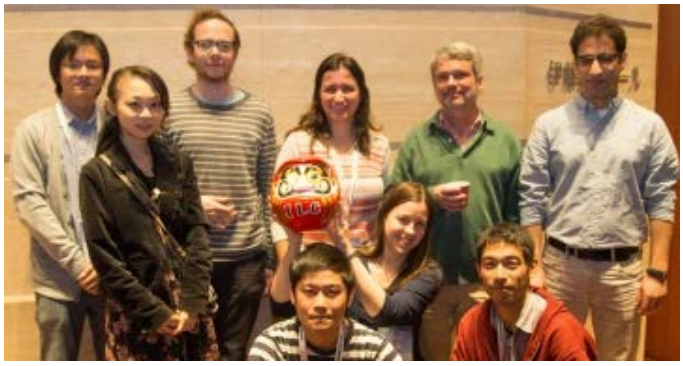
LC NEWSLINE
THE NEWSLETTER OF THE LINEAR COLLIDER COMMUNITY

AROUND THE WORLD

Take part in the #mylinearcollider campaign!

Voice your dreams for the ILC

by Rika Takahashi

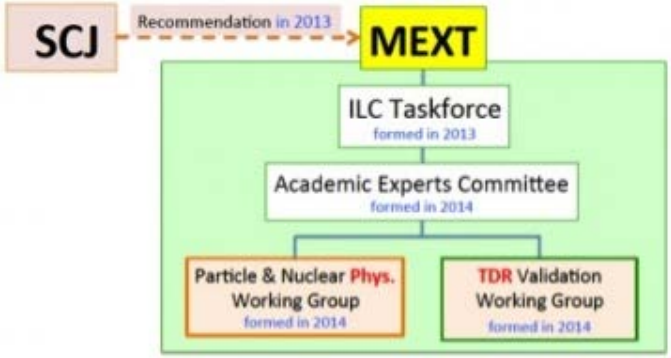


The Linear Collider collaboration has launched the video message campaign #mylinearcollider to visualise the support for the ILC from scientists around the world. Tell us why you want the ILC!

DIRECTOR'S CORNER

Efforts for the ILC to be matured "from Design to Reality"

by Akira Yamamoto

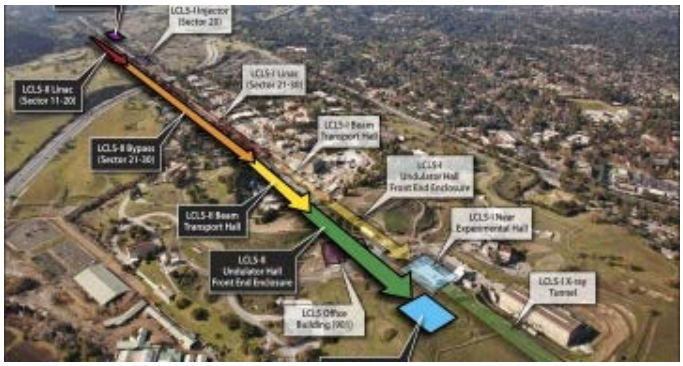


Things continue to evolve in the ILC design. In order to make sure that changes and optimisations formally make it into the new design, a change management board has been put into place, recounts Akira Yamamoto.

AROUND THE WORLD

From the world to America: seeding superconducting accelerator technology through the ILC

by Leah Hesla



The superconducting technology at the heart of the ILC is one of the outstanding innovations of the machine's design. The new kid on the block, SLAC National Accelerator Laboratory's light source LCLS II, owes much to the ILC's advances in superconducting radio-frequency technology.

IMAGE OF THE WEEK

Happy birthday CERN!

Image: CERN

Sixty years and nowhere near retirement age: CERN, the European Organization for Nuclear Research, celebrated its birthday this Monday with official delegations from 35 countries and many other invited guests. CERN is one of the pillars of linear collider R&D for both accelerators and detectors, so the Linear Collider Collaboration sends its congratulations and hopes that the next 60 years will be as productive, exciting and groundbreaking as the first.

