ilc newsline

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DIRECTOR'S CORNER

ILC in Europe’s Strategic Outlook

Updating the European Strategy for Particle Physics for 2026

by Tatsuya Nakada



As Europe moves forward with its next update to the European Strategy for Particle Physics (ESPPU2026), the International Linear Collider (ILC) remains part of the conversation. While new proposals and shifting priorities have added complexity, the ILC’s strong technical groundwork and global support continue to position it as a candidate for future international collaboration. How Europe engages will help shape the next phase of global particle physics planning.

FEATURE

Japan’s Vision for the Future of Particle Physics

Interview with Tsuyoshi Nakaya, Chairperson, Japan Association of High Energy Physics

by Rika Takahashi



Japan's high-energy physics community is entering a crucial phase as it maps out its long-term vision. ILC NewsLine spoke with Tsuyoshi Nakaya, Chairperson of the Japan Association of High Energy Physicists (JAHEP), about Japan’s recent input to the European Strategy for Particle Physics and the outlook for the field.

ANNOUNCEMENTS

Join us for the LCWS-2025!

Shaping the Future of Linear Colliders — This Time in Valencia



LCWS 2025 is coming to Valencia! Registration and abstract submission are now open. Register early by 31 July 2025 to take advantage of discounted rates.

IMAGE OF THE WEEK

“Freshly Made Universe — Just for You.”

Behind the creation of the new ILC catchphrase

by Rika Takahashi



What does a collider have in common with a hot bowl of soup? A simple yet striking phrase won the AAA Award in a Japan-wide contest to create ideas that inspire people to bring the ILC to Japan. The winning words help make one of the world’s most ambitious science projects feel closer and more personal.

IN THE NEWS

from *NHK*
12 June 2025
大型実験施設ＩＬＣ協議会“今年度が誘致に重要なタイミング”
岩手と宮城にまたがる「北上山地」が候補地になっている次世代型の大型実験施設、ＩＬＣ＝国際リニアコライダーの誘致を進める協議会の会合が１２日開かれ、今年度が誘致に向けた重要なタイミングだとして、国への働きかけを強化することを確認しました。（A meeting of the council promoting the ILC, a next-generation large-scale experimental facility proposed for the Kitakami Mountains spanning Iwate and Miyagi prefectures, was held on the 12th. At the meeting, participants confirmed that this fiscal year represents a crucial time for advancing the project and agreed to strengthen their efforts to engage with the national government.）

from *INFN*
25 May 2025
Major research infrastructures and Italy-Japan collaboration in fundamental physics at Expo2025 Osaka
At the heart of the discussions were current and future flagship projects in fundamental physics: from the Future Circular Collider to the International Linear Collider, from the global network of gravitational wave detectors — LIGO, Virgo, and KAGRA — to the Einstein Telescope, from major experiments on neutrino physics and dark matter searches at Gran Sasso National Laboratories to neutrino studies in the T2K, Super-Kamiokande, and Hyper-Kamiokande experiments.

from *CERN Courier*

19 May 2025
European strategy update: the community speaks
Inputs for an electron–positron LCF cover potential starting configurations based on Compact Linear Collider (CLIC) or International Linear Collider (ILC) technologies. It is proposed that the latter LCF could be upgraded using CLIC, Cool Copper Collider, plasma-wakefield or energy-recovery technologies and designs. Other proposals outline a muon collider and a possible plasma-wakefield collider, as well as potential “bridging” projects to a future flagship collider.

from *Kahoku Shinpo*
14 May 2025
国際リニアコライダーの推進を文科省に要望　岩手、宮城両県
岩手、宮城両県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）」を巡り、達増拓也岩手県知事、伊藤哲也宮城県副知事ら両県関係者が１３日、文部科学省などを訪れ…（有料記事）（On June 13, officials from both Iwate and Miyagi prefectures — including Iwate Governor Takuya Tasso and Miyagi Vice Governor Tetsuya Ito — visited the Ministry of Education, Culture, Sports, Science and Technology (MEXT) . (a paid article.)

