

Sunday, July 9th 2023

BUTSURI

# 物理

Issue 1

Welcome to JAPAN!

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# Welcome to IPhO 2023!



Message from IPhO President

Prof. RAWAT Rajdeep Singh

President, IPhO Head,  
Natural Sciences and Science Education, National Institute of Education, Nanyang Technological University, Singapore

I extend my warmest greetings to the best young physics talents, shortlisted to represent their country after a rigorous selection procedure, and team leaders from about eighty countries of the world who have come back together for IPhO2023 once again in the original physical face-to-face format, after a gap of three years, in this wonderful land of rising sun, Japan, which is known for excellence in science, technology and innovation. As you gather from all corners of the globe, I am humbled by the immense talent and dedication each one of you brings to this global stage. The International Physics Olympiad represents the pinnacle of physics competitions, where the brightest young minds converge to test their mettle and push the boundaries of physics. Tokyo, a city renowned for its rich cultural heritage and technological innovation, is an ideal setting for this momentous event. From the bustling streets of Shibuya to the tranquil beauty of the Imperial Gardens, Tokyo offers a captivating blend of tradition and modernity that will undoubtedly inspire and invigorate your pursuit of knowledge in physics. Throughout the IPhO2023, you will have the opportunity to engage with fellow participants and local volunteers from diverse backgrounds, cultures, and perspectives. Embrace this unique opportunity to forge new friendships and foster a global network of scientific minds that will shape the future of physics. Remember that beyond the competition itself, this journey is about personal growth, learning, and enjoying diverse international exposure. Cherish every moment, relish the challenges, and savor the joy of looking at complex problems through the lens of physics. On behalf of the International Physics Olympiad community, I wish you all the best as you embark on this challenging yet incredible journey towards excellence in physics.



Message from Chairman of the Organizing Committee of IPhO2023

Dr. KOBAYASHI Makoto

Honorary Professor Emeritus, High Energy Accelerator Research Organization (KEK)  
2008 Nobel Laureate in Physics

I am very happy to welcome you to the International Physics Olympiad (IPhO) 2023 in Japan. After three irregular years due to the spread of the COVID-19 infection, the normal style of the Physics Olympiad has come back. Now you can enjoy face-to-face communication. Human life is supported by the development of science and technology. In this development, physics plays an important part as a foundation of all fields of science. One of the missions of the Physics Olympiad is to enhance international contact in the field of school education in physics. It also aims to encourage the formation of friendships among young participants who will lead the future of our society. I hope you do your best in the competition and enjoy the various programs offered during your stay in Japan.

# Cheers from Students!



NAKAMURA Hanako

My name is Hanako, and I'm a student support staff member. I'm a fourth-year student studying International Relations at International Christian University. While I have no knowledge of physics, I decided to become a support staff member for IPhO 2023 because I wanted to be a part of this wonderful opportunity where students from around the world get together in Tokyo, my hometown. I personally think Japan is a very interesting country with its rich history, vibrant culture, and of course, good food. I hope you enjoy your time in Japan. Feel free to reach out to the support staff any time if you have any questions or need any assistance. Remember to stay hydrated and good luck! :)



YATSU Rikuo

IPhO 2023 is ready to start! We spent one and a half years pursuing exciting and unforgettable IPhO 2023 for all participants. The reason why I've worked hard for the excursion planning is because I love traveling very much. So, I'm really excited to go on one-day trips with you and show you around famous sightseeing spots. In addition, your questions or comments will give me the opportunity to reflect on our familiar customs. I hope you'll enjoy not only the events we prepare but also all the wonderful experiences in Japan. Good luck with your exam, too!



SASAKI Yasutaka

My name is Yasutaka Sasaki, a second-year student at the University of Tokyo. I am looking forward to interacting with you all and experiencing Japanese culture at this convention. Although I was not able to participate in IPhO 2020 due to the covid pandemic, I think that the experience of studying for IPhO has built up not only my basic academic ability, but also my attitude to challenge various fields such as biology and information science, too. I wish you all the best of luck and hope that you will gain something from this competition!



