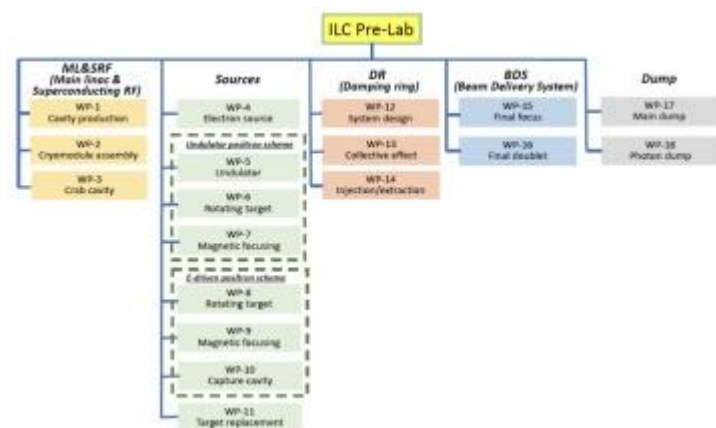


ilc *newsline*

DIRECTOR'S CORNER

All eyes on ICFA

by Tatsuya Nakada



Almost one and half year has passed since the ILC International development Team was formed with the aim to prepare the ILC Preparatory Laboratory. In the coming months, we will explore and develop ideas for the Pre-lab implementation to provide information necessary for the ICFA discussion.

AROUND THE WORLD

Interactions between science and comedy

by Rika Takahashi



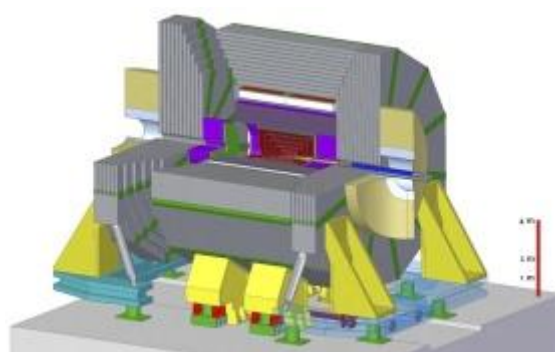
Public support plays a major role in carrying out big scientific projects such as the International Linear Collider. The ILC International Development Team is taking a fun approach to getting the Japanese people to get in touch with the ILC :a

FEATURE

SiD reinvents itself

New sensors, new hardware, better timing for the proposed ILC detector

by Barbara Warmbein

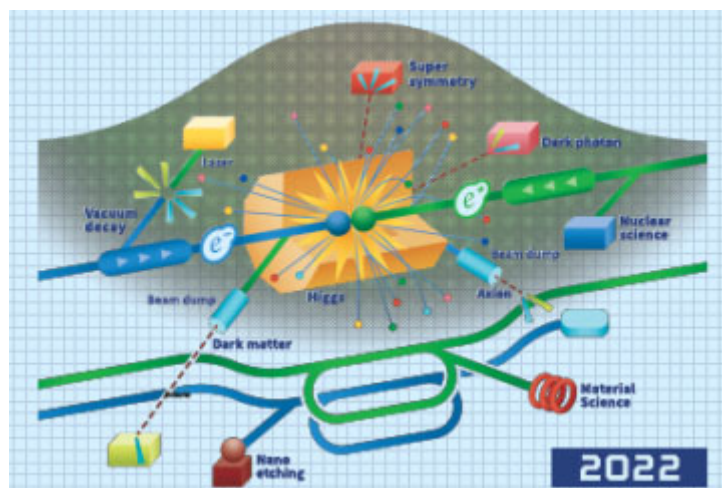


There are thought exercises that end in the head or on paper and there are those that lead to change. A group of scientists working on the SiD detector, one of the two particle detectors proposed for the International Linear Collider ILC, have just turned one of those exercises into a major technological overhaul for their detector. Here's an overview of what will be different if the green light to build the ILC comes.

ANNOUNCEMENTS

KEK fundraising campaign

by Rika Takahashi



KEK is fundraising to gain understanding and support from the public to realise the ILC in Japan. Please give your warm support! All support will be used for communication activities.

YouTube livestreaming series of talk shows with comedian Fukumaru Katsura.

