

NEWSLINE

THE NEWSLETTER OF THE LINEAR COLLIDER COMMUNITY

AROUND THE WORLD

Good signal, little noise

Power-pulsing tests on the SiW electromagnetic calorimeter yield promising results

by Barbara Warmbein

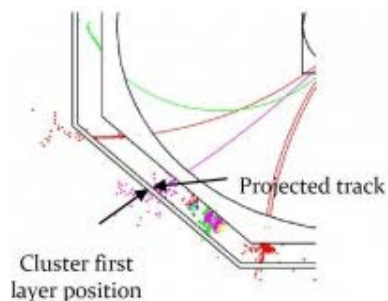


A concept to save space and power for future particle detectors called power pulsing has recently been tested and proven to work on one of the possible calorimeter options for the future ILC detectors. The silicon-tungsten electromagnetic calorimeter prototype took data in test beam and magnet at the German lab DESY. The project is currently run by groups from France and Japan.

LC PEDIA

Particle flow

by Daisy Yuhas



With the help of the particle flow algorithm, physicists will be able to identify and measure each particle of a collision using the subdetector which provides the best measurement. LCpedia explains.

DIRECTOR'S CORNER

Dream for humankind

by Hitoshi Murayama



On 27 March, LCC Director Lyn Evans paid a courtesy visit to Japan's Prime Minister Shinzo Abe, who said a linear collider was a dream for humankind. Deputy Director Hitoshi Murayama also attended the meeting and explains why this moment was very special for him.

IMAGE OF THE WEEK



And the winner is...Italy!

Image: Nino Bruno, Laboratory: Gran Sasso National Laboratory

Italy takes top honours among strong competition in the [2012 Global Particle Physics Photowalk](#).

In September 2012, hundreds of amateur and professional photographers had the rare opportunity to explore and photograph accelerators and detectors at particle physics laboratories around the world.

The photograph of Nino Bruno, a building contractor in L'Aquila, picturing a tunnel connecting the underground halls of INFN's Gran Sasso National Laboratory garnered the most online votes and a panel of international judges awarded the top prize to Joseph Paul Boccio's detailed photograph of the KLOE detector at INFN's Frascati National Laboratory.

[Read the press release](#)

[View top thirty-nine photographs from the Photowalk](#)

IN THE NEWS

from *Fermilab Today*

16 April 2013

[Director's Corner: Our first FY14 budget news](#)

The President's Budget Request for FY2014 was unveiled last week. This is the first step in the annual federal budget cycle and gives us a good idea of what we can expect for next year's budget.

from *Kahoku Shinpo*

13 April 2013

[誘致に向け、岩手と宮城の議員連盟が国に合同要望](#)

超大型加速器「国際リニアコライダー」の岩手県南部・北上山地への誘致に向け、岩手、宮城両県議会の誘致議員連盟は 日、関係省庁に合同で要望活動を行った。(Association of the diet members in Iwate and Miyagi prefecture visited concerned government ministries on 12 April, demanding the invitation of the ILC to Tohoku area)

from *Saga Shimbum*

12 April 2013

[積極誘致を確認 佐賀経済同友会総会](#)

佐賀経済同友会の総会が 日、佐賀市で開かれた。「国際リニアコライダー」の脊振山地への積極誘致など本年度の事業計画を承認、誘致に関するアピールも採択し関係機関と一体となって取り組むことを確認した。(Association of cooperate executives in Saga prefecture held general meeting on 12 April, and approved the fiscal activity plan. They also agreed to promote the activities toward inviting the ILC)

from *Jiji Press*

12 April 2013

[Iwate Team Visits Swiss Lab to Invite Linear Collider](#)

A mission of Japan's Iwate Prefecture aiming to invite a next-generation international linear collider (ILC) for particle physics experiments visited CERN, or the European Organization for Nuclear Research, near Geneva on Thursday.

from *Saga Shimbum*

10 April 2013

[佐賀県市長会、誘致推進へ](#)

