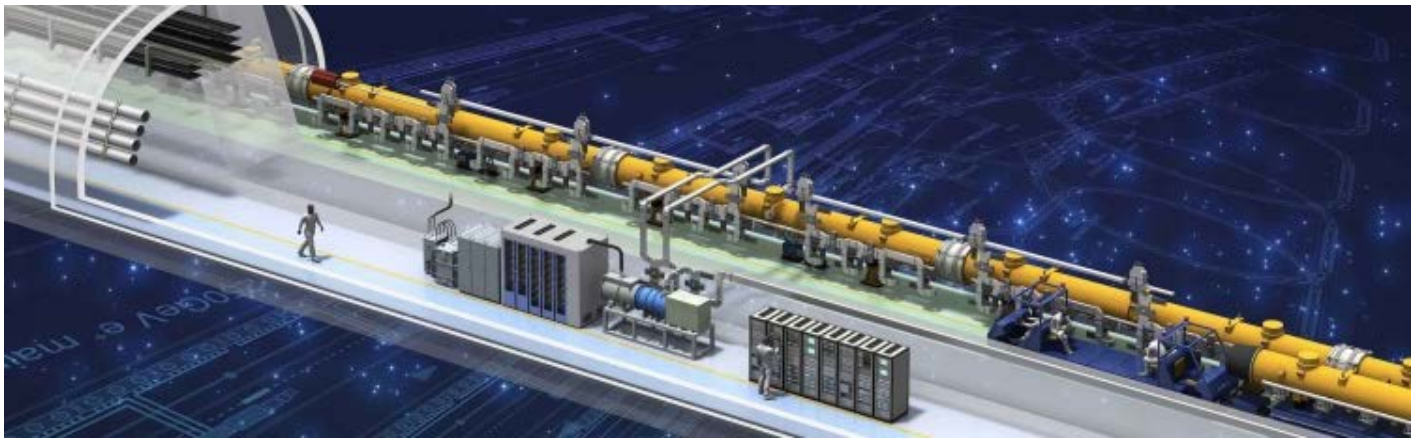
NEWSLINE
THE NEWSLETTER OF THE LINEAR COLLIDER COMMUNITY

DIRECTOR'S CORNER

The Summary Report explained

by Sachio Komamiya



Sachio Komamiya is the chair of the Linear Collider Board, the oversight committee for ILC and CLIC. In today's guest corner, he explains what the recent "Summary Report" for a Japanese advisory panel means for the project. It's good news, he says, and urges the community to demonstrate the need for the next big machine.

FEATURE

Expert puts report into context

by Barbara Warmbein

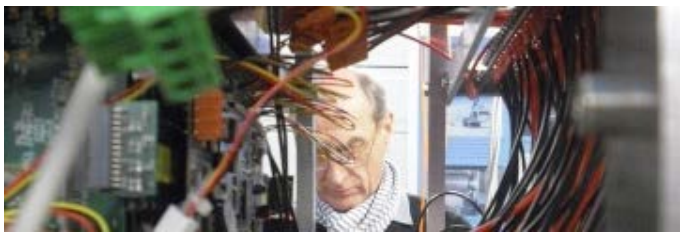


The summary of discussions published by the ILC Advisory Group to Japan's funding agency MEXT is subject of a lot of discussion within the community. Why was it published now, what does it mean? NewsLine spoke to Satoru Yamashita from the University of Tokyo to find out more. Read also this week's Director's Corner.

AROUND THE WORLD

Fresh funding for technical detector prototypes

by Barbara Warmbein



Detector R&D for future projects has just received a boost in Germany. Six universities are receiving some 1.8 million Euros from the German ministry of education and research (BMBF) for the next three years – twice the amount that was available before. The project will concentrate on improving the time projection chamber for the ILD detector, one of the two planned ILC detector concepts, and the hadronic calorimeter based on SiPMs.

IMAGE OF THE WEEK



The history of a future collider

In the last issue we celebrated the 10th anniversary of the ILC-constituing meeting in Snowmass. For those who missed it, here's the timeline of linear collider development since 2005. We're also still collecting your personal memories of highlights from the last ten years and hopes for the next ten!

