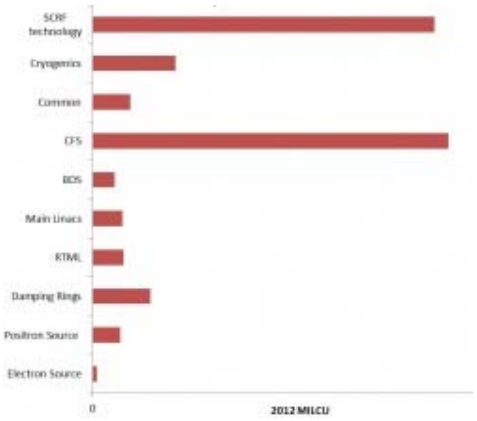
DIRECTOR'S CORNER

The cost estimate for the ILC's *Technical Design Report*

This week's issue features a Director's Corner from Gerry Dugan, Americas Region Cost Manager

by Gerry Dugan



The cost estimate for the ILC that will accompany the *Technical Design Report* is intended to be a credible, comprehensive, and well-documented presentation of the costs in a format which is useful for all regional partners. It will be a "Value" estimate, stated in "ILC Units" which are convertible to any regional currency, and in person-hours of institutional labour at the ILC laboratory, or at collaborating laboratories and institutions.

FEATURE

ILC physics and detector programme sees progress in Kyushu

by Rika Takahashi

Close to 80 scientists gathered at Kyushu University in Fukuoka, Japan for the ILD workshop held from 23 to 25 May. The workshop also drew interest from Japanese media, who attended press briefing and the tour around "the south site" for the ILC.

IMAGE OF THE WEEK

France, Japan and Korea cooperation in particle physics

Image: CNRS/Yannick Legré

For the first time, two internationally associated laboratories, the France-Korea Laboratory for Particle Physics and e-science and the France-Japan Particle Physics Laboratory (renamed Toshiko Yuasa Laboratory), jointly held their annual meeting, providing new opportunities for trilateral collaborations. More than 70 physicists gathered from 28-30 May at the Laboratoire de Physique Corpusculaire, in Clermont-Ferrand, France. Talks included overviews from the directors of KEK, KISTI, CEA/Irfu and CNRS/IN2P3 and a review of the latest results of the collaborative work on particle detector and accelerator R&D, astroparticle and neutrinos and grid computing.

IN THE NEWS

from ***La Montagne***
30 May 2012
Recherche sans frontières en physique des particules
…ces équipes travaillent d'ores et déjà à la création d'un nouvel accélérateur de particules en Asie « très certainement au Japon », ainsi qu'aux détecteurs qui y seront associés. Cet accélérateur de particules linéaire devrait venir compléter, au début des années 2020, les résultats du LHC…

from ***Iwanichi Online***
30 May 2012
ILC誘致 5.4兆円経済効果も～花巻商議所研修会 (ILC will have possible economic effect of 5.4 trillion yen)
誘致した場合の地域に与えるメリットについて「研究者とその家族、関連業者などを含めると　万人のスモールタウンと約　・　兆円の経済効果が生まれる見通し」と説明。

from ***IHEP***
25 May 2012
BEPCII/BESIII: one billion J/Psi events collected in 40 days
The Institute of High Energy Physics announced that till 4: 00 PM, May 22, 2012, BEPCII/BESIII has accumulated one billion J/Psi events during the past run, which is a significant and new milestone for BEPCII/BESIII.

from ***New Scientist***
24 May 2012
Crisis averted: Dark matter was there all along
Fans of dark matter can rest easy. A study published last month raised eyebrows by suggesting that our cosmic neighbourhood is empty of the extra mass needed to hold the galaxy together. But a re-analysis shows that the dark matter was there all along.

from ***INFN***
24 May 2012

Research on neutrinos and dark matter, youth education, and particle accelerators: INFN-IHEP's virtual Institute in Beijing

The National Institute for Nuclear Physics (INFN) and the Beijing Institute of High Energy Physics (IHEP) entered a collaborative research and youth education agreement. This collaboration will be included in the agenda of the Italian Minister for Research and Education Francesco Profumo's China visit in June.

