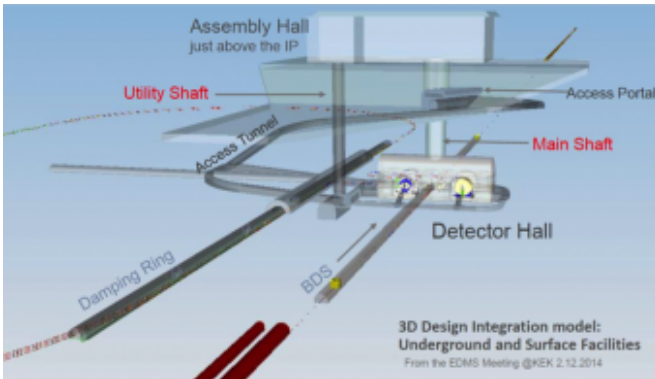


NEWSLINE

THE NEWSLETTER OF THE LINEAR COLLIDER COMMUNITY

FEATURE



And vertically down it goes

New vertical shaft for the ILC experimental area on the Kitakami side

by Ricarda Laash

In our issue on 9 July, NewsLine introduced the change management process that oversees changes to the machine's overall design. Today, we look in detail at one of the change requests that was put forward and went through: vertical shafts (as opposed to inclined tunnels) for the interaction region.

AROUND THE WORLD

Science 101: Higgs-kun's first day at his new school

by Ricarda Laasch



Curious about ILC in Japan and the Higgs particle but not a physicist? Well not a problem! This little Youtube video gives answers to many questions. It is designed for school kids and will explain everything in an easy and short fashion. Also, it will introduce you to Higgs-kun - a ghost-like character representing the Higgs particle who is new at his school. So, take the time and watch this short video. You will see many interesting things!

DIRECTOR'S CORNER

SRF Technology getting ready for the ILC: A Report from Whistler

by Akira Yamamoto



Reporting almost live from Whistler, Canada, Akira Yamamoto says progress is impressive. The conference SRF 2015 covered the latest advances in the science, technology, and applications of superconducting RF, including leading SRF accelerator projects, such as European XFEL, the European Spallation Source, FRIB, and the LCLS-II project.



Eckhard Elsen to become research director at CERN

by Barbara Warmbein

From cavity studies to shaping the future of particle physics in Europe: Eckhard Elsen, scientist at the German lab DESY, will become research director at CERN when Fabiola Gianotti becomes Director-General in 2016. Elsen is well known in the linear collider community for his central role advancing not only the the performance of high-gradient superconducting cavities but also of the linear collider project itself. He is a member of and has chaired numerous committees in the world of particle physics and beyond. His term of office covers the second run of the Large Hadron Collider LHC.

IN THE NEWS

from *Tokyo Cable TV*

1 October 2015

ILC 科学少年団 第5話

ILC Kids Club Episode 5

from *Iwate Nichi Nichi*

17 September 2015

一関の国際化へ提言 推進サポーター A L T 10人を登録

一関市は、市内在住の外国語指導助手（A L T）10人を国際化推進サポーターに登録した。I L Cの北上山地（北上高地）誘致を見据え、市は国際化への提言、助言を得ようと市内のA L Tからサポーターを募集。(Ichinoseki city newly registered 10 internationalization promotion supporters from the city's assistant language teachers. In view of the ILC construction around the area, city aims to collect advises and proposals.)

from *ATSV*

11 September 2015

โดย สุทัศน์ ยกส้าน

ตั้งนั้นเราจึงเห็นได้ว่า เครื่องเร่งอนุภาคที่ใช้โปรตอนหรืออิเล็กตรอนต่างก็มีทั้งข้อดีและข้อเสียคือ โปรตอนมีมวลมากกว่าอิเล็กตรอนประมาณ 2,000 เท่า และมีโครงสร้างภายใน ตั้งนั้นเวลาชนกัน อนุภาคต่างๆ จะเกิดชิ้นมากมาย จนทำให้การสังเกตผลลัพธ์หลังการชนเป็นเรื่องยาก ส่วนอิเล็กตรอนเวลาถูกเร่ง จะแผ่รังสีทำให้พลังงานตก แต่การชนจะสะอาด เพราะอิเล็กตรอนไม่มีโครงสร้างภายใน (Proton or electron accelerators has both advantages and disadvantages. Protons are far more massive than electrons and has internal structure. So after observing the results is difficult. When electrons are accelerated, radiation results into energy fall. But the particle events are clean.)

from *Ds News*

4 September 2014

Опасны ли “черные дыры”, которые сгенерирует большой адронный коллайдер

Многое зависит от Японии – она является наиболее вероятным кандидатом на сооружение Международного линейного коллайдера, поскольку японское правительство готово покрыть половину затрат: общая стоимость проекта составляет около \$8 млрд. (Much depends on Japan – it is the most likely candidate for the construction of the International Linear Collider.)