IN THE NEWS

from *FNN*
2 September 2015
ILCを子どもたちにわかりやすく 女子学生が小学校で出前授業へ
ILC(国際リニアコライダー)を子どもたちにも理解し
プリントを用意したり、また、グループワークで子どもたちの考えを引き出す時間を設けたりと、さまざまな工夫を凝らしなら、ILCの役割を説明した。(Female university student will give ILC lessons at elementary schools, aiming to gain understandings about the ILC project, and had a trial session at Iwate University. Students devised ways of explaining about the ILC effectively preparing printed quiz or providing thinking time.)

from *AAA*
2 Septemeber 2015
「ILC科学少年団」の第　話公開
当協議会が制作に協力しているケーブルテレビ番組「ILC科学少年団」の第　話が公開されました。ぜひご覧下さい。(Broadcasting of Episode 4 of the cable TV program sponsored by AAA started on 2 September. Enjoy!)

from *CERN*
1 September 2015
ATLAS and CMS experiments shed light on Higgs properties
Three years after the announcement of the discovery of a new particle, the so-called Higgs boson, the ATLAS and CMS Collaborations present for the first time combined measurements of many of its properties, at the third annual Large Hadron Collider Physics Conference (LHCP 2015). By combining their analyses of the data collected in 2011 and 2012, ATLAS and CMS draw the sharpest picture yet of this novel boson.

from *Helmholtz Association*
1 September 2015
Fragen an Otmar D. Wiestler
Otmar D. Wiestler replaces Jürgen Mlynek as president of the Helmholtz Association

from *Physics world.com*
1 September 2015
Antimatter 'surfs' to higher energies on a plasma wave
Today, the researchers believe the plasma-wakefield technique could double the energy of particles in a conventional accelerator, allowing particles in the ILC to reach 1 TeV before collision.

from *New Indian Express*
28 August 2015
The Best Man for the Job is a Woman
She could have chosen a 9-to-5 job at the Bank of Maharashtra. It carried the guarantee of a stable life and the promise of a good salary. But Rohini Godbole chose to walk a different path.

from *Kahoku Shinpo*
28 August 2015
技術開発に　　万円計上

文部科学省は　　年度予算の概算要求で、超大型加速器「国際リニアコライダー　　」計画関連として、加速器技術の高性能化の開発費など計　億　　万円を計上した。(MEXT submitted its 2016 rough estimate of their budget to the government, which included the ILC related budget of 110 million yen.)

from ***Iwate Nippo***
26 August 2015
ILC予算　億円規模で調整 文科省16年度概算要求案
これまで同省の　　関連予算は　、　年度に　　計画の実施可否判断に関する調査検討費として　千万円計上。　　年度は　　にも貢献できる加速器技術の高度化を図るための要素技術開発費に　千万円を計上していたが、　　年度概算要求案はこれまで以上に具体的課題への対応に踏み込む形だ。(MEXT has allocated 50 million yen ILC related budget on FY 2014 and 2015 for the research on the project toward the decision making. For FY 2015, additional 30 million for the R&D was also allocated. 2016 budget is funded to deal with the identified issues.)

from ***Channel Sakura***
26 August 2015
【生きた金の使い方を】サイバー防衛拠点の人材確保と国際リニアコライダーの誘致
Construction of the ILC costs 1 trillion yen, and it will be internationally shared. But I think Japan should go ahead even if Japan needs to cover them all, because those cost will be used in Japan, and generate employments and incomes of citizens in Japan.

from ***Asahi Shinbun***
23 August 2015
物質・時空ナゾ迫る巨大装置、建設　兆円 文科省は慎重
「国際リニアコライダー　　」を、北上山地に造りたいと岩手県が熱望している。国際協力で建設するが、費用は　兆円以上。文部科学省は予算のめどがたたないこともあり慎重だ。造るべきかどうか。あなたはどう思いますか　(Iwate prefecture is eager to construct the ILC at Kitakami mountain. It will be constructed by international collaboration, but the cost will exceed 1 trillion yen. MEXT is deliberate since the budget is uncertain. How do you think? Should Japan proceed to the ILC construction?)

