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DIRECTOR'S CORNER

LCWS2021- the community focuses on an ILC Pre-Lab as the next step

by Steinar Stapnes

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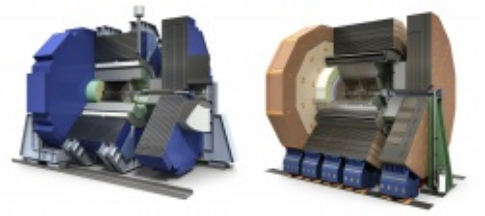
LCWS2021 highlighted the large and increasing international community and efforts pursuing a future linear collider, and the community is now very focused on an ILC Pre-Lab as the immediate next step towards an operational Higgs-factory by 2035.

ANNOUNCEMENTS

Call for participation in Physics & Detector WG3

by Hitoshi Murayama



The IDT Working Group on Physics & Detector activities (WG3) would like to invite the community to engage in ILC studies. You are encouraged to contact convenors of the subgroup of your interest. We look forward to having you involved!

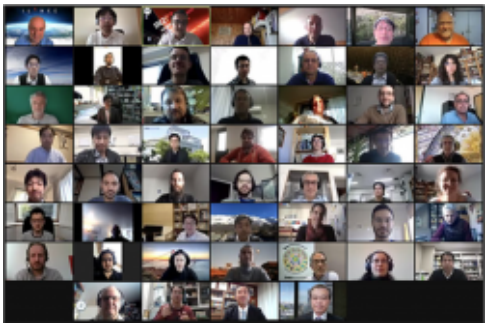
AROUND THE WORLD

Laboratories and industry in tune for particle physics detector R&D in Europe

by Perrine Royole-Degieux

AROUND THE WORLD

From CNRS: Joint French-Japanese laboratory in Tokyo for physics at the largest and smallest scales



10 million euros. This will be the amount granted to members of the AIDAinnova project funded by the European Commission Horizon 2020 programme. As particle physics requires highly-specialised detection equipment, often on an industrial scale, this project will be strongly marked by the collaboration between industry and academic institutions. Coordinated by CERN, it will explore advancement and innovation for particle physics detectors, including those proposed for the ILC.

From neutrinos to dark matter, and from particle accelerators to gravitational wave detectors and the first light of the Universe: the ILANCE laboratory, bringing together the CNRS and the University of Tokyo, will conduct physics research at the very smallest and largest scales of our Universe.

IN THE NEWS

from *IPMU*
13 April 2021
柏キャンパスに宇宙・素粒子分野の国際研究拠点を設立　Kavli IPMU を含む東京大学4部局とフランス国立科学研究センター(CNRS)
共同研究の対象には、ニュートリノ物理、原始宇宙、暗黒宇宙、重力波、素粒子物理などの分野にあたる、ハイパーカミオカンデ、スーパーカミオカンデ、T2K、KAGRA、CTA、LiteBIRD、PFS、ATLAS、ILC などのプロジェクト名が挙げられています。

from *TENDENCIAS*
7 April 2021
Nace el primer laboratorio internacional de los dos infinitos
En este capítulo, ILANCE se propone investigar las propiedades del bosón de Higgs con el apoyo del experimento ATLAS, uno de los siete detectores de partículas construido en el Gran Colisionador de Hadrones (LHC), y del International Linear Collider (ILC), un acelerador lineal electrón-positrón.

from *Scientific American*
7 April 2021
Long-Awaited Muon Measurement Boosts Evidence for New Physics
Even if all of these efforts confirm there is new physics at work in muons, however, they will not be able to reveal what, exactly, that new physics is. The needed tool to reveal its nature may be a new collider—something many physicists are clamoring for via proposals such as the International Linear Collider and the High-Luminosity LHC.

from *KITAKAMI TIMES*
25 March 2021
WELCOME TO THE TOWN OF NISHIWAGA
Nishiwaga is a town in Iwate, with a population of 5,363 and an area of 590.74 km2, that is famous for its abundant nature, ranging from wild plants such as bracken, to wildlife, such as deer and bear.—-Nishiwaga is just about an hour drive from the proposed ILC site, and neighbors Kitakami City.