For the supporters who donate ¥2000 and more will receive original calendar for return.

VIDEO OF THE WEEK



ILC and you

Don't ask what the ILC can do for you... because you know already that it's set to deliver collisions that might hold the answer to some of the most pressing questions in particle physics. However, there are things you can do that might help the project on the way. Watch the recording of the communication session where communicating scientists and science communicators met during last year's ILCX meeting.

from *ibc*

04 February 2022

[I L C 誘致実現に向け、国への働きかけを継続／岩手](#)

I L C = 国際リニアコライダーの誘致実現に向けた岩手県の推進本部会議が、4日開かれました。達増知事は、改めて県を挙げて取り組みを推進していくと意気込みました。

from *KITAKAMI TIMES*

02 February 2022

[Let's spread western vegetables in Iwate!](#)

The Ichinoseki “Southern Agricultural Technology Development Center” is aiming to cultivate and popularize western vegetables in Ichinoseki, as the city is a candidate construction site for the ILC.

from *KITAKAMI TIMES*

02 February 2022

[Christmas in Morioka](#)

December, the month of Christmas. This is a holiday celebrated in Japan too, and today, we will introduce, along with some photos of the season in Morioka, a slightly different and uniquely Japanese way of celebrating Christmas.

from *Project Design Online*

February 2022

[東北大発ベンチャー ISSに代わる衛星プラットフォームを開発](#)

同社が実験を重ねて技術力を蓄えることは、異分野からの宇宙産業への進出を促したり、新しいビジネスの進展を加速させることにつながるだろう。もちろん、地元活性化への好影響も期待される。もともと東北は、能代（秋田県）と角田（宮城県）にJAXAの拠点があるほか、素粒子物理学の実験装置（国際リニアコライダー）を岩手・北上山地に誘致するなど、宇宙ビジネスに縁のある土地柄だ。東北大学発のシーズは、ispace、ALE、PDエアロスペースといった宇宙ベンチャーに採用されている。

from *TechTimes*

28 January 2022

[Large Hadron Collider Discovers Particles Dating Back To The FIRST FEW SECONDS Of The Universe's Birth](#)

According to Science.org, the Japanese government is now hesitant to build their \$7.5-billion International Linear Collider (ILC) due to the underwhelming nature of the Large Hadron Collider's discoveries-or lack thereof.

from *Big Think*

06 January 2022

[How the unstable muon could revolutionize experimental particle physics](#)

The idea of a linear lepton collider has been bandied about in the particle physics community as the ideal machine to explore post-LHC physics for many decades, but that was under the assumption that the LHC would find a new particle other than the Higgs. If we want to do precision testing of Standard Model particles to indirectly search for new physics, a linear collider may be an inferior option to a circular lepton collider, as the length limitations on a linear collider are quite strict.

from *IN2P3*

05 January 2022

[Accélérateurs de particules : l'expertise française s'exporte](#)

Plusieurs grands projets à venir augmenteront la demande de telles cavités, comme le Futur collisionneur circulaire (FCC) qui prendra la suite du LHC vers 2040, le projet International Linear Collider (ILC) qui pourrait voir le jour au Japon, l'ESS ou encore le prototype de réacteur nucléaire alimenté par un accélérateur de particules MYRRHA11 en Belgique, mené côté français par l'IJCLab, le LPSC et d'autres laboratoires.

from *Iwate Nippo*

24 December 2022

[生徒が描く I L C「実現後」 一関二高、まちづくり在り方提言](#)

一関二高（高橋正勝校長、生徒589人）の1年生は授業で、国際リニアコライダー（I L C）を基軸としたまちづくりの提言に取り組んでいる。国内外から大勢の研究者らが移住する多文化共生社会をイメージ。地域が抱える人口減少など課題解決の可能性も踏まえ、思い思いの未来図をポスターにまとめた。

from *E & T*

15 December 2021

[View from India: The year that was...](#)

Dr Godbole has won global recognition for her research on the different aspects of particle phenomenology, a pursuit that began three decades ago, and is best known for her work at CERN, the European Organisation for Nuclear Research. At CERN, she has contributed towards the design and implementation of the Large Hadron Collider and the Next Linear Collider.

from *Iwate Nippo*

15 December 2021

[I L C 推進を三経連が要望 政府と自民党に](#)

