Ichinoseki Linear Collider Bulletin

ILC News

International Linear Collider

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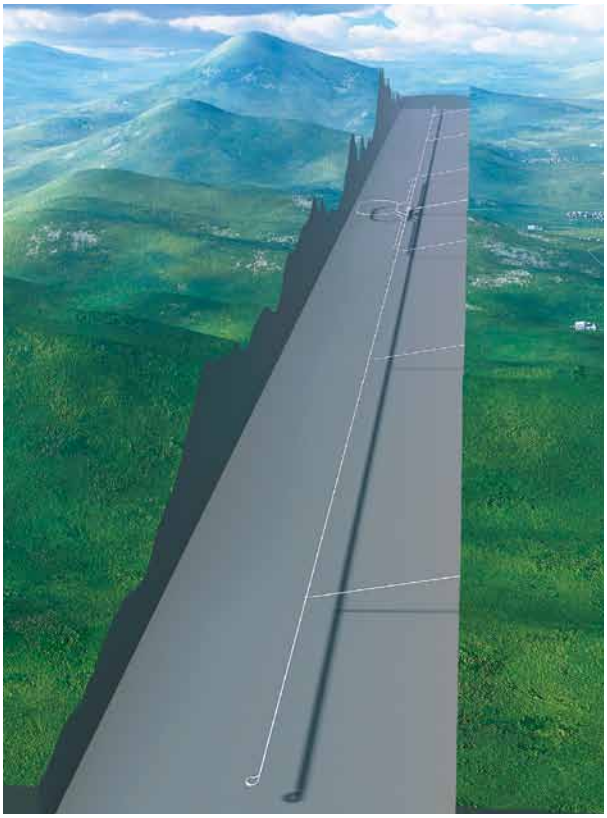


Artist's conception of the ILC ©Rey.Hori

Introduction

The international linear collider (ILC) is a large-scale linear accelerator that will aid in understanding the origins of the universe and the mysteries of elementary particles. The ILC will be the only one of its kind, the world's most cutting-edge institution in particle physics research.

The Kitakami mountain region, which includes Ichinoseki City, is covered by an extremely hard granite bedrock, making it a serious contender for the future site of the ILC.

To provide information about the ILC such as what the plans for the ILC are and how the region will change as these plans are realized, the decision was made to issue the "ILC News", a bulletin about the Ichinoseki linear collider.

This year, the bulletin will be issued roughly once every two months.

What is the ILC?

The ILC, short for International Linear Collider, is a large-scale experimental apparatus, centered around a linear accelerator placed in a straight underground tunnel 31 to 50 km in length, and used to measure the collision reactions of electrons and positrons in the center of the tunnel.

Through the experiments conducted with this apparatus, scientists hope that they will be able to reproduce the conditions of the Big Bang (the instant of a massive explosion that gave birth to our universe), and help us understand the mysteries behind the creation of the universe, of space and time, and of mass.

In Conversation

Osamu Katsube, Mayor of Ichinoseki × Masakazu Yoshioka, KEK Professor Emeritus

Until now, plans for the ILC plan have been moving along behind the scenes, but the time is finally approaching when construction of the ILC will become a reality.

Mayor Katsube has been involved with the ILC since his days as a prefectural government employee.

The High Energy Accelerator Research Organization (abbreviation: KEK; Tsukuba City) has been hard at work on the ILC as the leader of the project within Japan. KEK Professor Emeritus Masakazu Yoshioka, who was involved with ILC planning in the early stages, and Mayor Katsube got together to talk about past ILC initiatives in Iwate and how the region will change with the realization of the ILC, among other topics.

Impetus for becoming involved with the ILC project

Discussion with Tohoku University Professor Nishizawa

Professor Emeritus Yoshioka (Yoshioka): The first time I visited Iwate Prefecture was when I met with then Governor Kudo together with KEK Director, Professor Sugawara, one step in our search for a suitable region for the linear collider in Japan.

What was the original impetus for Iwate prefecture to get involved with the ILC project?

Mayor Katsube (Katsube): It all started with KEK Director Sugawara coming to Professor Nishizawa, who was the president of Tohoku University, to talk about whether there wasn't somewhere with a hard bedrock foundation.

Professor Nishizawa then relayed the details of this discussion to the prefecture. At least, that's my recollection of what the prefectural planning office head told me when we ran into each other on the bullet train.