from *Iwate Nippo*
24 March 2021
準備研への進展状況説明　ＩＬＣ 国際推進チーム３人が講演
チーム議長のスイス連邦工科大ローザンヌ校の中田達也名誉教授、ともにチーム部会長で高エネルギー加速器研究機構（ＫＥＫ、茨城県つくば市）の道園真一郎教授と米カリフォルニア大バークレー校の村山斉（ひとし）教授の３人が話題提供した。

from *Iwate Nippo*
20 March 2021
24年度、米で予算措置も　ＬＣＷＳ閉幕、研究者が報告
LCWSは日本時間の18日夜から19日未明にかけてオンラインで全体会議を開き、4日間の日程を終えた。ILC計画を巡る米国の状況報告で「2024年度予算で措置される可能性がある」との見方が示された。

from *Iwate Nippo*
17 March 2021
骨格「１カ月程度で」　ＩＬＣ準備研究所、推進チームが見通し
15日夜から16日未明にかけて開かれたLCWSの初日全体会議で、ILCの実現に向けた状況報告が行われた。ILCの前身となる準備研究所の設立を目指す国際推進チームは、骨格をまとめた中間リポートが「１カ月程度でまとまる」との見通しを示した。

from *Sankei Biz*
11 March 2021
震災10年「東北振興、継続的に取り組む」、経済団体トップが談話
日本商工会議所の三村明夫会頭は「（原発事故で）根強く残る風評や海外の食品輸出規制などの課題解決への、国の主体的対応を求める」と表明。さらに、福島イノベーション・コースト構想、国際リニアコライダーなどの大規模プロジェクトが「東北の地域振興につながる希望の光になる」とした。

ANNOUNCEMENTS

IDT Website open

The official ILC International Development Team website is now open. This website provides information regarding development of the IC project, international conference, outreach events, and the latest news.

We are planning to provide additional contents about the ILC project, so stay informed by subscribing the ILC NewsLine.

Click the here to view the website.

PREPRINTS

19 APRIL

2104.06421
Searching for lepton portal dark matter with colliders and gravitational waves

2104.03701
Leptophilic bosons and muon g-2 at lepton colliders

2104.03287
The new “MUON G-2” Result and Supersymmetry

2104.03217
Supersymmetric Interpretation of the Muon g−2 Anomaly

2104.01003
Model-independent study on the anomalous $\tau\bar{\tau}\gamma$ couplings at the ILC

2104.00890
Radiative Seesaw Mechanism for Charged Leptons

2104.00888
Leptophilic Gauge Bosons at ILC Beam Dump Experiment

2103.16320
Linear Collider Signals of Z' Bosons in GUT Inspired Gauge-Higgs Unification

2103.13403
Improved $(g-2)_\mu$ Measurements and Wino/Higgsino Dark Matter

2103.12639
Global interpretation of LHC indications within the Georgi-Machacek Higgs model Talk presented at the International Workshop on Future Linear Colliders (LCWS2021), 15-18 March 2021. C21-03-15.1

2103.11412
Doubly Charged Higgs Production at Future ep Colliders

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DIRECTOR'S CORNER

LCWS2021- the community focuses on an ILC Pre-Lab as the next step

Steinar Stapnes | 19 April 2021

The 2021 International Workshop on Future Linear Colliders (LCWS2021), arranged by Europe as an online conference with more than 900 registered participants, took place from 15 to 18 March. As earlier conferences in this series it was primarily devoted to the physics, detector, and accelerator studies for the Compact LInear Collider (CLIC) and the International Linear Collider (ILC).

Since the last workshop in the series (LCWS2019), many new international developments have taken place. The European Strategy for Particle Physics (ESPP) Update 2020 places an electron-positron Higgs factory as the highest-priority next-generation collider. A linear collider – CLIC or ILC – will operate as a Higgs factory during its initial stage, while maintaining a clear path for future energy upgrades. The CLIC programme and associated high-gradient R&D for 2021-26 have been defined in accordance with the ESPP outcome.

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The table showing the session time slots in 3 time zones;
Pacific Daylight Time (PDT) – US West Coast
Central European Time (CET) – Geneva
Japan Standard Time (JST) – Tokyo

Preparations for the ILC in Japan have changed gear with the International Committee for Future Accelerators (ICFA) announcing the establishment of the ILC International Development Team (IDT) hosted by KEK. ILC is currently the focus of a general and broad effort in Japan involving several Ministries as well as the Diet, in close connection with industry, academia and the Tohoku region, the potential construction site. This progress has been summarised in a recent document issued by the ILC Steering Panel established under Japan Association of High Energy Physicists (JAHEP). Besides the progress achieved in Japan, 2020 also saw the emergence and focused effort of the IDT towards defining the ILC Pre-Lab programme – a four-year preparatory phase to bring the ILC project to construction readiness, and the organisational structures and processes needed to start the Pre-Lab. In the US, the Snowmass process is on-going with ILC as the most prominent Higgs-factory possibility on the timescale considered.