CALENDAR

UPCOMING EVENTS

15th International Conference on Calorimetry in High Energy Physics (CALOR 2012)
Santa Fe, New Mexico
04- 08 June 2012

36th International Conference on High Energy Physics (ICHEP2012)
Melbourne, Australia
04- 11 July 2012

UPCOMING SCHOOLS

The 2012 European School of High-Energy Physics
Anjou, France
06- 19 June 2012

View complete calendar

PREPRINTS

ARXIV PREPRINTS

1205.5676
Two Higgs Bi-doublet Model With Spontaneous P and CP Violation and Decoupling Limit to Two Higgs Doublet Model

1205.5292
A feasibility study of the measurement of Higgs pair creation at a Photon Linear Collider

ANNOUNCEMENTS

SiD Detector Concept Workshop at SLAC

The SiD Detector Concept for the ILC will hold its next workshop at SLAC National Accelerator Laboratory, 21-23 August 2012. The main purpose of the workshop will be to review the first draft of the SiD Detailed Baseline Design (DBD) due to be completed by December 2012. It will also include a review of the status of ongoing detector R&D, reports on physics benchmark studies, updates on the ILC accelerator and facilities development, and discussion of future plans for the concept. In addition, we'll discuss future cooperation between SiD and the CLIC detector team, review ongoing efforts to provide support for future lepton collider detector studies in the US, and discuss SiD's future beyond the DBD. The sessions will take place in the Kavli Auditorium on the SLAC campus.

Programme and registration soon available

NB: the workshop immediately precedes the celebration of SLAC's 50th Anniversary on 24-25 August

ilc newsline

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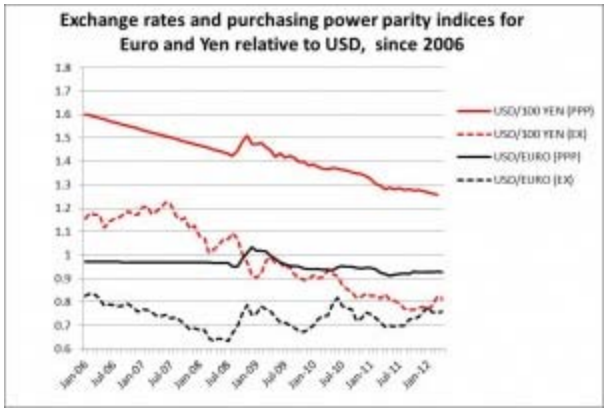
Gerry Dugan | 31 May 2012



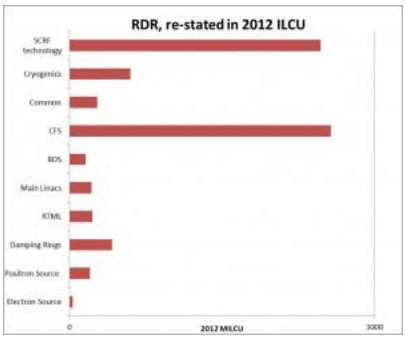
Exchange rates and purchasing power parities. Source: OECD

The cost estimate for the ILC that will accompany the ILC *Technical Design Report* (TDR) is intended to be a credible, comprehensive, and well-documented presentation of the costs associated with the ILC design as described in the TDR. To provide the cost information in a format which is useful for all regional partners, the estimate is a "Value" estimate, stated in "ILC Units" (ILCU) which are convertible to any regional currency, and in person-hours of institutional labour at the ILC laboratory, or at collaborating laboratories and institutions.

The first challenge for the value estimate is converting cost estimates from different regions and currencies into a common ILCU. For the *Reference Design Report* (RDR), the ILCU was defined as equal to 1 USD on 1 January 2007, and was related to other regional currencies (Euros and Yen) based on an average of exchanges rates over the preceding few years. However, in general, and particularly in times of wide fluctuations in monetary supplies related to financial crises, exchange rates do not necessarily represent true comparative prices between items manufactured in different regions of the world. International economists have introduced the concept of "purchasing power parity" (PPP) to deal with this issue. Compiled through extensive surveys by the research arm of the Organization for Economic Co-operation and Development (OECD), PPP indices are price relatives that show the ratio of the prices in national currencies of the same good or service in different countries.