This information was then reported to Governor Kudo, and that's where Iwate got involved.

The prefecture first set to work on collecting information, sending personnel to Tsukuba City and setting up offices to promote science and technology, things like that. I think that all this showed the very strong feelings that then Governor Kudo had about science.

Yoshioka: Wasn't it unusual for a group to hang out a sign for science and technology like this, especially on a national scale?

Katsube: Indeed. I believe there were only Iwate and Kanagawa.

Yoshioka: When did you become involved with the ILC?

Katsube: A science and technology development office was set up in the prefectural office in 1993 to enhance the information collection system. I was transferred to this office that year and put in charge of the ILC. At the time, it was called the JLC, the Japan Linear Collider.

I was a complete layperson when it came to science and technology, but soon after I was transferred, I was ordered to go to an accelerator workshop taking place in the United States, and that was my first job related to the ILC. It was around that time that you and I met, wasn't it?

Yoshioka: I suppose it was. You and I have known each other for quite some time. How was it in the United States?

Katsube: In the US, I got to see the SLAC accelerator and meet Director Richter. It was an extremely valuable experience. That said, I could barely understand the details of the meetings, and I spent every evening being lectured by KEK Professor Kawabata, who accompanied me.

Yoshioka: Director Richter wasn't only a brilliant physicist, he also had influence politically, and gave shape to the overall state of research in the States at the time.

International conferences

Katsube: When I came back from the United States, we decided to do a workshop in Iwate, and we held our first international conference in Appi Kogen. I think Iwate managed to make its case both in and out of the prefecture, by doing things like holding academic conferences on particle physics for three consecutive years after that.

Prefectural initiatives from 1995 to 1997

Kamaishi Mine use-of-underground-space project and neutrino conference

Katsube: Around 1995, 1996, research into using an underground space began, and I was involved with work related to using the tunnels below Kamaishi Mine from the perspective of experiment and research. We had a project to create clouds in the underground institution, called the Magic Monkey Project, named after Goku's Flying Nimbus from the fact that we would be able to manipulate the clouds. When someone proposed that given that we were able to make clouds, perhaps we could also make it snow, which we were in fact able to do, so we thought about making it a tourist attraction, but we ended up having to stop the project because of research budget issues. A total of fourteen projects were proposed, such as experimental studies with gravitational wave antennas, pumped hydro, compressed air energy storage, and a depressurized underground training facility. The aim was to take advantage of the special characteristics of the bedrock of the Kitakami mountain region.

We also held a neutrino conference for three years in a row, starting in 1995. Atsuto Suzuki, a professor at Tohoku University at the time, was the organizer, and the fact that both Professor Koshiba and Professor Totsuka (deceased) took part made an impression.

I was asked to say something, so I took up the history of Iwate and spoke on the topic of "What if the Panama Canal did not exist?", discussing the idea of Columbus's target being Iwate. Thinking back on it now, the fact that I could give such a talk in front of Nobel Prize winners sends a chill down my spine.

CERN visit

Yoshioka: From the end of the 19th century until the beginning of the 20th, modern physics was centered in Europe, but the wars triggered a flow of scientists from Europe to the United States. In Europe, from a sense of crisis with regard to the US, the international laboratory CERN was established very soon after the war, and the world's largest circular accelerator was constructed. Currently, the world's most advanced research is progressing in roughly the three regions of the United States, Europe, and Asia.

Katsube: I visited CERN in 1996, and inside the facilities, there was a kindergarten, a hotel, a fire department, a clinic, and a bank, among other things. There was also a cafeteria and a restaurant, and the facilities were open twenty-four hours. I started to think about how it was possible to do something like this in a region, instead of just building a research institution, making this visit extremely important for me in envisioning a grand design.

Yoshioka: Given that the initiatives in Iwate started in 1991, and if you think about when the end of the war was, we've only been working on the ILC for twenty-one of those sixty-seven years, about one-third of the time. It's impressive that during this period we've taken up a variety of initiatives, such as holding international workshops, visiting other facilities around the world, and carrying out projects using underground caves.

The town around CERN and inside the facility

Initiatives and issues being faced in order to attract the ILC

Things required of the region

Yoshioka: It was not long after the start of the new imperial era (1989) that I first came to Iwate, meaning that twenty years have passed since then. Over this time, I've come to Iwate any number of

Osamu Katsube Biography

1950: Born in Senmaya-cho, Ichinoseki.