CALENDAR

Upcoming events

[International Workshop on Future Linear Colliders \(LCWS15\)](#)
Whistler, BC, Canada
02- 06 November 2015

Upcoming schools

[9th International Accelerator School for Linear Colliders](#)
Whistler, British Columbia, Canada
26 October- 06 November 2015

[Joint Universities Accelerator School](#)
Archamps, Haute Savoie, France
11 January- 18 March 2016

[View complete calendar](#)

PREPRINTS

ARXIV PREPRINTS

[1509.06850](#)
Study of the XYZ states at the BESIII

[1509.06478](#)
Search for associated production of Higgs with Z boson in the noncommutative Standard Model at linear colliders

[1509.06392](#)
The Transverse Momentum Dependent Fragmentation Function at NNLO

[1509.06375](#)
Hadron Collider Tests of Neutrino Mass-Generating Mechanisms

[1509.06192](#)
Dilepton events with displaced vertices, double beta decay, and resonant leptogenesis with Type-II seesaw dominance, TeV scale Z' and RH neutrinos

[1509.05747](#)
2D-Oide effect

[1509.05327](#)
Phenomenology of NMSSM in TeV scale mirage mediation

NEWSLINE

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FEATURE

And vertically down it goes

New vertical shaft for the ILC experimental area on the Kitakami side

Ricarda Laash | [1 October 2015](#)

One of the major changes on the ILC design laid out in the Technical Design Report (TDR) that is ongoing right now is a layout change of the experimental hall complex. A vertical shaft connecting the underground experimental hall to the buildings above ground will be added to the original plans. This change request was submitted to the Change Management Board (CMB) after the choice of the Kitakami area as possible construction site for the ILC.

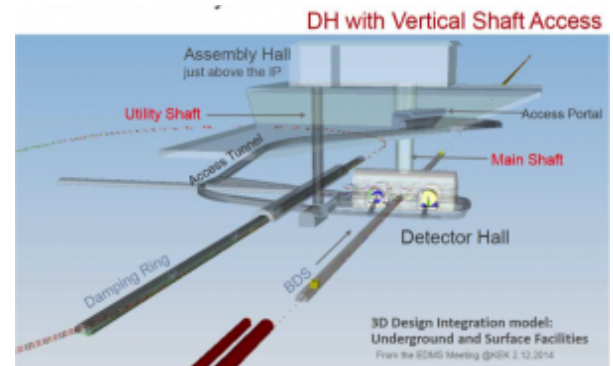
“I have written this change request in my function as leader of the MDI Working Group,” explains Karsten Büßer from the German lab DESY, who is also part of the team that is in charge of the implementation of this request (aptly named Change Implementation Team). “Both the ILD and SiD detector groups want this shaft.” This shaft will be an important addition to the whole layout of the experimental hall complex.

The ILC has two different detector groups working on further plans and improvements for the possible future detectors at the ILC. Both detectors will be placed in the same hall so that they can be moved into the interaction point in a [push-pull configuration](#). Just like the accelerator, the whole interaction region and thus the experimental facilities are underground; meaning a plan to access these underground facilities was needed no matter where this machine would be built.

The original design within the TDR foresaw an inclined horizontal tunnel to access the underground experimental hall. This was a design choice based on the question whether or not both halls – on the surface and underground – could be built on top of each other or not. “When TDR was published the Kitakami area had not been an option yet,” says Büßer. At this point it was unclear whether the machine would be built in Asia, the U.S. or even in Europe. Therefore it was essential that the TDR plans were as generic as possible to fit any possible site in any country on this earth. “For Asia it was assumed that most sites would be in mountains,” Büßer explains further. “There might have been a mountain peak above the interaction. On a mountain peak you can’t build any infrastructure to support the underground, so you don’t build vertical access shafts.” And even if it would have been possible to build support facilities on top of a mountain, the shaft would have been too long and probably too pricy to build. So to compensate for the lack of an acceptable possible vertical access shaft the horizontal tunnel was included into the plans.