CALENDAR

Upcoming events

10th International Positron Source Workshop (POSIPOL 2015)

Cockcroft Institute, UK
02- 04 September 2015

17th International Conference on RF Superconductivity (SRF2015)
Whistler, BC, Canada
13- 19 September 2015

International Workshop on Future Linear Colliders (LCWS15)
Whistler, BC, Canada
02- 06 November 2015

Upcoming schools

15th Hellenic School and Workshops on Elementary Particle Physics and Gravity (Corfu2015)
Corfu, Greece
01- 26 September 2015

The 2015 European School of High-Energy Physics
Bansko, Bulgaria
02- 15 September 2015

9th International Accelerator School for Linear Colliders
Whistler, British Columbia, Canada
26 October- 06 November 2015

Joint Universities Accelerator School
Archamps, Haute Savoie, France
11 January- 18 March 2016

View complete calendar

ANNOUNCEMENTS

Open House at KEK this weekend



Japan's particle physics research centre KEK will have its Open House on 6 September. Two ILC test facilities, ATF and STF, will have guided tours. Check out the informative and fun exhibits at the Kenkyu-honkan building, meet the Higgs particle in person. Everybody who visited and collect stamps of two ILC related facilities and an exhibit can get one of 18 particle button. It's a must if you're in Japan! For more information have a look at the open house website (in Japanese).
...Read more

PREPRINTS

ARXIV PREPRINTS

1508.07016
Lepton Flavor Violating Radiative Decays in EW-Scale vR Model: An Update

1508.07010
The Zbb Couplings at Future e+e- Colliders

1508.05616
R-Parity Conserving Supersymmetric Extension of the Zee Model

1508.05407
Associated Production of Z_H and T in the Littlest Higgs Model at High Energy Linear e^-e^+ Collider

1508.049377
Seesaw mechanism at electron-electron colliders

1508.04818
Prospects for Slepton Searches in Future Experiments

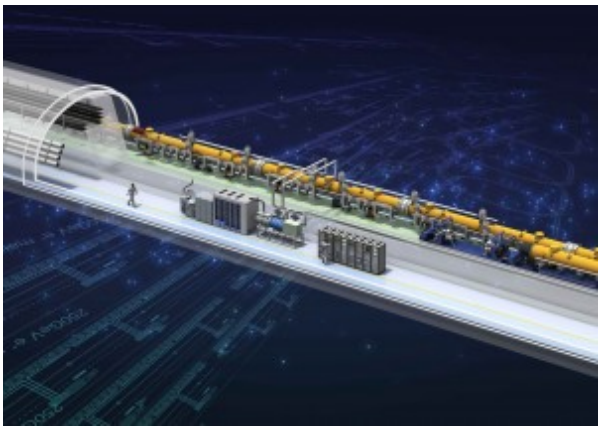
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LC NEWSLINE
THE NEWSLETTER OF THE LINEAR COLLIDER COMMUNITY

DIRECTOR'S CORNER

The Summary Report explained

Sachio Komamiya | 3 September 2015



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

Let me start by explaining the context of this summary report. In September 2013, the Science Council of Japan (SCJ) submitted a report on the study of the International Linear Collider to the Ministry of Education, Culture, Sports, Science and Technology (MEXT) (see LC NewsLine from 10 October 2013). The SCJ report recommended the government to allocate funds necessary to study risks and discuss with potential partners in the next two to three years. Following this recommendation, MEXT set up the ILC Advisory Panel to study these issues.

Last month, this Panel issued a report called "Summary of the International Linear Collider (ILC) Advisory Panel's Discussions to Date." This is an important step for MEXT and Japan to move forward. The report is still an interim one, since the study by the Panel continues to further study the human resources aspect of the project and the international trend to the project.