東北経済連合会（海輪誠会長）、北海道経済連合会（真弓明彦会長）、北陸経済連合会（金井豊会長）は14日、政府と自民党に地域経済対策の推進などを要望した。——国際リニアコライダー（I L C）実現に向けた日米欧政府間の国際協議と加速器の技術開発の推進・強化も盛り込んだ。

from *IN2P3*

29 November 2021

Angeles Faus-Golfe, l'ingénieure des interactions fortes

Une ingénieure au service des physiciens : c'est avec réalisme qu'Angeles Faus-Golfe considère sa fonction au sein de l'IN2P3. « Les accélérateurs sont des cathédrales technologiques, mais on ne construit pas des cathédrales juste pour qu'elles soient belles », se justifie-t-elle. Le Large Hadron Collider (LHC), les futurs: International Linear Collider (ILC), Compact Linear Collider (CLIC) et Future Circular Collider (FCC) et tous les autres accélérateurs de particules sur lesquels elle a travaillé sont des instruments mis à disposition de ses collègues pour répondre aux grandes questions que la physique se pose.

from *Iwate Nippo*

26 November 2021

技術革新の可能性強調 I L C、東京大・浅井祥仁氏が講演

国際リニアコライダー（I L C）の誘致を目指す東北 I L C 推進協議会（共同代表・大野英男東北大総長、高橋宏明東北経済連合会名誉会長）は 2 5 日、仙台市内のホテルで講演会を開いた。東京大素粒子物理国際研究センターの浅井祥仁（しょうじ）センター長（5 4）は I L C 開発が加速器技術を進展させ「イノベーション（技術革新）が生まれる」と説いた。

from *Iwate Nippo*

29 December 2021

安全性や最新動向 地域住民ら耳傾け 一関で I L C セミナー

一関市大東町の大原まちづくりの会（熊谷幸次会長）は 2 6 日、地元の大原市民センターで、国際リニアコライダー（I L C）のセミナーを開き、約 3 0 人が専門家から安全対策や誘致活動の最新の動向を学んだ。

ARXIV PREPRINTS

[2201.11646](#)

Signals for vector-like leptons in a S3-symmetric 2HDM at ILC

[2201.11485](#)

Phenomenology of a two-component dark matter model

[2201.08251](#)

Why should we search for vector-like leptons?

[2112.15090](#)Decoding Dark Matter at future e^+e^- colliders[2112.13070](#)Search for invisible dark photon in γe scattering at future lepton colliders[2112.11958](#)

A 96 GeV Higgs Boson in the 2HDM plus Singlet

[2112.10009](#)Charged Hadron Identification with dE/dx and Time-of-Flight at Future Higgs Factories[2112.07982](#)

A Georgi-Machacek Interpretation of the Associate Production of a Neutral Scalar with Mass around 151 GeV

[2111.13492](#)

ILC estimates for leptophilic scalar dark matter

[2111.10543](#)Using modified isolation forest machine learning algorithm to study the neutral triple gauge couplings at an e^+e^- collider[2111.10464](#)Likelihood analysis of the flavour anomalies and $g-2$ in the general two Higgs doublet model[2111.09928](#)

New physics searches with the International Large Detector at the ILC

[2111.09874](#)

Key4hep, a framework for future HEP experiments and its use in FCC

[2111.09434](#)

On the Effectiveness of Iterative Learning Control

[2111.07122](#)

Positive equilibria of power law kinetics on networks with independent linkage classes