Han Ruisi

I'm Ruisi, the student staff leader for IPhO 2023. I came from China four years ago and am currently a junior student at International Christian University. I'm very interested in different cultures and communications, so I joined this big family to help every contestant to have a fantastic adventure in Japan. I really enjoyed the process to plan for the trip and culture events because while researching and field-working on the event contents, I could feel the charm of Japanese culture from various aspects. I hope everyone can enjoy our activities and have a wonderful time in Japan!

# Why Butsuri?

As you may have noticed, the title of this newsletter is 物理 . It is written in kanji, i.e., in Chinese characters, and pronounced as BU-TSU-RI. It is the word that means PHYSICS in Japanese. People in countries that use kanji understand the meaning of each word (物 and 理); 物 means all things and 理 means reason or natural way. Therefore, 物理 , which combines the two characters, means "the natural way of all things". In fact, in China, 物理 has been used in this sense in the past. The word 物理 in today's sense of PHYSICS began to be used in Japanese school textbooks in 1872. After that, 物理 has also been used as a word to express PHYSICS in China. PHYSICS is derived from the Greek word for "NATURE". It is very interesting to see a similarity between "NATURE" and the word 物理 in kanji, which expresses "the natural way of all things".

# The Messages Behind...

## -LOGO-

We hope you like the logo of IPhO2023. As you most likely have already recognized:

The "I" is an exclamation mark (!) representing the excitement of doing physics. The "P" is a question mark (?) symbolizing intellectual curiosity which is a driving force of research. The "h" may be seen as the Planck constant, one of the fundamental constants of physics (admittedly a strained

interpretation). The "O" is designed as a light bulb, a classic symbol of a "Eureka" moment.

## -MEDAL-

These medals to be awarded to the top-grade contestants carry the image of Mount Fuji, which is an undisputed symbol of Japan and has been an inexhaustible spring of artistic inspiration. Inscribed on these medals is one of the most

famous images of Mt. Fuji taken from a series of masterwork wood prints (ukiyo-e) "Fugaku Sanjurokkei (Thirty-Six Views of Mount Fuji)" by Katsushika Hokusai (1760-1849), renowned artist of the Edo era.



Wood print work "Gaifu-Kaisei (fine breezy day)" , also known as "Aka-Fuji (red Fuji)" by Hokusai.



# Some useful Japanese phrases!

Kon nichi wa!

Why don't you use Japanese, even if it is only one word, during your stay in Japan?  
All Japanese people who hear you will respond with a smile

## Good morning (morning!)

- O ha yo u go za i ma su (O ha yo!)  
おはようございます

## Hello

- ko n ni chi wa  
こんにちは

## Good evening

- ko n ba n wa  
こんばんは

## Good night

- o ya su mi na sa i (O ya su mi)  
おやすみなさい

## Good bye

- sa yo u na ra  
さようなら

## See you soon

- ma ta ne  
またね

## Thank you very much

- a ri ga to u go za i ma su  
ありがとうございます

## Frank thank you

- do u mo  
どうも

Phrase used when asking something or passing by others (Excuse me)

- su mi ma se n  
すみません

Phrase of apology (I'm sorry)

- go me n na sa i  
ごめんなさい  
("go me n" for more frank way)

Phrase to begin a meal

- i ta da ki ma su  
いただきます

Phrase at the end of the meal

- go chi so u sa ma  
ごちそうさま

How much is this?

- ko re wa i ku ra de su ka  
これはいくらですか

Where is \*\*\*?

- \*\*\* wa do ko de su ka  
\*\*\*はどこですか

Yes/No

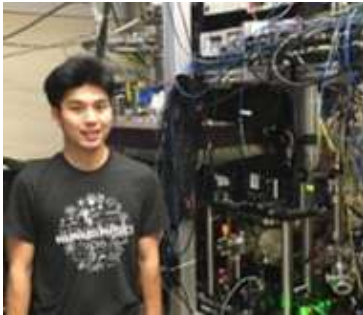
- ha i = Yes  
はい

- i i e = No  
いいえ

Remember some Japanese phrases and try using them for the staff!