In the report of the Panel, the scientific merit of the ILC project is clearly given:

> *"The ILC is considered to be important because of its capability to investigate new physics beyond the Standard Model by exploring new particles and precisely measuring the Higgs boson and top quark. It should be also noted that the ILC might be able to discover new particles which are difficult to be detected in LHC experiments."*

The summary also states:

> *"ILC experiments are able to search for new particles, different from the ones that LHC experiments have been searching for. In case these new particles are supersymmetric particles, ILC and LHC experiments can study them complementally. On the other hand ILC experiments can carry out more precise measurement of the Higgs boson and the top quark, which are beyond the reach of LHC experiments."*

The report says in the section of "International Collaboration":

> *"The European and American particle physics community expects Japan to proceed with the ILC project in line with their strategies. However, current plans and budget of their countries do not explicitly define the ILC project. It is necessary to proceed based on worldwide attitudes to the ILC project."*

In the past the international community has confirmed the scientific significance and the consensus of indispensability of the ILC at several occasions. It is very important to transfer this information to the appropriate governmental officials of possible participating countries. To move the project forward to the next step, MEXT wants to see the interest in the project outside of Japan. I understand that most of the countries are not able to make decision to participate in the project before seeing the green sign from Japan. This step, however, does not require commitment of participation: what it needs is that government officials understand the eagerness of their own scientific community. Since the ILC is a truly international project, the enthusiasm of the international community as well as understanding

the communities' wish by the government officials in appropriate positions are necessary.

In the report "Social effect of the ILC project" is given especially on the technological and economic spin-offs:

> *"The Survey and Analysis of the Technological and Economic Spin-Offs of the ILC Project and Global Research and Technology Trends in Particle and Nuclear Physics estimates that the ILC project will in the end generate domestic demand worth JPY 2.10 trillion and lead to production worth JPY 4.46 trillion. This is the estimated impact of the ILC project over a 10-year construction period and a 10-year operational period."*

These numbers do not include serendipitous spin-offs such as the economic effect of the world wide web invented at CERN. The effect of scientific education for the next generations is an even more important factor.

The report includes three recommendations. I will give interpretation of these in a consistent view of the first parts of the report.

> *"Recommendation 1: The ILC project requires huge investment that is so huge that a single country cannot cover, thus it is indispensable to share the cost internationally. From the viewpoint that the huge investments in new science projects must be weighed based upon the scientific merit of the project, a clear vision on the discovery potential of new particles as well as that of precision measurements of the Higgs boson and the top quark has to be shown so as to bring about novel development that goes beyond the Standard Model of the particle physics."*

We all understand that discovery is NOT guaranteed at any frontier machines. However, for the ILC experiment, a clear discovery potential beyond the Standard Model has been demonstrated already. This information should be described in a more understandable fashion, and a small committee is working on a new concept to make the science graspable for everybody.

The report also states '*… it is indispensable and essential prerequisite for the implementation to have a clear vision of participation and cost sharing by international partners* …'. Even though this may sound like a stringent condition, it actually allows MEXT to initiate serious talks with other countries. Based on this recommendation MEXT is set to make such a move in the near future. It is critically important, however, that the receiving side is well prepared for such talks. So, please convey the importance of the ILC project and your enthusiasm to your governmental officials!

> *"Recommendation 2: Since the specifications of the performance and the scientific achievements of the ILC are considered to be designed based on the results of LHC experiments, which are planned to be executed through the end of 2017, it is necessary to closely monitor, analyze and examine the development of LHC experiments . Furthermore, it is necessary to clarify how to solve technical issues and how to mitigate cost risk associated with the project."*

Surely we will monitor LHC physics in the current running period. Many physicists outside and inside of Japan tend to misunderstand this recommendation, thinking it means that MEXT will keep quiet during this running period and wait for the end of Run2 in 2018. This is absolutely not the case. MEXT will further study the project feasibility including possible human resources of the project. A recent ILC Progress Report by LCC to be published soon answers most of the technical items in the Panel's report. We need to digest and clarify these in a more understandable fashion.

> *"Recommendation 3: While presenting the total project plan, including not only the plan for the accelerator and related facilities but also the plan for other infrastructure as well as efforts pointed out in Recommendations 1 & 2, it is important to have general understanding on the project by the public and science communities."*

The international public relations as well as those in Japan will be reinforced specially by KEK and the industry supporters of ILC in Japan (AAA, Advanced Accelerator Association Promoting Science & Technology). Discussions with scientists of other fields have been undertaken by the KEK's Director General in Japan.

