ISSUE 7 Saturday, July 15th

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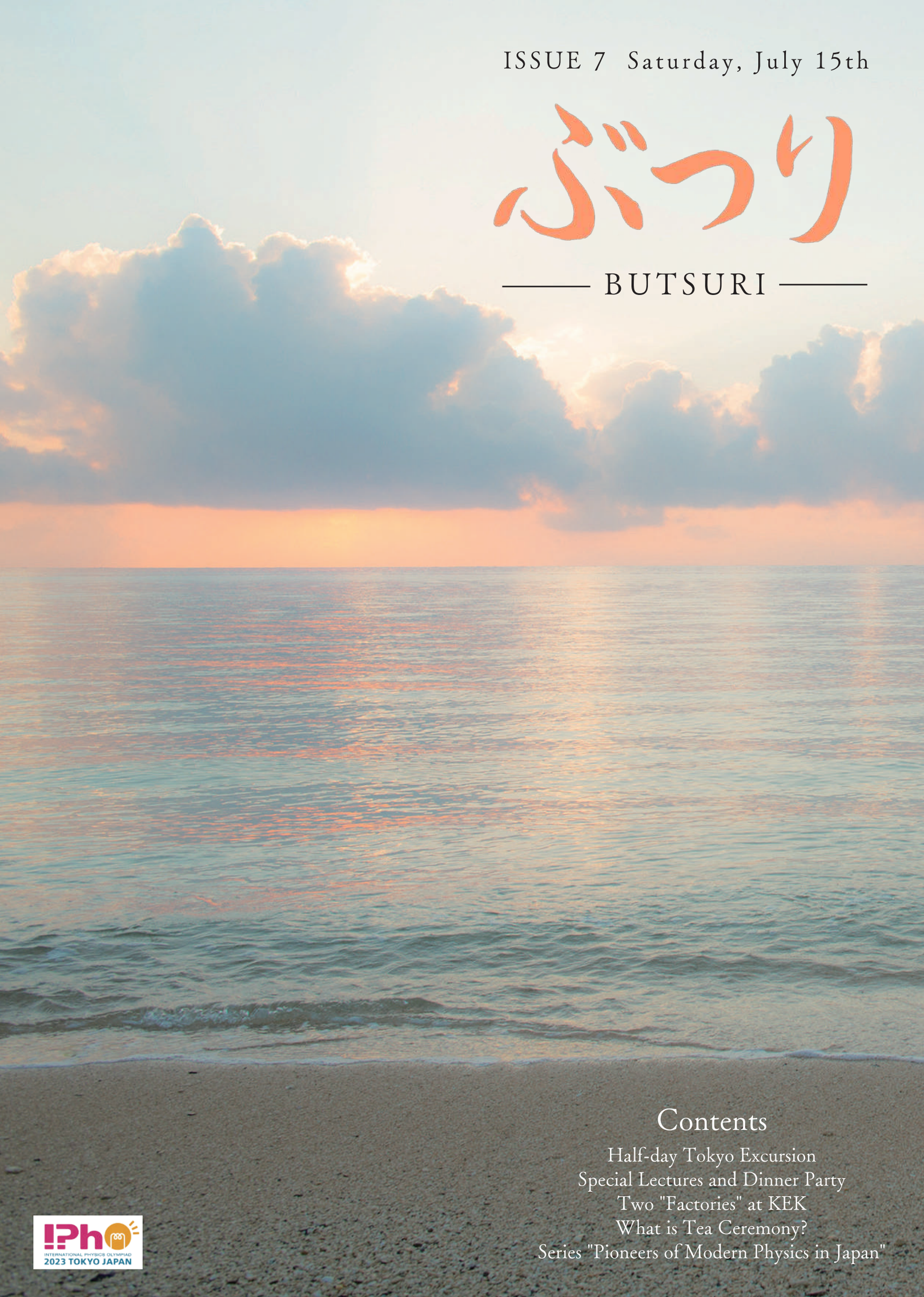

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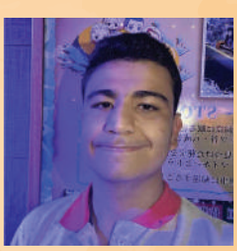
IPhO INTERNATIONAL PHYSICS OLYMPIAD 2023 TOKYO JAPAN

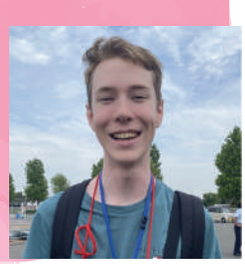
Half-day Tokyo Excursion



Iran: FAYZ Shayan

In Tokyo-joypolis, I had to wait very long before I got in, but the ride was really fun. If we could stay here much longer, it would be much better. I also found that Odaiba was a good place, but I thought the museum was not designed for us, but rather designed for kids much younger than us. In addition, the price of food is reasonably good. All in all this city was really nice.

