collisionneur linéaires, on pourrait presque faire une "usine à bosons de Higgs" – en produire en très grande quantité, observer toutes leurs façons de se désintégrer en d'autres particules et faire une métrologie extrêmement précise, qui permettra de le caractériser complètement" (video interview of Etienne Klein)

from Discover Magazine blog

11 October 2013

After the Higgs Boson: A Preview of Tomorrow's Radical Physics

"That would be absolutely amazing because the ILC is a whole different kind of machine than the LHC. It collides electrons with positrons [their antimatter twins], which produces very clean collisions. You can do precision measurements of the kind you can't even think about at the LHC. So if you can produce dark matter at the ILC, then it will become the dark matter factory for the next 30 years. That's the way we're going to figure out what the dark universe is all about."

from Physics World

10 October 2013

Japan looks beyond the LHC

According to Hitoshi Murayama, director of the Kavli Institute for the Physics and Mathematics of the Universe in Tokyo, who sat on the international review committee, there are about 150 people in the Japanese Congress who actively support the ILC and in July the ruling party LDP published a policy document that mentioned the ILC. However, supporting the ILC is not yet an official position of the government, with the Japanese Ministry of Education, Culture, Sports, Science and Technology waiting for a decision.

CALENDAR

Upcoming events

[LCWS 2013](#)

The University of Tokyo, Japan
11- 15 November 2013

Upcoming schools

[Eighth International Accelerator School for Linear Colliders](#)

Antalya, Turkey
4- 15 December 2013

[View complete calendar](#)

PREPRINTS

ARXIV PREPRINTS

[1310.5189](#)

Report of the Snowmass 2013 energy frontier QCD working group

[1310.4496](#)

Reconstructing Supersymmetric Contribution to Muon Anomalous Magnetic Dipole Moment at ILC

[1310.3953](#)

Development of an intense positron source using a crystal-amorphous hybrid target for linear colliders

[1310.3800](#)

Neutrino Physics, Lepton Flavour Violation and the LHC

[1310.1083](#)

Unitarity Constraints on Higgs Portals

[1310.1082](#)

An explicit Z'-boson explanation of the $B \rightarrow K^* \mu^+ \mu^-$ anomaly

[1310.1072](#)

Shedding Light on Dark Matter at Colliders

[1310.0799](#)

Determination of the top quark mass circa 2013: methods, subtleties, perspectives

[1310.0763](#)

ILC Higgs White Paper

LC NEWSLINE

THE NEWSLETTER OF THE LINEAR COLLIDER COMMUNITY

AROUND THE WORLD

Explaining the ILC in an easy-to-understand way

Rika Takahashi | [24 October 2013](#)

Despite the largest typhoon in the year approaching, about 300 people braved the elements and gathered at a conference hall at University of Tokyo on 15 October. A symposium entitled “Can the ILC solve the mystery of the Universe?” was held, with representatives from Linear Collider Collaboration (LCC) and specialists from various fields.

The symposium was opened with a speech by Lyn Evans, director of the LCC. It consisted of two parts: two talks by Hitoshi Murayama, deputy director of the LCC, and Hideaki Omiya, Chairman of the Board of Mitsubishi Heavy Industries, Ltd, and a panel discussion. In addition to Evans and Murayama, Mike Harrison, LCC’s Associate Director for ILC, Yukako Uchinaga, Board Chair of J-WIN (Japan Women’s Innovative Network), and Naoko Yamazaki, Astronaut, joined the panel. The discussion was led by Akira Ikegami, a journalist who is known in Japan as a person who explains any topic, no matter how difficult it is.

The panel discussion started with the video clip about the 2013 Nobel prize in physics, which was awarded to François Englert and Peter Higgs and for their work on the theory of the Higgs boson, discovered at CERN in 2012. Moderator Ikegami showed himself surprised by the comment made by Murayama that he did not believe that the particle like Higgs boson exists. Murayama said, “Higgs boson is a pretty strange particle. It is a sort of ‘faceless’ particle without spins. It feels strange to think there is some faceless species in this world.”