After the meeting of the International Committee for Future Accelerators (ICFA)on 19 August, the ICFA chair, Joachim Mnich, wrote a letter to the chair of the MEXT ILC Advisory Panel. The letter says that ICFA discussed the report from the Panel, and thanks them for their significant effort. "We (ICFA) appreciate the very important summary document which indicates the serious interest of Japan in hosting a linear collider and which we take as an encouragement for work of the worldwide ILC community. ICFA is preparing a short document to clarify some of the issues and questions raised in the summary report. The document will be submitted to the Panel before the end of this year. We (ICFA) would be pleased to assist in obtaining further information in case the need arises in the course of the investigation."

Particle physics is at an essential turning point. The direction of the field will be determined by the next discovery of new particles or new phenomena beyond the Standard Model, most likely in the next few years at the LHC. As stated in the report of the Panel, ILC has

“capability to investigate new physics beyond the Standard Model by exploring new particles and precisely measuring the Higgs boson and top quark.” For this important step we need both the LHC and the ILC. The governments’ recognition of the enthusiasm of their own community is a very important factor for Japan to proceed towards a positive decision.

The ILC is inevitable and we need to show that.

ILC ADVISORY GROUP | MEXT | SUMMARY REPORT

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FEATURE

Expert puts report into context

Barbara Warmbein | 3 September 2015



Satoru Yamashita answers questions about the recently released Summary Report from Japan.

Satoru Yamashita is professor for particle physics at the University of Tokyo. He is also the chair of the ILC Strategy Council of Japan and as such acts as go-between, interpreter and commentator between worlds. He is familiar with the world of science ministries, in particular the Japanese Ministry of Education, Culture, Sports, Science and Technology MEXT, the high-energy physics community, industry, as well as strategy groups from various regions. He explains the meaning of the recently published summary report from the ILC Advisory Panel reporting to MEXT.

What's the report's main message?

The ILC is at a stage where it's basically ready for construction. The scientific community in Asia, the Americas and Europe feature it on their strategies for future facilities. The project is no longer a pure R&D undertaking; within the next few years governments will have to decide whether to go ahead and build it or not. "I think the report says that Japan is ready to discuss the project on an international level," says Yamashita. "But in order to discuss issues like cost sharing or human resources, it needs other countries to be ready to seriously discuss (without commitment for now) with MEXT on these matters. A clear evidence of readiness would be, for instance if the government of the country officially discusses the possibility of funding for ILC construction or to attribute funding to the linear collider in their budgets."

Discussions have already started with the US and with the European Commission, but "Europe is very complicated – you've got the EU, you're got CERN and all the individual countries, plus all the high-priority projects currently ongoing like ITER or the LHC upgrade," Yamashita says. "Japan is doing what it can do really seriously, and we should take the next steps together."

Why was the report published now?

The next report of the Advisory Panel is due in spring next year, so the report now published is called "Summary of Discussions to Date". "It is usual custom for panels like the ILC Advisory Panel to publish interim reports like this one, to first summarise issues to solve," says Yamashita. The summary stresses the importance of international support and discussions. With it in hand, MEXT can take the next step. "They can go ahead and discuss the highlighted issues, especially internationally. So now we need our counterparts, potential partner countries, to be ready to seriously discuss the possibility of sharing of cost and human resources."

What is the ILC Advisory Panel? Does it have any influence?

The ILC Advisory Panel was created by MEXT following a report from the Science Council of Japan. Unlike SCJ, the Advisory Panel is an official body of MEXT: it is part of the “ILC Task Force” which was set up by the boss of MEXT – the science minister – and is chaired by his deputy, the vice minister. “In Japanese policy this is quite exceptional,” explains Yamashita. “The ILC is seen as a special case, especially in view of the wide range of supporting bodies from industry sector, political sector, local governments to social groups there, and the wish to trigger a new style of international activities in a remote area of Japan together with the world’s top-level scientists.”

