

DIRECTOR'S CORNER

A game plan for producing the ILC *Technical Design Report*

by Barry Barish



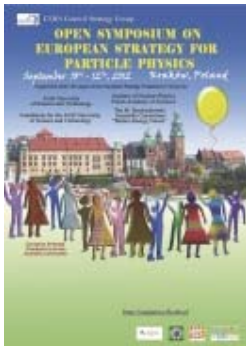
The GDE Executive Committee met in a two-day face-to-face meeting in Melbourne just following ICHEP12. The main order of business was to develop a detailed 'game plan' for producing the ILC *Technical Design Report*.

RESEARCH DIRECTOR'S REPORT

Alea iacta est – the die has been cast

The update of the European strategy process for particle physics

by Juan Fuster



The process towards an updated European Strategy for the future of particle physics is well under way. In preparation for the upcoming Strategy meeting in Kraków, Poland, several generic linear-collider documents as well as many specific to ILC or CLIC have been submitted and will be discussed in September.

AROUND THE WORLD

Physics that goes bang

by Barbara Warmbein



A new stage show based on accelerators and accelerator physics is taking off in Germany this month. Conceived by two ILC scientists at DESY, it shows the basic ingredients of a particle accelerator, complete with all the fun stuff, to schoolchildren ages 12 and up. It even gives a live audience-involving demonstration of the fundamental acceleration principle of the ILC.

IMAGE OF THE WEEK



Lyn Evans visits DESY

Image: DESY

The designated Linear Collider Director Lyn Evans, who will take up his new role when the ILC *Technical Design Report* has been officially delivered next summer, is already touring the labs. On Monday and Tuesday he visited DESY to inspect its cavity production facilities and chat to DESY scientists about the future.

IN THE NEWS

from **lalibre.be**
12 August 2012

[Ces secrets de l'Univers qui résistent encore](#)

On réfléchit déjà à des machines géantes, linéaires (pour éviter les pertes par rayonnement à hautes énergies dans les machines circulaires), et qui étudierait des collisions électrons-positrons et non plus protons-protons, car les premières sont beaucoup plus "propres" que celles entre protons qui consistent à faire se rencontrer violemment, des "sacs" de quarks dans une explosion de collisions difficiles à bien étudier. ([google translation](#))

from **Deutschlandradio**
11 August 2012

[Higgs und die großen Rätsel der Physik](#)

Über die Bedeutung der Teilchenphysik für das Verständnis der Welt

Gäste: Rolf-Dieter Heuer, Physiker und Generaldirektor des CERN, und Ulrich Woelk, Astrophysiker und Schriftsteller ([google translation](#))

from **Kijk.nl**
10 August 2012

[Wetenschappers willen 'higgsmachine' in LHC-tunnel](#)

Een ander punt is dat er al jaren wordt overlegd over een nieuwe deeltjesversneller, die in een rechte in plaats van een cirkelvormige tunnel moet worden gebouwd: de International Linear Collider (ILC). ([google translation](#))

from **NPR**
10 August

[Amidst Rocky Peaks, Physicists Ponder The Universe](#)

For fifty years, physicists have flocked to the Aspen Center for Physics to ponder their ideas amidst the serenity of the Rocky Mountains. The string theory revolution started there, and over the years the center has hosted 10,000 theoretical physicists—53 of whom are Nobel laureates.

from **Nature**
8 August 2012

[Physics prize dwarfs all others](#)

Theorists left reeling after billionaire reveals massive prize.

from *The Huffington Post*

8 August 2012

[Higgs Boson, a History](#)

But few outside a small community of specialized mathematicians and theoretical physicists know that, in fact, the discovery of the Higgs boson is even more significant than has been popularly explained.

ANNOUNCEMENTS

LCWS12 early registration deadline: 31 August 2012

The early registration of the International Workshop on Future Linear Colliders 2012, LCWS12, is 31 August. The registration fee will be increased from \$425 to \$490 starting on 1 September. You must make the payment by 31 August to take advantage of the reduced early registration fee.

In addition, the conference special rates for hotels begin to expire as early as 1 September due to the great possibility of American baseball World Series championship games near the conference dates. So we strongly encourage you to make a reservation as soon as possible.

The hotel information and the registration can be done on the conference web site, LCWS12.org.

We look forward to welcoming you all in Arlington, Texas!

