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FEATURE

A Tribute to Sachio Komamiya

by Rika Takahashi

With deep sadness, we announce the passing of Professor Sachio Komamiya, a prominent figure in the Japanese and international ILC community.

AROUND THE WORLD

Federation of Diet Members resolves to promote the ILC in Japan

by Rika Takahashi

On March 21, the Federation of Diet Members for the ILC held a meeting with 50 participants, including Diet members, government agencies, businesses, and researchers. Reports on the ILC project's progress and initiatives by relevant organizations were presented, followed by a discussion on the project's future course of action.

FEATURE

KEK-produced Video “International Linear Collider” Wins Silver at the Telly Awards

by Rika Takahashi

On May 21st, KEK’s video “Unraveling the Mysteries of the Universe: International Linear Collider” (Entry title: High Energy Accelerator Research Organization (KEK) International Linear Collider) won a Silver Award in the “Non-Broadcast – Science & Technology” category at the 45th Telly Awards, a prestigious honor in the television and video broadcasting industry.

IN THE NEWS

from *Fukushima Minpo*
July 1 2024
大型加速器「建設なら米は参加」 米政府諮問委員長の村山氏
宇宙誕生の謎を探る次世代大型加速器に関する米政府諮問委員長を務める、村山斉・米カリフォルニア大バークリー校教授は１日、盛岡市内で講演し、日本に国際リニアコライダー（ＩＬＣ）ができるとはっきりすれば「米国は必ず乗ってくる」と述べ、誘致すれば米側の協力が期待できると強調した。(Sure, here is the English translation:
宇宙誕生の謎を探る次世代大型加速器に関する米政府諮問委員長を務める、村山斉・米カリフォルニア大バークリー校教授は１日、盛岡市内で講演し、日本に国際リニアコライダー（ＩＬＣ）ができるとはっきりすれば「米国は必ず乗ってくる」と述べ、誘致すれば米側の協力が期待できると強調した。(On the 1st July, Professor Hitoshi Murayama of the University of California, Berkeley, who serves as the chairman of a U.S. government advisory committee on the next-generation large accelerator exploring the mysteries of the universe's birth, gave a lecture in Morioka City. He emphasized that if it becomes clear that the International Linear Collider (ILC) will be built in Japan, 'the United States will definitely join,' highlighting that attracting the ILC would ensure cooperation from the U.S. side.)

from *Nikkei*
July 1 2024
ILC推進で学者らが意義を解説　盛岡で講演会
日本で建設が計画されている巨大加速器「国際リニアコライダー（ILC）」の誘致を産学官民でめざす岩手県ILC推進協議会は1日、盛岡市で公開講演会を開いた。世界的な物理学者、村山斉・米カリフォルニア大学教授は「地球を外から見る視点が大事」とプロジェクトの意義や現状を解説した。(Sure, here is the English translation:

"On the 1st, the Iwate Prefecture ILC Promotion Council, which aims to attract the planned construction of the giant accelerator, the International Linear Collider (ILC), to Japan through industry-academia-government collaboration, held a public lecture in Morioka City. Renowned physicist Professor Hitoshi Murayama from the University of California explained the significance and current status of the project, emphasizing that 'it is important to have a perspective of looking at the Earth from the outside.'")

from *ibc*
July 1 2024
「科学は人類共通。世界で共通するものを日本で」世界的物理学者がILC国内誘致への期待を語る　盛岡市での講演会
村山教授は、ILCが宇宙や物質の誕生に関わる研究施設として期待されていると説明しました。「科学というのは人類共通のもので、世界から本当にたくさんの人が集まってくる。世界で共通するものを日本でできたらすばらしいなと思う」（Sure, here is the English translation:

"Professor Murayama explained that the ILC is expected to be a research facility involved in the study of the origins of the universe and matter. 'Science is something that belongs to all of humanity, and a great many people from around the world will gather here. I think it would be wonderful if we could have something of global significance in Japan.'")