IN THE NEWS

from ***La Stampa***
29 September 2014
Sessant'anni di Cern il sogno (realizzato) della nuova Europa
« si chiama International Linear Collider (Ilc) e il suo progetto è già molto maturo. Ma non sarà alternativa a Lhc. Lhc è uno strumento estremamente potente, la trivella con cui si cercano in profondità giacimenti di conoscenza. Ilc sarà uno strumento di precisione, fondamentale per capire i dettagli di un fenomeno. È importante che entri in funzione prima che Lhc abbia finito la sua attività, in modo che possano lavorare in parallelo almeno per qualche anno».

from ***Tanko Nichinichi***
29 September 2014
外国人患者の対応円滑に　奥州市国際交流協が研究都市実現を見据え
奥州市国際交流協会は、医療通訳者の育成研修を、　月　日から　回日程で実施する。国際リニアコライダー　　実現による在住外国人の増加も見据えた取り組み。Oshu International Relations Association will provides special session to train the medical interpreter in anticipation for the increase of foreign residents around the area)

from ***CNRS Le Journal***
29 September 2014
Le Cern, quelle histoire !
Confrontés à l'impérieuse nécessité de collaborer – car aucun pays européen n'aurait pu, et ne pourrait aujourd'hui encore financer seul une telle organisation –, ils sont parvenus à dessiner les plans d'une institution souple, originale et performante. Actuellement, plus d'une dizaine de milliers de scientifiques, issus de six cents centres de recherche à travers le monde, continuent d'avancer sur le chemin tracé par ces quelques pionniers.

from ***Iwate Nippo***
26 September 2014
加速器関連産業、参入意欲83　県内企業アンケート
国際リニアコライダー　　に関し、県が実施した本県企業の加速器関連産業への参入可能性を探るアンケート調査で、回答企業の　　が「取引したい」、「条件次第で取引したい」と答え、参入意欲が高い企業が多いことが分かった。(83% of local companies showed interest in to move into the accelerator industry, according to the survey by Iwate prefecture)

from ***physicsworld.com***
26 September 2014
Japan seeks to splurge on big-science facilities
The ministry also aims to spend $1m to continue studies for the proposed International Linear Collider (ILC), which Japan has expressed an interest in hosting.(…) Yamashita, a physicist at the University of Tokyo who chairs Japan's ILC Strategy Council, says the country took a step towards international support for the $10bn project with initial political-level discussions with the US in July. "There is still a lot to do," adds Yamashita.

from ***Asahi shimbun***
24 September 2014
実現へ、提言まとめる 盛岡商工会議所
盛岡商工会議所は　日、「国際リニアコライダー」　計画の実現に向けた提言をまとめた。盛岡市を「知の拠点」とし外国人研究者が住みやすい国際都市として再生させ、地元企業が波及効果で潤うような仕組みづくりをめざす内容だ。(Morioka Chamber of Commerce and Industry presented its recommendation toward the realisation of the ILC on 24 September. The recommendation includes the proposals to rejuvenate Morioka as an center of excellence where foreign researchers can live comfortably, and to make systems to benefit the local business.)

from ***El Periodiquito***
19 September 2014
Comienza el diseño del nuevo acelerador de partículas del CERN
El LHC tiene una circunferencia de 27 kilómetros. El nuevo Future Cicular Collider o FCC tendrá entre 80 y 100 kilómetros de circunferencia, lo que lo convertirá en el colisionador de partículas más grande que se ha construido nunca.

CALENDAR

Upcoming events

International Workshop on Future Linear Colliders 2014 (LCWS14)
Vinca Institute of Nuclear Sciences, Belgrade, Serbia
06- 10 October 2014

25th FCAL Workshop
Vinca Institute of Nuclear Sciences, Belgrade, Serbia
12- 13 October 2014

The 11th ICFA Seminar on Future Perspectives in High-Energy Physics 2014
IHEP, Beijing, China
27- 30 October 2014

Upcoming schools

The Second Asia-Europe-Pacific School of High-Energy Physics
Puri, India
04- 17 November 2014

Joint International Accelerator School: Beam Loss and Accelerator Protection
Newport Beach, California, USA
05- 14 November 2014