Jae Yu and Andy White, Co-Chairs
LCWS12 Local Organization Committee

PREPRINTS

ARXIV PREPRINTS

[1208.2890](#)

Prospects for the Measurement of the Higgs Yukawa Couplings to b and c quarks, and muons at CLIC

[1208.2827](#)

SAPPHiRE: a Small Gamma-Gamma Higgs Factory

[1208.2129](#)

Search for excited electrons through $\gamma\gamma\gamma$ scattering

[1208.2018](#)

Vibrational measurement for commissioning SRF Accelerator Test Facility at Fermilab

[1208.1521](#)

MSSM parameter determination via chargino production at the LC: NLO corrections

[1208.1507](#)

Determination of the CP parity of Higgs bosons in their tau decay channels at the ILC

[1208.1402](#)

CLIC e+e- Linear Collider Studies

DIRECTOR'S CORNER

A game plan for producing the ILC *Technical Design Report*

Barry Barish | 16 August 2012



The GDE Executive Committee at their face-to-face meeting in Melbourne. From the left, Toshiaki Tauchi, Gerry Dugan, Ewan Paterson, Nick Walker, Brian Foster, Mike Harrison, Maxine Hronek, Akira Yamamoto, Barry Barish, Mark Ross and Kaoru Yokoya. Steinar Stapnes was absent.

The GDE Executive Committee met in a two-day face-to-face meeting in Melbourne just following ICHEP12. The main order of business was to develop a detailed “game plan” for producing the ILC *Technical Design Report*.

The Global Design Effort (GDE) was created by the International Committee for Future Accelerators (ICFA) and its subcommittee, the International Linear Collider Steering Committee (ILCSC) to globally coordinate the worldwide R&D and design effort for a 0.5-TeV linear electron-positron collider based on superconducting radiofrequency (RF) technology. This followed a decision by ICFA to base the design of this companion machine for the LHC on superconducting RF technology, rather than the more conventional room-temperature technology. The culmination of that work is an R&D programme that

has demonstrated that the crucial technologies can meet the ILC performance requirements, and has produced a realistic design for realising such a global machine. The final deliverable for the GDE is a *Technical Design Report* (TDR) that summarises both the R&D accomplishments and presents a proposed design for the ILC.

The baseline for the ILC technical design was established last winter and all the resulting smaller technical decisions were made by the end of spring. Now it is the task of the GDE to document that design and also to make a report on the R&D accomplishments and future plans. Our plan is to produce a standalone two-volume accelerator report, one volume on the R&D programme and the other on the accelerator design. By standalone we mean that it will cover the entire programme with direct references to the backup materials on the Electronic Data Management System (EDMS) that has been developed for the GDE. There will be companion volumes on the physics and detectors, making a complete package that can be used as the basis for proposals to governments for a linear collider project.

The R&D volume will be an update of the [interim R&D report](#) that we produced last year. It will also address the ongoing and proposed future ILC R&D programme. The ILC accelerator design volume will present the design that has evolved since we produced the ILC [Reference Design Report](#) (RDR). The schedule is to complete both volumes of the TDR in advanced draft form to submit to the Project Advisory Committee (PAC) for their meeting on 13 and 14 December 2012 at KEK, where an augmented committee will begin the technical review process. In association with that meeting, there will be a public event in Tokyo immediately following the PAC meeting. An international cost review is also planned for the end of January and a report to the ILCSC in Vancouver on the TDR reviews and status in February 2013. Revisions from those reviews will be incorporated into the final versions of the TDR, which will be officially submitted to the ICFA at the Lepton Photon 2013 conference in San Francisco in June 2013.



Kaoru Yokoya happily reporting to the EC on plans for a public unveiling of the TDR in Tokyo in December.

John Carwardine is coordinating the effort to produce the TDR. A detailed outline, including page counts, has been agreed to and author responsibilities have been assigned for each section. The draft sections will then go through an editing process. Finally, each section will undergo a review by the GDE Executive Committee, where we have assigned two reviewers for each section and have already begun the review process on the early drafts that have been submitted. By having the EC participate in an ongoing review process, as the sections become refined, the final approval by the EC should be expedited. The EC will have a one-day face-to-face meeting in November to go over the final referee reports before approving the version that will be submitted to the PAC.



Mike Harrison, Ewan Paterson and Toshiaki Tauchi during the Melbourne EC meeting.

