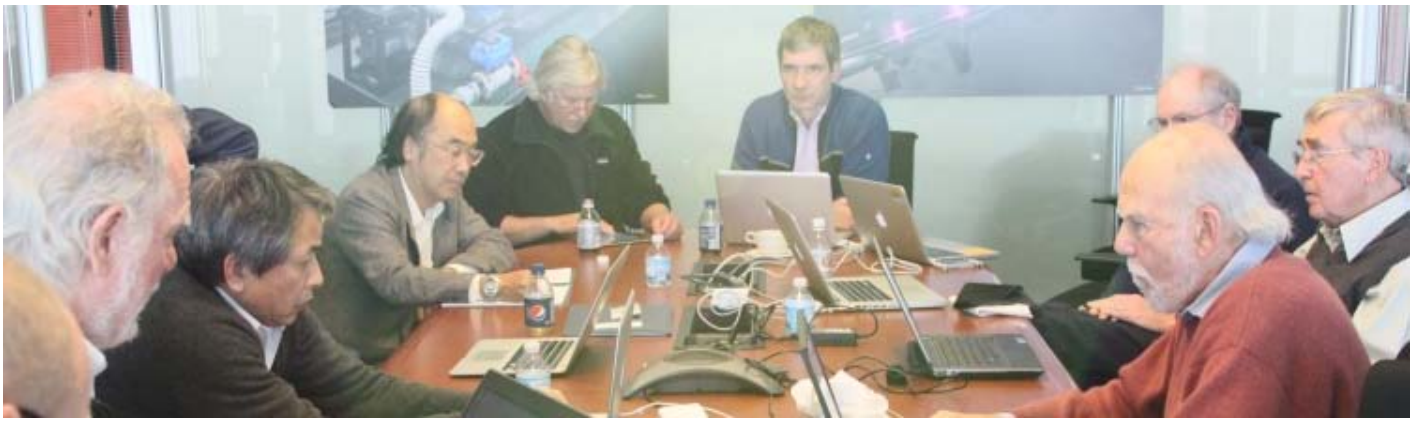
DIRECTOR'S CORNER

Happy New Year! Reflections on 2012

by Barry Barish



Last year was an especially exciting year for particle physics with the discovery of a 126-GeV particle that appears to be the long-sought Higgs boson. This event is likely to be the most important discovery in decades: the observation of a new kind of particle that signals the mechanism for creating mass in the universe. These impressive early results already point to future directions for the LHC, and more broadly for particle physics. In fact, closer to home, this discovery is providing strong motivation for a Japanese initiative for a staged approach to the ILC, beginning with a ~250 GeV Higgs factory, with the capability of increasing the energy in the longer term.

FEATURE

Members of new Linear Collider Board announced

The International Committee for Future Accelerators ICFA, has selected the members of the new Linear Collider Board. the Board will take up office in February as the oversight committee for the new Linear Collider Collaboration. It will be chaired by Sachio Komamiya from the University of Tokyo.

LCPEDIA

Cavity gradient

by Daisy Yuhas

What is an accelerating gradient? How do particles get accelerated, and how much? LCpedia explains.

IMAGE OF THE WEEK

The year of the snake

Image: Zanaq

2013 is the year of the snake - according to Chinese wisdom, it will be a year of steady progress and attention to detail.

This prognosis is something the ILC design team can certainly sign off on: attention to detail is intrinsic to the ILC'S precise collisions, state-of-the-art detectors and challenging machine. And steady progress is certainly ahead with the publication of the Technical Design Report in summer.

The uroboros - the snake that eats its own tail - is also often the representation of the universe, where the very big mirrors the very small.

IN THE NEWS

from ***Kahoku Shinpo***
9 January 2013
ＩＬＣ誘致、岩手が要望 知事、文科相と会談
達増拓也岩手県知事は８日、下村博文文部科学相を訪れ、科学者らが建設を目指している次世代加速器「国際リニアコライダー（ＩＬＣ）」について、「東日本全体の復興の象徴として、国家プロジェクト、国際協力事業としてぜひ進めていただきたい」と岩手県・北上山地への誘致に協力を求めた。日本は誘致に乗り出すかどうかは決めておらず、下村氏は「東北経済界の皆さんからも依頼されている。全力で取り組んでいきたい」とだけ答えた。(Takuya Tasso, the governor of Iwate prefecture visited Hakubun Shimomura, minister for MEXT (Ministry of Education,Culture,Sports,Science & Technology) on Tuesday, 8 January, demanded to promote ILC as a national project and place it as a symbol of the recovery from the earthquake. Shimomura responded saying “I was also asked by the Tohoku Industry. I will deal with it to my full extent.”