View complete calendar

BLOGLINE

23 September 2014
Particular Views
Goals for Detector Optimization: Mass resolution

PREPRINTS

ARXIV PREPRINTS

1409.8165
Theory for Baryon Number and Dark Matter at the LHC

1409.7157
Full simulation study of the top Yukawa coupling at the ILC at $s\sqrt{}$ = 1 TeV

1409.6844
Lightness of Higgs Boson and Spontaneous CP Violation in Lee Model

1409.6553
Exploring the Anomalous Higgs-top Couplings

1409.6050
The production and decay of the top partner T in the left-right twin higgs model at the ILC and CLIC

1409.5586
A concept of the photon collider beam dump

1409.5563
Photon collider Higgs factories

1409.5263
Constraints on dark forces from the B factories and low-energy experiments

1409.4900
Electroweak radiative corrections to W+W−γ production at the ILC

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AROUND THE WORLD

Take part in the #mylinearcollider campaign!

Voice your dreams for the ILC

Rika Takahashi | 2 October 2014

We're looking forward to watching your #mylinearcollider videos. Take part! ©KEK

The ILC is just one step away from the start of construction. Japan's Ministry of Education, Sports, Science and Technology (MEXT) set up a "Task force for ILC" headed by the vice-Minister. Under the Task Force, an "Academic Experts Committee" was established, and they are now reviewing if Japan should take a lead for the ILC.

Now is the time to really show our ambition to realise the ILC. The LC communication team will produce a collection of #mylinearcollider video messages from all over the world to support the ILC. Please join the team and give the ILC project a final push! Tell us who you are and what difference the ILC would make for physics, for you, for Japan. Together we can show the funding agencies that there is strong support for the ILC around the world. Your messages will help realise the ILC. Ask your colleague, students and family to join. Three, two, one – action!

If you don't have the equipment to record yourself, please contact us and we'll try to help. And if you're at the LCWS in Belgrade Linear Collider workshop next week, there'll be a camera and a communicator waiting to record your #mylinearcollider message on Thursday and Friday.

Your message can contain following statements:

- Your name and name of institution/university (essential)
- Why you think you need the ILC
- What you want to do when the ILC is built
- Your will to come to the ILC site
- Any message to back up the realisation of the ILC

How to record your video – there are several possibilities:

1. Take a short video message using your iPhone or computer. Here a a few tips on how to take a video using your cell phones: clip one, clip two
2. Using Photo Booth application: Open Photo Booth. In the left hand corner below the image window are three buttons. The third button is used to take a video clip.
3. Contact the communicators and ask for help in recording your messages

4. Come to LCWS14 in Belgrade
5. If you are camera shy, you can also send us a picture of you with a written message.

How to send your video:

Send your file to communicators via any of file sending service outlines below. Please DO NOT send your file as an attachment to your e-mail – it will crash our inboxes.

- Transferbigfile
- Dropsend
- 宅ふぁいる便
- Firestorage
- Filemail
- WeTransfer

You can also share you message with the #mylinearcollider tag on our Facebook page, or write on Twitter @LCNewsLine or post a video on YouTube and let us know.

Now, here's our first video, from Hitoshi Murayama, Deputy Director of the Linear Collider Collaboration.

MYLINEARCOLLIDER

NEWSLINE
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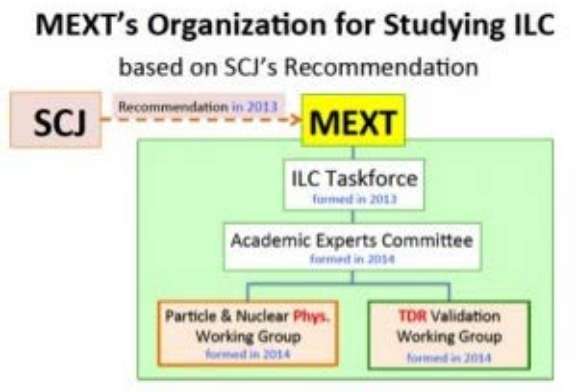
DIRECTOR'S CORNER

Efforts for the ILC to be matured “from Design to Reality”

Akira Yamamoto | 2 October 2014

The 2014 International Workshop on Future Linear Colliders (LCWS’14) hosted by Vinca Institute of Nuclear Science, Serbia will be held in Belgrade, Serbia, next week from 6 to 10 October. The workshop will mark an important step for accelerator and detector design to be further optimised and prepared for the best physics case.