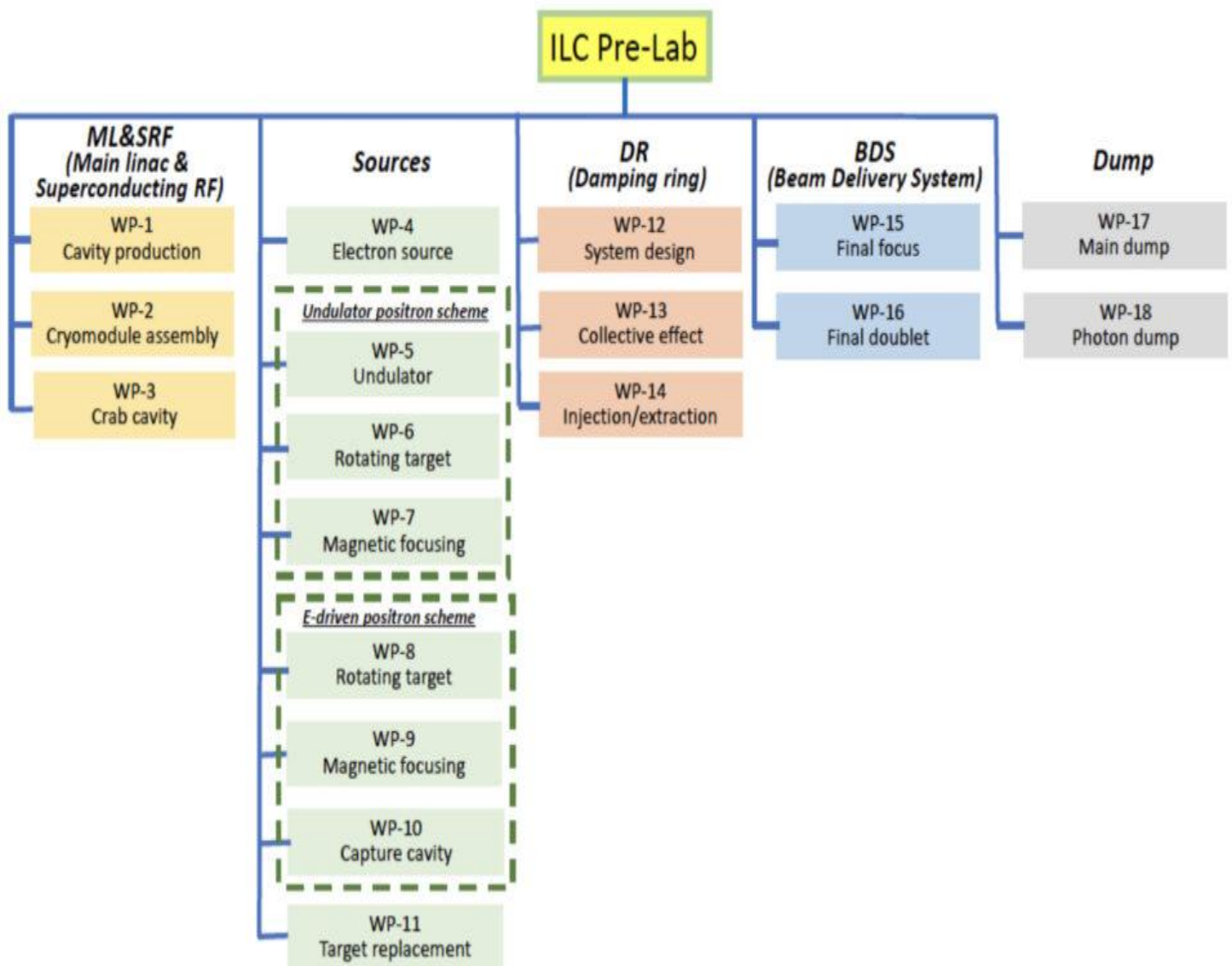
[2111.06523](#)Searching for Charged Higgs Bosons via $e^+e^- \rightarrow H+H^- \rightarrow c\bar{b} \bar{c} b$ at Linear Colliders

All eyes on ICFA

Tatsuya Nakada | [8 February 2022](#)

Almost one and half year has passed since the International Committee for Future Accelerators (ICFA) formed the ILC International development Team (IDT) with the aim to prepare the ILC Preparatory Laboratory (Pre-lab). The completion of the [Pre-lab proposal](#) on 1 June was the biggest achievement of the IDT in 2021. It was nice to see that the work for the Pre-lab proposal generated revived activities and stimulated new interest for the ILC.

It was truly a worldwide effort, but due to the COVID restrictions, entirely done remotely: everything was online work,. not only the document writing but also all the meetings from the technical ones by the Accelerator Working Groups to the planning and editorial discussion by the Executive Board. There were advantages and disadvantages: for example, since people travelled less, it was easier to arrange remote meetings, but time differences among the participants rather limited the duration of these meetings. It should be also noted that we profited from the knowledge accumulated by the Global Design Effort for the Technical Design Report and from their worldwide network.