佐賀県市長会は 日、脊振山地が候補に挙がっている次世代加速器「国際リニアコライダー」の国内誘致推進など、九州市長会に提案する 項目の要望をまとめた。(Saga prefecture's conference of the mayors assembled their petitions consist of 5 items include the invitation of the ILC)

from Iwate Nichinichi Shinbun

10 April 2013

ILC誘致など8議案 県市長会議

年 回目の県市長会議は 日、盛岡市内のホテルで開かれ、県内13市の各市長が出席した。 誘致に向けた取り組みを東北全域に拡大していく手法などについて意見を交わした。(13 mayors of the Iwate prefecture gathered at the second general meeting held on 9 April, and discussed the way to promote the activity to invite the ILC)

from Asahi Shimbun

4 April 2013

巨大直線加速器、日本が頼り 研究者代表、首相に直訴

史上最大の直線型加速器「国際リニアコライダー」
the ILC to Japan are shifting into the high gear)

の誘致に向けた動きが本格化している。(The activities toward inviting

CALENDAR

Upcoming events

Calorimetry for the High Energy Frontier (CHEF2013)

Paris, France
22- 25 April 2013

FCAL Collaboration meeting

Cracow
29 April- 01 May 2013

IPAC - 4th International Particle Accelerator Conference

Shanghai, China
12- 17 May 2013

Photon 2013

Paris, France
20- 24 May 2013

European Linear Collider Workshop (ECFA LC2013)

DESY Hamburg
27- 31 May 2013

Upcoming schools

CERN Accelerator School: Course on Superconductivity for Accelerators

Erice, Sicily, Italy
24 April- 04 May 2013

[View complete calendar](#)

ANNOUNCEMENTS

The Infinity Puzzle – The Story of the Higgs Boson: From QED to the LHC via Higgs and the Gang of Six

Colloquium by Frank Close (Oxford University) on Thursday 18 April in the CERN Main Auditorium at 16h30. The colloquium will be **webcast**.

Roadmap for high energy physics in Japan and KEK

Talk by Yasuhiro Okada (KEK) on Wednesday 24 April 2013 from 11:00 to 12:00 (Europe/Paris) at LAL (Auditorium Pierre Lehmann). The talk will be **webcast**.

PREPRINTS

ARXIV PREPRINTS

1304.4082

Luminosity measurement at ILC

1304.2825

Physics performances for Scalar Electron, Scalar Muon and Scalar Neutrino searches at 3 TeV and 1.4 TeV at CLIC

1304.2632

Strong field effects on physics processes at the Interaction Point of future linear colliders

1304.2586

The International Linear Collider

1304.2431

Future Prospects at Electron-Positron Machines

1304.2419

Comment on “Beamstrahlung considerations in laser-plasma-accelerator-based linear colliders”

1304.2249

Single vector-like top partner production in the Left-Right Twin Higgs model at TeV energy $\$e\gamma\$$ colliders

1304.1008

Revisiting ZZ and γZ production with effective field theories

AROUND THE WORLD

Good signal, little noise

Power-pulsing tests on the SiW electromagnetic calorimeter yield promising results

Barbara Warmbein | [18 April 2013](#)



Complete setup of the SiW-ecal test in the test beam. The small silver box makes sure that the power pulsing works.

Leprince-Ringuet (LLR). “By trying it out in the DESY test beam we wanted to find out how feasible the system is.” They did two separate tests: running the prototype with power pulsing in a 2-Tesla magnet, and in the test beam from the DESY accelerator, but without a magnetic field. First results of the tests were presented at the [CALICE Meeting](#) at the University of Hamburg in March 2013.



Close-up of the technological prototype that was successfully tested with power pulsing in a magnetic field as well as with beam.

Particle detectors are expected to detect a lot of signal and very little background noise so that scientists can see what went on in their detector without being distracted by irrelevant signals. The technological prototype of the [silicon-tungsten \(SiW\) electromagnetic calorimeter](#) passed its first test in summer 2012 with flying colours with a signal to noise ratio that was between 14 and 20 to one (way better than the required ten to one). But that was then. Now, the task was to test the same prototype, but under different conditions: in a different powering mode, in a magnet, with beam.

