

LC NEWSLINE

THE NEWSLETTER OF THE LINEAR COLLIDER COMMUNITY

DIRECTOR'S CORNER

LHC commissioning continues in spite of obstacles

by Lyn Evans



After almost two years of major work on the machine and its detectors, the Large Hadron Collider is in the middle of the so-called commissioning phase. During the roughly two months of commissioning, the operators check out every little system in the large complex that is the LHC. LCC Director and former LHC project leader Lyn Evans watches and learns from the sidelines.

IMAGE OF THE WEEK

“ILC to Japan!”



The people of Iwate prefecture in northern Japan – the potential future home of the ILC – go to great lengths to show their support for the collider project. Banners under cherry blossoms and bumper stickers are just a few of the many examples of visible support – here are a few impressions from a recent visit of the interaction collaboration to the region.

VIDEO OF THE WEEK

Researchers and nobel laureates support the ILC



Nobel laureates Toshihide Maskawa, Masatoshi Koshihara, David Gross and Burton Richter join the #mylinearcollider campaign. Plus as a little bonus a compilation of some of the videos collected during the campaign so far. Can you find yourself?



From TRIUMF: Tokyo Gathering Reaffirms Case for the ILC

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IN THE NEWS

from **CERN**

7 May 2015

US-CERN Agreement Paves Way for New Era of Scientific Discovery

A new agreement between the United States and the European Organization for Nuclear Research (CERN) signed today will pave the way for renewed collaboration in particle physics, promising to yield new insights into fundamental particles and the nature of matter and our universe.

from **DESY**

6 May 2015

Scientists X-ray Chocolate

Study shows ways to reduce unwelcome whitish fat bloom

from **Iwate Nippo**

May 2 2015

ILC 「米側前提は北上山地」 帰国の鈴木議員インタビュー

月 日からの訪米日程を終え 日帰国した超党派のリニアコライダー国際研究所建設推進議員連盟の副会長、鈴木俊一衆院議員は「 月 日に米ハドソン研究所で行われた 円卓会議で日本と米国の議員による『日米科学・技術協力推進議連』の創設を目指すことになった。この組織は などの加速器、宇宙開発、エネルギー、次世代コンピューターなど先端科学分野で包括的に日米で共同事業を進める」と述べた。(Deputy director general of Japan's ILC Diet members association, Shun-ichi Suzuki, who visited Washington from 26 April said "At the roundtable meeting held at Hudson Institute on 28 April, we agreed to form US-Japan political association for the promotion of science and technology. This organization will discuss and promote US-Japan comprehensive collaboration on scientific fields, such as accelerator, space development, energy or next generation computing.")

from **de Volkskrant**

1 May 2015

Deeltjeslab CERN mikt op een viermaal grotere versneller

Deeltjesfysici studeren al jaren op manieren om de deeltjeswereld te bestuderen bij nog veel hogere botsingsenergie dan de LHC levert. Zo is er ook een programma voor een deeltjesbotser in Japan, die bestaat uit twee rechte op elkaar gerichte bundels, de International Linear Collider.

CALENDAR

Upcoming events

Meeting of the American Physical Society Division of Particles and Fields (DPF 2015)

Ann Arbor, Michigan, USA

04- 08 August 2015

PREPRINTS

ARXIV PREPRINTS

1505.02209

Lepton flavor violating Higgs couplings and single production of the Higgs boson via $e\gamma$ collision

1505.01406

XXVII International Symposium on Lepton Photon 2015 (LP 2015)

Ljubljana Exhibition and Convention Centre, Slovenia
17- 22 August 2015

[View complete calendar](#)

CESR positron source

[1505.01089](#)

Searches for additional Higgs bosons in multi-top-quarks events at the LHC and the International Linear Collider

[1505.01059](#)

Higgs Physics

[1505.01039](#)

Higgs as a probe of supersymmetric grand unification with the Hosotani mechanism

[1505.00799](#)

