World Premier International Research Center Initiative (WPI)
Activities Report of the WPI Academy Center
(FY 2021 – FY 2024)

Host Institution	The University of Tokyo	Host Institution Head	Teruo Fujii
Research Center	Kavli Institute for the Physics and Mathematics of the Universe		
Center Director	Jun'ichi Yokoyama	Administrative Director	Tomiyoshi Haruyama (~ Sep. 2024), Saeko Hayashi (Oct. 2024 ~)

Common Instructions:
* Unless otherwise specified, prepare this report based on the current (31 March 2025) situation of your Center.
* Use yen (\) when writing monetary amounts in the report. If an exchange rate is used to calculate the yen amount, give the rate.
* Prepare this report within 10 pages (excluding the appendices, and including "Summary of State of WPI Academy Center Progress" (within 2 pages)).

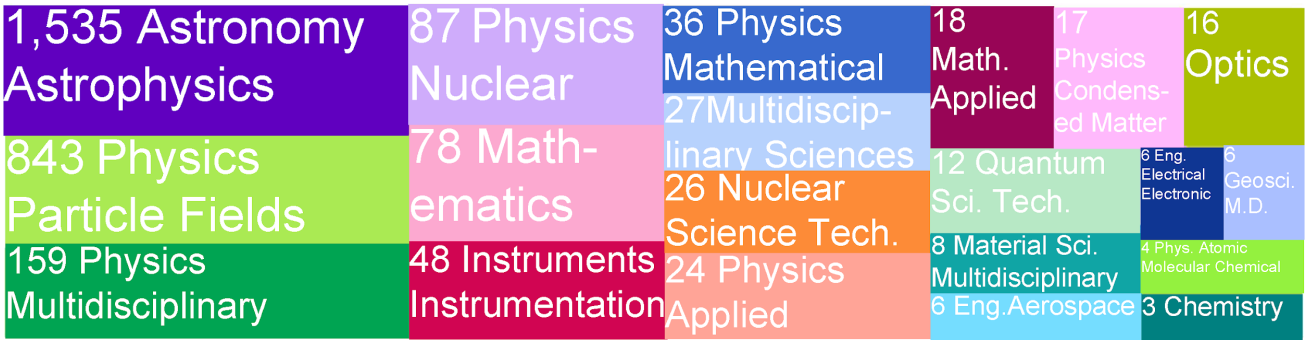
Summary of WPI Academy Center's Activities (write within **2 pages**)

[Five fundamentals]

Kavli Institute for the Physics and Mathematics of the Universe, WPI, The University of Tokyo Institutes for Advanced Study, The University of Tokyo (hereafter KIPMU as the shortest abbreviation) strives to answer the following five questions, which are deeply fundamental and ingrained in human nature since ancient times. We endeavor to tackle these by coupling with ever-growing new approaches.

What is the universe made of?
How did it begin?
What is its fate?
What fundamental laws govern it?
And Why do we exist at all?

The quantitative indices of the activities often used are the publications of research papers and their citations, invitations to talk at the conferences; as well as sparkling strong interests in the conferences held at KIPMU. The diagram below showing the number of publications in the research field created from the database of Web of Science indicates the quick turnaround of astronomers having advantages of new tools, while mathematicians work requires long thoughts. As the namesake of KIPMU, there are publications covering more than one specific area of the discipline. More detailed information regarding the research publications is shown in the major research achievements (summary in Appendix 1 and full list in Appendix A). Of 20 such papers, 3 are mathematics, 4 are theoretical physics, 5 are experimental physics, and 8 are astronomy. These numbers are close to what the tree diagram of the tile of publication number in each category shown below. Note that many of the category labels have more than one discipline.



[Chronology]

This report period from FY2021 to FY2024 largely overlaps with the period during which KIPMU is the WPI Academy. It started in FY2022 and is ending in FY2025, and hopefully renewed for another term.

A world-wide challenging period of the COVID-19 virus pandemic started from early 2020 for several

years. Revision of the infection category of this disease to 5 in May 2023 instead of highly infectious and lethal category 2 eased both the anxieties of the society and the restriction of on-site activities. Its effect was much more profound at KIPMU since the interaction with outside researchers, many in abroad were severely restricted.

The lockdown at the height of the pandemic prepared KIPMU to become more resilient in the changing and challenging environment. It was able to remind the researchers the importance of holding the ground together and think ahead. That experience contributed to the rapid start and growth of Center for Data-Driven Discovery (CD3) in FY2023 at KIPMU involving artificial intelligence (AI) and machine learning (ML).