from *NHK*
June 27 2024
岩手県議会 知事"ＩＬＣ誘致は山場 全力で国に働きかけ"
県議会の6月定例会は27日から一般質問が始まりました。
達増知事は次世代の大型実験施設、ILC＝国際リニアコライダーの誘致は今年度から来年度が山場だとして、全力で国に働きかけていくと述べました。（Sure, here is the English translation:

"The June regular session of the Prefectural Assembly began on the 27th with general questioning. Governor Tasso stated that the effort to attract the next-generation large experimental facility, the ILC (International Linear Collider), will reach a crucial point from this fiscal year to the next, and he expressed his commitment to lobbying the national government with full effort.")

from *Kahoku Shinpo*
June 15 2024
ＩＬＣ「国政策に引き上げを」 東北推進協、仙台で総会
岩手、宮城両県境にまたがる北上山地が建設候補地の超大型加速器「国際リニアコライダー（ＩＬＣ）」の誘致を目指す東北ＩＬＣ推進協議会は１４日、仙台市で総会を開き、２０２４年度の事業計画を承認した。(Sure, here is the English translation:

"On the 14th, the Tohoku ILC Promotion Council, which aims to attract the International Linear Collider (ILC) to the Kitakami Mountains spanning Iwate and Miyagi prefectures, held a general meeting in Sendai City and approved the business plan for fiscal year 2024.")

from *Iwate Nippo*
June 15 2024
ILC誘致に向け十分な予算措置求める　推進協総会で決議採択
東北ＩＬＣ推進協議会は１４日、仙台市内で本年度の総会を開いた。国際リニアコライダー（ＩＬＣ）の誘致実現に向け、日本政府に国の政策と位置付けて推進することや高性能加速器開発への十分な予算措置を求める決議を採択した。(Sure, here is the English translation:

“On the 14th, the Tohoku ILC Promotion Council held its annual general meeting in Sendai City. To realize the attraction of the International Linear Collider (ILC), the council adopted a resolution urging the Japanese government to promote the project as a national policy and to secure sufficient budgetary measures for the development of high-performance accelerators.”)

from *Nature*
June 6 2024
CERN’s $17-billion supercollider in question as top funder criticizes cost
But some researchers argue that a circular collider is not the only option for a Higgs factory, and that a linear collider could have some advantages — including lower energy consumption and possibly lower construction and running costs.

from *Iwate Nippo*
May 28 2024
ILC整備計画、各国の理解増進　東京でKEK浅井機構長が講演
ＩＬＣ整備については、日本側と海外との間で経費負担や運営、意思決定などに意見の隔たりがあるとし「認識に差があったことを各国に共有してもらい、日本の考え方を説明する。ＩＬＣテクノロジーネットワークを使って計画の理解を進めている」と強調した。(Sure, here is the English translation:

“Regarding the development of the ILC, there are differences in opinions between Japan and other countries on cost sharing, operations, and decision-making. ‘We will share the differing perspectives with each country and explain Japan’s standpoint. We are advancing understanding of the project using the ILC Technology Network,’ he emphasized.”)

from *Physics World*
May 6 2024
Superfluid helium: the quantum curiosity that enables huge physics experiments
Other accelerator facilities that use superfluid cooling include the Thomas Jefferson Laboratory in the US and the European X-ray Free Electron Laser in Germany. A future International Linear Collider – a possible successor to the LHC – would also employ superfluid-cooled SRFs.

from *CERN Courier*
May 3 2024
European strategy update
A ramp-up of R&D for future accelerators also featured high on the priority list, followed by coordination with a potential International Linear Collider and participation in a global neutrino programme.

from *Iware Nippo*
April 29 2024
国が加速器連絡会を設置　ILCなどの情報共有を促進　岩手からは政府に早期の判断求める声
内閣府と文部科学省は、担当部局で構成する「将来の高性能加速器に関する連絡会」を設置し、国際リニアコライダー（ILC）などの情報共有を進めている。研究者や関係省庁の検討状況を把握する目的。ILCの東北誘致が正念場を迎える中、取り組みの推進が期待される。(Sure, here is the English translation:

“The Cabinet Office and the Ministry of Education, Culture, Sports, Science and Technology have established a ‘Liaison Council for Future High-Performance Accelerators,’ composed of relevant departments, to facilitate information sharing about projects such as the International Linear Collider (ILC). The purpose is to understand the status of deliberations by researchers and related ministries. As efforts to attract the ILC to the Tohoku region reach a critical stage, the promotion of these initiatives is highly anticipated.”)

from *Asahi Shimbun*
April 23 2024
大型加速器誘致に向け正念場　県のILC推進本部会議が開かれる
宇宙の謎に迫る大型加速器「国際リニアコライダー（ILC）」の誘致を目指す岩手県は22日、ILC推進本部会議を開いた。誘致をめぐっては2025年が一つのメドになるとの見方があり、県は日本政府に前向きな判断を促すとともに国民にILCの重要性を啓発して機運を高めたい考えだ。(Sure, here is the English translation:

“On the 22nd, Iwate Prefecture held a meeting of the ILC Promotion Headquarters to discuss efforts to attract the large accelerator, the International Linear Collider (ILC), which aims to uncover the mysteries of the universe. There is a view that 2025 will be a significant milestone for the attraction efforts. The prefecture aims to encourage the Japanese government to make a positive decision while also raising public awareness about the importance of the ILC to build momentum.”)

from *CERN Courier*
April 19 2024
Accelerator sustainability in focus
With the workshop being held in Japan, the proposed International Linear Collider (ILC) figured prominently as a reference project – attracting considerable attention from local media.

from *CERN Courier*
April 11 2024
A global forum for high-energy physics
One is devoted to the International Linear Collider (ILC). For more than two decades, ICFA has promoted the realisation of the ILC, for which a global design effort was put in place in 2005.

from ***CERN Courier***
March 27 2024
China's designs for a future circular collider
In Europe, the 2020 update of the European strategy for particle physics concluded that a Higgs factory is the highest priority, while the US Snowmass 2021 community study and subsequent P5 report released in December 2023 also stressed the importance of overseas Higgs factories. CEPC scientists have actively contributed to both exercises. Meanwhile in Japan, which proposed to host an International Linear Collider (ILC) Higgs factory in 2012, a new baseline design to start at a collision energy of 250 GeV instead of 500 GeV was presented in 2017.

from ***Symmetry***
March 19 2024
A trio of paths toward the discovery machine of the future
It could be built after or in tandem with one of the committee's top priorities for the near-term future: a collider designed for the in-depth study of the Higgs boson, such as the proposed Future Circular Collider at CERN or the proposed International Linear Collider in Japan. It would use technology so cutting-edge that it currently does not exist.

PREPRINTS

ARXIV PREPRINTS

2407.00969
Dark matter-electron scattering and freeze-in scenarios in the light of Z′ mediation

2407.00587
Development of Rotating Target with Ferrofluid Seal for ILC Electron-Driven Positron Source

2406.15939
Exploring new physics via effective interactions

2406.04040
Precise measurement of light-quark electroweak couplings at future colliders

2406.01675
Measurement of CKM element |Vcb| from W boson decays at the future Higgs factories

2405.09583
Comparison of WarpX and GUINEA-PIG for electron positron collisions

2405.08494
Determination of CP-violating HZZ interaction with polarised beams at the ILC

2405.05820
Probing CPV mixing in the Higgs sector in VBF at 1 TeV ILC

2403.09144
Probing gauge-Higgs Unification models at the ILC with quark-antiquark forward-backward asymmetry at center-of-mass energies above the Z mass

2402.02072
Searching for singlet vector-like leptons via pair production at ILC

2401.13402
One-loop electroweak radiative corrections to polarized e+e−→ZZ process

2312.09409
One-loop processes in doubly-charged-scalar lepton-triality models: current constraints and future sensitivities

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FEATURE

A Tribute to Sachio Komamiya

Rika Takahashi | 8 July 2024

Portrait of Sachio Komamiya taken in 2013 when he was appointed as LCB Chair

With deep sadness, we announce the passing of Professor Sachio Komamiya, a prominent figure in the Japanese and international ILC community. He passed away on 5 June at the age of 71.

Born in Yokohama, Japan, in 1952, Komamiya graduated from the University of Tokyo in 1976. He went on to the Graduate School of Science, the University of Tokyo, and studied under Prof. Masatoshi Koshiba, the 2002 Nobel Laureate in Physics.