The LCWS2021 started Monday morning with an online version of the 8th Linear Collider Physics school where some 160 students participated. From Monday afternoon to Thursday afternoon plenary and parallel sessions were used to review the progress on accelerator design for linear colliders, detector developments and physics studies and, equally important, looking ahead towards the next steps. ILC topics were overlapping with similar CLIC activities whenever possible.

The main plenaries were on Monday and Thursday. The Monday plenary session featured reports on technical/scientific aspects on ILC and CLIC, status reports from Japan (KEK, the JAHEP ILC Steering Panel and Tohoku) and North America, and recent progress from IDT. The Thursday plenary included CERN and European perspective talks, an update on the linear-collider-related Snowmass preparation and documentation, and summaries of some of the parallel working group sessions. The Tuesday and Wednesday plenary sessions focused on accelerator and physics & detector studies, respectively.

With a wide programme of 51 parallel sessions, the workshop provided ample opportunities to present ongoing work as well as getting informed and involved. The Physics and Detector parallel sessions alone attracted 144 submitted abstracts. Altogether 292 talks were given during the four days.

Besides these sessions, the programme also included a special ‘New Research and Opportunities Tracks’ to discuss ideas of complementary programmes beyond the ILC Higgs factory (e.g. fixed-target and beam-dump experiments – relevant for example for dark sector physics, lower energy beams for accelerator and detector R&D, irradiation possibilities, electron-laser collisions, etc.). In addition, a session on ‘New Technologies & Ideas for Collider Detectors’ was included. These sessions represent a first step towards ILC Expressions of Interest, and these topics will be further pursued in a dedicated ILC workshop, planned to be held in Tsukuba from 26 to 29 October.

A new feature was a session on advanced and novel accelerator (ANA) technologies prepared by the ICFA-ANA panel. Not only can these technologies be of interest to deploy in the longer term in an LC tunnel to reach multi-TeV energies, but an LC facility can also in the shorter term provide interesting and unique beams and opportunities for developing such novel technologies.

A very interesting session with around 70 participants was devoted to the industrial aspects of the ILC, offering an opportunity to highlight the expertise and innovation capabilities of national laboratories and their related industrial partners for the ILC Pre-Lab activities and the main ILC technologies.

Overall the workshop highlighted the large and increasing international community and efforts pursuing a future linear collider, and the community is now very focused on an ILC Pre-Lab as the immediate next step towards an operational Higgs factory by 2035.

Steinar Stapnes on behalf of – and with sincere thanks to – the Organising Committee

EUROPE | EUROPEAN STRATEGY FOR PARTICLE PHYSICS | HIGGS FACTORY | ILC

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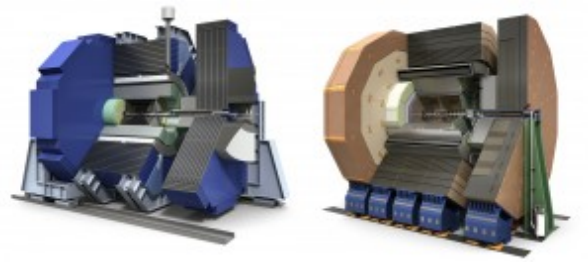
ANNOUNCEMENTS

Call for participation in Physics & Detector WG3

Hitoshi Murayama | 19 April 2021

The IDT Working Group on Physics & Detector activities (WG3) would like to invite the community to engage in the ILC studies.



Two detector concepts- SiD(left) and ILD(right)
Image: Rey.Hori

WG3 aims to raise awareness and interest in the ILC development and expand the community, support newcomers to get involved in physics and detector studies, encourage new ideas for experimentations at the ILC.

The WG3 Steering Group consists of the coordinator (WG3 Chair), two deputy coordinators, subgroup conveners, and additional members of the Steering Group.

The four subgroups of WG3 are: (1) Machine-Detector Interface Subgroup, (2) Detector and Technology R&D Subgroup, (3) Software and Computing Subgroup, (4) Physics Potential and Opportunities Subgroup.

The studies provide crucial information about the physics and detectors to the final engineering design of the machine as well as infrastructure and lead up to Expressions of Interest for collider and non-collider experiments. The participation is completely open to anybody interested in the particle physics community.

You can find the mandate adopted for the WG3 at https://linearcollider.org/idt-wg3-mandate/. The members of the leadership are listed at https://linearcollider.org/team/. You are encouraged to contact convenors of the subgroup of your interest. We look forward to having you involved!