[Members: significant mixture]

The members of KIPMU consists of the following: researcher side has faculty (professor, associate professor, lecturer, assistant professor; each with or without "project" prefix), project researcher aka postdocs, and graduate students. By now, there are and were members from 40 countries and counting. Professors and project professors are the Principal Investigators (PIs) at KIPMU after a change in FY2022 when a separate designation of PI ended, and there are 27 in total as of FY2024. In addition, there are senior fellows including the notable award recipients, and affiliate members who are not the employee but very important "members." Affiliate members are either professor, associate professor, assistant professor or equivalent of any of these, not postdocs. Number 191 of "other researchers" in center personnel table (appendix 3-1a) includes, as in the past, junior faculty and affiliate members. There are 49 postdocs. With 37 staff in the administration office, a total of 304 members as of FY2024 actively promote research under the name of KIPMU. In addition, there are always dozens of visitors with long and short stay who participate in conferences, workshops, colloquia, seminars, and other functions or study as research intern students. With 17 years from the start, some of the "graduates" who became faculty members in other institutions return as affiliate members and continue to research collaboration, hence contribution to research activities at KIPMU.

During this period, management had changes as well, as described in section 5.

[Modern-day Agora]

Despite the challenging situation, this institute is now established as a hub of intellectual circulation connecting Japan, Asia and the rest of the world. Located on the outskirts of a major continent actually gives the advantage of being easily recognized as a distinct location – ensuring interaction amongst the "mixture" of research field, cultural background, and generations.

As the pillar in the middle of Fujiwara Hall on the third floor of KIPMU building says, "Universe is written in the language of mathematics," common language is the logic and law of nature. English is just to supplement the communication. One can witness that kind of interaction taking place in front of the blackboards located everywhere in the building, and most conspicuously at Fujiwara Hall. Real work shows up in the numbers, formulas, diagrams etc. scribbled on the boards, and the discussion takes place between mathematicians and physicists, or any combination of researchers. Workshops/conferences receive more than half of the participants from overseas institutions. Visiting researchers, again, half from foreign institutions, for research collaboration. Here, new ideas are forming from these free and active interactions among the researchers.

To address the five fundamental questions, KIPMU has experts in mathematics, theoretical and experimental physics, and astronomy. More specifically, the currently ongoing research topics include astroparticle and neutrino physics, collider experiments and phenomenology, dark matter theory and detection, flavor physics, particle cosmology, cosmic inflation, cosmic microwave background (CMB), structure formation, observational cosmology, general relativity and gravitation, gravitational waves and multi-messenger astrophysics, string theory, quantum field theory, quantum information, data science with AI, medical application of gamma ray imaging, and detector development, as well as modern science in the humanities, in addition to various topics of mathematics.

Recently, the role of AI in research and in scholars' daily lives is rapidly growing. Even if the subject is not AI research, it is gaining popularity as the tools. At KIPMU, newly found CD3 is heavily engaged in this subject and leading efforts not only in Japan but also in the world.

Another reality challenging the operation of KIPMU is the economic one. The significant depreciation of the currency is causing much higher price of international travels. Researchers are forced to choose much smaller number of attendances in the international conferences.

* Describe clearly and concisely the progress being made by the Center from the viewpoints below.
- In addressing the below-listed 1-8 viewpoints, place emphasis on the following:
(1) Whether research standards and operation of the Center is maintaining a "world premier" status.
(2) Whether the Center participates and cooperates with the activities to advance the overall development of the WPI Program and to promulgate its achievements.

1. Overall Image of Your Center

・Describe the Center's current identity and overall image.
・List the Principal Investigators in Appendix 2, diagram the Center's management system in Appendix 3-1, enter the number of center personnel in Appendix 3-1a, and enter center funding in Appendix 3-2.

The Kavli Institute for the Physics and Mathematics of the Universe , WPI, The University of Tokyo Institutes for Advanced Study, The University of Tokyo (hereafter KIPMU as the shortest abbreviation) embarked on and continued to pursue the answers to these five foundational, interrelated questions:

What is the universe made of?
How did it begin?
What is its fate?
What fundamental laws govern it?
And Why do we exist at all?

KIPMU started on October 1, 2007 from a clean slate thanks to the generous funding from WPI, independent of any specific or single department or discipline. It embodies unique fusion of three disciplines of fundamental science, mathematics, physics (both theoretical and experimental), and astronomy. These fields go as far back as the time when humans started to study the surrounding nature and utilize the knowledge for their livelihood and survival. Now KIPMU has grown to have 300 members, including the faculties almost all on-site, postdocs, graduate students, plus senior fellows and affiliate members in Japan and abroad. The average age of the constituents remained below 40 years old. There is a constant flow of researchers, whether they are stationed here or visiting. The word "flow" might give wrong impression that the young researchers are disposed at the end of their term. On the contrary, KIPMU serves as their steppingstones for their growth. Both literally and figuratively, the Institute grew together with younger generation in advancing research. Theoretical work shows what's possible, while observational and experimental approaches reveal which world we actually live in. In the name of this institute, <I> is not for international, being global is assumed and granted, <P>, <M>, <U>, namely physics, mathematics, and the Universe, signify the research fields we are pursuing.

