ilc newsline

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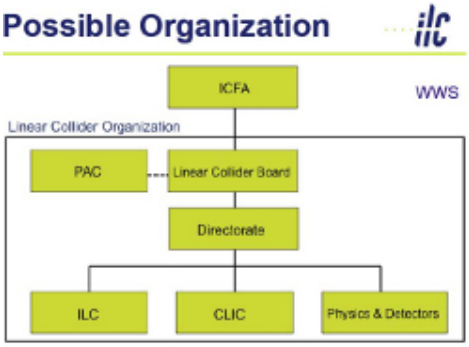
DIRECTOR'S CORNER



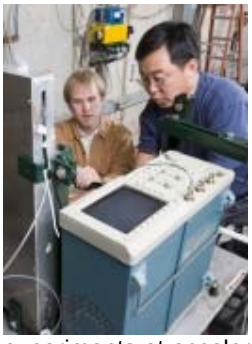
The International Linear Collider Steering Committee plans for the future

by Barry Barish

The International Linear Collider Steering Committee, chaired by Jon Bagger, met at Oxford University on 2 February. The main order of business was to plan the future of the ILC effort, following completion of the *Technical Design Report*.

AROUND THE WORLD

From Symmetry Breaking: Scientists put detectors to the test, a few particles at a time



At the Fermilab Test Beam Facility, scientists from around the world line up to test new detector technologies that will help shape the future of particle physics. Whether experimenters need a few pions or lots of protons, the FTBF can deliver: It offers the only high-energy hadron test beam in the United States. It is a proving ground for particle detector designs being developed for experiments at accelerator laboratories in the United States, Europe and Japan. Last year alone, the facility accommodated 13 experiments. In the future, it might even host detector tests for medical imaging applications.

Read the full story

AROUND THE WORLD

ILC beyond the technical design

by Rika Takahashi

Realising a big international project such as International Linear Collider involves many issues beyond finalising the technical design. The Advanced Accelerator Association promoting science and technology, Japan's industry-academia collaboration towards the realisation of the ILC, recently published a report to address such issues.

IMAGE OF THE WEEK

Ghosts in the tunnel

Image: Dirk Noelle

Visitors ramble where electrons will one day whizz: a large number of people working at DESY and the European XFEL were treated to a rare trip underground into the recently completed but still completely empty tunnel for the European XFEL. And empty tunnels make for good images.

Read more about the European-XFEL tunnel

IN THE NEWS

from ***Interactions***
8 March 2012
Announcing the First Results from Daya Bay: Discovery of a New Kind of Neutrino Transformation
Theta one-three, the last mixing angle to be precisely measured, expresses how electron neutrinos and their antineutrino counterparts mix and change into the other flavors. The Daya Bay collaboration's first results indicate that $\sin^2 2\,\theta_{13}$, is equal to 0.092 plus or minus 0.017.

from ***Fermilab***
7 March 2012
Tevatron experiments report latest results in search for Higgs boson
New measurements announced today by scientists from the CDF and DZero collaborations at the Department of Energy's Fermi National Accelerator Laboratory indicate that the elusive Higgs boson may nearly be cornered. After analyzing the full data set from the Tevatron accelerator, which completed its last run in September 2011, the two independent experiments see hints of a Higgs boson.

from ***CERN***
5 March 2012
LHCb experiment squeezes the space for expected new physics
"The LHCb result on Bs decaying to two muons pushes our knowledge of the Standard Model to an unprecedented level and tells us the maximum amount of New Physics we can expect, if any, in this very rare decay."

from ***Fermilab***
2 March 2012
World's best measurement of W boson mass points to Higgs mass and tests Standard Model
The world's most precise measurement of the mass of the W boson, one of nature's elementary particles, has been achieved by scientists from the CDF and DZero collaborations at the Department of Energy's Fermi National Accelerator Laboratory.

from ***Physics Today***
March 2012
The many uses of electron antineutrinos
The kind of neutrinos emitted in nuclear beta decay—namely electron antineutrinos—are helping scientists implement a diverse range of intriguing applications beyond fundamental particle-physics research.

