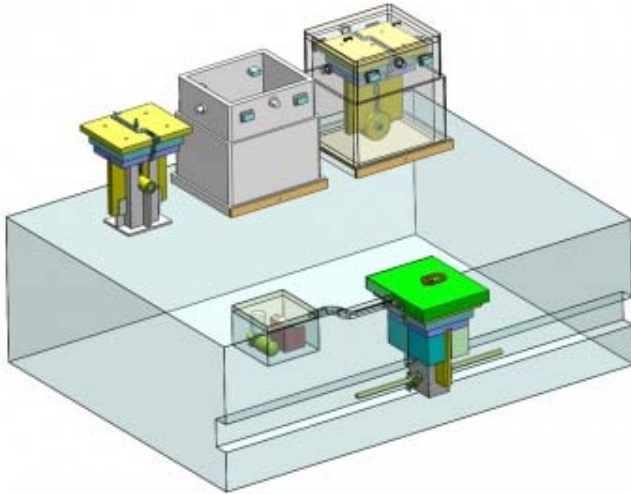


FEATURE



ILC positron target benefits from Chinese technology

by Qian Pan

A group of Chinese scientists, headed by Xuejun Jia from the Institute of Physics of the Chinese Academy of Sciences, recently finished the design of the remote handling of the ILC positron target. The target forms part of the positron source and is the place where positrons are produced and then accelerated before they collide with their antiparticles, the electrons.

AROUND THE WORLD

Report to build a new international science city presented

by Rika Takahashi



On 30 July, a report called "Science Frontier Kyushu" was presented in the eighth meeting of a study group in Kyushu, the southernmost island of Japan. This report is indicative of the prefectures' aim in urban development to build a new international science city, which could be a hub of science research in the 21st century.

DIRECTOR'S CORNER

A crucial technical review

by Barry Barish



In May, the GDE underwent its most recent technical review, just before embarking on the task of assembling the Technical Design Report (TDR). The review covered the status of the key ILC R&D, the TDR baseline, the outline and plans for the TDR, and a look to the future.

IN THE NEWS

from **BBC**

1 August 2012

[Higgs boson results from LHC 'get even stronger'](#)

The Higgs boson-like particle whose discovery was announced on 4 July looks significantly more certain to exist.

from **physicsworld.com**

26 July 2012

[Planning the world's next collider](#)

Having led the construction of CERN's Large Hadron Collider (LHC), where researchers recently announced the discovery of a particle that looks like the Higgs boson, Lyn Evans was appointed as the first ever linear collider director by the International Committee for Future Accelerators in June.

CALENDAR

UPCOMING EVENTS

[SiD Workshop](#)

SLAC

21- 23 August 2012

[6th International Workshop on Semiconductor Pixel Detectors for Particles and Imaging \(PIXEL2012\)](#)

Inawashiro, Japan

03- 07 September 2012

[POSIPOL 2012](#)

DESY, Zeuthen

04- 06 September 2012

[XXVI International Linear Accelerator Conference \(LINAC 12\)](#)

Tel-Aviv, Israel

09- 14 September 2012

[CERN Council Open Symposium on European Strategy for Particle Physics](#)

Crakow, Poland

10- 13 September 2012

[12th International Workshop on Accelerator Alignment \(IWAA 2012\)](#)

Fermilab

10- 14 September 2012

[CALICE collaboration meeting](#)

Emmanuel College, Cambridge, UK

16- 19 September 2012

[5th International Workshop on Top Quark Physics \(TOP 2012\)](#)

Winchester, UK

16- 21 September 2012

[View complete calendar](#)

ANNOUNCEMENTS

Submissions to European Strategy Process

The European Strategy for Particle Physics will be discussed in Cracow, Poland, in early September. The input for the strategy process for both the ILC and CLIC are now online and can be found [here](#) for the ILC and [here](#) for CLIC. The physics case for an e+e- linear collider (for both ILC and CLIC) can be found [here](#).