from *Nikkei*
07 May 2025
岩手知事、ILC誘致「節目の年」 大阪万博機にPR
岩手県は7日、国際リニアコライダー（ILC）推進本部会議を開き、大阪・関西万博の機会を捉えて誘致機運を醸成する方針を確認した。万博では周辺交通機関への広告出稿などに取り組む。 (On the 7th, Iwate Prefecture held a meeting of its ILC Promotion Headquarters, where it confirmed a policy to use the opportunity of the Osaka-Kansai Expo to build momentum for attracting the ILC. As part of this effort, the prefecture plans to place advertisements on surrounding transportation networks during the Expo.）

from *Iwate Nippo*
06 May 2025
ILC実現へ意見書、欧州の計画反映目指す　国内外研究組織
欧州の素粒子物理学の研究指針となる次期戦略への反映に向けて、国内外の研究者組織などが国際リニアコライダー（ＩＬＣ）に関する意見書を提出したことが分かった。日本での実現へ「グローバルプロジェクト」としての推進を強調する内容で、加速器建設費の最新試算も示した。今回の戦略更新は、次世代大型加速器の方向性が焦点。欧州、中国でも建設が計画される中、ＩＬＣがどう位置付けられるか注目される。(Research groups from Japan and abroad have submitted statements to the upcoming European particle physics strategy, emphasizing the promotion of the ILC as a global project based in Japan. The submissions include updated cost estimates for construction, and the positioning of the ILC is expected to be a key focus as the future direction of next-generation large-scale accelerators is considered.)

from *Big Think*
29 April 2025
A new collider can teach us about the origin of matter
Although there are many novel proposals for new particle colliders, including in China, at CERN, and at Fermilab, the question of whether to build a circular machine, a linear lepton collider, or to pursue a novel muon collider all remain options on the table. In an ideal world, we’d get a linear machine to study the Higgs and the electroweak phase transition with great precision, and then a circular machine to collide hadrons at even higher energies. But funding, political realities, and popular opinion will also play a major role in determining what decisions get made.

from *The Conversation*
17 April 2025
Why do scientists want to spend billions on a 70-year project in an enormous tunnel under the Swiss Alps?
The FCC is not the only major particle physics project under consideration.
Another is a proposed 20-kilometre machine called the International Linear Collider, which would likely be built in Japan.
The US has several projects on the go, mainly detectors of various kinds. It also supports an “offshore Higgs factory”, located in Europe or Japan.

from *IEEE Spectrum*
02 April 2025
Four Ways Engineers Are Trying to Break Physics Search

The accelerator that could theoretically come on line the soonest, would be the International Linear Collider (ILC) in Iwate, Japan. The ILC would send electrons and positrons down straight tunnels where the particles would collide to produce Higgs bosons that are easier to detect than at the LHC. The collider's design is technically mature, so if the Japanese government officially approved the project, construction could begin almost immediately.

from *https://www.theguardian.com/science/2025/mar/29/the-physics-community-has-never-split-like-this-row-erupts-over-plans-for-new-large-hadron-collider*
29 March 2025
Just a big toy – or key to the universe? Row over even Larger Hadron Collider
Instead, researchers have suggested that linear accelerators – which would fire particles in straight lines – might prove to be cheaper, more flexible and more likely to achieve results than a circular collider. This point was backed by Jenny List, a researcher based at the German accelerator centre Deutsches Elektronen-Synchrotron (DESY) in Hamburg.
"There are other technologies on the horizon that could be used to accelerate particles like the proton without needing huge magnets or tunnels," she said. "Plasma wave technology is one of these. Current devices are small, but within 20 years or so we could find they are ready to use to run a big collider."

from *Japan Chamber of Commerce and Industry*
28 March 2025
ラップで「ＩＬＣ」ＰＲ　若者向け動画200万回再生
PR動画は、普段なじみのない素粒子物理学やILCを若い世代に身近に感じてもらうとラップやダンスを取り入れ、ILCの特徴である「衝突」を、食パンをくわえた高校生や相撲取りがぶつかり合うシーンで印象的に表現している。動画は２月現在、YouTubeで4万7千回以上、TikTokで200万回以上再生された。(The PR video incorporates rap and dance to help younger generations feel closer to particle physics and the ILC—fields that are usually unfamiliar to them. It highlights the ILC's defining feature, "collision," through memorable scenes such as a high school student with a slice of bread in their mouth and sumo wrestlers bumping into each other. As of February, the video has been viewed over 47,000 times on YouTube and more than 2 million times on TikTok.)

from *nature*
19 March 2025
The biggest machine in science: inside the fight to build the next giant particle collider
Advocates of a linear Higgs factory modelled on the International Linear Collider say it would do all the Higgs studies of the circular version, but be cheaper and faster. Jenny List, a physicist at the German Electron Synchrotron (DESY) in Hamburg, says that a machine with a 21–33-kilometre tunnel could cost less than half as much as the first stage of the FCC. It could also study how two Higgs particles interact with each other.

from *The Cable*
04 February 2025
What will Jesus do when heaven becomes scientists' playground?
We can currently observe and measure this force at the CERN's Large Hadron Collider (CHC) in Switzerland. As China builds its Circular Electron-Positron Collider and Japan builds its International Linear Collider, with Switzerland's new Future Circular Collider and the Compact Linear Collider, we hope scientists will arrive at the long sought-after Grand Unified Field Theory. And if you add gravity, we will get the complete "Theory of Everything."

