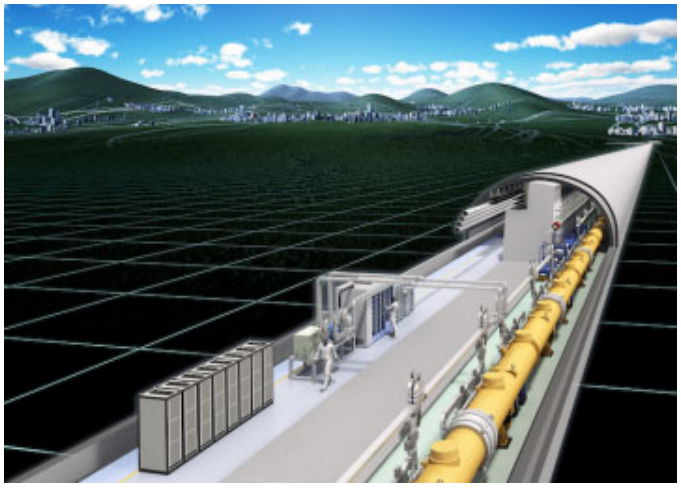
ilc newsline

DIRECTOR'S CORNER

Unite behind the ILC now

by Geoffrey Taylor

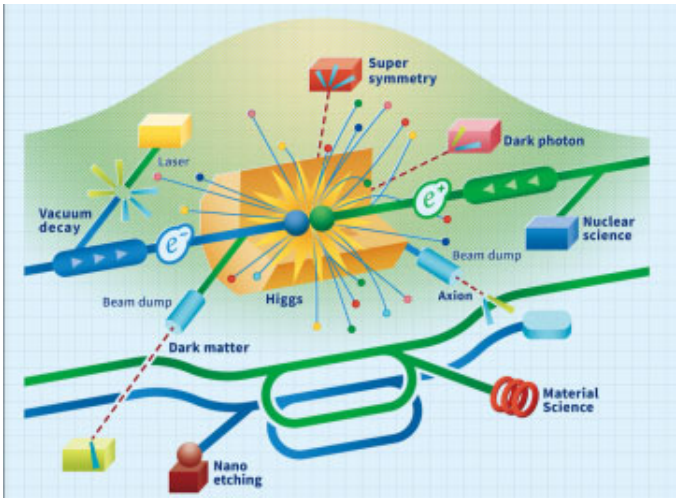


Asian countries are highly engaged internationally and Asian scientists continue to be at the forefront of international science. With the ILC, the International Linear Collider, Asia has the opportunity to host the most significant global collider in the coming decades.

ANNOUNCEMENTS

ILCX: hybrid or fully online

by Hitoshi Murayama

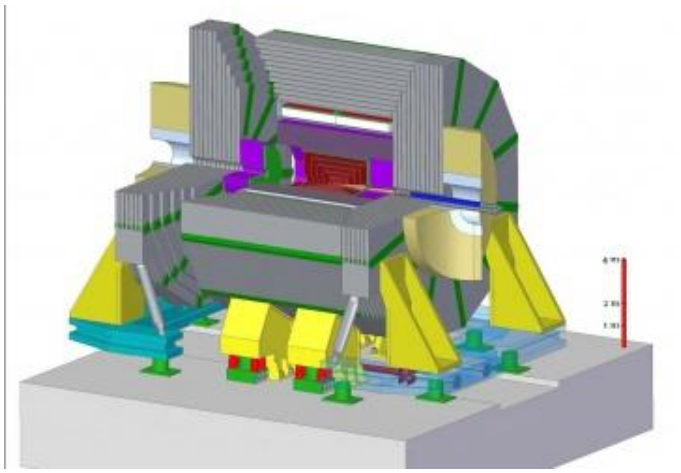


Now is the time to dream up for new ideas of experiments at the ILC facility! Register for the ILC Workshop on Potential Experiments (ILCX2021) from 26 to 29 October 2021, which will be held either in the hybrid mode or fully online.