1973: Graduated from the Faculty of Law, Asia University.

1974: Started work in the Iwate prefectural government office.

Employed as

General Employment Measures Office Director

General Measures Office Director

Prefectural Southern Development Office Director, among other positions.

October 2009: Elected mayor of Ichinoseki.

Masakazu Yoshioka Biography

1946: Born in Tottori Prefecture.

1969: Graduated from the Department of Physics, Faculty of Science, Kyoto University.

1975: Graduate School of Science, Kyoto University Completed his doctoral program

1976-1989: Institute for Nuclear Study research assistant.

From 1989: High Energy Accelerator Research Organization assistant professor, professor, professor (special appointment), and then since 2012, professor emeritus.

times, and the area has gradually improved.

Katsube: In the investigations in the initial stages, we got the result that the Kitakami mountains area was extremely favorable in terms of geology.

The topography and the geology has not changed with the time, but the infrastructure has changed with the times. In particular, the roads are much better than they were twenty years ago, and access to the proposed site for the facility is easy now.

I don't know where the central laboratory (main laboratory) could be built, but given the current status of transit, a drive of about twenty or thirty minutes would likely be within a suitable range. For the scientists, I think this kind of distance won't be a problem at all, time-wise.

Yoshioka: My impression of the region is that the environment is very beautiful. It's not some fallow land gone wild, and there's no production waste or TVs or old fridges lying about. Also, the farmers' gardens are extremely beautifully arranged, with flowers all in a row. Why is that?

Katsube: The National Athletic Meet was held in Iwate in 1970, which is when the "Flowerful Movement" started as a prefectural citizens' movement. The movement is still active in the regions, with flower bed contests held in the cities, and individuals and regions competing against each other.

Yoshioka: I wholeheartedly want to see the ILC come to Japan, and if it does, the people involved will also be living in Japan. Short-term residents and young people can live in dormitories (hotel facilities such as youth hostels) or guest houses, but I think we'll see some longer-term residents or people of a certain age who want 100 tsubo (approx. 330 m2) or 200 tsubo (approx. 660 m2) of land to build a house.

Those houses will use local lumber and be built by local carpenters, which I think is good. And I think there will be a number of foreign scientists who would like to live in the region, so I expect that in that case, the area will turn into something we haven't seen in Japan before.

Here, what's important are medical care and schools. If I were to add one more thing to that list, it would be places of employment for the spouses of the scientists. If we can work these three things out, we'll see a number of variations on places to live.

It's also being said that before that, we have to integrate the laboratories and the accelerator into the region. CERN has an exhibition space called "Microcosm" which has an incredible number of visitors. Not only scientists, but an overwhelming number of people such as elementary, junior high and high school students, university students, and politicians. We could set up something like this and be the first of a new model in Japan.

Katsube: If we make our region into this kind of science and technology city, Ichinoseki alone cannot possibly handle all the municipal functions of that city, and I don't think we should. Since Ichinoseki is close to Sendai, I'd like to consider the two as one and cooperate fully with Sendai to ensure the functioning of the new city.

Ichinoseki has also been in touch with Kesennuma and Rikuzentakata, where the damage from the tsunami was significant, and naturally, the larger trend of recovery, restoration and creation of culture after the disaster that united the overall region is important. The mindset of neighborly support is essential. On this point, we are sharing information with neighboring cities in Miyagi such as Kesennuma, Osaki, and Tome.

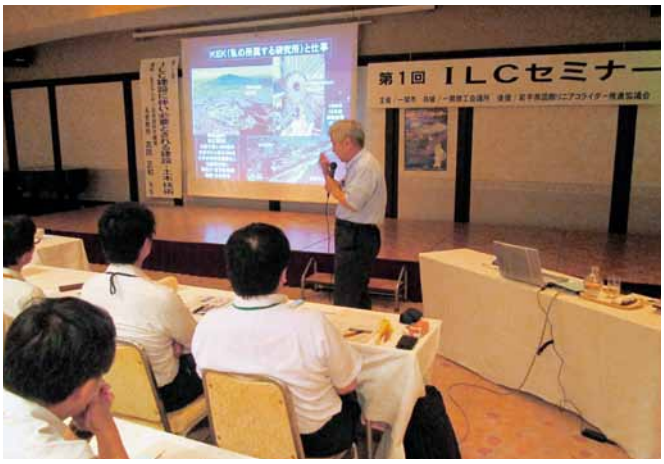
In the future, I don't believe we can think about regions only in terms of lines on a map. If the accelerator is 50 km, the southern tip will be Kesennuma.