EXECUTIVE COMMITTEE | TECHNICAL DESIGN REPORT

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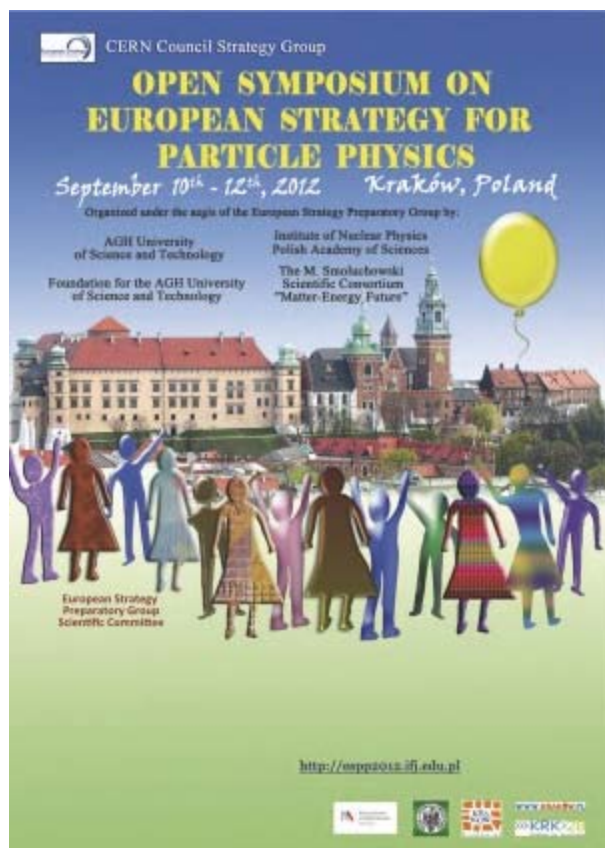
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RESEARCH DIRECTOR'S REPORT

Alea iacta est – the die has been cast

The update of the European strategy process for particle physics

Juan Fuster | 16 August 2012



The next meeting of the European Strategy for Particle Physics will be held in September.

This February, the CERN Council initiated the process to review the implementation of the 2006 European Strategy for particle physics. For that purpose a specific European Strategy Group was created with the aim of establishing a proposal for an update of the medium- and long-term European Strategy for Particle Physics. Tatsuya Nakada chaired this group. This proposal will eventually be submitted for approval to the CERN Council. Details of the process, members, mandate and timeline can be found on the group's [webpage](#).

On 31 July the period for accepting submissions on scientific issues was closed. All the collected materials will be discussed in an [Open Symposium](#) in Kraków in Poland from 10 to 12 September. The whole update process will include several steps until May/June 2013 when the new European Strategy will be adopted in a special session of the CERN Council in Brussels. It is also expected that the update of the Strategy will become an agenda item for the European Union Council of Ministers meeting to be held at the same time.

The linear collider community has submitted several documents analysing the physics case, the project's technological status and its maturity for the International Linear Collider (ILC) as well as for the Compact Linear Collider study (CLIC). These documents can be seen online for [ILC](#) and [CLIC](#).

The ILC submission to the European Strategy Process consists of seven documents. The first one is the cover letter, which shows the general characteristics of the ILC, including the description of the

accelerator, the detectors and the physics. This part places the ILC within a strategic overview of the field of particle physics over the next two decades, including possible upgrades and special running modes. The second document is a summary of the accelerator *Technical Design Report*. The following document is taken from the *ILC Project Implementation Planning* document and discusses the governance of the ILC project, its implementation, project management and schedule. The fourth document includes the physics case for a linear collider including the latest results from the LHC and the recent discovery of the Higgs-like particle. A committee chaired by Francois Le Diberder and composed of Jim Brau, Rohini Godbole, Mark Thomson, Harry Weerts, Georg Weiglein, James D. Wells and Hitoshi Yamamoto has compiled this physics case. The document constitutes a common submission from the linear collider community and it is endorsed by both the ILC and CLIC as it argues the physics case for a linear collider independent of the technology. The fifth and sixth documents set out the status, plans and prospects for the ILD and SiD detector concepts. Finally the seventh document summarises the spin-offs resulting from the detector R&D work.

These documents being presented to the European Strategy are the result of a tremendous common effort of the worldwide ILC community throughout many years to which the Europeans have contributed, but which they could never have achieved alone. This fact, while it may be obvious, should be recognised and credited. For instance, the physics case document uses many arguments and results developed in the *Physics at the International Linear Collider* report, which will be part of the ILC *Detailed Baseline Design* report that has been produced by Howard Baer et al. and coordinated by Michael Peskin.