ANNOUNCEMENTS

Invitation to join the SiD Consortium for the ILC

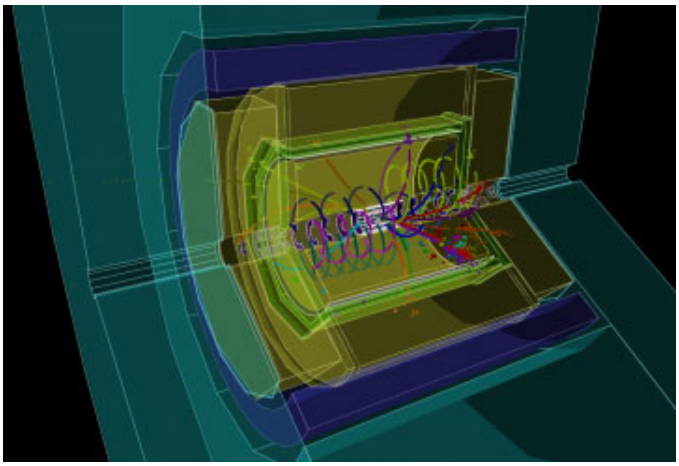
by Andy White and Marcel Stanitzki



FEATURE

Ready to take the next step

by Barbara Warmbein



The ILD detector is one of two detector proposals at the ILC, that take turns in taking collision data and look for exciting insights through precision studies of the Higgs, heavy flavor

The SiD Consortium is very open to new ideas and new colleagues who would like to contribute to our detector and physics studies and to push technology forward. We welcome participation from physicists at all levels. Join us!

physics and searches for new physics. ILD has just undergone a thorough five-year concept revisit and development and is now even better and more ready for the next step than before, its international team of designers says.

IN THE NEWS

from *Scientific American*
July 2021
Plasma Particle Accelerators Could Find New Physics
Many scientists support a plan to build the International Linear Collider (ILC), a straight-line-shaped accelerator that will produce collision energies of 250 billion (giga) electron volts (GeV). Though not as powerful as the LHC, the ILC would collide electrons with their antimatter counterparts, positrons—both fundamental particles that are expected to produce much cleaner data than the proton-proton collisions in the LHC.

from *Iwate Nichi Nichi*
10 July 2021
2部門作品募る　いわてマンガ大賞
岩手県は、第11回「いわてマンガ大賞」コンテストの概要を発表した。本県を題材にしたオリジナル作品で、一般と1～4コマの2部門で募集している。締め切りは9月21日必着。題材例は「岩手の食」や伝統工芸、郷土芸能、新しい生活様式、本県への誘致実現を目指す次世代の大型加速器「国際リニアコライダー（ILC）」など。

from *Iwate Nichi Nichi*
23 June 2021
来月下旬に仮契約　NEC跡地取得　一関市、臨時会議提案へ
一関市は22日、JR一ノ関駅東口に近接するNECプラットフォームズ一関事業所跡地（同市柄貝、以降NEC跡地と表記）の取得に向けた今後のスケジュールを市議会に示した。7月上旬に同社と契約条件を確定後、同社取締役会の決定を経て同下旬に仮契約を結ぶほか、勝部修市長が8月上旬の開催を請求予定の市議会臨時会議に財産取得議案を提出する。次世代の大型加速器「国際リニアコライダー（ILC）」関連や貸しオフィスなどに活用する第2、3工場の改修工事に着手する準備も進める。

from *SAKISIRU*
22 June 2021
物理学で世界をリード！日本がILCを誘致すべき3つの理由
世界中の物理学者がいま、日本のリーダーシップを熱望している。素粒子物理学の国際プロジェクト「国際リニアコライダー（ILC）」だ。これが日本にできれば、世界中から多くの研究者や技術者が集う国際研究都市が日本に出現することになる。ILC計画の実現を目指す物理学者らの国際推進チームは、今月、その前身となる準備研究所（プリラボ）の提案書を公表した。日本政府の正式誘致表明が熱望されているILC計画とは、一体どのようなものなのか。

from *The Daily Gallaxy*
19 June 2021
“The Last Holdout” –LHC Scientists See a Gateway to the ‘Dark-World’
These Higgs factories will include the International Linear Collider (ILC) under consideration in Japan and the Compact Linear Collider (CLIC) at CERN, while the other two are circular: the Future Circular Collider (FCC-ee) at CERN and the Circular Electron Positron Collider (CEPC) in China.