The workshop motivation and general scope for the ‘accelerator’ can be seen in a previous Director’s Corner by Mike Harrison on 4 September. We need an adequate process for design updates, changes and further optimisations to be discussed, agreed, and formalised by the entire linear collider collaboration.



Organigram showing the various committees and task forces in place for the Japanese funding agency MEXT.

Recently the design change management board (CMB) has been established, and the following two design change requests have been submitted to the CMB: the first one is for an “insertion of so-called ‘dogleg’ optics and space after the electron linac high-energy end”, and the second one is for “Baseline optics to provide for a single L* optics configuration”. Those result from our further study after the TDR, and are symbolical starting efforts for the ILC “from design to reality”. Those requests will be formally announced during LCWS’14, evaluated by CMB, and formalised by LCC/LCB. We are expecting further change request such as for “the Interaction Region CFS design to be updated”, soon, for further progress.

The LCC is actively moving forward the ILC to be realised, and we are planning to collect direct live voices of strong support and anticipation for the realisation of the ILC from LCC collaborators and supporters to be reported to relevant official committees and organisations in Japan (described by Lyn Evans in last issue’s Director’s Corner, and see figure) working on the ILC physics justification and technical validations. Please see the announcement in this week’s issue for more info. We would appreciate everyone’s contribution to this effort!

CHANGE MANAGEMENT BOARD | LCWS | LCWS14 | TECHNICAL DESIGN

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AROUND THE WORLD

From the world to America: seeding superconducting accelerator technology through the ILC

Leah Hesla | 2 October 2014

The superconducting radio-frequency technology at SLAC's LCLS II light source is owed in part to developments made by the International Linear Collider. Credit: SLAC

The superconducting technology at the heart of the future International Linear Collider is one of the outstanding innovations of the machine's design. Of international heritage, ILC-type superconducting acceleration has borne American offspring, including technology for the newest kid on the block, SLAC National Accelerator Laboratory's light source LCLS II, scheduled to begin operations in late 2018.

"ILC development is a breeding ground for LCLS II," said Hasan Padamsee, head of Fermilab's Technical Division and renowned SCRF expert. "Without that available technology, you couldn't dream of applications that are now spread around for different purposes."

Central to the technology are superconducting cavities – niobium structures through which particles hurtle at close to the speed of light. To be superconducting, the cavities need to be kept cold, so researchers work diligently on cryogenic systems to refrigerate them efficiently.

LCLS II will use superconducting radio-frequency technology, or SCRF, to generate extremely bright electron beams – not to investigate quarks and leptons, as the ILC will do – but to take snapshots of cellular structures and chemical reactions.

"It's a remarkable example of different corners of science in our country coming together for a common purpose," said SLAC's Marc Ross, cryosystems manager for LCLS II and former Americas region project manager for the Global Design Effort, the original governing entity for the ILC.

Developments in superconducting accelerator technology at the ILC has begotten innovations in other accelerators for nuclear physics, materials sciences and in high-intensity proton accelerators for neutrino beams or muon beams.

International roots

Of course, the ILC's superconducting radio-frequency technology has its own ancestry.

SCRF had significantly advanced the field of particle physics around the world by 2004, when an international group of scientists was deciding on the acceleration technology to be implemented in a large, yet-to-be-named future linear collider. They had recognised decades of successful SCRF performance at other previous electron-positron colliders around the globe: CESR at Cornell University in the United States, FLASH at Germany's DESY, KEK-B and TRISTAN at Japan's KEK, and LEP II at CERN in France and Switzerland.

There is also the ILC's close relative at DESY, the European X-ray Free-Electron Laser, or European XFEL. Of more modest scale than

the ILC – it calls for 800 cavities compared with the ILC's 16,000 – it has served as the ILC's SCRF training ground.