The ever-increasing activities manifest in various indices including publications of research papers in the professional journals, which require rigorous screening by peers, and the citation of those papers. The latter is a strong measure of recognition in the research field. The visiting researchers from around the world is another measure, and many of such visits add to the discussion with the onsite researchers, hence resulted in the publications.

To invite established or rapidly emerging researchers from abroad to join KIPMU faculty, a variety of hiring schemes are created, including split appointments and partially flexible salary scales.

The reputation of KIPMU as the world-leading institute can be proven in the highly oversubscribed application to postdoc positions. When making an annual call for the postdoc applications, the number of submissions was several tens of times, and now close to a hundred-fold competition. The recruitment is entirely open and international, with strict guidelines for recommendation letters; documents must be in English. As such, regular postdocs screened and hired by KIPMU has 90% from overseas; 80% when including JSPS and other postdocs of external funding. After their term, 90% graduate to faculty or equally competent postdoc positions.

The endowment from Kavli Foundation and donation from Hamamatsu Photonics, as the most notable, are the manifest of international recognition of KIPMU. There are only 20 institutes in the world that have Kavli as its name. It is a great honor for IPMU, still only one in Japan.

KIPMU led the Hyper-Suprime Cam (HSC) on the Subaru Telescope. Currently ongoing and near-future projects include the Primary Focus Spectrograph (PFS) on the Subaru Telescope, Super- and Hyper-Kamiokande, and Lite (Light) satellite for the studies of B-mode polarization and Inflation from cosmic background Radiation Detection (LiteBIRD). Some of our members are also actively working in Belle II, COSI, EGADs, KAGRA, and XENONnT projects.

During the final period of the WPI Center funding prior to the WPI Academy funding, the Institute proposed 9 challenges, 5 of which are on research activities and the remaining 4 are related to management, and put them into practice as much as possible. As a result, the KIPMU has made a

successful transition to a permanent research institute with the support of the University of Tokyo as well as the increased fund from the Kavli Foundation. Although the pandemic of COVID-19 had a huge impact on our institute, practically stopping direct international communications for a couple of years, we vigorously continued our research and have steadfastly established its position as a World Premier Institute, producing top-level research outputs in the world and boasting high visibility in the science community in the world. Furthermore, KIPMU has a highly international atmosphere, even more so after the pandemic, with a fraction of domestic researchers less than 40% and made major progress toward equity, diversity, and inclusion, which we recognize as a very important feature, and we continue our efforts to further promote them to become stronger.

2. Advancing Research of the Highest Global Level

・Describe what's been accomplished in the Center's research objectives and plans.
・In Appendix 1, list the papers underscoring those research achievement and list the Center's research papers published in 2021-2024 in a manner prescribed in Appendix A.

[Background]

The application document for Academy Center Certification revised at the time of the Director change from Dr. Hirosi Ooguri to Dr. Jun'ichi Yokoyama lists the major breakthroughs in the research fields KIPMU researchers are heavily involved in. In 2012 Higgs particle was discovered at the Large Hadron Collider in CERN in Switzerland. In 2015, KIPMU's PI (and current senior fellow) Dr. Takaaki Kajita was awarded the 2015 Nobel Prize in Physics for the discovery of neutrino oscillations.

In the meantime, accelerator experiments have yet to discover supersymmetry (SUSY), and it remains challenge as a natural means of solving the hierarchy problem. Observations by Planck satellite (from 2009 to 2013) of cosmic microwave background (CMB) in its detailed maps of the submm to cm wavelength radio waves have provided the fundamental parameters in the understanding of the primordial universe, especially the spectrum of curvature perturbations, thus has given constraints on the models of cosmic inflation. Furthermore, the first detection of gravitational waves from a black hole binary merger in 2015 marked the beginning of a new era in gravitational-wave astrophysics, followed by the detection of gravitational waves from binary neutron star coalescence in 2017, opening the doors to the multi-messenger astronomy far beyond the conventional electromagnetic wave observations.

In 2019 detailed view of the black hole shadow revealed by the Event Horizon Telescope (EHT) gave great excitement for KIPMU researchers. Then in 2020 KAGRA started operation, a project which Director Yokoyama used to be a spokesperson. James Webb Space Telescope (JWST, launched in 2022) and Euclid Space Telescope (launched in 2023), started observations and KIPMU astronomers are rapidly making discoveries. The partnership with Rubin Observatory's LSST project and Euclid Space Telescope is sure to produce many fascinating discoveries soon.