Yamazaki, the second Japanese female astronaut who went to space on the space shuttle Discovery as part of mission STS-131 in 2010, is of course a prominent scientist. She commented on the 2013 Nobel prize “My first impression was ‘well, what is the Higgs particle?’” drawing laughter from the audience. When CERN announced the discovery of new particle in July last year, Yamazaki said she felt a bit impatient because CERN did not announced the discovery very clearly. “I wondered why, but then I learned that in order to announce a discovery it takes a lot of precise analysis. I was so impressed.”

The Higgs particle is said to give mass to particles in the universe. “But we do not usually think of the difference between mass and weight,” Ikegami talked to Yamazaki about her experience in the space. “In the microgravity environment of the International Space Station, we realise what mass is.” The experimental equipment weights as heavy as 500 kilograms on the earth. It becomes weightless in space, but we still feel the mass when we move and catch it.”

Last August, the ILC site evaluation committee of Japan announced the result of the assessment on the two candidate sites in Japan, and they recommended the Kitakami mountains in the Iwate and Miyagi prefectures as a best suitable location. Evans said, “It would be



Panelists at the ILC Symposium in Tokyo (From left, Akira Ikegami, Hitoshi Murayama, Lyn Evans, Mike Harrison, Naoko Yamazaki, Yukako Uchinaga)



Mie Yamanaka, a high school student, gave a presentation at the symposium.

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Panelists at the ILC Symposium in Tokyo (From left, Akira Ikegami, Hitoshi Murayama, Lyn Evans, Mike Harrison, Naoko Yamazaki, Yukako Uchinaga)



Mie Yamanaka, a high school student, gave a presentation at the symposium.

best to have the LHC (Large Hadron Collider) and the ILC operating at the same time. I strongly hope that Japan takes initiative for the ILC.” Harrison said, “For the ILC, the technology is mature, and the physics case is bold. The remaining issue would be the finance,” expecting the start of the international discussion between prospective participating countries.

In the panel discussion, important input from the younger generation was presented from a future scientist and an educator. Mie Yamanaka, a senior high school student, is part of a programme provided by Tohoku University to train future scientists. Yamanaka wishes to pursue the medical profession, and is studying about cancer treatment at the training programme. Yamanaka said, “I learned that the ILC has a lot of potential for practical applications, and I got interested especially in the medical applications.” Now she is joining a research group of other high school students whose future interests are varied, such as astronomy, agriculture, or education. She said that she would like to know more about the ILC, and “I would like to propose the ILC community to provide a workshop with specialist in many fields for students, so that we can have more clearer picture of what is the ILC.”

Another important input was made by Yosuke Gotoda from Nara University of Education. The university provides a special programme to cultivate “Super Science Teachers”, science teachers with high-level knowledge and communication skills, and Gotoda wishes to become such a super teacher, because he believes that the key persons to bring up the children’s understanding of science are teachers. Gotoda has helped the science educational programme at KEK, and “I started wondering. Every participant in the programme said it was an interesting experience, or science is fun to study. But, how many of them keep that interest after the programme? We need some activities to make them maintain their interest. I think the ILC will be the core laboratory for such activities.”

The panel also discussed issues related to establishing the ILC international city. Ikegami pointed out that even if the ILC project is approved now, it will take another 15 to 20 years for the accelerator to start running.

Uchinaga, the top female business leader in Japan, who became the first woman from outside the United States to be inducted into the Women in Technology International Hall of Fame in 1999, said that despite it seems a long time, it will come very soon. “There are many issues to address to realise such a big project. Rather, we have little time left.”

Murayama explained the difficulties he had when he came back to Japan after the long stay in the US. “I could not get a credit card, because I did not have any working records in Japan. I had difficulties to buy a cell phone, because I did not have a street address in Japan. Even though I am Japanese, and speak Japanese, I still had many troubles.” He emphasised the need for change in the institutional procedures and systems.