Four and two-lepton signals of leptophilic gauge interactions at large colliders

[1504.07970](#)

Beyond the SM phenomena and the extended Higgs sector based on the SUSY gauge theory with confinement

[1504.07966](#)

Probing composite Higgs models by measuring phase shifts at LHC

[1504.07957](#)

The MSSM Higgs Sector at the LHC and Beyond

[1504.07945](#)

hhh Coupling in SUSY models after LHC run I

[1504.07792](#)

Impact of quark flavor violation on the decay $h_0(125\text{GeV}) \rightarrow c\bar{c}$ in the MSSM

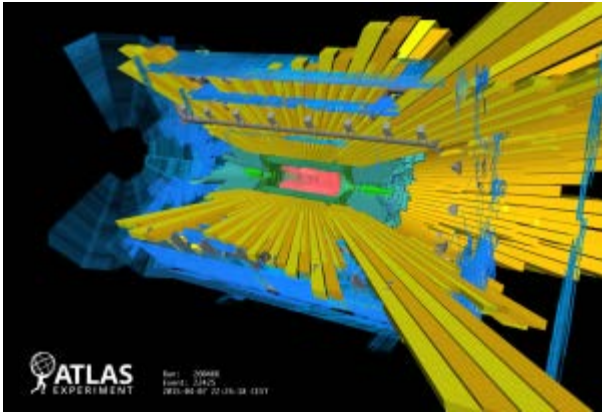
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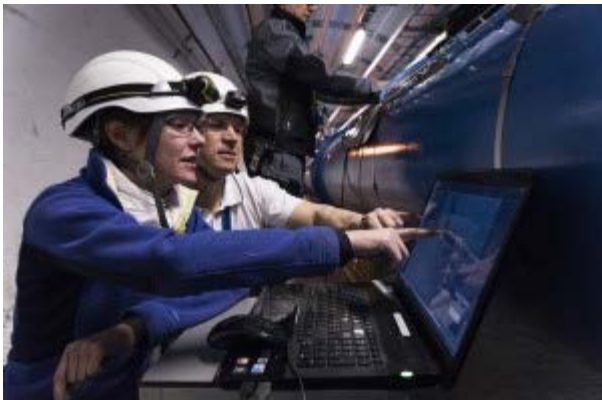
LHC commissioning continues in spite of obstacles

Lyn Evans | [14 May 2015](#)



Beam are back in the LHC and its detectors after the long shutdown. Image: ATLAS Experiment © 2015 CERN

radiation environment. They would need to be periodically “regenerated” by applying a reverse bias on the diodes. With this in mind, an extra current lead was included which became redundant when special diffusion diodes were developed which did not suffer from this weakness. The resourceful team responsible for the quench protection system realised that this lead could be used to apply a current pulse through the offending object to vaporise it and remove the short circuit. This was shown to work perfectly, adding another useful tool to the bag of tricks needed to keep the LHC running.



The LHC gets an X-Ray: mobile X-ray technology helped solve a problem with diode box. Image: CERN

It is exciting to watch the LHC operations team slowly switch the machine back on step by step, encountering problems, solving them, encountering new ones and still breaking records while getting the machine running again. It is also educational. When the linear collider goes into operation it won't be at the push of one button either – it's a long and arduous process.

Commissioning of the LHC for operation at 6.5 TeV has not been without challenges so far. Firstly, during training to their nominal field, a short circuit developed in one of the magnets. Detailed measurements showed that the short was located in a one of the diodes which protects the magnets in case of a quench. It was found that it was due to a piece of metallic debris lying across the terminals. Fortunately a historical relic helped to resolve the problem.

The original design of the quench protection system foresaw the use of epitaxial diodes. They were the only ones available at the time but they were weak in a high

The next problem was found with the circulating beam. It quickly became clear that there is a restriction in the aperture in one of the magnets, with an object lying on the bottom of the vacuum chamber. However, orbit bumps allow the beam to stay clear of the restriction and it should be possible to operate the machine under these conditions.