The new powering scheme saves both space (no major cooling mechanisms are needed because very little heat is generated by the electronics) and power (thus money) by powering the components down between beam cycles. “Right now it’s more of an engineering challenge than a physics challenge,” says Roman Poeschl from LAL in France. “Indeed it’s a completely new technique,” says engineer Remi Cornat of the French Laboratoire

In the test, physics signals were well distinguished from detector noise in particular in power-pulsed detector layers. The exact signal-over-noise ratio needs to be evaluated, but the team is very happy with the first results of operation in power-pulse mode. “There seems to be no extra signal from the power supply, which means that the signal is just as clean as in continuous mode,” says Cornat. However, the team also learned more about the limits of their system. There was some cross-talk, issues with grounding and other prototype-stage flaws that help improve the system in the next step. “We know the limitations of our front-end electronics much better,” reports the engineer, and Pöschl concludes: “We have proof of the principle for our detector technology.”

The next step is a refined version of the detector, with more channels, more chips, more front-end boards that will grow to more than three times as many layers as it is now and a total length of two metres. Then there’s more testing to check the reliability and predictability of the new system. The final

calorimeter would have about 100 000 front-end boards, 10 000 detector layers and consist of 1000 modules – a scale that can only be produced by industry. The team has already started discussions with the Japanese company Hamamatsu to see how labs and industry could produce the final detector.

VIDEO:

A short video showing the effect of the magnetic field on the cable that feeds the detector cards when a pulse of current passes.
(Needless to say that the cards do not move)



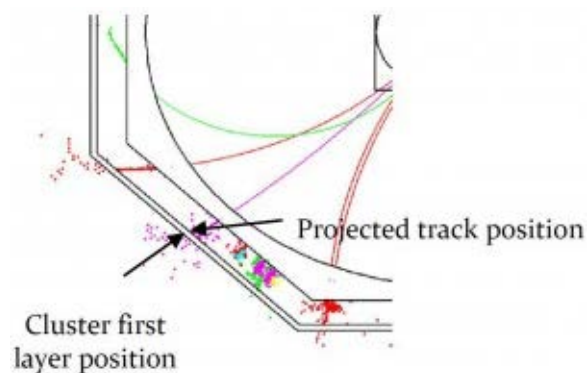
[CALICE](#) | [DESY](#) | [DETECTOR R&D](#) | [ELECTROMAGNETIC CALORIMETER](#) | [FRANCE](#) | [JAPAN](#) | [POWER PULSING](#) | [TEST BEAM](#)

Copyright © 2013 LCC

Printed from <http://newslines.linearcollider.org>

Particle flow

Daisy Yuhas | [18 April 2013](#)



Particle tracks inside a detector. Image: John Marshall

When particles collide, they often produce sprays of new particles called jets. Given the complexity of these particles' interactions, measuring the energy of jets with high precision is a formidable challenge. New detector designs, such as those being developed for the ILC and CLIC, are based on a paradigm called particle flow which will allow physicists to identify and measure each particle within a jet using the subdetector which provides the best measurement.

To understand how particle flow works, you need to think about the way particles move through a detector's subcomponents. A given jet may include about twenty particles, many of which will carry a charge. The detector's tracker will capture the momentum of the charged particles and the calorimeters will measure the energy of both charged and neutral particles.

The energy of a jet is then reconstructed by adding the momenta of the charged particles, as measured by the tracker, and the energies of the neutral particles, as measured with the calorimeter. This provides the best energy resolution.

Particle flow requires that scientists correctly identify the energy deposits in the calorimeter as originating from either charged or neutral particles. To do this, they must match the charged particles observed in the tracker to energy deposits in the calorimeter. Energy deposits without a match come from neutral particles.

The concept may sound simple but in practice it requires pushing calorimeters further than ever before. The calorimeters must be finely segmented in order to provide more resolution, resulting in tens of millions of channels and an image-like level of detail. "This is a really novel endeavor," says Argonne scientist José Repond. "Only recent developments in electronics have made this possible." Repond and colleagues recently created a one cubic meter prototype of a hadron calorimeter, compatible in design with the detectors planned for the ILC or CLIC, that had 500 thousand channels, more than the total number of channels on all four calorimeters at the Large Hadron Collider combined.

Read more about [particle flow](#).