The purpose of the Pre-lab is to advance the current technical description of the ILC accelerator and site design to the engineering level to be ready for the start of the construction. This will provide a reliable cost estimate and feasibility assessment of the project that are essential for the intergovernmental discussions on the share of the cost and responsibilities. Therefore, the Pre-lab must start now as stressed in the proposal. At the moment, however, the Japanese government maintains its position that some clarity in the international cost sharing would be needed for expressing their interest in hosting the ILC as well as for declaring their support for the Pre-lab.

Since the completion of the Pre-lab proposal, the IDT, in particular the Executive Board, has been trying to implement the proposal. The proposal notes: "Elaboration, modification and adjustment should be introduced for its implementation, in order to incorporate requirements arising from the physics community, laboratories, and governments". This is exactly what we are doing now, faced with the situation described above. Japanese colleagues are working hard to move their government to a positive direction, and we are discussing with different laboratories how to help their effort.

Recalling that the ICFA mandate indicates to complete the IDT work by the end of 2021, ICFA needs to assess the situation of the ILC and IDT work in the coming meeting in March to decide how to proceed. In their discussion, the current development in Japan, meaning the new community organisation for the ILC, activities by the Federation of the Diet Members and the anticipated review result from the MEXT Advisory Panel for the ILC, will be very important. An equally important issue in their discussion will be whether a linear collider should remain as a viable option for the Higgs factory. While there exists a community consensus that an $e+e-$ Higgs factory should be the next high energy physics project, no conclusion has been reached which one. Although there already exists intensive regional efforts for different options, now might be the time for ICFA to discuss a global strategy for the realisation of the Higgs factory. Further effort to advance the ILC accelerator development from the current technical design to the engineering design phase should be judged in this context.

In the coming months, we will explore and develop ideas for the Pre-lab implementation to provide information necessary for the ICFA discussion. The support and positive opinion of the community are of course essential in this effort and we are counting on them.

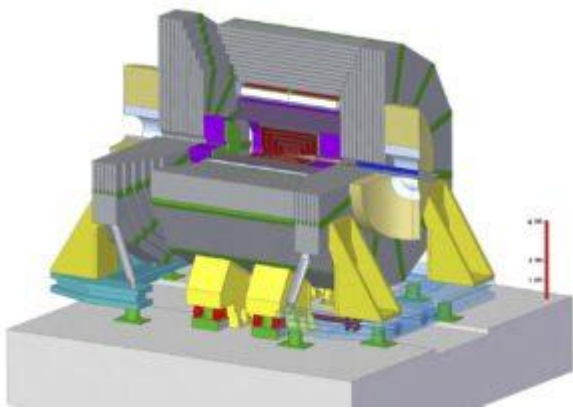
FEATURE

SiD reinvents itself

New sensors, new hardware, better timing for the proposed ILC detector

[Barbara Warmbein](#) | [8 February 2022](#)

Detectors for planned particle colliders don't just appear. They are the product of a long process involving many specialists from many areas and institutes who propose, discuss, select and review the most optimised technologies for the complicated tasks they expect the detector to do. There are many milestones along the way, including the initial “letter of intent” that gathers those scientists willing to participate in the new project around a virtual table, the “detector baseline design” or “interim” and the final “technical design reports.” An interim report summarises the conclusions after several years of research and development of customised detector technologies, while the final technical design report stands at the end of this process, signaling the closing of R&D efforts in order to actually build the high-tech state-of-the-art apparatus. The two ILC detectors ILD and SiD have ticked off all milestones except the final one, and [SiD has just published their thoughts](#) on necessary changes from the baseline design – published in 2013 – to now.



One of the two proposed detectors for the ILC, SiD. Image: SiD collaboration

“Discussions kicked off with this year’s Snowmass process where the American particle physics community sets the strategy for the next years,” explains SiD spokesperson Marcel Stanitzki from DESY. “We looked at the existing detector design from the hypothetical angle of a green light from Japan for the ILC. What would we change in SiD if it came now?” The existing design refers to the blueprint lined out in the SiD detector baseline design (DBD) that in turn relies on technology that was state-of the art then.