[KIPMU's attempts]

Under these circumstances and by leveraging the strengths accumulated at KIPMU, researchers here devoured the new aspects of the research fields across astronomy, cosmology, particle phenomenology, string theory, with mathematics overarching. Also, three projects are identified as the key experiments: Prime Focus Spectrograph (PFS) for the Subaru Telescope representing survey astronomy, underground neutrino experiments in Kamioka Observatory, and polarization measurements of CMB with Simons Observatory (existing and under construction) and the LiteBIRD satellite (planned). The last one is a challenging experiment even in the brave tradition at KIPMU in understanding of all five key questions.

Now the former XMASS team joined international XENON collaboration, and started from XENON1T, the ongoing project is called XENONnT now. In 2020 at Super-Kamiokande, 50,000 tons of ultrapure water in its tank was enriched with gadolinium. With higher sensitivity from this doping, researchers are eagerly awaiting the world's first observation of the diffuse supernova neutrino background (DSNB) flux.

Two paths emerged as the course correction at KIPMU in 2023 based on these changing landscapes. (A) Seeking new laws of nature by combining newly available observations and the comprehensive theoretical studies, and (B) Multi-messenger science that combines the multi-wavelength electromagnetic wave observations, cosmic rays, and the gravitational wave science encompassing both theory and experiments.

(A1) Planck's CMB observation suggests non-supersymmetric inflation models with modified gravity,

such as the curvature square model and the Higgs inflation. These models in turn possess large dimensionless parameters much bigger than unity, which may be a hint of extra dimensions. These features can have a profound impact on fundamental physics, including string theory and mathematical studies of space-time. Furthermore, these models can be probed by the LiteBIRD. Thus, this approach employs synergies from mathematics and string theory to cosmology and observation and will take advantage of KIPMU's strengths.

Dr. Eiichiro Komatsu, a senior fellow of KIPMU, has shown that the polarization angle of CMB may have changed in time. The cosmological birefringence may indicate the existence of axion fields which have major implications not only to the nature of dark matter and dark energy but also to string theory that predicts numerous species of axion. This is another demonstration of the synergy of fundamental physics and observations, to be furthered by the LiteBIRD project as well as by the observation of jet-emitting radio galaxies.

(A2) Observations using PFS, one of the key projects of KIPMU, fits this scope extremely well, because this instrument, being able to measure spectra of nearly 2400 objects simultaneously, will provide the precious information on neutrino mass, dark energy, modification of gravity, and galactic archeology.

(B1) Simultaneous observations of binary neutron star mergers in the gravitational wave event with γ-rays, X-rays, visible light, and radio waves provide critical information on γ-ray bursts where rarer elements are formed, and nucleosynthesis in the universe. Thus addressing the question "Why do we exist?" The LSST to which researchers at KIPMU have access, consisting of the Simonyi Survey Telescope and its LSST Science Camera under commissioning, can play a major role in rapid follow-up observations of gravitational wave events by taking advantage of its wide field of view and rapid response.

(B2) Particle side of the multi-messenger science: Super-Kamiokande, with its water tank doped with gadolinium as proposed by KIPMU faculty Dr. Mark Vagins, and Hyper-Kamiokande once the construction finished, can not only detect very diffuse signal from the background neutrinos cumulatively produced by supernova and measure CP violation in the neutrino sector with high precision but also detect neutrino burst associated with gravitational wave events. Thus, KIPMU plays critical roles in multi-messenger astronomy, and CD3 will develop rapid data analysis system to lead this area.

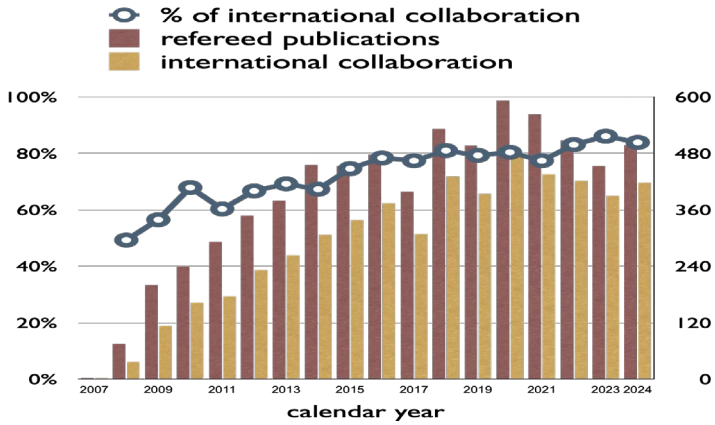
(B3) Gravitational waves in multi-wavelength convey information on a variety of cosmic phenomena, just like photon-based astronomy. Primordial gravitational waves which extend to the Hubble scale can tell us when cosmic inflation happened, which can be measured by B-mode polarization experiments like Simons Observatory and LiteBIRD. The observations of the stochastic gravitational wave background in the 1 Hertz band will enable determination of the period when the Big Bang occurred, which is feasible by space-based laser interferometer for gravitational wave measurement such as Deci-hertz Interferometer Gravitational wave Observatory (DECIGO). If LiteBIRD and/or DECIGO can reveal when inflation and the Big Bang occurred, it can answer the question "How did the Universe start?"