“After the choice of the Kitakami region as the possible construction site for the ILC physicists all around the world started working on more solid plans for the construction. And one of these more concrete plans was to figure out whether or not a vertical access shaft could be added to the plan for this specific site,” Büßer explains. “Kitakami is not a mountainous region, it is just hilly. Therefore we could move the location of the underground experimental hall to a place where we have a relatively flat surface.” Therefore it would be possible to construct support facilities on the surface directly above the interaction point. “Before we handed in the change request, we checked this possibility very carefully. We did not want to start such a request unless we were sure that the site would be flat enough to house the facilities directly above the interaction point.”

The formal change request for the addition of the vertical shaft has now been processed and finalised. Such an extensive change for the



The change request was submitted by the MDI group to provide a vertical access shaft for the ILC experimental hall as well, so that the detectors could be assembled mainly above ground.

design of the machine of course means that a number of further questions come up. Moving things around in one place means changes in the overall layout of the whole facility. "For example another point which we have now on our to-do-list is to check the geological properties of the area for the new interaction point," says B  ser. Relocating the interaction point within the Kitakami site by 800 metres has quite some impact. "We now need to take a test drilling to further investigate the geological properties in the depth of the experimental hall." This test drilling should give the last needed clues for the new setup plan which is based on this change request.

Not only the qualities of the underground but also the installation with in the planed support facilities of the surface need to be checked. The new layout includes a gigantic gantry crane within the surface halls (see picture). "The crane can lift masses up to 4000 tons," says B  ser. The crane itself will consist of a massive gantry and the extremely stabile holding structure for the loaded goods right above the vertical shaft. It will also be movable along the size of the shaft to allow maneuverability of the hanging loads.

"In the actual design concept for the hall we now have the vertical shaft which enables us to mostly assemble the detectors on the surface and then crane the remaining parts into the experimental hall for final assembly and later usage," says B  ser. But they also kept the inclined horizontal tunnel for access to the damping rings and the hall. The new horizontal tunnel is smaller than in the old design since it is no longer needed as entry way for the heavy pieces of the detectors. It will still be used for smaller installations and transportation for smaller equipment into the underground halls.

"We hope that the tunnel will be very helpful during the construction phase for the hall and for transporting most of the infrastructure which does not need craning," says B  ser. Another reason to support the vertical shaft is that even though the detectors could be assembled by bringing in the parts via truck along the tunnel, it would still be a lot of heavy lifting on a 10% inclination for the trucks which could have also caused problems. The tunnel will also always be an emergency exit for the detector hall without a lift or stairs.

Mike Harrison, Associate Director for the ILC in the Linear Collider Collaboration, summarises this development with the following words: "It is extremely fortunate that the Kitakami site offers the possibility of an interaction region design based on a vertical shaft topology. There are many advantages of such an approach. This is an important and highly useful step forward for the whole Project."

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AROUND THE WORLD

Science 101: Higgs-kun's first day at his new school

Ricarda Laasch | [1 October 2015](#)



The Japanese ILC mascot “Higgs-kun” – a ghost-like representing the Higgs particle with a permanent tear in its eye – has its own YouTube video. The 25-minute-long video introduces not only Higgs-kun but also the ILC at the possible Kitakami mountains site. After the summer vacations the students are back in class and their teacher brings the new student Higgs-kun to the class. There is more news to talk about than the new student: there is a plan to build the ILC near their homes. So the question is now what is the ILC? The kids wonder if this another kind of train like the Shinkansen trains. Luckily their teacher has most of the answers for them.

So he explains to them what the ILC is with many illustrations and easy comparisons. Is that all? Not really, a brief history is also part of the short lesson, as are the partners of the project. Not to forget what it means for Kitakami if the ILC would be built there. The students are very concerned about the region, the visitors and what good this machine would bring. All these points are addressed in a short and understandable way. And of course the why: why do we want to build this huge machine. Can we really understand the birth of the universe? And what other things could we learn from it?

There are many answers in this short video and it is not necessary to be a physicist to be able to follow all of them. On the contrary – many important questions are answered in an understandable and amusing way, which is just as well as it was produced for primary schoolchildren. Many comparisons with day to day life things are used to illustrate the more abstract topic. Have a look for yourself!