from ***Tokyo Shimbun***
6 January 2013
宇宙解く「夢の道」どこに 長さ３１キロ加速器でヒッグス粒子測定
全長三十一キロという巨大加速器「国際リニアコライダー（ＩＬＣ）」の設計が昨年末にまとまった。宇宙の成り立ちの謎を解く手掛かりが得られ、技術の応用は医療などに革新をもたらすと期待される。夢は膨らむが、施設をどこに建て、膨大な建設費を参加国でどう負担するのかという大問題が残っている。(ILC will unveil the mystery of the universe, and its technology might bring innovations. Pretty exciting, but there remains a lot of issues such as a choice of the construction site and how to bear a huge construction costs between participating countries)

from ***The Nikkan Kogyo Shimbun***
4 January 2013
ＩＬＣの国内誘致に期待感－候補地の取り組みと今後の課題
次世代加速器「国際リニアコライダー」が２０２０年代半ばにも世界に１ カ所完成する。日本は東北・北上山地と九州・脊振（せふり）山地の２候補地を研究者らが科学的判断で今夏にも一本化し、日本への誘致を政府間協議に委ねる。(Researchers will show scientific decision on two ILC candidate sites in Japan around thins summer, and expect to leave it to the intergovernmental consultation to attract ILC to Japan)

from ***Iwate Nippo***
4 January 2013
＜確かな一歩＞ ＩＬＣ誘致 ナンバーワンを岩手で
経済効果も大事だが、何よりナンバーワンの研究が震災で傷ついた岩手で行われることだ。次世代を担う子どもたち、若者たちが、ここに住むことの誇りにつながる。研究者の間では、北上山地は世界６カ所の候補地の中で有力とみられている。自信を持って誘致を加速させたい。(Of course, economic effect is important. However, more important thing is that it is an opportunity for Iwate prefecture, which was severely damaged by the major earthquake to have a the world premier laboratory. ILC will

make Iwate prefecture a place to live with pride. We will accelerate our activity to invite ILC.)

from ***Sankei Shimbun***
1 January 2013
宇宙誕生、日本で解明へ 次世代加速器の国内候補地争い今夏決着
宇宙誕生の謎に迫る素粒子物理学の壮大な実験施設の構想が進んでいる。日米欧などが目指す次世代加速器「国際リニアコライダー」（ＩＬＣ）計画だ。建設地は日本が最も有力で、今夏に国内候補地が決まり誘致が本格化する。物理学に革命を起こすノーベル賞級の発見が日本で実現する期待が高まっている。(Expectation has been raised that the discovery which would bring a Nobel Prize might take place in Japan)

from ***Itoshima Shimbun***
1 January 2013
糸島へＩＬＣ誘致目指す 国際リニアコライダー
「国際リニアコライダー（ＩＬＣ）」の建設候補地に、福 岡・佐賀の県境にまたがる脊振山地の名前が挙がっている。国内候補地は東北の北上山地と二カ所で、もし建設地に決まれば、経済波及効果は建設期間（８年 間）で国内１兆１０００億円、九州では３４００億円に上るとの試算もある。今夏に予定される国内候補地の一本化に向け、誘致活動が熱を帯びつつある。糸島 が国際都市へと変ぼうする可能性が出てきた。(Sefuri mountain is one of the two ILC candidate sites in Japan. If the ILC to be constructed, estimated economic effect would be over one trillion-yen all over Japan, and 340 billion-yen for Kyushu area. The activities toward inviting the ILC to the area is picking up momentum. Itoshima might transform into a international city.)

from ***Guardian***
1 Januar 2013
Higgs boson was just a start for Cern’s atom smasher – other mysteries await
The Large Hadron Collider will shut down for an overhaul in preparation for exploring questions of dark matter, extra dimensions and other universes

from ***gizmag***
24 December 2012
Japan frontrunner to get International Linear Collider
According to Nature, Japan is the frontrunner for the planned International Linear Collider (ILC), for which Europe and the United States are also in the running to host.

from ***Tom’s Hardware***
23 December 2012
Japan Leads Race To Build Next Particle Smasher
It appears that Fermilab in Batavia, Illinois, will not be able to secure the funding to build the International Linear Collider (ILC) as the potential successor of the Large Hadron Collider (LHC) at CERN.

from ***French Tribune***
20 December 2012
News Talks about Heir of Large Hadron Collider
Yes, sources are talking that the plans are already underway for Large Hardon Collider’s successor, the International Linear Collider, or ILC, which will cost approx between $10 and $20 billion. Moreover, rumors are also airing that the host country of same will probably be Japan.