Thus, for the TDR, the "2012 ILCU" will be defined as equal to 1 USD on 1 January 2012, but the relation of the ILCU to Euros and Yen will be based on PPP indices (as of January 2012: see figure above). The use of PPP indices, while not entirely free of difficulties, offers the best way to state the TDR estimate as a region-independent value estimate. It also provides regional users of the cost estimate, seeking to assess the local resource requirements for in-kind contributions, with a way to translate components of the estimate into local currencies which is not dependent on exchange rates.

With this definition of the 2012 ILCU for the TDR, the RDR estimate can be re-stated in these units by escalating the elements of the RDR cost estimate from 2007 to 2012, based on regional escalation indices, and converting to 2012 ILCU. The resulting breakdown of the escalated RDR is shown in side figure. This would be the TDR estimate if the TDR design and cost basis were identical to that of the RDR.



ILC Reference Design Report cost, re-stated in 2012 ILCU. The costs for the area systems are for conventional technical systems only. Image: 2007 ILC RDR

Of course, there have been major changes to the RDR design since 2007, which have resulted in a TDR design which is more cost-optimised. In addition, R&D and design work since 2007 has improved the scope and reliability of the cost basis. New and

more detailed site designs and cost estimates have been developed for the conventional facilities in Asia, the Americas, and Europe, with more extensive use of contractor estimates than was possible for the RDR. New designs for the L-band high-level radiofrequency (RF) modulators and pulse distribution systems have been developed, and new estimates are available for the multi-beam klystrons. Much experience has been gained throughout the world in cavity fabrication and processing, and in cryomodule fabrication and assembly, in particular for the European XFEL. The net result of all this new information is that we expect about 70% of the TDR cost estimate to have a new cost basis. For the remaining 30%, we will use the RDR cost basis, with quantities modified as appropriate based on the TDR design.

For the TDR, the conventional facilities design in each region is adapted to the specifics of each regional site. Differences in site characteristics and constraints have led to rather different designs for the conventional facilities (and for some of the technical systems) in Asia, as compared to the Americas and Europe. These design differences naturally have different costs, which poses a problem, since the Global Design Effort goal is to produce a single cost estimate for the TDR. This single estimate will be an average of the estimates from the three regions; the sources of the variance from region to region will be clearly explained in the TDR.

The technical progress in cavity and cryomodule development since 2007 has been enormous, which naturally leads to an improved understanding of the costs. In addition, experience from the construction of the European XFEL, now underway, provides an invaluable source of cost information. However, the ILC project has substantial scale, and the numbers of superconducting radiofrequency (SCRF) components required are much larger than for any previous project. Economies of scale in the production of these systems must be exploited to manage the project costs well. To estimate these economies, we have initiated a number of industrial studies (at least one in each region) with firms which have experience in cavity fabrication or in mass production. These studies are not yet complete, but the preliminary results indicate that substantial reduction in the unit costs, even from those for European-XFEL-scale quantities, are possible.

Adoption of a realistic model for the procurement, acceptance and testing of elements of the superconducting technology is also a key issue. The model must be consistent with the vision of the project as a world-wide collaboration incorporating in-kind contributions from industries and laboratories in many regions. The model must also strike the proper balance of risk reduction versus cost mitigation. The way in which these general principles are realised in a specific procurement model for ILC SCRF components will be developed over the next few months.

At a more technical level, there will also be major changes from the RDR. All elements of the TDR estimate will be formatted in custom-designed Excel spreadsheets which are created by a set of Windows scripts called the ILC Cost Estimating Tool (ICET). The custom spreadsheets contain all the cost information, including uncertainty estimates, and each line item of the estimate can be tagged and linked to basis-of-estimate documentation stored in EDMS. ICET creates a cost-WBS structure from the input spreadsheets, and also allows the estimate to be loaded into a database. Reports can be run on the database to detail the estimate by cost-WBS element, and cross-cuts can also be generated using the line item tags. These features, together with the links to the detailed basis-of-estimate documents, are intended to make it as easy as possible for future reviewers and users of the estimate to obtain detailed project cost information.