CALENDAR

UPCOMING EVENTS

ILC Mechanical & Electrical Review and CFS Baseline Technical Review
CERN
21- 23 March 2012

AIDA - Academia meets Industry: Solid-State Position Sensitive Detectors
DESY, Hamburg, Germany
26- 27 March 2012

AIDA 1st Annual Meeting
DESY, Hamburg, Germany
28- 30 March 2012

Joint ACFA Physics and Detector Workshop and GDE meeting on Linear Collider (KILC12)
Daegu, Korea
23- 26 April 2012

UPCOMING SCHOOLS

Physics and Technology of Particle Accelerators (JUAS 2012)
Geneva, Switzerland
09 January- 16 March 2012

USPAS sponsored by Michigan State University
Grand Rapids, Michigan, US
18- 29 March 2012

AIDA Student Tutorial - Solid State Detectors
DESY, Hamburg, Germany
27 March 2012

View complete calendar

BLOGLINE

Fermilab
Frequently Asked Questions About the Higgs Boson

PREPRINTS

ARXIV PREPRINTS

1203.1599
Three-cell traveling wave superconducting test structure

1203.1240
Interactions of hadrons in the CALICE silicon tungsten electromagnetic calorimeter

1203.1168
Pair production of the heavy leptons associated with a gauge boson gamma or Z at the ILC

1203.0934
Non-resonant effects in the top-antitop resonance region

1203.0774
GARLIC: GAmma Reconstruction at a LInear Collider experiment

1203.0762
Little Higgs with T-parity measurements at the ILC

1203.0736
Large Area Silicon Tracking: New Perspectives

1203.0668
A Study of Heavy Higgs Properties at a Multi-TeV e+e- Collider

1203.0430
Decoupling Property of SUSY Extended Higgs Sectors and Implication for Electroweak Baryogenesis

1203.0416
Indirect Sensitivity to Heavy Z' Bosons at a Multi-TeV e+e- Collider

1203.0070
Prototyping of the ILC Baseline Positron Target

1203.0048
Iowa Particle Flow Algorithm

1203.0045
A closer look at the beam-beam processes at ILC and CLIC

1203.0031
Photon Linear Collider Gamma-Gamma Summary

1202.6659
Determination of Top-quark Asymmetries at the ILC

1202.6634
Imaging Techniques for Relativistic Beams: Issues and Limitations

1202.6621
h γγCoupling in Higgs Triplet Model

1202.6516
Model-independent WIMP Characterisation using ISR

1202.6510
Beam Test with a GridGEM TPC Prototype Module

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ilc newsline

DIRECTOR'S CORNER

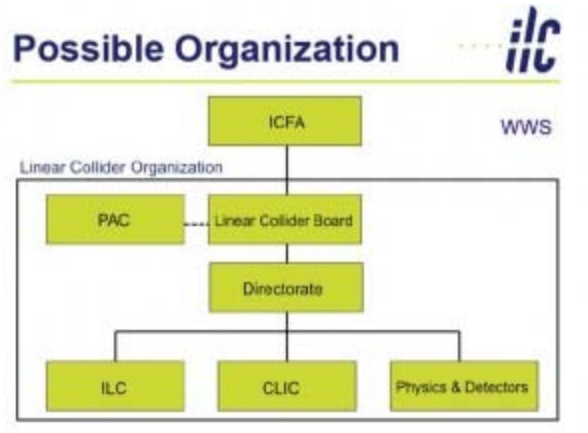
The International Linear Collider Steering Committee plans for the future

Barry Barish | 8 March 2012

ILCSC chair Jon Bagger presides over the February meeting. Image: ILC

The International Linear Collider Steering Committee (ILCSC), a subcommittee of the International Committee for Future Accelerators (ICFA), provides oversight to the Global Design Effort. As we approach our final milestone, the publication of the ILC *Technical Design Report*, the ILCSC is in the process of creating a new organisational structure and mandate for future work towards a linear collider. This new organisation will have *one* director, with responsibility for ILC, CLIC and detector development. The first order of business is to appoint this director. The next order of business is to begin to incrementally develop a new, more integrated organisation. For the ILC accelerator effort, a new mandate is being developed that will continue the high-priority superconducting radiofrequency (SCRF) R&D systems tests, as well as developmental work towards higher energy.