CALENDAR

UPCOMING EVENTS

SiD Workshop
SLAC
16- 18 January 2013

CLIC Workshop 2013
CERN
28 January- 01 February 2013

Les Rencontres de Physique de la Vallée d'Aoste (La Thuile 2013)
La Thuile, Italy
24 February- 04 March 2013

UPCOMING SCHOOLS

Joint Universities Accelerator School (JUAS 2013)
Archamps, France
07 January- 15 March 2013

CERN - Latin-American School of High-Energy Physics
Arequipa, Peru
06- 19 March 2013

Excellence in Detectors and Instrumentation Technologies (EDIT 2013)
KEK, Japan
12- 22 March 2013

View complete calendar

PREPRINTS

ARXIV PREPRINTS

1212.6865
Higgs Production in Neutralino Decays in the MSSM – The LHC and a Future e+e- Collider

1212.6203
Molybdenum sputtering film characterization for high gradient accelerating structures

1212.6023
Proposal for Single-Bunch Collimator Wakefield Measurements at SLAC ESTB

1212.5127
Calorimetry for Lepton Collider Experiments – CALICE results and activities

1212.4808
The NMSSM with F-theory unified boundary conditions

1212.4789
Penguin contributions to B to J/Psi P Decays

ilc newsline

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Barry Barish | 10 January 2013

The original mandate for the GDE

Last year was an especially exciting year for particle physics with the discovery of a 126-GeV particle that appears to be the long-sought Higgs boson. This event is likely to be the most important discovery in decades: the observation of a new kind of particle that signals the mechanism for creating mass in the universe. These impressive early results already point to future directions for the LHC, and more broadly for particle physics. In fact, closer to home, this discovery is providing strong motivation for a Japanese initiative for a staged approach to the ILC, beginning with a ~250 GeV Higgs factory, with the capability of increasing the energy in the longer term.

For the ILC, last year was also a special year! We have achieved almost all of our ILC R&D goals, we finalised the ILC technical design, and we have completed and submitted for reviewing a draft version of the *Technical Design Report*.

The first big goal when ICFA formed the Global Design Effort (GDE) was to develop what we called a reference design for the ILC. The goal of this two-year conceptual design project was to establish the capability of an electron-positron collider that would meet the physics goals established by the ILCSC, an ICFA subcommittee, and to estimate the cost for such a new global machine. We successfully achieved those goals and published a four-volume report with a reference design, in collaboration with the ILC detector and physics collaborations.

Following the completion of the RDR, we undertook to do a more detailed and optimised design and to complete the high-priority R&D goals. The objective was to develop a design and costing that could be used to approach governments. Our original idea and approach to this phase of our work was to perform a grounds-up value engineering study to establish a new baseline and design. Unfortunately, we lacked sufficient resources to perform such a study, and alternately, we tasked the GDE project managers to develop a finite set of top-down changes that promised to reduce costs, while preserving performance and not unduly increasing risk. They responded by creating a rather innocent looking paper called 'Strawman Baseline Proposal 2009'.

The GDE Executive Committee signing off on the draft TDR for technical review at a special meeting at Fermilab in November

This document served as the starting point for a set of workshops and studies, including detector representatives where there were possible impacts on physics. We followed a formal change control process to decide on these changes one by one. The project managers deserve substantial credit for the fact that most of their original proposal has been implemented for the *Technical Design Report*.

After having determined the top-level baseline for the TDR, we carefully went through and made decisions on all the smaller changes that flowed down from these baseline changes. That was completed last spring, establishing our baseline for the *Technical Design Report*. The last step to complete our mandate has been to document the present design and results from our

R&D programme in a *Technical Design Report* that also includes a new value costing for the ILC.