Finally, something already seen in the previous run but now much more sensitive to magnet quenches at the higher field, was the appearance of so-called UFOs, unidentified falling objects which pass through the beam periodically, producing sufficient loss to quench a magnet. The operations team thinks that these are due to “air” condensed on the surface of the beam screen which is cooled to about 20 K. Warming the beam screen up to about 80 K releases the molecules which are then cryo-pumped through holes in the screen by the 1.9-K surface of the vacuum chamber behind it. So far, this has proved to be effective in fixing the problem.

In spite of struggling with the reliability of primary services, water and electricity, the operations team is doing a heroic job in bringing the LHC back on for this exciting run at the energy frontier. The experiments are eager to their hands on the first data from collisions at 13 TeV, expected for this summer. Whatever they see will be essential guidance for the ILC.

Want to know more? Read these updates from CERN about [the fixing of the short circuit](#), [the first beam in 2015](#), [the first beam at 6.5 TeV](#), [commissioning](#) and [first collisions at low energy](#).

[CLIC](#) | [ILC](#) | [LHC](#) | [OPERATION](#) | [QUENCH](#)

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IMAGE OF THE WEEK

“ILC to Japan!”

14 May 2015

[Show as slideshow]



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If you'd like to follow what the prefectural and city governments are doing to educate residents about the ILC, gather support for the project and prepare the ground for more foreign residents in the area in the future, here are a few links to relevant pages in English:

- Iwate prefecture's [tourism facebook page](#)
- [information for foreign Iwate residents in English](#)
- the [ILC promotion council](#) of Iwate prefecture
- [Ichinoseki city's ILC Promotion Division](#) facebook page
- [Ichinoseki's ILC website](#)
- [Oshu ILC Promotion Division](#) facebook page
- [Oshu's ILC website](#)
- [Kesen-numa](#) facebook page
- [ILC Support Committee](#) facebook page
- [Kitakami videos](#) and "[Oshu for You](#)" videos
- the [official ILC facebook](#) page

And if you're still confused about all the terms and names and places, check out the [Big ILC Kitakami Iwate Tohoku Glossary](#).

[COMMUNITY WORK](#) | [ILC SITE](#) | [JAPAN](#) | [KITAKAMI](#)