Komamiya began his diverse international career by connecting with Germany. Koshiba proposed an experiment using PETRA, an electron-positron collider at DESY in Germany, in collaboration with Heidelberg University and Manchester University. This collaboration led to the JADE experiment collaboration, representing Japan, Deutschland (Germany), and England. Koshiba's laboratory took charge of developing the lead-glass electromagnetic shower detector for the experiment, which operated reliably and contributed to numerous achievements, including the discovery of gluons.

During his second year in a PhD program, Komamiya relocated to Germany. After obtaining his PhD for his work at DESY, he took up a postdoc position at the University of Heidelberg, joining the group of Prof. Joachim Heintze in the JADE experiment. “He very quickly integrated himself into the group and the JADE experiment in general. Not only an excellent scientist and much appreciated colleague, he even showed a remarkable understanding of our German sense of humor,” said Rolf Heuer, former Director General at CERN. In his final lecture at the University of Tokyo, Komamiya reflected on his time in Germany, dedicating three slides to the jokes and pranks he and his colleagues enjoyed there. “As a physicist, Sachio was a pioneer. At DESY, he was one of the first to perform searches for supersymmetric (SUSY) particles, and his enthusiasm for this type of analysis earned him the nickname *SachiNo*,” Heuer added. Komamiya led the world’s first systematic search for groups of SUSY particles—a pursuit that continues at the Large Hadron Collider (LHC). Additionally, he made significant contributions to research efforts focused on the Higgs boson.

In 1986, His enthusiasm for the highest-energy experiments led him to move to the Stanford Linear Accelerator Center（SLAC）in the U.S. as a staff physicist. The construction of the new machine, the SLAC Linear Collider (SLC), the first linear collider, was underway there. The SLC was a single-pass collider that used the linac to accelerate both electrons and positrons, a design that was highly complex. Arcs at the end of the linac bend the beams, and a final set of optics focuses the beams down to a radius of 2-3 microns at the interaction point, achieving a center-of-mass collision energy of approximately 92 GeV to produce the Z0 particle. Komamiya worked on developing the arcs that bend the beams, one of the most complicated parts of the machine.

Physics measurements at the SLC started in 1988 with the Mark II detector. “Although we met countless times at conferences and workshops (in particular in smoking corners) we worked only once together, in the MarkII experiment,” recalls Francois Le Diberder, Laboratory of the Linear Accelerator (LAL), France. Beside work in the wonderful SLAC for nearly two years, we enjoyed regular end of the week beer&smoking-workshops, mostly at his wife’s kitchen.Sachio laughed endlessly at my ability not to even notice the huge celebration-party in SLAC for the first Z0 produced by e+e- annihilation,that I missed completely, to my dismay,” he said.

The Mark-II experiment achieved several significant successes, such as the discovery of Tau lepton and the precision measurement of the Z boson. In October 1989, the San Francisco Earthquake caused considerable damage in the San Francisco Bay Area, but SLAC managed to avoid severe damage. However, it disrupted the Mark-II experiment, and Komamiya decided to move on to the next challenge.

Komamiya’s enthusiasm for the highest-energy experiment made him move to to Europa in 1990, joining the OPAL experiment at the Large Electron Positron Collider（LEP）at CERN. “Sachio was one of the first scientists to work in a large international collaboration at CERN on the OPAL detector”, said Lyn Evans, former project Leader for LHC, and the director of the Linear Collider Collaboration. “He learned the value of global collaboration in science. Sachio was an outstanding physicist and a great friend. His passing brought great sadness,” Evans shared. Tatsuya Nakada, Chair of the ILC International Development Team (IDT) also met Komamiya at CERN. “My encounter with Sachio took place when he was one of the major players in the OPAL experiment. I was particularly impressed by the clarity of his plenary presentation at the International Europhysics Conference on High Energy Physics in Brussel in 1995”, said Nakada,

Komamiya returned to Japan in 1999 and became a Director of the International Center for Elementary Particle Physics (ICEPP) at the University of Tokyo in 2000. While leading research and experiments there, Komamiya led Japan’s high-energy community. He served three terms as the chairman of the Japan Association of High Energy Physics (JAHEP).

