

ILC NewsLine special issue: ILC cavities — a globally successful year



As this year draws to a close, the global ILC project can look back on a year of progress. One of the most visible and important ILC R&D short-term milestones was achieved globally: the production of cavities with a gradient greater than or equal to 35 megavolts per metre and the required quality factor at a 50 percent production yield. That means: half of all cavities produced around the world could be used to run the ILC. Next stop: a 90 percent yield, to be reached in 2012. Labs around the world at Cornell, DESY, Fermilab, JLab, and KEK now consistently feed their test data into a common ILC cavity database. Since January, the "S1 global" programme connects cryomodules containing a total of eight dressed cavities from around the globe.

In this issue, Barry Barish describes and explains a year-long process for evolving the ILC Baseline: setting the average cavity gradient and quality factory requirements. You will also read hot news from KEK's superconducting radiofrequency test facility and chilly news from Fermilab, where the first US ILC-type eight-cavity cryomodule was successfully cooled down to 2 kelvins.

Finally, to retrace one year of milestones in R&D for ILC superconducting radiofrequency cavities, we have made a selection of [relevant articles published in ILC NewsLine](#) in 2010.

Around the World

From Fermilab Today: Fermilab begins operation of first SRF cryomodule



More than 100 Fermilab employees contributed to the Cryomodule 1's assembly and operation. They include scientists, engineers, technicians, safety personnel and administrators.
Photo: Reidar Hahn

Editor's note: Watch our video of the week, showing the installation of the first SRF cryomodule at Fermilab.

At particle physics laboratories around the world, people have closely followed a much anticipated cooldown at Fermilab.

Years of effort by more than 100 staff members at Fermilab have led to the cooldown of Cryomodule 1 at the laboratory's SRF Accelerator Test Facility. At 11 a.m. on Nov. 22, liquid helium flowed through CM1, cooling it to 2 Kelvin (-271° C).
[Read more...](#)

-- Leah Hesla

Around the World

From KEK: Japanese 9-cell SCRF cavity meets ILC specifications



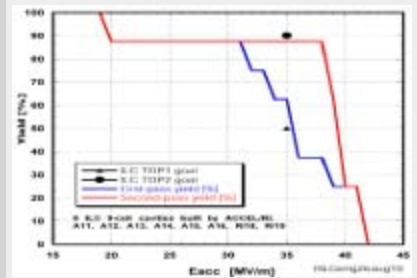
Scientists working on cavity vertical test at STF. *Image: Akira Yamamoto*

Designing and fabricating an optimal accelerating cavity is not so simple. There are two important parameters scientists are looking for: the gradient of 35 megavolts per meter (MV/m) and the quality factor (Q_0) of $> 0.8 \times 10^{10}$. A Japanese cavity now fulfilled those requirements for the first time at a test which took place at the Superconducting radiofrequency Test Facility (STF) at KEK, adding momentum towards future mass production.

Accelerating gradient and an unloaded quality factor (Q_0) are two important parameters for realizing the ILC. The accelerating gradient is a measure of how much an accelerator can increase the energy of a particle over a given stretch, typically indicated by the unit MV/m. The higher the gradient, the shorter the accelerator, and hence, the cheaper the system can be built. The quality

Director's Corner

Evolving the ILC baseline: main linac operating gradient



Encouraging recent gradient yield results presented at Baseline Assessment Workshop BAW-1 by Rong-Li Geng achieving our second-pass Technical Design Report goal of 90% yield at 35 MV/m, although with very limited statistics

Last week I described the motivation and the process for evolving the baseline for the technical design effort that we will be carrying out over the next two years, culminating in a *Technical Design Report* (TDR) at the end of 2012. The baseline for the TDR is being evolved by making a series of specific changes, of which four of the proposed changes have been determined to have impacts that require a "top-level change control" action. I defined that process last week.
[Read more...](#)

-- Barry Barish

[Director's Corner Archive](#)

Calendar

Upcoming meetings, conferences, workshops

[Second Baseline Assessment Workshop \(BAW-2\)](#)

SLAC

18-21 January 2011

Upcoming schools

[US Particle Accelerator School \(USPAS\)](#)

Old Dominion University, Hampton, Virginia, USA

17-28 January 2011

[Excellence in Detectors and Instrumentation Technologies \(EDIT 2011\)](#)

CERN, Geneva, Switzerland

31 January - 10 February 2011

[GDE Meetings calendar](#)

[View complete ILC calendar](#)

factor, Q_0 , is a qualifier of how well the cavity can sustain the stored RF power. A higher Q_0 means a lower rate of power loss relative to the stored energy.

[Read more...](#)

-- Rika Takahashi

Video of the Week

Cryogenic Module installed at Fermilab



Watch a video of the installation of the first ILC-type superconducting cryomodule at Fermilab. Read also this week's related story to learn more about the cool down of the first eight-cavity SRF cryomodule of its type in the United States on 23 November 2010. *Video: Fermilab.*

In the News

From *Astronomy*

6 December 2010

Road trip: Fermi National Accelerator Laboratory, part 2

When you hear the name Fermi National Accelerator Laboratory, or Fermilab for short, cosmology likely isn't the first thing to cross your mind. ...

[Read more...](#)

From *CERN*

6 December 2010

CERN experiment makes progress towards antihydrogen beams

The ASACUSA experiment at CERN2 has taken an important step forward in developing an innovative technique for studying antimatter. Using a novel particle trap, called a CUSP trap, the experiment has succeeded in producing significant numbers of antihydrogen atoms in flight.

[Read more...](#)

From *Le Figaro.fr*

3 December 2010

Des télescopes sous l'eau pour écouter le chant des baleines

Les détecteurs de neutrinos cosmiques ont trouvé une nouvelle application. Les cétacés utilisent en effet les mêmes fréquences que ces particules pour communiquer.

[Read more...](#) (in French)

Announcements

ECFA extends the "Study of physics and detectors for a linear collider"

On 26 November, the European Committee for Future Accelerators decided to extend the period of the "ECFA Study of Physics and Detectors for a Linear Collider" till the end of 2013 and appointed Juan Fuster as the new chair of this study group. These ECFA decisions confirm its support to the European activities on linear colliders, especially in the important coming period for the project. The mandate of former chair François Richard has come to an end, along with his other international duties, in particular being a Worldwide Study co-chair and a regional representative to the ILC Research Director Sakue Yamada. Juan Fuster is a very active supporter of the ILC activity in Spain and has been, among other things, the organiser of the ECFA workshop in Valencia in 2006.

- View slides of the latest [ECFA meeting at CERN](#)

- Latest ["ECFA Study of Physics and Detectors for a Linear Collider"](#) workshop at CERN

arXiv preprints

[1012.1035](#)

Measuring a Light Neutralino Mass at the ILC: Testing the MSSM Neutralino Cold Dark Matter Model

[1012.0824](#)

Electroweak non-resonant corrections to top pair production close to threshold

[1012.0189](#)

Indirect search for color octet electron at next generation linear colliders

[1012.0167](#)

The Higgs sector of the minimal $B-L$ model at future Linear Colliders

[1011.6314](#)

Design and Construction of a Cherenkov Detector for Compton Polarimetry at the ILC

[1011.5969](#)

Performance of Glass Resistive Plate Chambers for a high granularity semi-digital calorimeter