(B4) The big data in spatial scale as well as time resolution from Vera Rubin Observatory's Legacy Survey of Space and Time (LSST) project will bring enormous information on cosmic structure. It will reveal fundamental physics of the Universe such as the properties of dark energy and modification of gravity. CD3 again will play a central role in gleaning the vast amount of data.

All of these approaches and prospects motivate us to further engage in research. These science goals naturally invite synergies from mathematics and string theory to cosmology and observation for which KIPMU is a unique place to realize. To make them a reality, KIPMU continues to provide a free and vigorous research environment and to stimulate cross-disciplinary discussions.

The following diagram shows the publications and the international authorship. Publication is recovering and increasing. Working with overseas researchers grew and reached about 70% after about 10 years and more or less leveled off, now it stays around 70-80%. Of about 400-500 publications in the professional journals, there are many particularly noteworthy ones picked as editor's pick or editor's suggestion, etc.

The number of publications is also recovering. With real face-to-face interaction returning, the trend will continue. In FY2020 in the beginning of the pandemic era, newly hired postdocs' arrivals were delayed yet still within that year. Upon arrival, their onsite activities, hence, face to face interaction with other researchers were severely restricted that year like the rest of the world. Combined with the larger number of members ending affiliate membership might have contributed. It was a very uncertain time. Per previous



reports, number of postdocs decreased between FY2020 and FY2021.

In January 2025, a press conference was held in Tokyo to demonstrate the power of newly commissioned PFS which is opening a new era of observational discoveries, data science, and models. https://www.ipmu.jp/en/20250110-PFS. Other index of research activities and achievements of researchers here are really conspicuous in "Awards, leadership in major professional organizations" listed in Appendix 1-3 Award recipients.

3. Facilitating Interdisciplinary Research Activities

- Describe the content of measures taken by the Center to facilitate interdisciplinary research activities. For example, measures that create an environment that will facilitate doing joint research by researchers in differing fields.
- Describe the contents and results of interdisciplinary research activities yielded by the measures described above.

[Modern-day Agora]

Or if we use a familiar story in East Asia, KIPMU is a modern-day Liangshanbo (梁山泊) where the bold and ambitious researchers gather. The architect of the building naturally encourages the interaction amongst the researchers – residents and visitors alike; opens and surrounds the Fujiwara Hall. It is easy to see if somebody is inside or passing by outside, thanks to the inviting structure of the office doors. With blackboards everywhere in the building, the environment encourages scholarly discourses, spontaneous discussions, and only to be re-written the previous arguments.

The interdisciplinary approach of solving the mysteries of the universe at KIPMU was rather unique in the beginning among the global settings, now is cemented and normalized here. Researchers freely choose their research topics, instead of being restricted to specific subjects, and the daily interaction with other researchers leads to the natural collaborations. That is expected and is being looked for by the members. Postdocs also say their favor for this atmosphere of "let's tackle the mystery of the universe together." In the mornings, each of them focuses on deep thinking in their respective office, then at 3 pm, come out to Fujiwara Hall to have tea/coffee and share their ideas during the teatime. It is quite often that the blackboards around the tea tables quickly change the scribbles on them. This teatime is already ingrained in the daily routine of the researchers.

The current administration knows that the "bottom up" approach by individual researchers increases much more engagement from them when they choose their own direction; and encourages early career researchers to propose the workshop/conference etc. In addition to these spontaneous research activities, Director Yokoyama took the lead in future planning meetings for theoretical fields with the aim for further collaboration between mathematics and theoretical physics. As a result, the fundamentals of quantum information were identified as a new field that KIPMU should pursue through cooperation between mathematicians and theoretical physicists.

We encourage all the members to apply external grants in Japan and overseas. The application process inevitably induces the deep thinking of the theme and provides learning opportunities to become effective in communication. Grant application is one of the forms of outreach, opportunities to demonstrate the excellence of the researchers themselves as well as their workplace and WPI. There is no quota of publications, however, the postdocs are keenly aware that their productivity opens the doors to their next position. The duty here at KIPMU of attending the Teatime further promotes interdisciplinary research along with their own expertise.

The day-to-day operation and management are conducted in "top down" style, with the Director making quick decision which is effective in execution thus the outcomes.