However, things move quickly in the detector developing world. New technologies have emerged that are often more efficient, more precise and even cheaper than those from five years ago. The standard chip feature size has also shrunk from 250 to 65 nanometers, making an overall design overhaul necessary anyway. “We might as well do that properly with the improved technologies,” concludes Stanitzki.

One such technology are monolithic active pixel sensors (MAPS), which have been around offering promising readout technology for a while, but have now offer more capabilities inside the pixels while giving a better yield. “The things you can integrate on MAPS chips these days are amazing,” Stanitzki says, “and there’s more to it than that: the sensors can even be made to bend into different shapes.” That means that in principle perfectly cylindrical detector layers are possible while before they had to be tiled into as much a barrel shape as possible. The system has been tried and tested for the future upgrade of the inner tracking system of the ALICE detector at the LHC.

MAPS would almost certainly move into SiD’s tracking system and electromagnetic calorimeter, replacing the silicon technology foreseen there in the DBD. Studies will need to determine the best pixel size for these systems, as well as whether SiD would go analogue or digital for their electromagnetic calorimeter.

With changes in the accelerator design and parameters, the interface between the detector and the accelerator also needs a brush-up, introducing updated systems like forward calorimeters or luminosity monitors and redesigning the hardware in that area – beam pipe, support tubes, piezo system and more.

The SiD team is also considering introducing new subsystems like timing layers, mostly to take advantage of recent improvements in fast-timing detectors. Timing layers add another dimension of information on the particle collision, making it easier to identify and track individual particles

from a collision and resolve clusters of particles, following them through the individual detector layers.

“In short: we know the direction in which we’re heading, and while we certainly don’t want to kick out all the old tech we’re ready to let in the new tech that is ready,” concludes Stanitzki. Find out more about thoughts and future studies in their “[SiD 2025](#)” report.

AROUND THE WORLD

Interactions between science and comedy

Rika Takahashi | [8 February 2022](#)

落語と科学の相互作用 第一回 村山齊さん The interaction between Rakug...



Public support plays a major role in carrying out big scientific projects such as the International Linear Collider. The ILC International Development Team is taking a fun approach to getting the Japanese people to get in touch with the ILC: a YouTube livestreaming series of talk shows with comedian [Fukumaru Katsura](#), entitled “落語と科学の相互作用,” which means the interactions between Rakugo (a Japanese form of comedy) and science.

It's not the first time Fukumaru combines comedy and science: he has been working together with supporters of [Kyoto University's Kwasan Observatory](#) for their outreach activity. Built in 1929, Kwasan Observatory is the second oldest university observatory in Japan. Equipped with the third largest refractor telescope in the country, it has contributed to observation of Mars and Moon. It also has Japan's oldest working telescope, which is still used for observation of solar flares and prominences every day. With great scientific and historical value, Kwasan's old telescopes are very popular among neighbors and space lovers all over the world, and have been contributing to gaining interest and education in science.

As new high-tech telescope-equipped observatories were built, Kwasan faced financial hardship as a result of budget cuts, and they were forced to discuss the possibility of demolishing the building. To protect the facility, supporters started outreach projects in various ways. Rakugo was one of them. They believe that the Rakugo is a very effective way to communicate the research results and the latest scientific knowledge at the university to the public in easy-to-understand words.

Rakugo is a Japanese traditional style comedy. Rakugo-ka, the storyteller, sits on a raised platform and performs very elaborated, long stories with a paper fan and a napkin as a prop. The stories are categorised into “Koten,” classical stories which were created over some hundred years ago and handed down from masters to apprentices, and “Sosaku,” newly created stories with more modern settings or imaginative themes. Fukumaru created new stories inspired by astronomy, and performed at talk shows collaborating with scientists. It has been successful to gain interest and support for the project.

They named the show “[Uchu Rakugo](#).” Uchu is a Japanese word which can be translated as outer space or universe. They also extended their activity to particle physics, to help ILC outreach.

The first Uchu Rakugo was streamed at [KEK's online open house](#) last September. Fukumaru talked about particle physics with Hitoshi Murayama, professor at University of California Berkeley and executive member of IDT. It became one of the most popular programmes in the event, and a successor YouTube series was started in November. In every one-hour programme, Fukumaru interviews one or more scientists, asking them why they chose their careers as scientists or their everyday lives. Three events have been live-streamed, and archived episodes can be viewed on the [ILC communication channel](#).