Uchinaga said that hosting the ILC in Japan will change the mindset of Japanese people. “So far, the meaning of the globalisation in Japan was to go abroad. With the ILC laboratory, we can realise globalisation from inside Japan. I expect the ILC to become a core of those changes.”

Yamazaki has lived in the US for her training at NASA. “NASA has a great programme called family support for the astronauts, and I received great help. The ILC may need something similar to support scientists and their families.”

The symposium was closed by messages to the ILC from each panelist. Evans wrote “Golden opportunity for Japan” on his board, and Murayama “Let’s solve the mysteries of the universe together.”

Ikegami concluded that the ILC may be the huge chance for Japanese society to change, and the great opportunity to consider the future of the country.

The symposium was well received by the audience. The survey result showed 90 percent of the audience found the symposium “interesting,” and 86 percent said it was easy to understand. The symposium will be edited to a TV programme and broadcast on the education and international channels. The date of the broadcasting to be announced on [NHK’s website](#).

[JAPAN](#) | [OUTREACH](#)

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NEWSLINE

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FEATURE

Industrialising the ILC

US members of the Linear Collider Collaboration make plans for a new stage of industrialisation studies.

Julianne Wyrick | [24 October 2013](#)



SLAC-developed waveguide system installed with a Fermilab cryomodule. Photo: Jerry Leibfritz

With the publication of the *Technical Design Report* (TDR), one stage of design and costing for the ILC is complete. Now, US members of the Linear Collider Collaboration must consider what ILC components the US might contribute—and how they will be produced.

By contracting with industry to consider details such as cost and facilities needed, US Linear Collider Collaboration (LCC) members hope to eventually be able to provide the Department of Energy (DOE) with a document containing specific suggestions for what unique contributions US labs and industry could provide to the future ILC. Producing such a document begins with industrialisation studies for specific components – such as a study of the SLAC-designed power distribution system that scientists hope to begin this year. Involving industry helps provide reliable cost estimates, determine facilities needed and drive further innovation.

“This is an enormously important part of the project because it’s very easy for physicists to just sit in the ivory tower and dream up these numbers,” said Marc Ross, a SLAC physicist and member of the LCC’s ILC effort.

The SLAC-developed power distribution, or waveguide, system is one of the ILC technologies ready for an industrialisation study. A series of rectangular pipes running along the outside of ILC cryomodules, the waveguide system transports radiofrequency microwave power from the power supply to the accelerator’s cavities. This power accelerates particles to the collision point.

Though companies that build similar systems for radar and long-distance telephone communication applications helped build a prototype system at SLAC, an industrialisation study will determine what would be necessary for a company to produce the system for the entire ILC.

“It gives them a chance to think about how they would do this on a larger scale, whether they have the current facilities to manage this or whether they would need to build new ones,” said Chris Adolphsen, also a SLAC physicist who is part of the LCC’s ILC effort. “All that has cost implications.”

In addition, industrialisation studies can often also provide innovative, cost-effective changes to the initial design.

“Hopefully the company (doing the study) would bring something to this other than just the cost: how to make this cheaper, how to make some of the parts as one as opposed to three, for example,” Adolphsen said. Though producing a single, more complicated part might require the development of a special machine to produce it, with industrial-scale production, making that machine may be more cost-

effective than producing and fitting together many small parts.

For example, the current design for SLAC's waveguide distribution system requires a large number of flanges to connect various pieces, which is both expensive and time-consuming. Ross and Adolphsen hope an industrial partner could develop a way to weld or otherwise unify parts to reduce the number of flanges.

The waveguide system study won't be the first industrialisation study done for the ILC; the LCC commissioned companies based in Europe, Japan and the US to do similar industrialisation studies for the ILC's cavities prior to the publication of the TDR.