One of the primary goals of the proposed new organisation is to integrate the efforts towards a superconducting RF machine (ILC), a two-beam accelerator (CLIC) and the associated physics and detector efforts. The new proposed organisation is shown below:



New organisational structure proposed for pre-construction future linear collider work

The Linear Collider Board (LCB), under ICFA, will replace the present ILCSC and will have the broad mandate of overseeing the preparation of a linear collider proposal. A draft mandate for the LCB was discussed at ILCSC and ICFA and it gives the LCB the role of creating a directorate to coordinate the activities for the ILC, CLIC and physics and detectors, and to focus those efforts towards a project proposal whose “timing and contents will reflect the LHC physics data.” The LCB will consist of 16 members, five from each region (Europe, Asia and the Americas) plus a chair.

As stated above, the most immediate task is to appoint a Linear Collider Director, and ICFA has authorised a worldwide search that is just getting under way. The search committee consists of Joachim Mnich (DESY) and Manfred Krammer (new ECFA chair) from Europe; Pier Oddone (Fermilab and ICFA chair) and William Trischuk (University of Toronto) from the Americas; and Sachio Komamiya (University of Tokyo) and Jie Gao (IHEP) from Asia. Nominations are welcome. The Linear Collider Director will lead the global linear collider community towards realising an electron-positron linear collider.

Of immediate concern to those of us in the GDE is the lower left hand box of the diagram in the above figure, which represents the successor organisation to the GDE. We will have completed the TDR by early next year, at which point the efforts will transition to the new post-TDR ILC R&D and design efforts. In order to make that transition as smooth as possible, the search for an associate director for the SCRF collider will get under way as soon as the new Linear Collider Director is appointed. Preparations for this search are already being made, even in advance of that appointment. The ILC Director will report to the LC Director, and will have the mandate of initially focussing on the continuation of the ILC programmes, including coordinating R&D on SCRF systems aimed at increasing gradients and potentially decreasing costs; completing system tests started in the GDE era; and furthering accelerator design and integration through a well defined change control process.

CERN Director General Rolf Heuer, GDE Americas Regional Director Mike Harrison and GDE Director Barry Barish during the February ILCSC meeting. Image: ILC

We all are keenly aware of the importance of continuing the ILC work towards a linear collider over the next few years, and of developing this option until the LHC results better inform us as to what linear collider project should go forward. I am confident that a well structured ILC R&D programme that builds on what we have already accomplished can be funded and will be an integral part of the continuing effort to develop the next energy frontier lepton collider.

CLIC | FUTURE | ICFA | ILC-CLIC COLLABORATION | ILCSC | TDR

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Scientists put detectors to the test, a few particles at a time

February 28, 2012 | 11:00 am

The Fermilab Test Beam Facility, with its blue, corrugated-steel roof, provided protons, muons, positrons and pions to 13 experiments in 2011. Photo: Fermilab

At the Fermilab Test Beam Facility, scientists from around the world line up to test new detector technologies that will help shape the future of particle physics. Whether experimenters need a few pions or lots of protons, the FTBF can deliver: It offers the only high-energy hadron test beam in the United States.

“We’ve had a group that asked for 10 particles to be delivered every couple of minutes,” said Aria Soha, who coordinates the experiments at the facility. “We were able to do it.”

Since 2005, the FTBF, with its distinctive blue, corrugated-steel roof, has staged 38 experiments, conducted by 528 collaborators from 119 institutions in 23 countries. It is a proving ground for particle detector designs being developed for experiments at accelerator laboratories in the United States, Europe and Japan. Last year alone, the facility accommodated 13 experiments. In the future, it might even host detector tests for medical imaging applications.