Quantitative proof of our status is in the Appendices: here just a few quick numbers. The conferences: FY2021, FY2022, FY2023 were 12 each, and FY2024 exploded to 19. Ones held in FY2021 until the middle of FY2022 was entirely online. Onsite portion resumed from FY2022, and hybrid format is maintained. 10-90% of participants are from 10-40 foreign countries - depending on the subject and scope of the

conference. The details can be seen in the Appendix.

The seminars held here have plural initials in the names, another strong measure of ongoing interaction between different expertise. They are MS Seminar (mathematics and string theory) and APEC Seminar (astronomy, particle physics, experimental physics, and cosmology). Together, they cover the entire scale of the material universe and beyond. Likewise, the colloquia. The topics can be a combination of different disciplines such as cosmology & statistics, string theory & condensed matter, medical application of gamma-ray imaging initiated in astronomical observations, and science and society. The details can be seen in the Appendix.

4. Maintaining an International Research Environment

- Describe what's been accomplished in the efforts to raise the Center's recognition as a genuine globally visible research institute, along with innovative efforts proactively being taken, including the following points, for example:
  - Efforts being developed to maintain an international research environment based on the analysis of number and state of world-leading, frontline researchers; exchanges with overseas entities
  - Proactive efforts to raise the level of the Center's international recognition
  - Efforts to make the Center into one that attracts excellent researchers from around the world (such as creating of an environment in which researchers can concentrate on their research, providing startup research funding, supporting efforts that will foster young researchers and contribute to advancing their career paths, and arranging support system for the research activities of overseas researchers.)
  - Consolidation of the administrative structures to support implementing the efforts described above
- In Appendix 3-1, describe the state of cooperation with overseas satellites, and list the main international research meetings held by the Center.

[Members are from different countries and disciplines]

Demography of KIPMU's constituents differs in the generations how long they have been here. 27 PIs include 26% non-Japanese and 7% women. Younger and newer faculty of 14 consists of 64% non-Japanese and 29% women. Current postdocs of 42 are 90% non-Japanese and 21% women. Affiliate members are 36% non-Japanese and 11% women. Non-Japanese speaking population thus has significant presence at KIPMU. Details of membership can be seen in Appendix 2 PI list and Appendix 3-1a center personnel. The significant presence of female researchers, compared with 10% or less in the respective departments in Japan and as such the professional societies in Japan. The assembly of brave at KIPMU, in tackling the fundamental and difficult subjects, thus stands out and offering a role model case in Japan.

Two indicators that WPI uses to show the minority ratio are foreigners and women. For all postdoc positions called, offered, accepted and actually came to KIPMU, there are 4305 applicants between FY2021 and FY2024, of which 93% were foreigners and probably about 17% are women. Those who actually joined are 66 and 91% are foreigners and 26% are women. Foreigners are by far the majority, and considering the proportion of applicants versus hires, women are doing quite good in the competition. Until they actually come, we only "guess" the gender of the candidates since that information should not be asked in the screening process with the international standard.

PI is the least diverse reflecting the generational change, i.e. back in the day domination of Japanese male was rather conspicuous. Foreigners (not the PI in the overseas, actually most of the PIs work at Kavli IPMU main campus) makes a third to a quarter, while women's ratio stays in a single digit. For other researchers, primarily the assistant and associate professors and affiliate members (spanning from the assistant to full professors), the foreigners make up 40%, women 10-13%. Postdocs by far are more diverse. Foreigners become dominant, from between 72% in FY2021 to 88% in FY2024, then 94% in FY2025. Women make 18% in FY2021, 27% in FY2024, and 28% in FY2025. It can easily surpass 30% in a year or two, and hopefully this general trend trickles up to the junior faculty and eventually senior faculty. It is obvious from both the postdocs and junior faculty that the openness to the global population naturally increase the presence of the female researchers.

One notable hire is a scholar from Ukraine. From 2023, Dr. Jia Liu and Dr. John Silverman have been co-hosting this scholar as a Kavli Scholar displaced from the scholar's home country, with cooperation between Kavli Foundation and KIPMU. The scholar is able to continue research in a safe environment and making a big contribution to CD3.

[Postdoc circulation]

KIPMU postdocs are active not only in publications but also in the workshops, conferences, and other forms of research collaboration. Even at their early stage in the career, they get invited as keynote or plenary speakers, which leads to exit to equal or higher positions when their term ends.

As the table in Appendix 3-1b of Career Path of WPI postdocs shows 90% of graduates namely the researchers who finished their terms as postdocs at Kavli IPMU stayed in academia, both Japanese and non-Japanese. 50% got faculty positions, 40% went onto another postdoc positions. Noteworthy is that 32% of Japanese went abroad while 20% non-Japanese stayed in Japan even though the number of positions in academia in Japan is small. These numbers suggest that Japanese postdocs are trained in the international competition at Kavli IPMU and became capable of going abroad, while the stable and safe environment in Japan compared with other countries might have convinced the foreigner to stay.