PREPRINTS

ARXIV

- **2506.01554**
  Searching for charged Higgs bosons via e+e−→H±W∓S at the ILC
- **2506.00353**
  ILC250 Cost Update — 2024
- **2505.11653**
  Probing Lepton Flavor Violation at Linear Electron-Positron Colliders
- **2505.11292**
  Status of the International Linear Collider
- **2505.02947**

Large One-Loop Effects of BSM Triple Higgs Couplings on Double Higgs Production at e+e− Colliders

- **2504.12431**
  Searching for the LFV γγeμ interaction at e−e+ colliders
- **2503.19983**
  A Linear Collider Vision for the Future of Particle Physics
- **2503.19880**
  HALHF: a hybrid, asymmetric, linear Higgs factory using plasma- and RF-based acceleration
- **2502.03555**
  The T-SDHCAL Hadronic Calorimeter for a Future Higgs factory

ILC in Europe's Strategic Outlook

by Tatsuya Nakada



Since its first adoption by the CERN Council in 2006, **the European Strategy for Particle Physics (ESPP)** has served as a guiding vision and roadmap for the field in Europe. It undergoes regular updates to reflect scientific and technological progress. The first and second updates were completed in 2013 and 2020, respectively. The third update process, known as ESPPU2026, is currently underway.

Written contributions from the scientific community were submitted last March. A community symposium in June reviews the current state of the field and explores future directions. A draft strategy will then be prepared in December by a dedicated team appointed by the CERN Council, with final adoption expected in the special CERN Council session in May 2026.

Although the strategy focuses on European efforts, it has always been developed in a global context, recognising the international nature of particle physics. For example, the 2013 update encouraged strong European participation in long-baseline neutrino experiments in the U.S. and Japan, rather than pursuing an independent European project.

In a similar spirit, the strategy has long acknowledged European involvement in the International Linear Collider (ILC), although the possibility of hosting the ILC in Europe has not been considered. Following the Japanese high-energy physics community's 2012 initiative to host the ILC in Japan as a global project, the 2013 update of the European strategy expressed a clear intention to consider European participation, waiting for a proposal from Japan. At the time, CERN's primary focus for the future collider project in Europe was on the High-Luminosity LHC (HL-LHC) upgrade.

The 2020 update continued to highlight potential European involvement in the ILC. By that time, the HL-LHC was already in its implementation phase, and discussions had begun on the next major collider in Europe beyond the HL-LHC. In this context, the timely realization of the ILC was seen as important.

Since then, the landscape of high-energy physics has continued to evolve. With the HL-LHC upgrade approaching completion, Europe must now identify its next flagship project. Proposals such as the Future Circular Collider (FCC) at CERN and the Circular Electron Positron Collider (CEPC) in China—both of which include physics goals similar to some of those of the ILC—are now well developed. In this context, evaluating how the ILC fits into Europe's future strategy has become a complex issue.

In **its contribution to the ESPPU2026 process**, the Japanese high-energy physics community has emphasised the need to first reach a global consensus on the ILC as the next major project, to be constructed through international collaboration without a predetermined host country. In discussions held by **the International Expert Panel** established by the International Development Team (IDT), it was noted that a misunderstanding among potential partners has led to the evolution of the ILC without first achieving this foundational agreement. Returning to this step is ambitious and likely to require more time than the ESPPU2026 timeline allows. Nevertheless, such global coordination is becoming essential, as the scale and cost of future particle physics projects continue to exceed the capacity of any single region.

Over the past few years, the IDT has advanced engineering studies for the ILC through the ILC Technology Network (ITN) and has reevaluated the ILC's cost based on 2024 prices. **A status report** summarising these developments was submitted to the ESPPU2026 process in March.