from *Iwate Nippo*
3 June 2021
世界の研究機関と提携　ＩＬＣ準備研提案書、日本に本部設置
国際リニアコライダー（ＩＬＣ）計画の実現を目指す「国際推進チーム」は２日、前身となる準備研究所の提案書を公表した。２０２２年に設立し、世界各国の加速器研究所とパートナーシップを結び、物品や技術の提供を得て運営。法人格を持つ独立した組織とし、日本に本部を置く。

PREPRINTS

27 JULY 2021

2107.12789
Electroweak baryogenesis via bottom transport: complementarity between LHC and future lepton collider probes

2107.12730
Dark matter searches with mono-photon signature at future e+e− colliders

2107.11194
Sensitivity of future e+e− colliders to processes of dark matter production with light mediator exchange

2107.03398
Asymmetric Dark Matter May Not Be Light

2107.02031
Time-of-flight estimation by utilizing Kalman filter tracking information — Part I: the concept

2106.16029
Parameter dependence of the neutral Higgs boson production and decay in the two Higgs doublet model

2106.11105
Sensitivity to Triple Higgs Couplings via Di-Higgs Production in the 2HDM at e+e- Colliders

2106.09278
Precision Higgs Measurements at the 250 GeV ILC

2106.02846
Probing heavy charged fermions at e+e− collider using the Optimal Observable Technique

2106.00819
SiD Simulation & Analysis for ILC Snowmass Physics LoIs

2106.00602
Proposal for the ILC Preparatory Laboratory (Pre-lab)

2106.00074
Photon Masks for the ILC Positron Source with 175 and 250 GeV Electron Drive Beam

2105.14340
Resolving a challenging supersymmetric low-scale seesaw scenario at the ILC

2105.14008
Designing a Plasma Lens as a Matching Device for the ILC Positron Source

2105.13768
New physics searches at the ILC positron and electron beam dumps

ilc newsline

DIRECTOR'S CORNER

Unite behind the ILC now

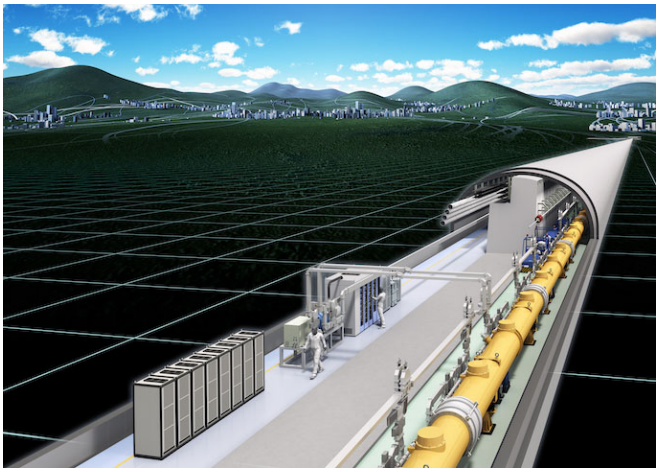
Geoffrey Taylor | 27 July 2021

There is no United States of Asia, nor an AU (an Asian version of the EU), nor is there any likelihood of such a union. However, Asian countries are highly engaged internationally and Asian scientists continue to be at the forefront of international science.

There is no prospect of an Asian equivalent of CERN. And yet national particle physics facilities in Japan and China, and to a lesser extent in India and Korea, have achieved world-class capability and achievement.

With the ILC, the International Linear Collider, Asia has the opportunity to host the most significant global collider in the coming decades. Such a facility in Asia would be a scientific statement to match the economic strength of the region.

And yet there remains a notable lack of unified, multi-national action to make the ILC happen.



Artist's impression of the ILC. (Image: Rey.Hori)

The ILC will not be a national facility. The challenge is for the international high-energy physics community to push, both within the science community and via our governments, for our next big machine.

The large Asian groups have been collaborating both within their nations and, importantly, in the very large experiments at CERN and DESY in Europe, and at Fermilab, SLAC, and Brookhaven National Laboratory in the US. Key facilities such as KEKB/SuperKEKB and K2K/T2K/T2H in Japan and BEPC in China have seen very significant international participation, the latter arising out of a formal and very important US-China program from the 1980's.

The benefits of international collaboration are manifold. Driven by the science and with many major associated benefits including technology advances and industrial exploitation, the sharing of experience and culture amongst young researchers from all corners of the globe, the government-to-government interactions and cooperation, high energy physics has a proud history of cooperation and development.