Experimentalist Erik Ramberg led the effort to revive an old test beam line at Fermilab in 2002. Then physicists began arriving with their detector prototypes. In 2005, a makeover added capabilities for low-energy particle beams to meet requests from particle detector developers. In 2007, a test beam workshop organized by scientists working on detectors for future particle colliders, attracted more than 100 scientists. And this month, Fermilab hosted a school for 64 graduate students and young scientists who received hands-on training with test beam measurements.

The test beam is so popular among detector and instrumentation aficionados around the world that there is often a waiting line for beam time. Work has begun on a second beam line.

Corrado Gatto, of the Sezione di Napoli of Italy’s Istituto Nazionale di Fisica Nucleare, or INFN, and spokesperson of Fermilab test beam experiment T-1015, described his group’s experience at FTBF as “nothing short of excellent,” praising the great flexibility and individual attention.

“The hard part,” Gatto said, “is that it is becoming increasingly difficult to book beam time at FTBF, with lead times longer than six months.”

The only other laboratory to provide a similar test beam is the European laboratory CERN in Geneva, Switzerland.

Two participants in a hands-on training session inspect the electronics for their test beam measurement at Fermilab this month. Photo: Fermilab

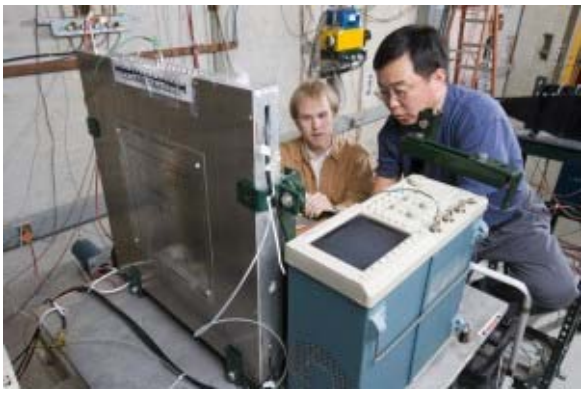
Ramberg led the FTBF operation until 2009. The handoff went to Soha, who uses her seven years as an accelerator operator to “translate” between the beam operators and the experimenters. “The facility is thriving under her direction,” Ramberg said.

At present, the FTBF regularly handles two experiments at a time. It has areas for six locations along the beam line where scientists can set up their equipment. The main enclosure has retractable roof panels for access by a crane. Each enclosure has at least one remote-controlled motion table. Almost everywhere are huge arrays of cable in patch panels that seem chaotic, but are actually designed to offer simple “plug-and-play” setup by experimenters.

The beam runs for 12 hours a day, usually 10 a.m. to 10 p.m., seven days a week, with no holiday breaks. Research groups usually spend one or two weeks at the facility, maximizing their beam time. Some stay much longer.

José Repond leads a group from Argonne National Laboratory, just a short drive from Fermilab. Their digital hadron calorimeter, with a world-record 480,000 readout channels, was assembled at Argonne and then transported to Fermilab. The detector spent about four months in the test beam in 2011. “We split the day into two shifts, each manned by two people,” Repond said. “Most of us worked six days a week.”

Repond’s group cashed in on the versatility of the test beam’s makeup. They exposed their detector to broadband muons, positrons and pions, and protons, testing the response of the resistance plate chambers that are the central component of the design. With the muons, the group was able to measure the efficiency and other properties of the chambers. With positrons and pions, the group found the response to be “compatible with predictions based on GEANT4 simulations of the setup,” Repond said.



Jacob Smith and Jae Yu set up a detector test at Fermilab as part of the International Linear Collider R&D program in 2007. Photo: Fermilab

To bring their equipment to the test facility from the University of Texas in Arlington, Jae Yu and two researchers – an undergraduate and a postdoc – rented a car and drove more than 16 hours and nearly a thousand miles. Yu's three-man group had everyone on shift throughout their two weeks last August to test detectors known as gas electron multipliers, or GEMs.

"While we had a lot of fun taking data," Yu said, "by the end of the run we were all quite exhausted. So many 20-hour days filled up our beam test campaign."

Gatto shipped the intricate glass-and-scintillator plates of the ADRIANO detector to Fermilab from his laboratory in Naples. The detector's full name is A Dual-Readout Integrally Active Non-segmented Option. The plates weigh less than 50 pounds and are sent through regular commercial carriers. The group then uses electronics available at Fermilab for the readout.