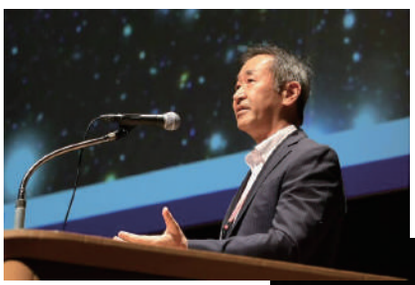
Finland: LEINONEN Eppu



I found Yokohama pretty nice. We went to see the red brick warehouse buildings, which were very interesting to see here in Japan. They looked like a European style buildings. Also, we went to the cup-noodle museum to make our own cup needle, which I found very nice. Even though I think we were the oldest children there, it was fun. We were able to design anything there, so we had a lot of fun with physics designs.

Special Lectures

by two Nobel Laureates in Physics



On July 14, two Nobel laureates in physics, Dr. Takaaki Kajita and Dr. Hiroshi Amano, gave special lectures. Dr. Kajita spoke about the importance of finding new questions in pure science and examining them for a long time, which is expanding the horizon of knowledge. Dr. Amano talked about the fascination of research and deep tech, which allows researchers to pursue the interest of science and its contributions to people in a unique way. He further explained that you shouldn't waste your gifted talent and three things are necessary for researchers: Vision of the future, Enthusiasm, and Persistence. As a whole, the two lectures gave us cues about how researchers should approach science.

Italy: GIURI Andrea

Both lectures were really interesting. In the first lecture, Professor Kajita talked about neutrinos. It was very informative and listening to the process of neutrino experiments was fun. In the second lecture, Professor Amano talked about important choices for the future and the idea of doing actual university doctorate work based on his experience.

Mongolia: MUNKHBAATAR

The special lectures by two Japanese Nobel laureates were really interesting. The first one was the talk about scientific achievement. The second one was about gifted young talents and what they should do in the future. I would like to thank both of them as well as the Japanese physics society.

Philippines: JACOB Benjamin

I found Professor Amano's talk really inspirational. Previously, I actually didn't think about what I was going to do in my life, but now I came to think it's about time to decide what I should do in the future. The lecture told me that I should keep on going with what I really believe in and what I want to do in my life.

Dinner Party photos

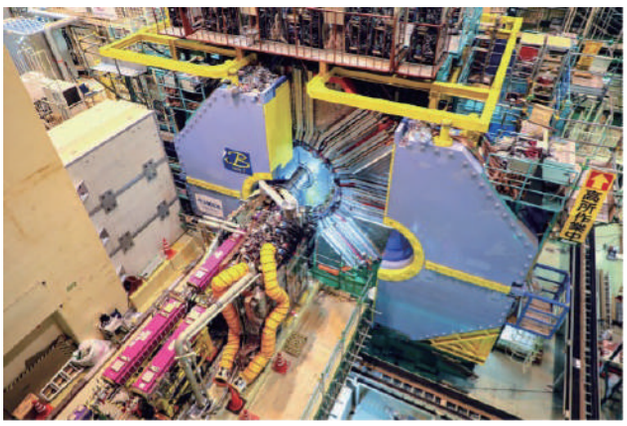
All the participants of IPhO2023, students, leaders, observers, and organizing staff, got together and enjoyed talking to each other while biting sushi, pizzas, sausages, etc. and drinking beverages and water.

Get-together photo

Two "Factories" at KEK Solving the Mysteries of the Universe, Matter, and Life

High Energy Accelerator Research Organization (KEK) is a national research institute with large equipment called "accelerators". Located in Tsukuba City, Ibaraki Prefecture, about 50 km north of Tokyo, KEK conducts a variety of research on space, matter, and life. It has a staff of about 1,000, half of whom are scientists. The annual budget is approximately 35 billion yen. It is an important role of KEK to provide external researchers with opportunities to conduct experiments and produce results.

An accelerator may not sound familiar to you, but it is basically a device that increases the speed of electrically charged particles by giving them energy through the force of an electric field. The vacuum tubes once used in radios and televisions are also small accelerators. Familiar devices that generate X-rays for medical use or microwaves to heat food in a microwave oven are also low-energy accelerators. However, the accelerator at KEK is one of the most special accelerators in the world, with an exceptionally high energy level.