COST ESTIMATE | ILC UNITS | TDR

FEATURE

ILC physics and detector programme sees progress in Kyushu

Rika Takahashi | 31 May 2012

Japanese press attending the site tour in Kyushu area. Image: GDE/R. Takahashi

On 22 May, a small room at Kyushu University's Hakozaki campus was crowded with journalists and local officials of the Kyushu area. A press briefing was held one day before the starting day of lively discussions on one of the detector concepts for the International Linear Collider, the ILD workshop.

"I appreciate the media's interests in the ILC activities in Kyushu area," said Kiyotomo Kawagoe, professor at Kyushu University, who acts as a chair of the organising committee of the ILD workshop, and also a speaker of the press briefing. Despite the very short notice, many reporters and TV crews gathered to listen to the lectures about the ILC.

Kawagoe started the press briefing by introducing the ILC, giving the basic information such as size and energy, and the importance of the research to be done at the ILC.

Tetsuro Esaki, professor by special appointment at Kyusyu University in geological investigation, followed Kawagoe. Esaki, who has broad experience and expertise in geological research, will oversee the detailed site study in Kyushu area, after the contract research agreement between Kyushu University and KEK has become effective. This contract is expected to be signed in a few weeks.

"The geology in the Kyushu area has been surveyed many times at many places for various purposes, such as train tunnel constructions, hot-spring trial borings, or underground power plant construction," Esaki said. Scientists and local affiliates have made investigations with the help of a lot of accumulated data and additional field investigations around the Kyushu site. "We conclude that the geological characteristics around the planned ILC site are pretty suitable for the ILC," said Esaki.

KEK received an additional appropriation from the government early this year to conduct geological investigations for two ILC candidate sites in Japan. Kyushu University will be responsible for the site investigations on the so-called "south site." There are two candidate sites for ILC construction in Japan, one in Iwate prefecture, in the northeast area of Honshu island ("the north site"), and the south one that sits across the border between Fukuoka and Saga prefectures in Kyushu island.

“I have done many geological investigations, but this will be the toughest case,” Esaki said. They will need to investigate over 500 square kilometres in Fukuoka and Saga. “It is pretty unusual to investigate such a huge area in short time with rather smaller budget.” They will compile the date from this investigation and put the report together by the end of March 2013. “We consider this investigation as a primary one, and hope to have secondary and tertiary investigation to follow,” Esaki said.

Following the press briefing, journalists and researchers were given a tour around the planned ILC site. Over 70 people including 56 researchers form Japan and overseas were divided into two buses. Their first stop was the Tenzan underground power plant, a pumped-storage power generation built 500 metres underground. Visitors went down to the underground cavern through the tunnel. If the ILC will be built in a mountain area, scientists might reach the ILC accelerator tunnel in a similar fashion. Tour attendees actually hit the bedrock with hammer and checked the hardness of the rock.

A scientist hitting the bedrock in the tunnel of Tenzan power plant. Image: GDE/R. Takahashi

With many newspaper articles about ILC published in the morning (see last week’s issue of NewsLine) the ILD workshop started on the next day, and successfully finished on 25 May.

Originally, the ILD workshop had been supposed to take place at KEK last year, but the venue for that meeting was changed to Paris due to the major earthquake. “This workshop was an impressive one for me, because it was the first ILD workshop held in Japan after the earthquake,” said Kawagoe. “The broad media coverage was also impressive. I will show the recorded TV news in the workshop!”

Scientist saw lots of progress on ILD in the workshop. They actually see that the content of Detailed Baseline Design report, which they are planning to publish early next year, is becoming clearer and clearer. Many open issues from Paris meeting were resolved, or became close to resolution. But they are also behind schedule in some areas. Ties Behnke from DESY, Germany, stated in his closing talk that “if we make a coherent effort we can finish a very good DBD in time!”

CANDIDATE SITES | ILD | JAPAN