I believe it's important to think about how to go forward without any regional egoism, but rather with the idea that this is a Tohoku-wide project, for all of Tohoku to be involved in, roughly speaking, including regions damaged in the disaster.

Yoshioka: As one issue, there is the problem of electricity. Going forward, we have to think about decentralized power for the region as a whole. I wonder what the governing body thinks of this. I believe we need to proceed in consultation with experts.

Former prime minster Yukio Hatoyama site visit

Katsube: The other day, former prime minister Yukio Hatoyama (Linear Collider International Research Facility Development caucus chairperson) came to view the proposed site of the facility, and the first thing he said was, "I thought I was going to be taken to some desolate place deep in the mountains, but this is not that at all." He was surprised there was a town so nearby. He also held one of the samples from the drilling investigation and checked the hardness of the granite from the Kitakami mountain region.



Seminar

Yoshioka: In Japan, describing it as a "mountain site" is a mistake; it's a hilly region. To be clearer, it's more of an undeveloped areas with hills. Going out to the proposed site by car, there are some areas with higher elevations, but the topography for the most part is rather gentle. However, as I said earlier, flowers bloom in the gardens, and any children you run into greet you with a smile.

This kind of environment is a serious asset. I'd like to further improve on this.

City initiatives up to now, future efforts

Katsube: In the city up to now, we have (1) welcomed cutting-edge science and technology, and scientists as education for the human resources who will be shouldering the next generation, and offered junior high advanced science and technology hands-on workshops, which send junior high school students to Tsukuba City, and International Linear Collider lectures, which target junior high and high school students, to deepen their understanding of science and technology. We have also set up (2) a series of lectures by Professor Koshiba and fun science classes as methods of disseminating and offering education and information about the advanced science of the ILC. I myself have been involved with these projects for many years now, which allows me to speak on entry points into this field, so I have given talks at the Chamber of Commerce and Industry, and industry-academic-government research exchange meetings, among other places.

Some regions also have been working on efforts such as lectures for the general public, but in Ichinoseki, we are trying to broach the subject from a different angle.

A variety of technologies are packed into the accelerator, from particle injection, acceleration, control, and finally up to the collision itself. We are looking to hold about six seminars this year introducing these advanced technologies and the possibilities of developing industry in each area.

We'd like to present each step from the construction of the tunnel itself and the relationship with the private sector. Japan also has the top excavation technologies in the world, and we'd like industries in the region to be aware of these Japanese technologies as well.

Yoshioka: Studying each of the component technologies like this is an extremely good approach. That kind of thinking is just like you, Mayor Katsube.

Katsube: Next, I'd like to move from the stage of giving these lectures to a large number of people, as we've been doing up to now, to working in the field. I'd like to summarize the results in a report every time we hold one of these seminars and disclose them on our website.

Yoshioka: Ours is an age where the Internet is everything, so I think it's a good idea to create this kind of site, and provide information so that people can also see past news.

This year, we have to raise awareness of the ILC in a variety of senses. It's important to overlap these efforts with building excitement in the region itself.

If national political measures and regional organizations are in agreement and the technologies for building the ILC are established, the ILC will be built in Japan. In the United States, the emphasis has shifted away from basic scientific research such as elementary particles and the universe. In Europe, the LHC, a large circular accelerator, already exists. Having both the ILC and the LHC would be difficult, and I think it's actually not possible for both to go to Europe. Given this, the ILC will inevitably come to Japan.

Katsube: I think there is the sense too that Japan is fulfilling its responsibilities not only in Asia, but also in the Pacific Rim area.

I think the next one or two years are extremely important toward the construction of the ILC. You've been kind enough to lecture at a number of seminars up to now and give us a great deal of advice, and I hope you will continue to offer your expertise going forward.

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ILC construction schedule

Up to 2012	2013 and on	Last half of 2010s	2020s
Engineering design for each proposed site by an international joint design team	Submission of design proposals by the ILC Global Design Effort to the governments of Japan, the US, and the EU ↓ Assessment of proposed sites and government discussion ↓ Site selection	Construction	Start of operation