The response to the annual call for application of regular postdocs at KIPMU is receiving strong and increasing applicants from the world. Oversubscription was already 50-folds, now passing 100-folds. The acceptance rate per offer used to be half, which is similar to the competitors, now three quarters or above, meaning the highly qualified candidates choose KIPMU over other universities/institutes.

[Visitors]

The total number of visitors 679 in FY2021-FY2024 includes both short-term visitors such as the speakers of seminar or colloquium and longer-term visitors for more in-depth discussion and collaboration. This number does not include the participants of the workshops, conference etc., not even the invited speakers. Many of them are affiliate members for either brainstorming ideas or reaping the harvests, namely writing up a research paper. There are researchers from Mou/MoA institutes and elsewhere as well. The number of visiting students in doctoral class who stay in Japan for more than 3 months is increasing. 3 in FY2021 to 17 in FY2024.

There are 13 active and official agreements of research collaboration. 5 of such agreements are described in Appendix 3-1 Section 4) which enable exchange of researchers, students, or co-host conferences.

[Graduate program]

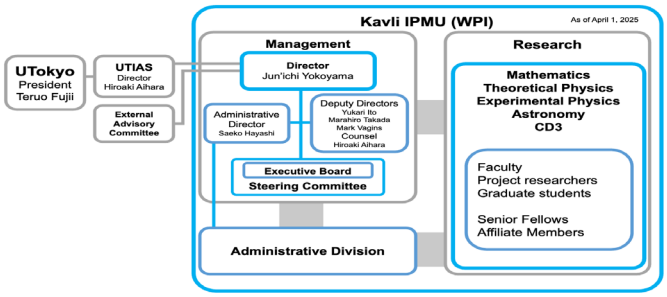
KIPMU believes in working with graduate students – both domestic and abroad – a noble duty for a world-class research institution. From 2015, it started to officially accept the University of Tokyo students enrolled in the following department: the Graduate School of Mathematical Science, Department of Astronomy of Graduate School of Science, Department of Physics of Graduate School of Science, and Graduate School of Interdisciplinary Information Studies. There are about 60 UTokyo students + 20 from other (including visitor) at the end of FY2024. Looking back in 2015, graduate students started to station at KIPMU, and the initial number was only five. For visiting students, KIPMU started the research intern scheme in FY2024 to be more responsible.

With the founding director Hitoshi Murayama as the program coordinator, KIPMU has led and established a new graduate school program in physics and mathematics titled the Forefront Physics and Mathematics Program to Drive Transformation (FoPM) which has been selected as a MEXT WISE program (Doctoral Program for World-leading Innovative & Smart Education). This program has enabled more KIPMU faculties to accept graduate students from the physics department. Students in existing departments are also staying at Kavli IPMU for an extended period to study in our international environment. Another channel of attracting international students is the 5-year Global Science Graduate Course (GSGC) program of the University of Tokyo with which we annually sponsor a few students from overseas. In addition, KIPMU has long been running a program to sponsor Oxford University's students to come to study at KIPMU since 2015 and 9 students have obtained PhD degrees. However, this scheme needs to be reviewed as we now have channels to accept students more efficiently.

5. Making Organizational Reforms

- Describe distinctive effort in managing research operation and administrative organization, such as the strong leadership that the director is giving on the Center's operation, strong performance by the administrative director who provides the center director with strong administrative and managerial support, and division of roles and authority between the Center and its host institution.
- Describe the ripple effects that activities to disseminate experience and know-how accumulated by the Center, such as the followings, have/had on the host institution (or other research institutes, if any):
  - System reforms made through the Center's leading activities to its research operation and administrative organization
  - Experience and know-how accumulated by the Center as it have worked to establish itself as top world-level research institutes.
- Other than the above, give examples, if any, of cooperative activities by the Center and the whole WPI Program or other WPI centers, to disseminate experience and know-how accumulated by the WPI program and/or the WPI centers.

[Tripod of KIPMU: researchers, administrative office and the management]



This organization chart shows the relation between different components in the organization, rather than a specific individual. The Steering Committee is the decision-making body at KIPMU, equivalent to the Faculty Meeting at other departments or institutes, while the Executive Board is closer to the day-to-day operation. Administrative Director, a distinct position in the WPI Center and has not changed in WPI Academy Center, still plays a key role in coordinating those operations, and bridge the gap between the academic members and the administration system. While the researchers are the brains of the organization, the business office, although not shown in this chart, is both the lifeline and the heart of the organization. Their significance is described in Section 8.