# "What I gained from the International Physics Olympiad."

Hiromitsu Sawaoka  
Participants of IPhO2013 in Denmark



If I had to name the most inspiring week in my 24 years of life so far, it would definitely be the week of the 2013 International Physics Olympiad. Through this week, I gained a "treasure" that will be a great weapon for the rest of my life.

Little did I know there was such a great "treasure" in it until I competed in the Physics Olympiad. I had always genuinely loved physics, and I also admired the fact that my fellow high school seniors had also won medals at the Physics Olympiad. That made me study for the Physics Olympiad. My love of physics began in junior high school physics experiment classes. By carefully examining the results of my experiments, I discovered laws of physics that were not intended in those experiments. Since then, I have been captivated by physics, which seeks to discover the hidden nature of things through careful experimentation and observation. And through the Physics Challenge, I was able to hone that ability further. I felt a great sense of accomplishment when I was able to derive a surprisingly simple principle for a phenomenon even though it seemed impossible to explain at first glance by considering approximations or, in the case of an experimental problem, by taking data under various conditions.

In this way, I had already benefited greatly from physics before competing in the Olympics, but actually competing in the Olympics stimulated me to the extent that it completely overturned my approach to physics. Of course, I was not only stimulated by the exam itself, which lasted only 10 hours in total during the week (although the exam itself was fun), but also the international exchange we had during most of the remaining time was the "treasure". Since I was the most fluent English speaker in the Japanese delegation, I took on the role of "exchange committee chairperson" and took the lead in actively interacting with "athletes" from other countries during the excursions and other activities. During these interactions, I heard serious topics such as the prize amount of scholarships at universities in Indonesia depending on the color of the medals from the Physics Olympiad, and I had fun playing logic games with athletes from around the world. In the evenings, I joined members from other countries on the dance floor and experienced the spirit of "work hard, play hard" firsthand. Above all, it was a refreshing discovery that many students around the world are interested in physics as I am and that the world is full of people who have strengths that I do not have. The most important thing was that I gained the mindset that it would be a shame not to learn physics not only from self-study or teachers but also from so many fascinating people of my generation.

The Japanese athletes have a tradition of bringing a blank map of the world every year and asking the athletes they interacted with to color their countries on the map. By the end of the Physics Olympiad, more than 40 countries, half of which participated in our Games, had been colored. And this exchange has continued ever since, and today at Harvard, I continue to engage in friendly competition as a classmate with the athletes representing Turkey and Iceland at that time. And after entering an overseas university, I especially valued the discussions with students of my generation, and my understanding of physics improved dramatically. I cannot thank the Physics Olympiad enough for giving me a lifetime treasure.



## 【Brief Personal History】

Born in Osaka City, Osaka

Graduated from Osaka Seikouin High School in 2014

Graduated from the University of Toronto in 2018

Current: Ph.D. student, Department of Physics, Harvard University

# “The Physics Olympiad has my back.”

Hiroto Takahashi  
Participant of IPhO2015 in India



My first encounter with physics was an educational manga that I came across in junior high school. The characters elegantly unraveled a few simple rules to describe the movement of familiar objects through experiment and discussion. Having been a big fan of various kinds of puzzles such as jigsaw, Sudoku, and role-playing video games, I naturally got interested in physics which I sensed to be a sophisticated puzzle involving cooperation and fun discussion. While the physics course that started in school was enjoyable, I was not motivated enough to get deeply involved at that time. Getting good grades on school exams was enough to satisfy myself and little did I imagine I would get more pleasure by studying more deeply. Even though my school grades were good, I was not confident that I would be able to compete with 'truly smart people' in solving enigmatic physics questions. It was the Physics Olympiad that changed my mind and pushed me forward.