It is also worth noting the strong and continuing global interest in building a linear collider based on superconducting radio-frequency (SRF) technology as the next-generation high-energy machine. **A proposal to construct such a collider at CERN** has been submitted to the ESPPU2026 process. **Another submission** outlines a long-term vision for the physics potential of a linear collider, including future upgrades to higher energies and luminosities through the adoption of advanced acceleration technologies under development. The ILC's extensive groundwork provides a strong foundation for this evolutionary approach.

Japan's Vision for the Future of Particle Physics

by Rika Takahashi



Japan's high-energy physics community is entering a crucial phase as it maps out its long-term vision. Researchers from across the country, working together through the Japan Association of High Energy Physicists (JAHEP), are discussing the next big steps for the field. JAHEP has set up a group to prepare a full report on future projects in high-energy physics, aiming to complete it by the end of 2026. Recently, JAHEP also submitted the input to the European Strategy for Particle Physics, based on these discussions.

“The last report on the Japanese future project was published in 2017, and since then, the landscape of particle physics has changed dramatically,” said Tsuyoshi Nakaya, Chair of JAHEP. That earlier report urged the community to pursue all possible avenues to realize two major projects: the International Linear Collider (ILC) and Hyper-Kamiokande. It also emphasized the start of SuperKEKB and the launch of physics operations of Belle II as planned, along with continuing the search for CP violation via the T2K experiment and upgrades to the J-PARC neutrino beam.

Today, SuperKEKB is operational and holds the world record for luminosity in electron–positron collisions. J-PARC has achieved key performance goals. Hyper-Kamiokande, officially approved in 2020, is under construction. “Among the major projects highlighted in the 2017 report, the one that has yet to advance to construction is the ILC,” Nakaya noted.

The discovery of the Higgs boson at the Large Hadron Collider (LHC) in 2012 prompted global recognition of the need for a Higgs factory, which produces large numbers of Higgs bosons, enabling precise studies of their properties. The 2012 and 2017 reports reflected this, stating that "should a new particle such as a Higgs boson with a mass below approximately 1 TeV be confirmed at LHC, Japan should aim for an early realization of an $e^+ e^-$ linear collider." At the time, the ILC was the only candidate being considered in Japan.

While international agreement around the importance of Higgs research remains unchanged, the past decade has seen the emergence of significant alternatives to the ILC, including China's CEPC and Europe's FCC-ee. “None of these projects have yet been approved, but they have become serious options on the table,” Nakaya said. In preparing Japan’s input to the latest European Strategy Update, JAHEP took these developments into account.

The input paper was compiled by the Committee on Future Projects in High Energy Physics under JAHEP. This committee is composed of relatively early-career researchers under the age of 50 from a broad range of experimental backgrounds. “Although the full report is not expected until 2026, our input for the European Strategy Update was due this March. So we asked the committee to prioritize discussions around how Japan should engage with a future Higgs factory,” Nakaya explained.

Historically, Japan has seen the Higgs factory as essentially synonymous with the ILC, and thus alternative projects were not seriously considered. “This time, however, the committee was explicitly tasked with exploring all options,” Nakaya said. Until recently, Japan's research community was not deeply involved with the CEPC or FCC-ee, partly because these projects are relatively new and Japanese participation has been limited. The committee began its work by studying these initiatives in depth.

Following these discussions, the committee concluded that the early realization of a Higgs factory remains the highest priority for Japan’s high-energy physics community. While it remains unclear which project will move forward globally, Japan should support the timely construction of a Higgs factory, wherever it may be.

The report outlines two key recommendations:

- *We prioritize efforts to realize the ILC as Global Project, taking a leading role in advancing ongoing initiatives. We will engage with international partners to discuss governance, responsibilities, and site selection. We intend to develop and expand our scientific and promotional activities to host the ILC as Global Project in Japan .*
- *We also extend our activities in other Higgs factory proposals as a collective approach to maximize the chances of timely realizing a Higgs factory.*

The community concluded that, particularly considering technical readiness and cost, the ILC remains the most feasible option for near-term realization. Furthermore, it should not be pursued as a purely national endeavour. “From the beginning, the vision has been for the ILC to be a global project,” Nakaya said. “There are people in the international science community who seem to think that the ILC is a Japanese initiative, and while Japan does wish to host it, this has always been on the basis of global consensus and collaboration.”