PREPRINTS

ARXIV PREPRINTS

[1207.7061](#)

Radiative type-I seesaw model with dark matter via $U(1)_{B-L}$ gauge symmetry breaking at future linear colliders

[1207.6471](#)

Radion production in gamma-electron collisions

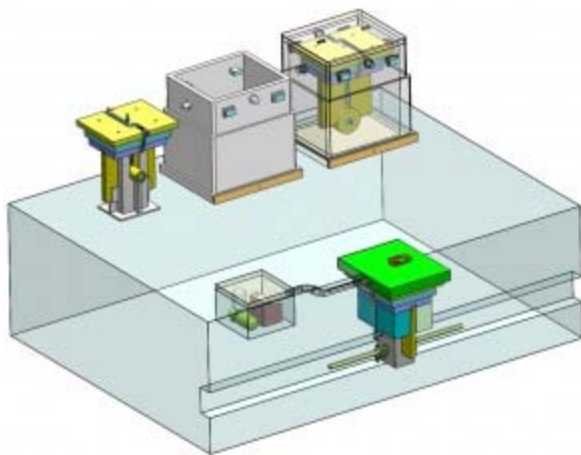
[1207.6234](#)

Sneutrino Identification in Lepton Pair Production at ILC with Polarized Beams

FEATURE

ILC positron target benefits from Chinese technology

Qian Pan | 2 August 2012



General layout of the positron target's remote handling concept

A group of Chinese scientists, headed by Xuejun Jia from the Institute of Physics of the Chinese Academy of Sciences, recently finished the design of the remote handling of the ILC positron target. The target forms part of the positron source and is the place where positrons are produced and then accelerated before they collide with their antiparticles, the electrons.

As part of the ILC *Technical Design Report* (TDR), the remote handling design aims to settle the challenge of maintenance of the ILC positron target. For the target station design in China's Spallation Neutron Source (CSNS) Project, the target team chose an all-horizontal target arrangement. The horizontal trolley that contains most of the active components in a single assembly can easily be retracted into the target's remote handling cell. It also reduces the complexity of the shielding and reduces the need for overhead handling.

"While referring to those remote maintenance experience and techniques adopted in the CSNS Project, we started a detailed calculation on radioactive sources, protection and shielding for the ILC project and then finished the design for remote handling system of ILC positron target," introduced Xuejun Jia, professor at the CSNS experimental system.

Before Jia and his teammates joined in the design work, experts from Britain and America proposed a [preliminary design](#). Since it stayed in a very initial stage, the design was comparatively sketchy and complicated. In Jia's design, a long and expensive shaft and a pre-designed hot-cell were no longer needed. These new improvements have led to a reduction of construction cost, which could be about \$30-40 million. "We did not minimise the budget; exactly speaking, we made a more precise calculation."

Because of the radiation damage, the ILC target is designed to have a limited lifetime of one year, and must be exchangeable within a reasonable time. Remote operations are always conducted in environments that are either hostile or inaccessible to humans, since it is clear that any problems encountered during operation has the potential to cause very serious and expensive delays. Handling requirements on every component have to be considered on a case-by-case basis. When it comes to remote handling, issues to be considered during the conceptual and detailed design of a component as well as its direct environment includes the expected lifetime of the component and frequency of handling, size and weight of the component, handling areas, etc. In most cases the basic driver is the expected lifetime or end-of-life mode of the addressed component.

Jia's participation in ILC project happened after his meeting with Wei Gai in late 2011, the Global Design Effort (GDE) positron technical area group leader. "I was just looking for an expert team to complete the remote handling design for the ILC positron target. Things happened at the time when I visited the Institute of High Energy Physics (IHEP). I had a chance to meet with the

CSNS people and invited Prof. Jia's team to finish the remote handling design for us. It turned out that they did an excellent job and this is also a very good example of how Chinese scientists make a direct contribution to an international project," Gai said.

At present, the actual writing of the *Technical Design Report* on remote handling for ILC positron target has been completed. Jia expressed his willingness to continue being involved in ILC construction work. He added: "The ILC is a huge international project, and we are thrilled to see that more and more Chinese scientists starting to contribute to this project. Apart from remote handling, we can exert our experience and techniques on facility protection and shielding in future ILC construction. As soon as more Chinese scientists participate in the ILC project, they will call for our government to take a more active role in the ILC project, and in the end a beneficial cycle would be built in China's scientific environment."