One of the things that impressed me a lot was the cover of the question booklet for the Japan Physics Olympiad. It read, "The problems may seem difficult to solve at first glance, but if you study them carefully, you will see that you can understand." Many problems in the Physics Olympiad deal with unique and advanced subjects. For example, "Let's try to estimate the surface temperature of the sun by modeling the fusion reaction" or "Let's describe how light scattering by water droplets in the air creates a rainbow". These questions appear to be so difficult that one may get tempted to throw them away. However, reading through the long problem text full of clues and thinking patiently for a few hours, I was often able to reach an answer. I found myself surprised and said, "Oh, did I really solve that?". Even a phenomenon as elusive as the sun or a rainbow just shining in the distance can be solved by a very beginner physicist like my high school self, if one builds up a logic step by step based on certain assumptions and hints. I was shocked by how open-door physics was. The excitement of successfully understanding difficult phenomena gave me great joy and confidence, encouraging me to continue studying and attacking even more mysterious and profound phenomena.

In addition to the joy of physics itself, it was a great pleasure to expand my world by meeting many new people. During my first Japan Physics Olympiad, I had a chance to talk with the participants of the International Physics Olympiad of the previous year, who seemed like from another world. Directly getting advice from them greatly encouraged me. Though I got a nearly bottom place in the competition that year, I was determined to catch up as much as possible next year, eventually making it through to the International Physics Olympiad. There I was shocked to realize that the world was indeed very large— getting 4th out of 5 Japanese representatives placed me at about 200th out of all the global participants. On the other hand, I was able to make a lot of fun memories. I overcame the language barrier and quickly became friends with representatives from other countries, talking about various subjects from physics to each other's culture, dancing together, and playing card games. These experiences motivated me to go abroad again and to work with researchers from around the world. I am currently based at the University of Oxford and also am affiliated with the Max Planck Institute in Germany. I am studying the physics of special types of magnets with interesting hidden structures inside. I have spent two years building up a large room-size apparatus that allows me to measure and elucidate the properties of these magnets, which are difficult to calculate or predict by theory alone. Compared to the time of the Physics Olympiad, the way I work on physics has changed, transitioning from scholastic "study" to academic research. However, the joy of understanding difficult phenomena through step-by-step logic and the pleasure of meeting new people remain the chief driving forces of my work.



## 【Brief Personal History】

Born in Tokyo

Graduated from Koishikawa Secondary Education School in 2016

Graduated from the Department of Physics, Faculty of Science, the University of Tokyo in 2020

Current: DPhil course in Condensed Matter Physics, University of Oxford. Student, Max Planck Graduate Center for Quantum Materials.

# SCHEDULE

TODAY  
Sunday, July 9th  32°C  
24°C

Students, Leaders, & Observers

|             |                         |     |
|-------------|-------------------------|-----|
| All day     | Arrivals                | NYC |
| 13:00       | Registration            | NYC |
| 17:00-19:00 | Get Together and Dinner | NYC |

TOMORROW  
Monday, July 10th  34°C  
25°C

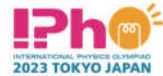
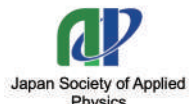
Students

|             |                         |     |
|-------------|-------------------------|-----|
| 7:15-8:00   | Breakfast               | NYC |
| 10:00-12:00 | Opening Ceremony        | NYC |
| 12:30-13:30 | Lunch                   | NYC |
| 14:00-14:45 | Briefing on Calculators | NYC |
| 15:00-18:00 | Free Time               | NYC |
| 18:00-19:00 | Dinner                  | NYC |

Leaders & Observers

|             |                  |     |
|-------------|------------------|-----|
| 7:00-8:00   | Breakfast        | NSH |
| 10:00-12:00 | Opening Ceremony | NYC |
| 12:30-14:30 | Lunch            | NYC |
| 14:30-18:30 | Board Meeting    | NYC |
| 18:30-20:00 | Dinner           | NYC |
| 20:00-23:00 | Board Meeting    | NYC |

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



<https://ipho2023.jp/en/>



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