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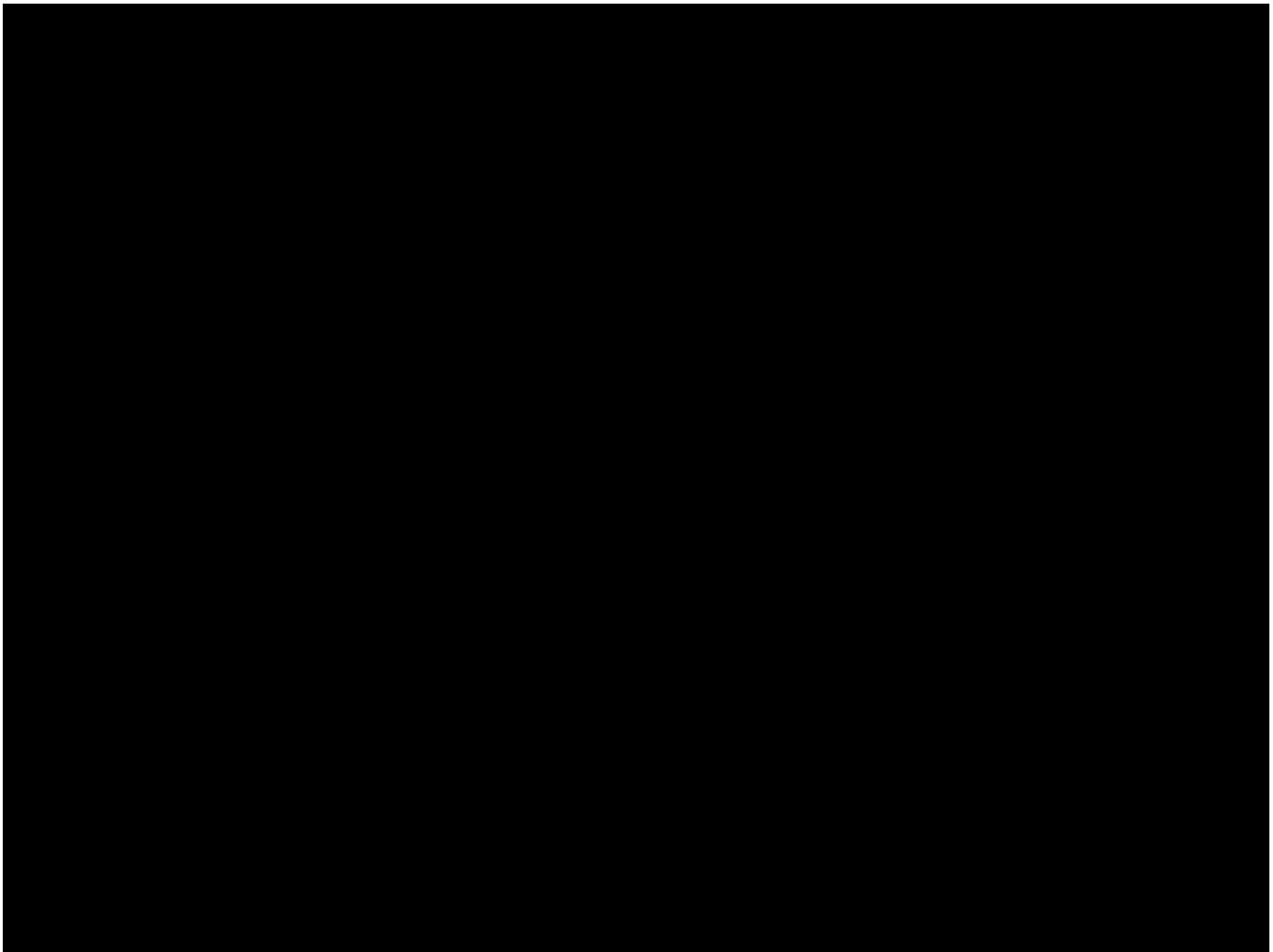
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