Industrial exploitation

The cooperation between nations in particle physics, even when going through political and strategic tensions, has been accoladed at the UN and beyond. The ILC is the next global opportunity for high energy physics to foster such cooperation and partnership.

For the nations of Asia the global ILC will be in our own "backyard"

Can this unique opportunity be converted into a reality for science and society for the coming decades? Yes, but only if we unite behind the ILC now, and convince all our governments of its unique benefits.

ilc newsline

ANNOUNCEMENTS

ILCX: hybrid or fully online

Hitoshi Murayama | 27 July 2021

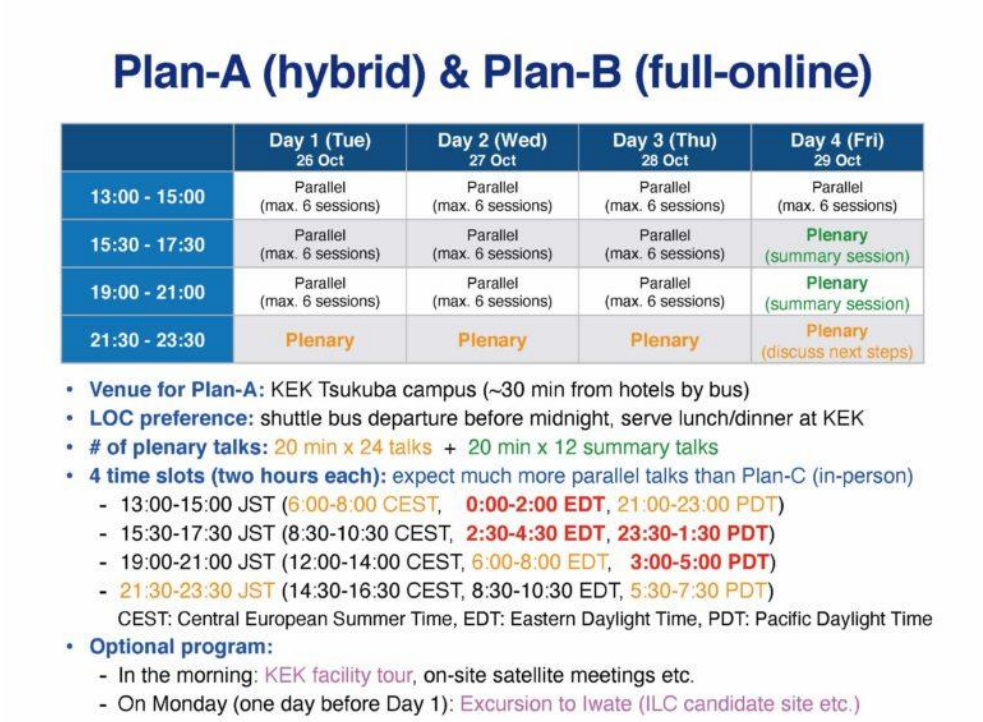
We have been planning for the coming ILCX 2021 workshop from 26 to 29 October 2021. We have a preliminary graphics for the poster and Local Organising Committee is working hard to understand logistics.

Last week, Local Organising Committee and IDT Executive Board made the decision to hold the workshop either in the hybrid mode or fully online. The COVID situation is still precarious especially with the new delta variant, and it seemed prudent not to push for a fully in-person meeting in the current situation.

The time table of the workshop is setup to maximise attendance of plenary sessions from many parts of the world. We left the decision between a hybrid or fully online format till early September. By then, we will know whether Japan accepts vaccine passport to avoid the quarantine, or how she survived the summer Olympic games. In the mean time, we will open the registration soon. Not knowing the final format, we will not charge the registration fee for the moment.

Please go ahead and register. For the hybrid case, we have reserved rooms on site at KEK, and we also plan for an excursion to the Tohoku region on Oct 25, as well as a KEK facility tour in the mornings. Now is the time to dream up for new ideas of experiments at the ILC facility!

Poster for the ILCX 2021 workshop.



Time table of the ILCX 2021 workshop.