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AROUND THE WORLD

Laboratories and industry in tune for particle physics detector R&D in Europe

Perrine Royole-Degieux | 19 April 2021

This 130-nm processed silicon wafer was produced during the AIDA-2020 project (at TSMC Foundry). These electronics will be used in the readout system of future detectors developed in the framework of AIDAInnova. Image: CERN

10 million euros. This will be the amount granted to members of the AIDAinnova project (advancement and innovation for Detectors at Accelerators programme) funded by the European Commission Horizon 2020 programme, under a special 'Innovation Pilots' call. As particle physics requires highly-specialised detection equipment, often on an industrial scale, the project will be strongly marked by the collaboration between industry and academic institutions.

AIDAinnova builds on the success of its predecessor projects AIDA and AIDA-2020, both of which boosted infrastructure at research labs for the development of new detector technologies. Coordinated by CERN, the successor project receives 10 million Euros for four years and features nine industrial companies, three research and technology organisations and 34 academic institutions in 15 countries. 'Having companies directly involved in detector development is a novelty that aims at faster turnaround and more innovation both for research and industry,' said Felix Sefkow (DESY, Germany), AIDAInnova coordinator, and scientific coordinator for the previous project AIDA-2020.

AIDAinnova will provide state-of-the-art upgrades to research infrastructures, such as test beams, in order to exploit the scientific potential of detector technologies. Among well-defined R&D work packages, scientists have opened the door to 'greenfield' projects. A call for tenders will be launched which will allow funding innovative and 'off-axis' projects.

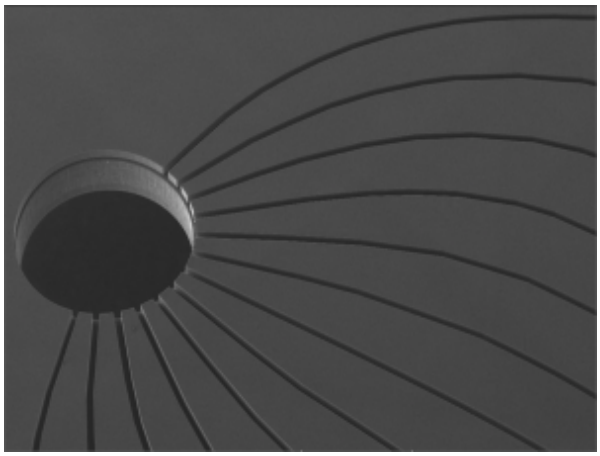
There will be two levels of participation for industry. Companies may simply participate as associates of AIDAInnova member laboratories. Other companies – nine in total – signed to join as full members of the collaboration. They will use the EC funds to design and test detector parts or to employ dedicated staff. A new kind of collaboration with industry, more constraining but also with more benefits.

'The nine industrial companies involved in AIDAInnova will benefit in many ways, first and foremost in terms of visibility,' said Giovanni Calderini, AIDAInnova coordinator at CNRS/IN2P3, France. Being a full member of the project demonstrates a strong link with the scientific community and is also a heavy responsibility. 'Collaborating with major institutions or laboratories such as CERN, IN2P3 or DESY to name a few, is a guarantee of quality for their future clients,' said Calderini. 'They may become later privileged partners for other scientific experiments, opening up new sectors and new markets.' And the benefit is mutual. 'In a collaboration, there is a deeper level of exchange. Sometimes this leads scientists to play an actual role within the company. Getting to know an industrial company in great detail is extremely valuable for us, the exchanges are sincere and transparent,' concludes Calderini.

AIDAInnova will cover a wide range of experiments from the second round of upgrades of the LHC detectors, at the mid of the high-luminosity phase (foreseen to be ready around 2030s) to CLIC, FCC and of course ILC detectors. Most work packages may contribute to any of these projects. For the ILC, one challenge will be to design mechanical structures and electronics as thin and light as possible so that incoming particles barely interact with them. Another crucial area of R&D will be the calorimetry, where scientists will try to increase

detector granularity and time resolution for a more precise reconstruction of particle showers. Another promising technology for the ILC are monolithic sensors, where sensors and front end electronics are realised on a common silicon structure. ‘We’ve made a lot of progress in this area in the last years, and I’m convinced that these technologies will play a major role in the construction of the ILC detectors,’ says Calderini.

For all these technological challenges, collaboration with industry will be crucial, as the real difficulty will be to find a compromise between the most advanced technology to date and a reasonable cost for the scientific community. The AIDAInnova kick-off meeting, gathering all partners from academia to industry, will take place from 13 to 16 April 2021.



Detail of a micro-channel cooling system, developed at IN2P3 in France. This cooling technique will be at the heart of one of AIDAInnova work packages, in order to make it more uniform and efficient. It could be used with either ‘traditional’ liquids or biphasic liquids (like CO2). Image: Fundazione Bruno Kessler

AIDA-2020 | AIDAINNOVA | DETECTOR R&D | H2020