"We tested nine different ADRIANO prototypes at FTBF," Gatto said. "All of them were successful. Our next step would be to build a large prototype and see if we can achieve the same performance as with the smaller ones."

Scientists who want to use the facility can visit the FTBF website to learn more about the types of particles and beam intensities that are available and how to sign up for beam tests.

Mike Perricone

Posted in R&D |
No Comments »

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AROUND THE WORLD

ILC beyond the technical design

Rika Takahashi | 8 March 2012

Realising a big international project such as the International Linear Collider involves many issues beyond finalising the technical design. The Advanced Accelerator Association promoting science and technology (AAA), Japan's industry-academia collaboration towards the realisation of the ILC, recently published a report to address such issues.

This report, entitled "ILC – Issues in construction of the ILC facility in the case of Japan," was edited by the Construction Issue Working Group headed by Masakazu Yoshioka, professor at KEK. This working group was established under AAA's Large Project Study Group, which studies comprehensive issues to realise the ILC in Japan. "In 2010, AAA published a report addressing the study of tunnel structure optimised for Japanese hilly rock sites," he said. "This time, we made an extensive survey to list most of the issues in constructing the ILC facility in Japan, such as environmental assessment, local laws, electric power, earthquake, and so forth."

Members of the Construction Issue Working Group visit RIBF at RIKEN. Image: ILC

The team consists of 49 experts from industry and academia who specialise in various areas such as construction, architectural design, electrical-power planning, and building services. "We basically fleshed out all the agendas," said Yoshioka. The table of contents of the report covers broad items including laws and regulations, environment issues, infrastructure, and a study on the demands for the relaxation of regulations.

The basic philosophy in producing this report was based on Japan's fourth science and technology policy issued in August last year. The editing team set down the principles of the policy as the basic philosophy for the report of how the ILC fits into it. In the report, the Japanese government listed visions for a future Japan and major goals Japan should aim for. "We recognised that one of those visions, for Japan to become a country that continues to create 'knowledge' assets and fosters science and technology as a culture, could be realised by building the ILC," said Yoshioka. Japan's policy states a commitment to the enhancement of globally top-level basic research, stressing the importance of building research centres that can work as a hub of international research networks. This also can be realised with the ILC.

Many of the items studied for the report were Japanese-specific issues since Japan lacks the experience to host a big international project. "There are many aspects of issues that need to be addressed," Yoshioka said. "One example is laws and regulations. Many laws and regulations will be involved in realising the ILC and different authorities have jurisdiction over them." In tackling the issue, AAA made a comprehensive list of laws and regulations and identified any problems in applying them in building the ILC.

Earthquake and electricity were two big themes in the report. "The contribution made by the experts from RIKEN was remarkable, especially on the electricity study," said Yoshioka.

Through the editing process, the team identified that there is hardly any impact from a potential earthquake for building the ILC in

Japan. The ground condition of two candidate sites were found stable and have good characteristics for tunneling. Also, no effect was observed on the precision instruments installed in the underground facilities in the Tohoku area.

Last September, the team visited the RI beam factory (RIBF) at the RIKEN Nishina Center for Accelerator-Based Science. RIBF has a co-generation system that increases the overall efficiency and reliability of a power supply that uses a gas turbine to drive an electrical generator, taking hot exhaust from the turbine into a steam generator. “It is crucial to secure a stable power supply to the ILC. The visit to RIBF provided us with important information,” said Yoshioka. RIBF is also a good example of an accelerator that was integrated into society for everyday purposes. “RIBF has a strong commitment to contribute to the local society. Their activities serve as a useful reference for the ILC.”

The team also identified many time-consuming issues, such as an environment assessment.

The report was submitted to Satoru Yamashita of the University of Tokyo, the chair of the AAA’s Large Project Study Group, to develop specific measures for each issue identified in the report. The English translation of the report will be published soon.

AAA | JAPAN | JAPANESE SOCIETY FOR PROMOTION OF SCIENCE

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