The second recommendation marks a significant shift. A decade ago, there was no discussion of Japan contributing to other Higgs factory initiatives. Now, the community is expressing a strong desire to engage. Though no Japanese groups are currently participating in overseas projects for Higgs Factories other than the ILC, the report encourages starting with collaborative technical efforts—particularly in areas where Japan has unique expertise.

One such contribution could be SuperKEKB’s nanobeam technology, which is expected to play a key role in future circular Higgs factories. “Rather than immediately committing to a specific project, we hope to begin with technical collaborations,” Nakaya said.

He also emphasized that building multiple Higgs factories has been unrealistic, especially given the current global situation and rising costs. Whichever project advances, it will require robust international dialogue on issues like funding and location. In this context, international cooperation becomes more crucial than ever.

“If any project becomes isolated or competitive in a negative sense, the entire field will suffer,” he said. “We must avoid exclusivity and pursue a more inclusive, cooperative approach.”

He pointed out that unproductive rivalries—for instance, assuming support for the ILC means one must oppose other ongoing projects such as B Factory or J-PARC , or vice versa—can be damaging. “If we start off by isolating ourselves, the project is unlikely to succeed,” he warned.

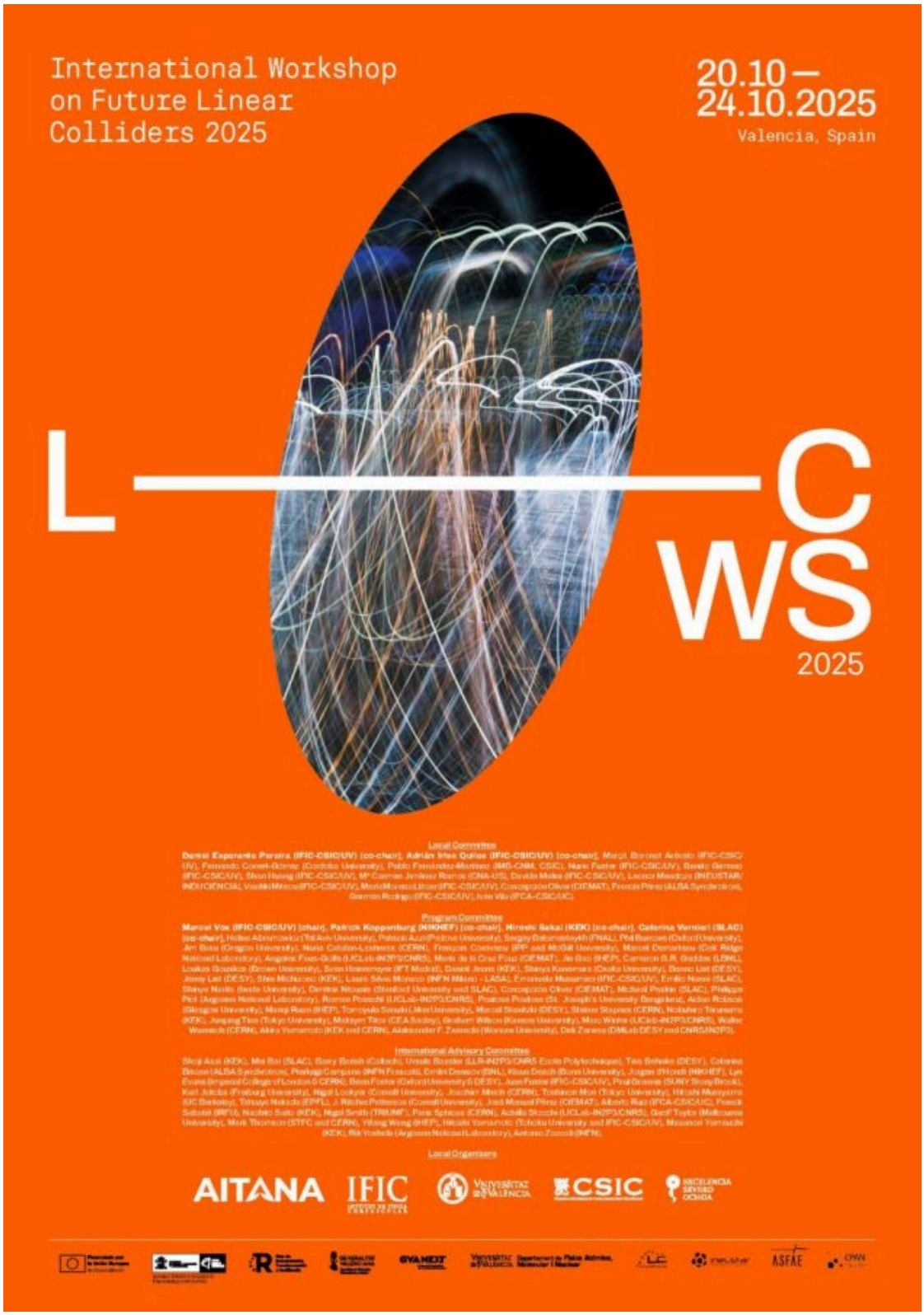
Positive signs are emerging. The recent Higgs Factory Study under ECFA signals growing interest in cross-border collaboration. “When things become difficult in your own country, it’s essential to have allies and supporters abroad,” Nakaya said. “We hope this mindset spreads across the entire community.”