We accomplished all of those tasks in 2012, have already undergone a technical review of the TDR in December that will be followed by an International Cost Review in London in early February. We have not yet received a review report from the Technical Review, but all indications in the oral close-out were favourable.

We look forward to completing the GDE mandate over the coming months, as well as helping facilitate the evolution to the new Linear Collider Collaboration under Lyn Evans that will carry out the next steps, hopefully leading to an early ILC construction project.

Nick Walker, GDE Project Manager, presenting the GDE TDR design overview at the PAC TDR Technical Review

COST REVIEW | HIGGS | HIGGS FACTORY | SB2009 | TECHNICAL DESIGN REPORT

FEATURE

Members of new Linear Collider Board announced

10 January 2013

Pier Oddone, the Chair of the International Committee for Future Accelerators (ICFA) announced yesterday the membership of the new Linear Collider Board (LCB), which as a sub-panel of ICFA will promote and oversee the development of a linear collider and its detectors as a world-wide collaborative project. The recently appointed Linear Collider Director, Lyn Evans, will report to the LCB.

Sachio Komamiya of the University of Tokyo appointed as a chair of the new Linear Collider Board , which will promote and oversee the development of a linear collider and its detectors as a world-wide collaborative project.

The LCB member are:

Chair
- Sachio Komamiya (University of Tokyo)

Americas
- Jonathan Bagger (Johns Hopkins University)
- The Fermilab Director (currently Pier Oddone)
- David MacFarlane (SLAC)
- Lia Merminga (TRIUMF)
- Hugh Montgomery (Jefferson Lab)

Asia
- Jie Gao (IHEP, Beijing)
- Rohini Godbole (Indian Institute of Science)
- Sunkee Kim (RISP)
- Atsuto Suzuki (KEK)
- Yifang Wang (IHEP, Beijing)

Europe
- The CERN Director-General (currently Rolf Heuer)
- The DESY Director of Particle Physics (currently Joachim Mnich)
- Francois Le Diberder (IN2P3)
- The JINR Director (currently Victor Matveev)
- Lenny Rivkin (PSI)

ICFA | LINEAR COLLIDER BOARD | LINEAR COLLIDER COLLABORATION

LCPEDIA

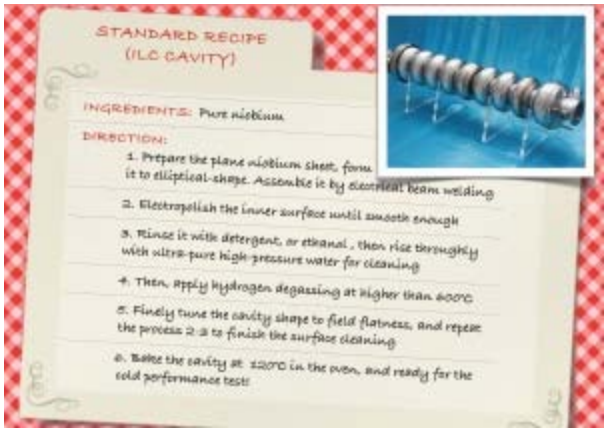
Cavity gradient

Daisy Yuhas | 10 January 2013

The term cavity gradient is used to describe the electric field that accelerates a particle. This reflects the most basic purpose of each cavity. “What you want out of a cavity is to give a particle more energy than it had before,” says Fermilab physicist Andy Hocker. Cavity gradient determines the rate of this change: the increase in energy with distance as it passes through the cavity.

At the ILC, the goal is for particles to enter one end of an accelerating cavity and emerge from the other having gained more than 32 million electron volts of energy. The change is sometimes illustrated with a graph. On the y-axis is the energy of particles and on the x-axis, distance. The resulting picture looks like a ramp: As the particles pass through the cavity, their energy increases.

Gradient is based on both the cavity’s design and how much power is put into the cavity. Therefore, this variable is not a characteristic of the cavity itself but a function of how the cavity is operated: put more radiofrequency power into a cavity and increase its gradient . The cavity gradient at the ILC will reach 31.5 million volts per metre. This is a very high gradient, which means fewer cavities will be needed and the accelerator can be more compact. However, these gradients do have limits based on the cavity’s quality factor and quenching limitations.



ACCELERATION | CAVITY | ENERGY | GRADIENT

IMAGE OF THE WEEK

The year of the snake

Image: Zanaq | 10 January 2013

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