[CHINA](#) | [POSITRON SOURCE](#) | [POSITRON TARGET](#) | [REMOTE HANDLING](#)

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AROUND THE WORLD

Report to build a new international science city presented

Rika Takahashi | 2 August 2012



Yasushi Furukawa, governor of Saga prefecture, giving an opening address at the eighth meeting of the ILC study group

With the completion of the *Technical Design Report* just around the corner, activities surrounding the International Linear Collider have intensified in Japan. On 30 July, the eighth meeting of a study group in Kyushu, the southernmost island of Japan, was held in Saga prefecture.

The study group was established in 2007 to study the value and role of basic science research, its importance and its spin-off effects, with next-generation accelerators as the group's primary subject through collaboration between industry, educational institutions and the administration in Kyushu area. Originally, this study group was lead primarily by Fukuoka and Saga prefectures. Since last January, the study group has expanded its activities to seven prefectures.

The main purpose of the meeting was to raise awareness of the value of basic science and to disseminate word about the ILC. The Sefuri

mountains, one of the ILC candidate sites in Japan, straddles Fukuoka and Saga prefectures on Kyushu island.

In the group's recent meeting, Nobuo Mishima, associate professor in urban engineering at Saga University, presented a report called "[Science Frontier Kyushu](#) ."

This report was prepared by two prefectures' local governments, Kyushu Economic Federation, Kyushu University and Saga University. The effort is indicative of the prefectures' aim in urban development to build a new international science city, which could be a hub of science research in the 21st century.

With their rich history, cultural diversity, and academic and industrial assets, the prefectures plan to invite the ILC as a core laboratory for their future international science city. In the report, following three visions are delivered:

1. *Development of human resources, which will be active internationally*
2. *Contribution to the innovation of a new era*
3. *Urban development to build an international city that uses various existing resources*

Mishima introduced the 90 meeting attendees to the high-energy physics laboratory from the non-physicist's point of view. He said that high-energy labs in the world won the confidence from community residents because they actively disclosed information and provided an opportunity to visit the facilities. He said that these labs have given rise to local pride.

He also pointed out issues that need to be addressed, such as the improvement of a system to accept foreign nationals, provision of present living climate or regional facilities. If Kyushu hosted the ILC, the prefecture would need housing, schools, and hospitals

to provide untroubled living conditions for foreign researchers and their families. They would also need to provide various vocational benefits such as insurance and pensions, as well as visas. "The ILC would become an international infrastructure that could sustain the or era of a shrinking world," Mishima said. "I expect the ILC to provide a spark for national and regional pride and dreams."

The meeting also included two other talks and a visit to accelerator facilities in the Kyushu area. Kiyotomo Kawagoe, professor at Kyushu University, explained for attendees the LHC experiment and the recent discovery of the Higgs-like particle.

Mitsutaka Kanazawa from SAGA HIMAT (Heavy Ion Medical Accelerator in Tosu), the first privately founded heavy-ion beam therapy facility in Japan, also addressed attendees. They visited the ion therapy facility, which will begin operations next spring.

Enthusiasm for the ILC in Kyushu goes beyond government officials; it also extends to educators. In the opening speech of the meeting, Yasushi Furukawa, governor of Saga prefecture, introduced the prefecture's educational programmes to meeting participants. Saga prefecture sends a delegation of high-school teachers to CERN every year. It so happened that this year's programme was held from 1 to 21 July, during the time that LHC made its particle discovery announcement. "They were so happy to arrive upon the historical moment of the discovery of new particle," Furkawa said. "I was a bit envious to hear their report."

The report "Science Frontier Kyushu" will be used for policy proposals to the Japanese government.