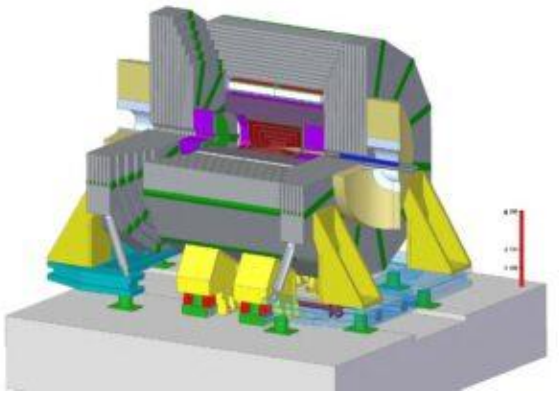
ilc newsline

ANNOUNCEMENTS

Invitation to join the SiD Consortium for the ILC

Andy White and Marcel Stanitzki | 27 July 2021

The SiD Detector is one of two major detector designs for the future International Linear Collider (ILC). SID features a compact, cost-constrained design for precision Higgs, top and other measurements, and sensitivity to a wide range of possible new phenomena. Since SiD has been validated by the International Detector Advisory Group there have been significant technological advances that offer opportunities enhancement and refinement of the SiD design.



SiD detector. (Image: Marco Oriunno)

The SiD Consortium is very open to new ideas and new colleagues who would like to contribute to our detector and physics studies and to push technology forward. For the detector design there are, for instance, opportunities in the areas of:

- Tracking detector – a MAPS-based version is being developed
- Electromagnetic Calorimeter – a digital version is under study
- Timing layers to assist in Particle Flow reconstruction
- Superconducting coil – potential new conductor(s)

For physics studies there are opportunities in, for example:

- ZH, H -> invisible
- Higgs CP violation in tau pairs
- Higgs to Long-Lived Dark Photons
- Higgs Self-coupling at 500, 1000 GeV

or, please propose your own study – all ideas welcome!

We welcome participation from physicists at all levels, from graduate students through senior colleagues.

To join SiD as an individual, institution or a guest member please see: SiD webpage

On behalf of the SiD Consortium

Marcel Stanitzki and Andy White

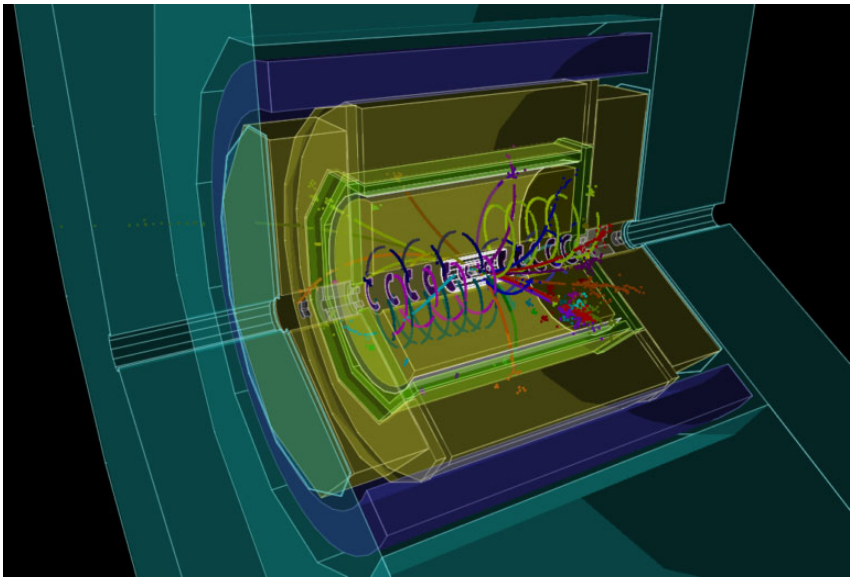
SiD Spokespersons

ilc newsline

FEATURE

Ready to take the next step

Barbara Warmbein | 27 July 2021



3D simulation image of ILD detector Image: Akiya Miyamoto

Things are busy at the ILD detector concept at the ILC. ILD stands for “International Large Detector”, and this is one of two current detector concept groups at the ILC. The ILD team has just published its interim design report (IDR) in which the current state of the detector, the state of the technologies and the situation in the collaboration are discussed.

The IDR is the result of about five years of studies, tests, calculations and simulations. It is meant to bring the status of the detector as recorded in the 2011 Technical Design Report up to scratch with the latest technical and physical standard and results.