The discussion on Japan’s long-term strategy is ongoing. As the 2026 report takes shape, broader conversations will include other major initiatives. Japan must consider how best to align the ILC with future plans for the B Factory, J-PARC, and more—and how to prioritize among them.

“Priorities change with time,” Nakaya concluded. “That’s why we need inclusive, forward-looking discussions that reflect both evolving circumstances and the needs of the community.”

Join us for the LCWS-2025!

The 25th edition of the LCWS takes place in Valencia from 20-24 October 2025. We hope this will be a memorable edition in an important year for the future of high energy physics. Registration and abstract submission are open! Please note that the deadline for abstract submission is 18th July 2025, and the early registration deadline is 31st of July 2025. For further details, please visit the conference **webpage**.



"Freshly Made Universe - Just for You."

by Rika Takahashi



The Advanced Accelerator Association Promoting Science and Technology (AAA) is a collaborative organisation in Japan that brings together industry, academia, government, and the public sector to promote advanced accelerator initiatives, including the International Linear Collider (ILC).

As part of its efforts to raise awareness and public interest, AAA sponsored the prestigious *Senden Kaigi Advertising Awards*, one of Japan's most prominent advertising competitions. Under the theme *"Ideas that make people want to bring the ILC to Japan,"* the competition received over 16,500 submissions, including catchphrases, radio scripts, and TV commercial concepts.

After a careful review by AAA members and researchers from KEK, the winning entry was selected:
"Freshly made Universe, Just for You." *(Original Japanese: 「できたてのうちゅうをどうぞ」)*
This catchphrase was created by Mr. Shingo Ishigami, an employee of Miyoshi Oil and Fat Co., Ltd., based in Tokyo.

Notably, Ishigami also received the Grand Prize of the Senden Kaigi Awards for a different entry in the same competition — the highest honor of the event.

"I had never even heard of the ILC before entering this competition," saied Ishigami. To come up with a good catchphrase, he did a lot of research about the ILC online and through other sources. "I thought, 'Wow, the ILC is incredible!' At the same time, I found it really difficult to grasp exactly *how* it's incredible in a way that would help me write catchphrase. To be honest, I still don't fully understand it."

He reflects that when it comes to solving the mysteries of the universe, he struggled to see what kind of direct benefit it brings to our daily lives. "I thought that understanding this would help me write a better tagline—but it wasn't easy." Unlike commercial products, the ILC's purpose is complex and abstract, so he focused on finding an expression that would help readers feel a personal connection.

Since the contest theme was “an idea that makes people want to bring the ILC to Japan,” he started by asking himself, “What if something like the ILC were built right nearby?” That simple question led to a spark of inspiration. “At some point, the phrase ‘within soup-delivery distance’ came to mind—it gave me a warm, familiar feeling of closeness. From there, the catchphrase ‘Freshly made Universe – Just for you’ naturally followed.”
With just a few words, he managed to make the vastness of the universe feel as close and comforting as a bowl of soup delivered to your door.

“I wanted children and people unfamiliar with science researc to feel that the universe isn’t something distant, but something close. And I wanted to convey that hosting the ILC in Japan would let people here experience a ‘freshly made universe’ firsthand.”

Looking ahead, AAA plans to use this catchphrase in a range of public outreach efforts. It has already made its debut on 3,500 tote bags handed out at ***Niconico Chokaigi***—a major pop culture event held in Tokyo in late April—where KEK hosted a booth.

“The winning catchphrase presents a friendly image but might not entirely reflect the depth and attractiveness of the ILC. I hope it can be paired with more text or design elements to effectively communicate the overall message. If alternative or added content is necessary, I’m willing to help,” he commented, offering his support for future ideas.