Now that the die has been cast (*alea iacta est*), our project will be discussed by the broad particle physics community and it is our challenge to convince the rest of this community of the critical added physics value of the ILC. In connection to this general objective, finding the proper balance to make the task compatible with the LHC upgrade programme will be a major step forward, mainly but not only for Europeans. The whole ILC community should feel engaged in this discussion because its results surely will also have implications extending outside Europe.

[DETAILED BASELINE DESIGN](#) | [DETECTOR R&D](#) | [EUROPEAN STRATEGY FOR PARTICLE PHYSICS](#) | [TECHNICAL DESIGN REPORT](#)

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AROUND THE WORLD

Physics that goes bang

Barbara Warmbein | 16 August 2012



Accelerating 'electrons' – DESY's new accelerator show has the whole audience involved in the demonstration of how a cavity works. Image: DESY, Lars Berg

Picture an auditorium full of schoolkids. When they walk in, they know nothing about superconducting radiofrequency acceleration (and who would blame them). When they walk out, they're full of acceleration facts and have even been part of a radiofrequency wave that has accelerated an "electron" from one end of the auditorium to the other. How? It's all thanks to a new stage show about accelerators that is taking off in Germany this year. Called "[Renmmaschinen](#)", it targets schoolchildren of ages 12 and up. Its creators are former [particle slam buddies](#) and ILC veterans [Brian Foster](#)

and [Marc Wenskat](#).

This isn't the first accelerator show in the world; it is based on "Accelerate!", which Foster developed together with Suzie Sheehy, a student at Oxford University, before taking up a professorship in Hamburg.

"We really wanted to concentrate on particle acceleration rather than creating another physics show," says Marc Wenskat. "So we took over the best ideas from the Oxford show, included some of our own, wrote a script and got a team together." This team now consists of four PhD students or young researchers at DESY, two engineers who volunteered to build some of the show's things that go bang and fizz, and Foster as the head and the 'bank'.

So how do they explain [superconducting radiofrequency](#) to an auditorium of twelve-year-olds? First of all, the kids are asked to do an 'ole ole' wave, where one person stands up and throws his arms up in the air, then the person next to him, and so on so that a wave movement is created by the people in the rows. Once that is routine – it usually only takes two tries – a giant inflatable ball enters the scene. The ball is the electron, the ole ole movement the RF wave, and if you think it's easy keeping the ball on its path, ask the kids (or any ILC cavity).

Most parts of the show are deliberately interactive. The audience is on stage to deflect electrons in an old cathode-ray tube TV screen, explaining a 'household accelerator'; to dip a toy train into liquid nitrogen and set it off on magnetic tracks, explaining superconductivity; and even to set off the impressive Tesla coils that shoot off sparks and tiny flashes of lightning. All parts put together give them the basic ingredients for a particle accelerator, or at least an understanding for it. "Getting the kids involved is key to what they take home after the show. Teaching is one thing, but a hands-on experience has a much longer-lasting effect," explains Brian Foster. "Especially if there are bangs and flashes."



The team conceived the experiments and wrote the script themselves. Schools and organisations can book the show online. Image: DESY, Lars Berg.

The concept has been tested on several groups of children and is supposed to go on tour once the missing experiments, including a linear accelerator, have been built and the presentation design has been smartened up with some new custom-drawn cartoons. Schools and organisations can book it for free so that the show comes to them, rather than they to the show. It is also self-renewing: new presenters are added so that once the hosts have completed their research projects and move on to other places, the new hosts can take over. So, Wenskat, Foster and their team are constantly looking for new members. They are also currently looking for a coach for show hosting and comic timing. "I already know that accelerator physics is totally exciting, and I want to be able to get that across to the kids," says Wenskat.

The team wrote the show themselves and tried several options before arriving at the current one. They time the intervals between experiments and give each other clues as to when to say what, still leaving room for improvisation. "The time between the experiments is well defined though," says Wenskat. "The audience needs time to digest, we need time to explain, but the gaps should not be too long for the show to remain engaging and exciting. One show lasts roughly 50 minutes – a bit longer than a standard lesson at school, but with way more bangs and fizzes."

[ACCELERATOR](#) | [DESY](#) | [OUTREACH](#) | [SHOW](#)

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