“We looked at many things,” explains ILD spokesperson Ties Behnke from DESY. “For example, we studied the dependence of the performance on the size of the detector with the goal to optimise the cost-performance benefits, or the impact of changes to the interaction region design on the detector performance. We looked at the basic technologies we propose to use at the ILD, and brought them up to date with latest technological developments. We also performed systematic demonstrations of key technologies for ILD in test-experiments in close collaboration with technology collaborations like CALICE or LCTPC.” In particular, though, the size of the detector is highly relevant, as it has a major impact on the cost of the system. To evaluate the impact different sizes and different technologies might have on the performance, ILD has created two different versions of the detector, a smaller one and a larger one, and developed novel techniques to compare different sub-detector technologies in one simulation model.

So does size matter? Yes, bigger is better, but the benefits are not always obvious. “Looking more closely”, Behnke says, “bigger in particular has significant advantages if the ILC would be upgraded to higher energies.” Scientists hope this will happen after an initial running period to increase the discovery potential of the collider.

The design of the ILC accelerator is also constantly evolving, and the detector needs to track these developments. For example, the distance between the interaction point (where particles collide) to the last component of the accelerating system can have a huge impact on the way collisions go, and the detectors have to be able to adapt to whatever system accelerator designers deem most useful and cost effective. Close interaction between detector physicists and accelerator designers have led to an optimised design of the forward region of the detector, an area which is notoriously difficult to instrument.

A suite of software tools to enable simulation of events and of the detector plays a central role in these studies. ILD has developed a robust, scalable and flexible software system, including simulation tools, access to reconstruction tools, and means for the user to easily access the simulated events. Based on these tools large sets of simulated data are available, which can be used for a wide variety of studies. To ease the access to these data sets, and to ILD in general, ILD has initiated a guest -membership programme which allows people to participate with minimal hurdles, and which will hopefully lead to a further increase in the participation in ILD studies.

Claude Vallee, until recently ILD technical coordinator and now deputy-Chair of the IDT Physics and Detector working group, summarises: “The ILD Interim Design Report constitutes the most up-to-date comprehensive description of a detector for an e+e- Higgs factory. It provides a good overview of the motivation for most concepts currently on the market, as well as the main directions of potential improvements in the subdetector core technologies, their internal integration and the overall detector configuration. I strongly recommend

it to all experimentalists willing to engage now on the ILC programme and, more generally, on any e+e- Higgs factory detector design." The report also clearly points out areas where developments are needed and promising, and how the concept will be developed into the future.

The ILD team currently consists of some 360 scientists from 68 different labs. The group recently re-elected its management team. Ties Behnke and Kiyotomo Kawagoe (Kyushu University) got confirmed as spokespeople, Filip Zarnecki (Warsaw University) joined the physics coordination and will share the work with Keisuke Fujii (KEK). Mary-Cruz Fouz (CIEMAT) and Karsten Buesser (DESY) will lead the technical coordination. The software team remains unchanged with Frank Gaede (DESY) and Daniel Jeans (KEK) as coordinators.

"With this optimised ILD detector we see ourselves well positioned to participate in the process now initiated by the International Development Team that will eventually led to the submission of expressions of interest for an experiment at the ILC," Behnke concludes. But the work continues: over the next years, the team plans to undergo a critical scrutiny of the key technologies which are currently used, folding in the experience gained in the construction of the upgraded LHC detectors, and exploring where new technologies could be used to further improve the performance – for example the use of timing in the detector, and the use of modern very thin pixel detectors.

About detector concepts at the ILC

Just to get you up to date with detectors at ILC: the current planning foresees two independent detectors, SiD and ILD. There will only be one place where electrons and positrons are made to collide, so the detectors will have a time-share on this popular spot. While one is in taking data, the other is in a parking position at the side and can undergo checks and repairs. The ingenious rotation scheme by which these two gigantic high-tech devices swap positions is called "push-pull" (while one is pushed in, the other is pulled out) and is the subject of a lot of study – but that's another story.

ILD and SiD use different systems to study the collisions. That's intentional, because one needs to be able to check and ideally verify the discoveries of the other to make sure it's a true discovery and not just a bug in the system. One central difference is the tracking system, closest to the beampipe just like the forward region. It is based fully on silicon at SiD, while ILD uses a time projection chamber. Otherwise they are very similar in size and performance.