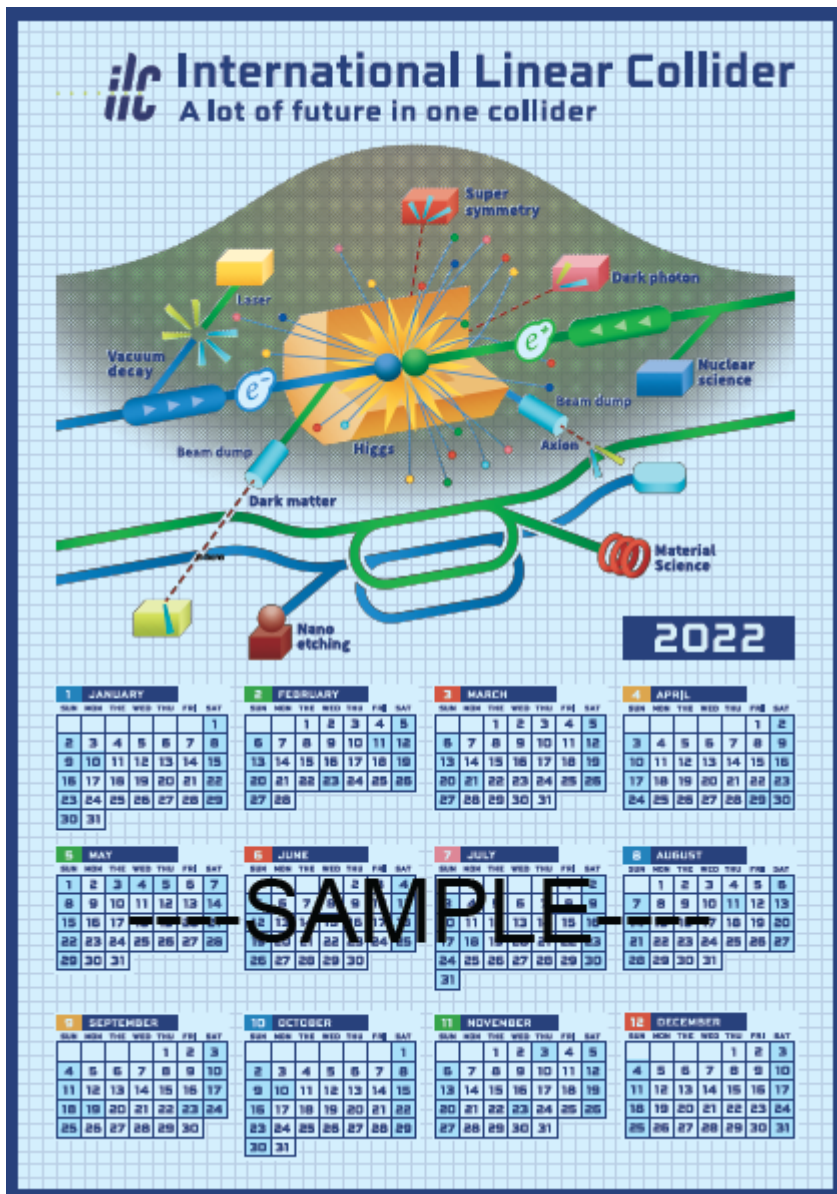
The next show will be held on 28 February, with invitee Mareki Honma from Mizusawa VLBI Observatory, who leads the Japanese team for the international collaboration project using the Event Horizon Telescope, who captured the first image of a black hole in 2019.

See also Fukumaru's English story "[White Lion](#)"

ANNOUNCEMENTS

KEK fundraising campaign

Rika Takahashi | 8 February 2022



2022 ILC calendar for your donation

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You can make a difference!

[See here for more detail.](#)

VIDEO OF THE WEEK

ILC and you

8 February 2022

What science community can do to make the support for the ILC visible | Rep...



Don't ask what the ILC can do for you... because you know already that it's set to deliver collisions that might hold the answer to some of the most pressing questions in particle physics. However, there are things you can do that might help the project on the way. Watch the recording of the communication session where communicating scientists and science communicators met during last year's ILCX meeting.