His leadership and extensive international experience have been precious in advancing the ILC project. He was a Japanese representative for the International Committee for Future Accelerators (ICFA) from 1999. In December 2012, the Global Design Effort (GDE) led by Barry Barish and the Research Directorate (RD) led by Sakue Yamada, both organisations responsible for leading the ILC R&D activities, completed their missions with the finalisation of the technical design report (TDR). At the same time, the ILC Steering Committee (ILCSC), which supervised the GDE and RD, also completed its mission. The batons were transferred to new organisations in 2013: the Linear Collider Collaboration (LCC), led by Lyn Evans for project development, and the Linear Collider Board (LCB), which oversaw LCC’s activity chaired by Komamiya. “He was a strong advocate for the ILC, eager to see it become Japan’s first globally hosted project,” Evans recalls. “I was very fortunate to witness how energetically he was steering the ILC activities as the first chairperson of the LCB. When I started getting involved with the ILC closer, Sachio was one of the most valuable partners for discussion,” Nakada affirmed.

Komamiya served as a diplomat to advance the ILC as a global project. “From the work and political perspective, I recall Sachio’s very helpful explanations of all the many different people and organisations who had a part in planning the ILC in Japan. I was always amazed that he could remember all the names and how they connected to each other,” said Andy White, Professor at the University of Texas, U.S.A. “Coming from outside Japan, it is not easy to understand Japanese politics at the national and local levels and all the other industrial and community entities having an interest in the ILC. I greatly appreciated Sachio’s calm and patient explanations of the often complex relations involved. Sachio fulfilled a critical and essential role bridging the areas of science and politics – a talent that we sorely miss”.

Sachio Komamiya with Masako Shiota (second from left) and other conference secretaries at LCWS 2013 held at University of Tokyo. Image credit: KEK

“As far as I have ever known, there is no other person whose personality was so loved by all the people around him, including particle physicists in Japan and abroad,” said Masako Shiota, a secretary at ICEPP who worked with Komamiya for 7 years. “I believe this is attributed to his enthusiasm for his research, his firm yet kind nature, and the charisma infused into every word he spoke.”

He wrote in his guest article for the ILC NewsLine, published in December 2013, “Since the ILC is a truly international project, the whole community has to possess a common vision of the science and the project.”. Perhaps it’s time to carefully consider his words once again.

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AROUND THE WORLD

Federation of Diet Members resolves to promote the ILC in Japan

Rika Takahashi | 8 July 2024

On March 21, a general meeting of the Federation of Diet Members for the ILC took place at the Second House of Representatives of the House of Representatives. The meeting was attended by approximately 50 participants, including members of the Diet, relevant ministries and agencies, business representatives, and researchers. During the meeting, comprehensive reports were presented regarding the progress of the ILC project and the initiatives undertaken by various pertinent organizations. Subsequently, stakeholders engaged in a dialogue aimed at deliberating on the future course of action for the ILC project.

The general meeting was led by Hon. Takashi Fujiwara, Deputy Secretary General of the Federation. “In his opening remarks, Hon. Ryu Shionoya, Chair of the Federation, said, ‘I recognise that one of the major problems of the ILC project is the lack of a host for the ILC, and this is the first thing we must consider. We must establish a collaborative system involving all the parties,” he demanded of the participants.

At the beginning of the session, researchers presented reports. First, then-KEK Director General Masanori Yamauchi delivered a report on the “Current Status of the ILC Project,” explaining the ILC and global trends in accelerator projects. He also highlighted that the research on the Higgs boson, discovered in 2012, stands as the most crucial advancement in particle physics. Additionally, scientists worldwide are advocating for the establishment of a “Higgs Factory,” an accelerator designed to generate a significant quantity of Higgs bosons for in-depth study. He also emphasised two advantages of building the ILC in Japan: Japan will become a centre of cutting-edge science, and it will be a source of innovation through the application of accelerator technology. Masaya Ishino, the recently appointed spokesperson for ILC Japan, offered an overview of the current promotional structure, while also providing guidance for researchers on the path forward. ILC Japan is an organisation that promotes ILC activities in Japan on behalf of the research community. Ishino mentioned that “the ILC is an experimental facility with numerous excellent features for advancing next-generation particle research.” He also expressed his hopes to “increase the involvement of more researchers in the ILC and to encourage research and development within a global framework.”