The Higgs-kun video is a project from the Iwate Prefectural Government to introduce the basics of the ILC to children who will be adults when the ILC comes to fruition. The production of the whole video took 3 months and 500 DVD copies were made. Most of the copies were distributed in elementary schools in Iwate Prefecture. Other copies are used in many ILC lectures. “The reactions to the character of Higgs-kun were positive and most children find him very cute. We also heard that the DVD video is easy to understand,” states the Iwate Prefectural Government representative. “We would really appreciate if people around the world watch the youtube video so that more people will learn about and gain interest in the ILC.” So far there are no plans to make more videos like this one but the Iwate Prefectural Government has just launched an English newsletter about Iwate/Tohoku and its efforts towards the ILC.

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DIRECTOR'S CORNER

SRF Technology getting ready for the ILC: A Report from Whistler

Akira Yamamoto | [1 October 2015](#)

[The Linear Collider Workshop \(LCWS2015\)](#) will be held, at Whistler, BC, Canada, in November, this year. [The 17th International Conference on RF Superconductivity \(SRF2015\)](#) was held in the same place from 13 to 18, September, just prior to the LCWS. We would thank TRIUMF hosting two major conference/workshop events at the nicest village surrounded by beautiful mountains and great nature.

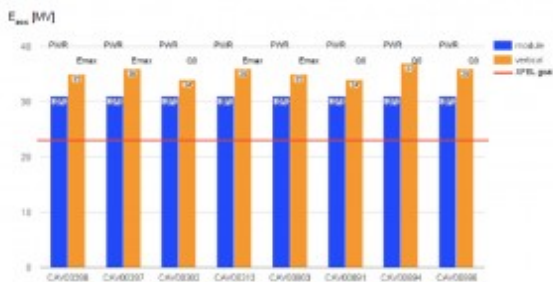


Group photo of SRF2015 image: TRIUMF

SRF2015 covered the latest advances in the science, technology, and applications of superconducting RF, including leading SRF accelerator projects, such as European XFEL, European Spallation Source(ESS), Facility for Rare Isotope Beams(FRIB), and Linac Coherent Light Source-II(LCLS-II) project.

I am very pleased to learn about the most updated progress in the European XFELSRF cavity and cryomodule construction. As it is shown in the figure presented by Olivier Napoly (CEA/Saclay on behalf of the European XFEL), the most recent cryomodule test result is nearly achieving the ILC SRF design goal of an individual vertical cavity gradient of 35 megavolt per metre (MV/m)

and an average grading of 31.5 MV/m after assembling into the cryomodule. The European XFEL XM59 cryomodule has nearly demonstrated these technical goals. And the reached 31 MV/m were not limited by the performance but simply because of the operational limit at the test facility including operational safety margin. We would like to express our sincere congratulations to whole the European XFEL collaboration for the exciting progress after the hardest effort integrated. The result really demonstrates that the ILC SRF technology is getting ready for the ILC to go forward.



The SRF cavity gradient achieved in the European XFEL Cryomodule XM59.

I am also very much pleased to add my personal impression from the SRF conference. The field of SRF is offering many interesting subjects in basic science and advanced technology such as basic surface phenomena and thin film technology. Many impressive research projects and developments have been carried out with a fresh and young generation. Many discussions have been exchanged even though all the sessions were plenary with a few hundred participants with keeping very high spirit for the promising advances.

Special thank is for Dr. Robert Laxdal of TRIUMF, conference chair, and his team having excellently organised the conference.

IMAGE OF THE WEEK

Eckhard Elsen to become research director at CERN

Barbara Warmbein | [1 October 2015](#)



Eckhard Elsen

From cavity studies to shaping the future of particle physics in Europe: Eckhard Elsen, scientist at the German lab DESY, will become research director at CERN when Fabiola Gianotti becomes Director-General in 2016. Elsen is well known in the linear collider community for his central role advancing not only the performance of high-gradient superconducting cavities but also of the linear collider project itself. He is a member of and has chaired numerous committees in the world of particle physics and beyond. His term of office covers the second run of the Large Hadron Collider LHC.

The other members of the new CERN directorate are Frédéric Bordry as Director for Accelerators, Martin Steinacher as the new Director for Administration and General Infrastructure, and Charlotte Warakaulle as the new Director for International Affairs.

“My aim is to ensure that particle physics in Europe and the world continues to stand on solid and broad foundations. CERN is currently the most important centre for particle physics. It would not have this role if it weren’t for the ideas contributed by other research centres and the constructive competition with them, as well as the young talents emerging from the participating universities. I would like to continue to strengthen CERN’s collaboration with all these different institutions,” says Elsen.

Read the [full DESY news story](#).