B Factory: Belle II particle measurement device of B Factory (Credit: KEK)

Photon Factory: Experimental Hall of Photon Factory (Credit: KEK)

At KEK in Tsukuba City, electrons are accelerated to nearly the speed of light and used for two major experiments.

The first is an experiment in which electrons and their antiparticles called positrons (particles that have the same mass as electrons but opposite electric charges), are created and collide with each other. In this experiment, an accelerator is used to create a high-energy state like the one in which our universe was born. Although the theory by Dr. Makoto Kobayashi, who is chairman of the Organizing Committee of IPhO2023, and Dr. Toshihide Maskawa (both won the Nobel Prize in Physics in 2008), helps to explain what happened when the universe was born, many mysteries remain. This experiment aims to elucidate them. The accelerator is in a circular tunnel with a circumference of 3 km at a depth of 11 m underground. The measurement device that looks at the particles produced as a result of collisions between electrons and positrons is 8 meters high. The accelerator and the measurement device are designed to create and observe particles called B mesons, hence the name "B Factory."

There is another experiment that uses the intense light produced when the orbits of accelerated electrons are bent by a magnetic field. This light, known as synchrotron radiation, is more directional than medical X-rays, making it ideal for studying the structure of matter, and is being used in a variety of studies. Recently, the samples brought back by the asteroid probe "Hayabusa 2" were analyzed. The facility has 48 light outlets, called "beamlines" , which extract synchrotron radiation from the accelerator. Each is used for a unique experiment. The facility is nicknamed the "Photon Factory" because synchrotron radiation is made up of light particles (photons). Dr. Ada Yonath of Israel, who experimented here for nearly 10 years and discovered the structure of the ribosome, the protein factory of our cells, was also awarded the Nobel Prize in Chemistry in 2009.

You can see both "factories" during a visit to KEK.

What is Tea Ceremony?

What comes to mind when you hear the term "tea ceremony"? Some people may think of matcha (powdered green tea) since matcha-based drinks are popular not only in Japan but also around the world these days. Let us tell you about the charm of the tea ceremony, which is not limited to matcha green tea.

The tea ceremony is a traditional Japanese art form based on a series of ceremonies in which tea is prepared and served to guests. There are more than 500 schools of tea ceremony, the three most popular being Urasenke, Omotesenke, and Mushanokoji Senke. The details of each school differ in various ways, but here we will introduce the Urasenke school, which is the most populous.

When you are invited as a guest, the general flow of the ceremony is to taste sweets, drink tea, and admire the furnishings. Most of the sweets served at a tea ceremony are Japanese sweets. They are not only tasty but also visually gorgeous, so you can enjoy them with your eyes. Sweets that are appropriate for the season or based on the season are served, so it is enjoyable to take a moment to appreciate them before eating them. After the sweets, matcha is served. The host who serves the tea will make froth for the matcha using a special device. This gives the matcha a mellow flavor. After the tea is finished, there is time to admire the room. The calligraphy scrolls, seasonal flowers in the alcove, vases, bowls, etc. can be savored and appreciated for their beauty.

In this way, the tea ceremony is not only about enjoying tea but also a place where one can enjoy beautiful things and feel the spirit of hospitality and wabi-sabi.

Matcha and sweets

Tea ceremony

Have you heard of Sencha-do?

One of the tea ceremonies is sencha-do, which involves brewing sencha, gyokuro, and other teas. The following is a brief introduction to what sencha-do is all about, using the Kung-fu school as an example.

Sencha-do have been founded in the middle of the 17th century by Ryuichi Ogen, the founder of the Obaku sect, a branch of the Rinzai school of Zen Buddhism that originated in China and was introduced to Japan. It was developed under the patronage of powerful persons during the Edo period when tea became popular among the general public as a luxury item. Every year in May, the National Sencha-Do Convention is held at Obakuzan Mampukuji Temple in Uji, Kyoto, where various schools of sencha-do are served in different ways. It is an exciting learning opportunity for those who practice sencha-do.

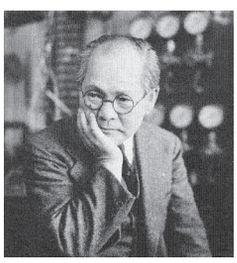
Examples of tea utensils in the Kaofu school

The following are some of the major differences between sencha-do and matcha-do. In sencha-do, a very large number of tea utensils are used, as shown in the picture below. This is in contrast to the matcha tea ceremony, which uses fewer tea utensils such as tea bowls and tea whisks. Also, while the same tea is served all year round in matcha, in the sencha tea ceremony, tea is served differently depending on the season or occasion. For example, in early spring, hojicha is served with cherry blossom petals, and in summer, when the temperature is high, gyokuro is served cold with ice. Why don't you enjoy not only matcha but also sencha?