"The idea was that, unless you had a more practical twin to serve as a precursor to the ILC, you really wouldn't be able to demonstrate that you could build a 16,000-cavity machine," Padamsee said.

The accelerator community designed and began constructing the superconducting XFEL, planned to be commissioned in 2016. The accelerator will use X-rays to probe molecular structures and extreme states of matter. The free exchange of technological advances between it and the ILC pushed the design of both machines to the cutting edge. The advances would be inherited by future particle accelerators.

The ILC would also bestow another gift to the next SCRF generation, one that only a machine of its size could offer: an infrastructure necessitated by its incredible scale.

American heritage

LCLS II and the ILC look nothing alike. LCLS II's accelerator complex is a tenth of the length of the proposed 31-kilometre International Linear Collider. It will accelerate particles to a far lower energy – 4 GeV versus 500 GeV. LCLS II cavity specifications are very different from those of ILC cavities. Finally, LCLS II will not probe fundamental bits of matter, as the ILC will, but larger-scale, molecular structures.

Early on, the U.S. high-energy physics community built an infrastructure to accommodate the large scale of the International Linear Collider. Pictured here is an ILC-type cryomodule at one of Fermilab's Industrial Complex buildings. Jefferson and SLAC laboratories, as well as institutions such as Cornell University, were a part of the U.S. infrastructure for ILC SCRF. Credit: Fermilab

Nevertheless, LCLS II is taking advantage of ILC SCRF technology to graduate from its previous life as a normal-conducting accelerator to a superconducting one. It also draws on the connections formed by the ILC community – connections between scientific disciplines, between economic sectors, between institutions.

Early on, the ILC connections were born of necessity to help manage its unprecedented scale. Seeing the need for a wide infrastructure to accommodate it, the high-energy physics community got to work.

In 2007, the US community started gearing up to build prototypes for the now officially named ILC. It began tooling up Fermilab in Illinois, Jefferson Lab in Virginia and SLAC in California, as well as university partners such as Cornell University, to advance SCRF research specifically for the future collider. Because US researchers needed a way to fabricate enough cavities to fill a tunnel nearly one-and-a-half times the length of Manhattan, the community also formed important relationships with industry to enable cavities' mass production.

"The successful prototyping for ILC provided a proof of principle – it mitigated the risk of LCLS II," Ross said. "We know how much these things cost. LCLS II can go ahead with this technology. It's a dream come true."

LCLS II is planned to start operating in late 2018. By then, Ross says, SCRF research in the United States will likely have matured considerably. Fermilab and Jefferson Lab both currently contribute to LCLS II R&D at SLAC.

"When we're done, we'll be able do this for a future cryomodule and to connect innovations in the way a cavity is built," Ross said. "LCLS II is providing the US system with an opportunity to flex its muscle, so to speak."

LCLS II isn't the only project in the United States taking advantage of the acceleration of SCRF development that the ILC helped establish. Fermilab's future PIP-II, a plan for upgrading the lab's accelerator complex to deliver high-intensity particle beams, will borrow from ILC advances in SCRF.

Global dissemination

The infrastructure for the international collider isn't limited to the United States, of course. Laboratories around the world – notably DESY, IHEP in China, KEK – have promoted and continue to nurture SCRF research globally, both for the ILC and for future accelerators.

The ILC's SCRF technology and network has transferred across geographic borders and scientific disciplines, perpetuating its technological genes to help fulfil humankind's penchant for discovery. As researchers press ahead on SCRF advances and build its attendant infrastructure, superconducting radio-frequency technology in the United States will have plenty of other opportunities to apply its strength – even beyond high-energy physics and the ILC.

Stay tuned for a future article on SCRF developments for LCLS II.

EUROPEAN XFEL | INTERNATIONAL COLLABORATION | LCLS | LCLS II | SCRF TECHNOLOGY R&D | SRF TECHNOLOGY

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IMAGE OF THE WEEK

Happy birthday CERN!

Image: CERN | 2 October 2014

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Image: CERN

CERN | CERN60