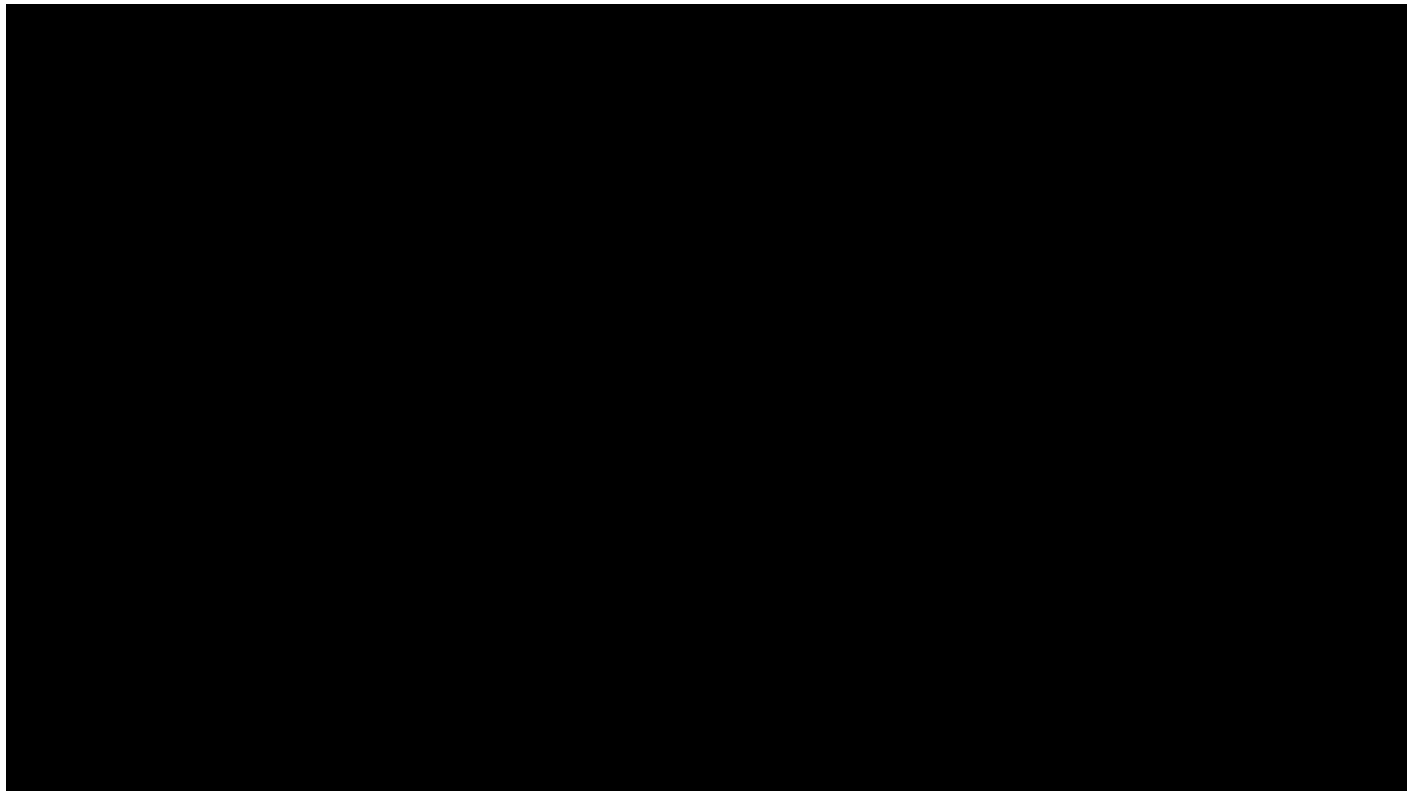
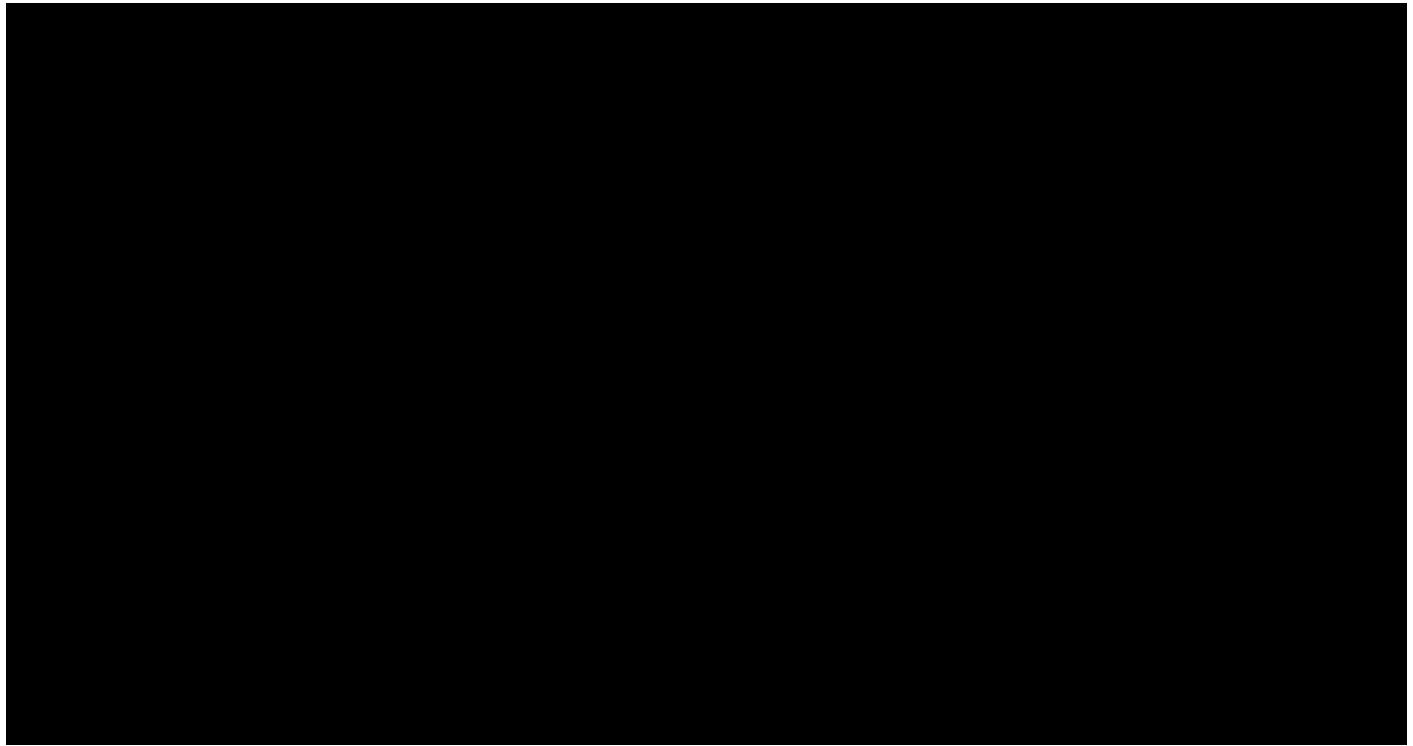
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Tokyo Gathering Reaffirms Case for the ILC