So to recap: MEXT runs the ILC Task Force. The ILC Task Force appointed the ILC Advisory Panel, which in turn consists of different working groups on specialized topics chosen for their neutral position to the ILC project, following an announcement by the MEXT minister in 2014. The Advisory Panel itself does not take decisions, but it collects information and makes recommendations to MEXT and thus the government. The activity will continue monitoring progress of the project until the government decides to go ahead (or not). And a government decision about the ILC is expected in about two years from now. “The technical and human resources issues mentioned in the summary need to be solved before the final decision. At this stage no commitment is necessary but we need prospects at the inter-government level. Discussions as well concrete plans on how to organise the ILC will have started under a hypothetical assumption and received positive prospects among partner countries by the final decision,” says Yamashita.

ILC ADVISORY GROUP | JAPAN | MEXT | SCJ | SUMMARY REPORT | TASK FORCE

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AROUND THE WORLD

Fresh funding for technical detector prototypes

Barbara Warmbein | 3 September 2015



The Time Projection Chamber (TPC), pictured here in a test beam with researcher Leif Jönsson from Lund University, is one of the projects receiving funding from the German research ministry. Image: DESY

Thirty new active calorimeter layers, two engineering prototypes and some ten PhD theses – and that's only part of the expected harvest of the recent funding approval for detector R&D targeted also towards the ILC in Germany. The German research ministry will support the universities of Bonn, Hamburg, Heidelberg, Mainz, Siegen and Wuppertal with 1.8 million Euros over the next three years. The money supports research cooperation between universities and research centres; in this case the Max Planck Institute for Physics and DESY.

"This is a very positive step forward for detector R&D in Germany. Our funding has doubled from the last funding period," says Klaus Desch, professor at the University of Bonn and speaker of the research cooperation. The main focus is on instruments for future ILC detectors, but the results achieved and technologies tested are so versatile that they are used by other projects, including the CMS detector at the LHC, CLIC, the CAST experiment at CERN and even for medical imaging.

Of course the German groups are part of a larger R&D effort in international collaborations like CALICE and the LCTPC collaboration. After the funding period the investigators hope to have enough experience with the different technologies that they can select one and form collaborations to write the technical design report for a future ILC detector. "It may seem like a long time until the ILC will actually be built, but we need to develop large components very early – now – because their construction and in particular the required industrialisation for mass production will take a long time once approved," explains Erika Garutti, University of Hamburg. "We need ten million SiPMs for one of the calorimeter types alone. In addition, wrapping ten million plastic tiles with reflector foil will require industrial-like procedures which will have to be developed by the university partners and transferred to companies."

The specific tasks the six universities and two research centres have set themselves are to complete the technological prototype of the analogue hadronic calorimeter (AHCAL) for the ILD detector and to prioritise the various readout options for the ILD tracker, the time projection chamber or TPC. For the calorimeter, this means adding another 30 active detector layers to the existing four in the prototype of the AHCAL, studying technologies with regard to cost optimisation and mass production, and testing digital silicon photomultiplier. The TPC will benefit from advances in a novel, extremely granular readout scheme, dubbed the "Pixel-TPC". Besides the development of the technology itself, simulations and prototype testing in the DESY test beam play an increasingly important role in order to optimise performance versus cost.

"We hope to get new international partners on board and count on the existing international R&D collaborations to continue the

preparations for the ILC detectors – we need all hands on deck for a big and exciting project like the ILC," says Klaus Desch.

BMBF | CALICE | DETECTOR R&D | GERMANY | ILD | LCTPC | SIPMS | TPC

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10 YEARS OF GDE, ILC AND NEWSLINE

Ten years ago, scientists from all over the world gathered in the picturesque town of Snowmass in the US to constitute a new global collaboration for a future particle collider called the International Linear Collider. People who had worked on several different concepts for a linear collider reshuffled to work together on the ILC and its challenging technologies. They researched, designed, tested and improved the machine's design and continue to do so to this day, hoping for a governmental go-ahead. However, the ILC is not the only concept for a collider to complement the LHC at CERN. What has happened in these ten years, and where does the project stand today?

SNOWMASS WORKSHOPS