The Ministry of Education, Culture, Sports, Science, and Technology (MEXT) and the Cabinet Office have both presented their reports.

In her report, Mizue Shiomi, Director of the Research Promotion Bureau of the Ministry of Education, Culture, Sports, Science and Technology (MEXT), explained the status of ILC-related budgetary measures and the status of requests and exchanges of views with relevant national governments and others. A significant amount was allocated for research and development related to the ILC. 700 million yen earmarked for “the development of key elemental technologies to improve the performance of future accelerators.” Also, sustained backing will be provided for the development of fundamental technologies that will contribute to future high-performance accelerators based on the current situation where the ILC Technology Network (ITN), a framework for promoting the development of critical ILC technologies through international collaboration, is being established. Additionally, MEXT is committed to fostering the growth of young researchers who are poised to assume leadership roles in the future. In addition, an operating grant of 350 million yen has been provided to KEK, an increase of 80 million yen compared to the previous year.

She mentioned that there have been six continuous opinion exchanges with relevant countries since 2021. Additionally, she reported that during an opinion exchange with the Director of the Science Bureau of the US Department of Energy last December, they received a positive response, indicating that the US would consider ways to participate in the ITN at the earliest possible date. Shiomi concluded by stating that MEXT would continue collaborating with the research community to advance the initiative steadily.

Deputy Director-General Naoyuki Fujiyoshi, from the Secretariat for the Promotion of Science, Technology, and Innovation at the Cabinet Office, reported the formation and purpose of the Liaison Group on Future High-Performance Accelerators. The liaison group is led by the Deputy Director-General in charge of the Secretariat for Science, Technology, and Innovation of the Cabinet Office, as well as the Research Promotion Bureau of the MEXT. Its objective is to exchange information regarding upcoming high-performance accelerators, including the ILC. There have been two meetings in February and March this year. During these meetings, information was shared about

various aspects of the ILC situation. This included details about the P5 report, which was created in December and outlines priorities for US particle physics projects, as well as MEXT's requested activities and exchanges of views with the relevant countries. Fujiyoshi stated that the Cabinet Office would enhance the system by allowing the participation of observers as necessary in the future.

Shoji Asai, Director of the International Research Centre for Particle Physics (ICEPP) at the University of Tokyo (then, now Director of KEK), presented the challenges of realizing the ILC as a global project. Conventional large accelerator programs have typically been carried out through international cooperation, with most of the construction and operation costs being covered by a single host institute or country.

This methodology, referred to as 'international projects,' serves to streamline decision-making processes while concurrently imposing a substantial burden on the host, who bears responsibility for any delays and accidents. Asai explained that there is a growing international recognition that future large-scale research projects, such as ILC, should be realised as "global projects," where decision-making, costs, and risks are shared among partner countries. He reported that, as there is no precedent for global projects in accelerator experiments, they are addressing issues from the researchers' perspective and compiling a 'script' for realisation. He referred to earlier projects such as the International Thermonuclear Experimental Reactor (ITER) and the Square Kilometre Array (SKA). In doing so, he mentioned that he plans to invite administrative officials of each country to a future briefing session to reflect the views of their administrative bodies.

During the exchange of views, questions were raised about the current status of China's accelerator program, and opinions were expressed calling for effective methods of publicizing the project, including catchphrases.

The meeting was also attended by Mr. Takeo Kawamura, former Chairman of the Federation. He mentioned, "The realization of the ILC is one of my unfinished tasks. I am pleased to learn that it is making steady progress. As Japan's first leadership project, I hope to see the ILC come to fruition," and conveyed his optimism for the future advancement of the initiative.

The meeting concluded with adopting the 'Recommendations on the Progress of the International Linear Collider Project'. Click here for the full text of the recommendation.