Series "Pioneers of Modern Physics in Japan"

Torahiko Terada
(1878-1935)

Bragg's law is the law of diffraction and reflection of X-rays. When a material with a periodic structure such as a crystal is irradiated with X-rays of a certain wavelength, the X-rays scattered by the atoms constituting the material are enhanced and canceled out by the repetition of the crystal structure, a phenomenon used in the structural analysis of crystals. Stimulated by the X-ray diffraction of crystals by Max Theodor Felix von Laue, this law was discovered in 1913 by William Henry Bragg and William Lawrence Bragg, a father and son from England. There was a Japanese physicist also inspired by Laue's X-ray diffraction conducted his own X-ray diffraction experiments and independently discovered the present Bragg condition. This Japanese was Torahiko Terada. His other achievements include pioneering research in the field of geophysics, such as observations of tidal secondary oscillations, and in the statistical mechanical field dealing with the "physics of form," such as studies on forms of confetti horns and cracks. Besides being a physicist, Terada had a deep knowledge of literature and other matters and has left behind many essays that harmonize science and literature. In Japan, where there are many earthquakes and tsunamis, Terada left us with the famous saying, "Natural disasters come when you forget about them."



Yoshio Nishina
(1890-1951)

Yoshio Nishina was a physicist called "the father of modern physics in Japan". After graduating from the Department of Electrical Engineering at the University of Tokyo in 1918, Nishina studied physics as a graduate student at the University of Tokyo and at the same time as a research student at the Institute of Physical and Chemical Research (RIKEN). From 1921 to 1928, he studied abroad: in Cambridge, England; Göttingen, Germany; Copenhagen, Denmark; and Hamburg, Germany. While at these places, he conducted experimental and theoretical research with Ernest Rutherford, Niels Bohr, Isidore Rabi, and others. He was active in Europe during the early days of quantum mechanics. In 1928, together with Oscar Klein, he calculated the effective cross section of Compton scattering of X-rays based on Dirac's relativistic electron theory, leading to the famous Klein-Nishina formula. After returning to Japan, he joined Hantaro Nagaoka's laboratory at RIKEN. In 1931, he became a senior researcher at RIKEN and established the Nishina Laboratory. He started experimental and theoretical research on quantum theory, atomic nuclei, X-rays, and cosmic rays, which was unprecedented in Japan at that time. In experiments, he worked on the construction of a cyclotron. In theoretical research, he invited talented young theoretical researchers such as Sin-Itiro Tomonaga. The liberal academic culture that he acquired under Niels Bohr brought a free and active mental climate to Japan and raised Japanese particle physics to a world-class level. Nishina was called "Oyakata" (master) because of his personality. Since many physicists have come out of the laboratories hosted by Nishina, there are few researchers in particle physics in Japan who are not influenced by Nishina.

SCHEDULE

TODAY
Saturday, July 15th

27℃
33℃

Students

7:15-8:00	Breakfast	NYC
8:00-19:00	Full-day Kanto Excursion	

Leaders&Observers

7:00-8:00	Breakfast	NSH
12:00-13:30	Lunch	NSH
14:00-15:00	Board Meeting	NSH
18:00-19:30	Dinner	NSH

TOMORROW
Sunday, July 16th

27℃
36℃

Students

7:15-8:00	Breakfast	NYC
8:00-19:00	Full-day Kanto Excursion	

Leaders&Observers

7:00-8:00	Breakfast	NSH
9:00-12:00	Moderation	NSH
12:30-14:00	Lunch	NSH
14:00-18:00	Moderation	NSH
18:00-19:30	Dinner	NSH
19:30-23:00	Final Board Meeting	NSH

NYC: National Olympics Memorial Youth Center
NSH: Nippon Seinenkan Hotel

The Physical Society of Japan
Japan Society of Applied Physics
The Physics Education Society of Japan
The Biophysical Society of Japan
Japan Science and Technology Agency (JST)
National Institution for Youth Education (NIYE)
National Museum of Nature and Science
Japan Arts Council
Tokyo National Museum
The University of Tokyo
Tokyo University of Science
Tokyo City University
Tokyo University of Foreign Studies
International Christian University
Sophia University
IPhO 2023 TOKYO JAPAN

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