"We did three or four studies (with companies) in each region," Ross said. "It was a really important part of gaining acceptance of our cost estimate and our technical plan."

Industrialisation studies of ILC technologies like the waveguide system will continue to inform planning for the ILC.

"These studies certainly help guide us toward the next step, which is talking to DOE and labs about how they would work on the ILC," Ross said. "The goal is to submit a document to DOE saying that this is what we think the US can do."

[INDUSTRIALISATION](#) | [SLAC](#) | [UNITED STATES](#) | [WAVEGUIDE SYSTEM](#)

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DIRECTOR'S CORNER

LCWS13 – a timely linear collider workshop

Hitoshi Yamamoto | [24 October 2013](#)



The upcoming LCWS2013 is likely to become a linear collider milestone.

The international linear collider workshop [LCWS13](#) will be hosted by the University of Tokyo from 11 to 15 November. In June 2013, the ILC TDR was completed and the new international linear collider organisation LCC has fully taken over from the GDE (Global Design Effort) and RD (Research Directorate) that coordinated the activities to produce the ILC TDR. This marked the culmination of the enormous amount of work that dates back to the selection in 2004 of the superconducting accelerating technology as the basis for a linear collider.

LCWS13 is the first international linear collider workshop after the completion of the ILC TDR, and accordingly the goal of the workshop goes beyond that of previous linear workshops in that we will be focused on moving beyond production of the design documents and towards the realisation of a linear collider. In addition the European strategy, where CLIC is highlighted as one of two main options for a next energy frontier machine

after the LHC at CERN, provides clear longer-term challenges also for the normal-conducting technology. So, LCWS13 is timely for both projects' next technical challenges, but it is also timely in two important ways having to do with events in Japan and the possibility of hosting the ILC there.

First, on 23 August, the [ILC site evaluation committee of Japan announced](#) that the two candidate sites had been down-selected to one; namely, the Kitakami site in Tohoku. There has been strong support for the ILC in both of the two candidate sites, and many officials of the local governments and industrial organisations have been working intensively for many years to prepare for the ILC to be sited in their regions. Thus, the selection has been a difficult process, but it has been done in a fair and scientific way, allowing the design effort by LCC now to focus on the selected site. In fact, the site-specific design effort is being started based on the Kitakami site, and on 17 October, the LCC management visited the Kitakami site. Within Japan, support by national organisations such as the Advanced Accelerator Association Promoting Science and Technology (AAA) can move forward based on the selected site.

Another event that makes LCWS13 timely is the report on the ILC by the Science Council of Japan (SCJ). This report has caused substantial concerns regarding the position of the Japanese government with respect to the ILC. As described in the [10-October Newsline article](#), the report is positive about the ILC. It proposes two actions by the Japanese government:

1. Appropriate a fund to create a new committee to intensively study for 2 to 3 years critical issues of the ILC including international resource sharing and domestic organisation.
2. In parallel to the above, conduct negotiations with laboratories and funding authorities of other countries and regions on international resource sharing.

It also says that 'it is too early at this time to grant a full-scale implementation of the ILC', but such action cannot be taken anyway until international agreements are reached. The report by the SCJ is, in fact, pretty much the best one can hope for from the committee.

The current number of registrants for LCWS13 is close to 300 and growing, and this is by far the largest attendance for the linear collider workshops that have been held in Asia. We expect that LCWS13 will be an important and interesting meeting, and it is quite possible that we will look back at this workshop as a benchmark event where the ILC would have moved toward its realisation and where the CLIC progress and plans, as well as many common studies, would have been intensified. See you in Tokyo soon!

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LCC NEWSLINE

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IMAGE OF THE WEEK

A physicist walks into a rice paddy...

24 October 2013

The Linear Collider Collaboration management team visited the recommended site in the Kitakami mountains last week. Surrounded by local journalists, including several camera teams, they inspected the area that might one day host the International Linear Collider.



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