[CALORIMETER](#) | [DETECTOR R&D](#) | [PARTICLE FLOW ALGORITHM](#)

Copyright © 2013 LCC

Printed from <http://newsline.linearcollider.org>

DIRECTOR'S CORNER

Dream for humankind

Hitoshi Murayama | [18 April 2013](#)



From left: Hitoshi Murayama, LCC Deputy Director, Masatoshi Koshihara, 2002 Nobel laureate in Physics, Lyn Evans, Shinzo Abe, and Takeo Kawamura, Chair of the Diet members association for ILC. Images: Prime Minister of Japan and His Cabinet

Our recent [meeting with Prime Minister Shinzo Abe](#) was a very special moment for me. He said a linear collider was a dream for humankind.

The moment happened when LCC Director Lyn Evans visited Japan for three days at the end of March to meet many dignitaries. He had come to invite Japan to host the International Linear Collider. I had the privilege to join him in some of the meetings, basically as Lyn's Japanese voice, but also representing the US community of particle physicists.

Lyn thanked Mr. Abe that Japanese contribution to the Large Hadron Collider (editor's note: Lyn Evans used to be Project Manager of CERN's LHC) was the first one announced outside the CERN member states, which helped his negotiation with other partners. He also pointed out that at the same time Japanese industry was critical in making the LHC happen at all. Eventually, Japanese industry benefited from this contribution in gaining international stature and experience working on the cutting-edge research project that involves about ten thousand people from around the world. Some of the products developed for this purpose turned out profits to some companies

too.

Then Lyn moved to the next point, stating that hosting a linear collider would give Japan the opportunity to receive wide international recognition as a leader in fundamental science as well as involvement of scientists and industry from all over the world. It would also bring many non-Japanese scientists and their families to Japan, in the same way it happens at CERN. This kind of recognition and attention is what Japan has been eager to receive.

Finally Lyn pointed out that Europe could not host this attractive project at this point because it is tied up in the LHC for the foreseeable future. The draft of the European Strategy update document, the final version of which will be adopted by CERN Council in May, says "The initiative from the Japanese particle physics community to host the ILC in Japan is most welcome, and European groups are eager to participate. *Europe looks forward to a proposal from Japan to discuss a possible participation.*" I added that the US was also under tremendous pressure to reduce the budget deficit and was not likely to host ILC either. The recent report from the High Energy Physics Advisory Panel of US Department of Energy on future facilities evaluated the ILC to be "absolutely central" to the field, and added "The initiative from the Japanese particle physics community to host the ILC in Japan is very welcome, and the US particle physics community looks forward to a proposal from Japan to discuss possible participation."

Masatoshi Koshihara, who received the Nobel Prize in Physics in 2002 for the pioneering work on neutrino astronomy, remarked that hosting the ILC would be a great opportunity for Japan when neither Europe nor US can do so. It would bring thousands of people from abroad, creating an international science city in Japan.

The Prime Minister promised to "monitor the development carefully," and to evaluate "what role Japan can play." We were all tremendously encouraged by these remarks.

In addition to the Prime Minister, we met Hakubun Shimomura, Minister of Ministry of Education, Culture, Sports, Science and Technology, Itta Yamamoto, Minister of State for Special Missions in charge of science and technology policy, and many other politicians. The level of attention ILC receives in Japan is quite amazing.

[JAPAN](#) | [LINEAR COLLIDER COLLABORATION](#) | [SITING](#) | [TECHNOLOGY TRANSFER](#)

IMAGE OF THE WEEK

And the winner is...Italy!

Image: Nino Bruno, Laboratory: Gran Sasso National Laboratory | [18 April 2013](#)



Italy takes top honours among strong competition in the [2012 Global Particle Physics Photowalk](#).

In September 2012, hundreds of amateur and professional photographers had the rare opportunity to explore and photograph accelerators and detectors at particle physics laboratories around the world.

The photograph of Nino Bruno, a building contractor in L'Aquila, picturing a tunnel connecting the underground halls of INFN's Gran Sasso National Laboratory garnered the most online votes and a panel of international judges awarded the top prize to Joseph Paul Boccio's detailed photograph of the KLOE detector at INFN's Frascati National.

[Read the press release](#)

[View top thirty-nine photographs from the Photowalk](#)

[INFN](#) | [INTERACTION COLLABORATION](#) | [PHOTOS](#) | [PHOTOWALK](#)

Copyright © 2013 LCC

Printed from <http://newsline.linearcollider.org>