[JAPAN](#) | [KYUSHU](#) | [SITING](#)

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DIRECTOR'S CORNER

A crucial technical review

Barry Barish | 2 August 2012

Scientific oversight for the ILC Global Design Effort (GDE) is provided by the International Linear Collider Steering Committee (ILCSC), a subcommittee of the International Committee for Future Accelerators (ICFA). The ILCSC has appointed a panel of accelerator experts to review and monitor the technical progress of the GDE, as well as that of the experimental programme. This Project Advisory Committee (PAC) has met twice per year to assess our technical progress, since we began our work toward an ILC technical design. The PAC's last review was carried out in May, before we began to write the *Technical Design Report* and therefore represented an especially important review of our status and readiness. I give the key findings of that review today, along with my annotated comments.

- *The PAC feels that the GDE work is progressing well, and will lead to a valuable, high quality, TDR; keeping up the momentum afterwards is recognized as being significantly more difficult.*



Lyn Evans, chair of the Project Advisory Committee, during the review

This overall conclusion provides validation that we are ready to proceed with the TDR, based on the baseline design we presented to the PAC. Keeping up the momentum following the TDR is a separate issue and I will be addressing over the coming months.

- *The R&D still needed is in general aligned with the needs of the major labs, particularly DESY and Fermilab. A concern is that R&D on high-gradient cavities, particularly in the U.S., may not be supported at the ILC-needed level.*

This comment is particularly important to the future R&D programme during the interim period, awaiting LHC results and prior to project approval.

- *Currently, the cavity yield at goal gradient is ~ 80%, rather than the desired 90%. The PAC encourages continued R&D on this after submission of the TDR.*

We set a goal of 90% yield in producing cavities, in order to be ready to cost-effectively produce cavities for the ILC. A focus of the ongoing work following the TDR will be to keep working towards being able to reliably produce high-gradient cavities. This will require systematic studies to define a cost effective process that can be used by multiple qualified vendors.

- *The Committee is concerned that cavity tuners have not reached the ultra-high level of reliability required for the ILC; the PAC recommends more study and a focused program to achieve the necessary reliability.*

This is the most substantive technical comment made by the PAC in this review. We are entering into a study to define the requirements for the cavity tuners, required to achieve the desired accelerator reliability. We will report the results of these studies at the next



Akira Yamamoto, GDE Project Manager, discussing the cavity tuner design with the PAC

meeting of the PAC in December.

- *The need to work on design for a mountainous topography site as well as a relatively flat site is being handled by the GDE as well as can be expected, and needs to continue to TDR completion.*

We have adapted our baseline design to the different candidate sites, in particular mountainous sites like in Japan and flat sites like at Fermilab or near CERN. This presents complications of not presenting a single detailed design and costing, but will give more useful design information for whatever site is chosen.

- *It is important to maintain the DESY cavity database, and the Committee appreciates DESY's support of this.*

The creation of a common database, originally started at DESY and later extended by the GDE for all the high-gradient cavity work around the world, has enabled quantitative comparison and compilation of results (read also [Global effort for high-gradient ILC SCRF cavities](#) and [One sheet to plot them all](#)).

- *The FLASH and CesrTA studies have been of very high quality, and are essential to the design of the ILC.*

The FLASH studies represent our first real systems tests with beam and the results are crucial to establishing the reality of the ILC design. This work is a precursor of future systems tests that will be carried out at Fermilab and KEK, in the post-TDR era.

- *The PAC is impressed with the costing effort, which appears to be using all available information. Based upon LHC experience, the Committee advises not to use a single vendor for any large production order, even if the single-vendor price is lower than using multiple vendors*

Since we only recently established the TDR baseline, the costing is still not fully available, but Gerry Dugan, the GDE cost leader, reviewed the methodology, progress to date, and plans for completing the costing. It is encouraging that the PAC was impressed with the costing. The PAC also gave sound advice on multiple versus single vendors for the costing and the project.

Overall, this PAC review substantiates our readiness to complete the TDR. That is now our main activity and our schedule is to have a very good draft TDR to submit to the PAC for review at their next meeting at KEK in December.

[ACCELERATOR R&D](#) | [CAVITY YIELD](#) | [HIGH-GRADIENT CAVITY](#) | [PAC](#) | [TECHNICAL DESIGN REPORT](#)

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