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The International Linear Collider is a proposed particle accelerator whose mission is to carry out research about the fundamental particles and forces that govern how the Universe works. It would complement the Large Hadron Collider at CERN and shed more light on the discoveries scientists have made and are likely to make in the coming years. The ILC would be one of the world's largest and most sophisticated scientific endeavors and the realization of the project would require truly global participation.

Opening remarks at the symposium were made by Lyn Evans (Director, LCC) and Ryu Shionoya (Member of the House of Representatives, Japan) with a keynote address from Hiroya Masuda (Chairman, Japan Policy Council). A panel including Joachim Mnich (Director of Particle Physics and Astroparticle Physics, DESY), Jonathan Bagger (Director, TRIUMF), Lyn Evans, Hiroaki Aihara (Vice president, The University of Tokyo), Masanori Yamauchi (Director General, KEK) and moderator Hitoshi Murayama (Deputy Director, LCC), discussed the latest news and progress towards



the realization of the ILC.

Jonathan Bagger concluded the panel discussion by saying, “The physics is strong, the technology is mature, and the politics are progressing. I hope the world come together to build the ILC.”

On behalf of the LCC and the participants of the ALCW 2015, Lyn Evans, Director of the LCC, announced the following three statements.

First, the ILC’s role in particle physics is to explore with exquisite detail the fundamental forces and constituents of matter by recreating the conditions just after the beginning of the Universe. This research is unique and indispensable for a deep understanding of how our Universe began, how it evolved, and how it works today. We are eager to build and work at the facility.

Second, the technical feasibility of the ILC has been demonstrated in the [Technical Design Report](#). The ILC is ready to be built following the completion of an [engineering-design phase](#). The project is now in a phase where governmental involvement should lead to a decision to realize the project. In this context we express our appreciation of the ongoing project assessment being undertaken by the Japanese government.

Third, the ILC is one of the largest scientific projects ever proposed, on a similar scale to the Large Hadron Collider project. Its realization as an international project requires the establishment of an international framework for sharing the cost and expertise among countries. We therefore intend to facilitate discussions between governments and funding authorities to achieve this goal as soon as possible.

More information on the International Linear Collider: www.linearcollider.org. For more photos from the event, please [view this album](#).

– prepared by Melissa Baluk, Communications Coordinator, with content from an InterActions [Press Release](#)