During FY2021 and FY2024, the Director changed from Dr. Hirosi Ooguri when he finished his 5-year term in 2023 to Dr. Jun'ichi Yokoyama. In October 2024, Dr. Tomiyoshi Haruyama finished his 12 years of service as the Administrative Director, and Dr. Saeko Hayashi took up the helm. From April 2025, Dr. Mark Vagins became one of the three deputy directors as the first non-Japanese speaking member. Administration Office went through job rotations of staffs inside the office twice during this period, in addition to the university-wide regular rotations of permanent administrative officers.

[Recognition of the business office by the host institution]

KIPMU has won the Special Award for business transformation from the University of Tokyo in 2013, 2015, 2016, 2017, 2018, and 2019/2020. Enabled the entry of foreign researchers at the height of the pandemic in 2020. In the early phase, non-Japanese citizens were not allowed to enter Japan. Also, mobility and on-site work were severely restricted, the additional hardship the foreigners had to deal with, along with the support staff in the business office.

The results of various reforms that KIPMU has undertaken to date will be applied to new organizations that will be established in the University of Tokyo once the application for the Universities for International Research Excellence Program is accepted, thereby propagating our system to the entire University.

6. Efforts expected to WPI Academy Center to Enhance and Amplify the Visibility and Brand of the Overall WPI Program

- Describe how the Center's outreach activities have contributed to enhancing and amplifying the visibility and brand of the WPI program. Describe the successful cases of the Center's outreach activities in Appendix 4, and enter the number of activities in Appendix 4a.
- Other than the above, describe, if any, the activities and their concrete contents that have contributed to the enhancement and amplification of the visibility and brand of the WPI program (such as holding a large international research meeting, collaborative activities with multiple WPI centers). If you have already provided this information, please indicate where in the report.
- Describe the Center's efforts in making it a place that expands and accelerates the international circulation of the world's best brains. Give their success cases and describe their concrete contents and effect in narrative.
- Describe examples, if any, of cooperative activities by the Center and the whole WPI Program or other WPI centers, to disseminate experience and know-how accumulated by the WPI program and/or the WPI centers.

The visibility will naturally follow the research activities at the Institute. "World Premier International Research Center Initiative" is an adjective description instead of a proper noun.

Appendix 4 Outreach Activities and their Results lists media coverage, popularization, and public events now in hybrid mode (on-site + online access). The press releases posted on the KIPMU website and its SNS cover a fraction of ~500 publications; each medium (website, X, Facebook, Instagram, and YouTube) deliver the news to the different target audiences. There are 56 articles in the Press Release from KIPMU during this period. They are primarily about the simulation and observation in astronomy – 29 articles, plus instrument developments – 17 articles. AI/ML/CD3 related has 7 articles, and the number will increase in the coming years. One advantage these fields hold is appealing visuals. In that way, readers are naturally drawn to the activities at KIPMU. The social media increases visibility in the younger generation. Continue to organize public lecture events, provide speakers for public talks, open campus program targeted for female undergrads and early grads, newspaper for high school (longevity is a key), individual's effort.

Appendix 3-2 list of participation in international research meetings show how KIPMU demonstrate

its research activities with others. Annual event of WPI Symposium is a great opportunity to strengthen the networking among the WPI centers and WPI academy centers.

7. Effort to Secure the Center's Future Development over the Mid- to Long-term

・ Address each of the following items that have been done to secure mid- to long-term center development:

- Contents of the measures taken by the host institution to support maintaining the activities of the Center (such as securing financial and personnel resources, coordination among host institution to bring together in-house researchers, in-kind provision and/or facilities afforded in terms of usage of building, lab space and other equipment, new management reform carried out after the funding period ends).
- Actions and measures taken to sustain the Center as a world premier international research center.

[Host's commitment]

Faculty positions and funding associated with them were guaranteed as described above and in the appendix. Several positions of administrative staff are also guaranteed, and their assignment of 3 or so years helps bringing the innovative method of KIPMU to other departments in the host institution.

[Enhanced collaborations]

Implemented the travel incentive, update for affiliate members at overseas institutions, besides a round trip to Kavli IPMU, can include a visit to the institutions collaborate with another affiliate member is located. KIPMU researchers should make a more conscious effort when organizing a conference to invite researchers located domestically as the keynote speakers, travel support for graduate students and postdocs in Japan, not only the ones from overseas, create more sustainable ways of accepting graduate students, instead of having them rotate through short and unofficial stays. Foreigners in the faculty position are getting enrolled in the domestic academic societies such as the Physics Society of Japan or Astronomical Society of Japan.

8. Others

□ In addition to the above1-7, note any of the Center's notable efforts and activities.

[Unsung staff support the sky]

We would like to take this opportunity to highlight the critical roles the business office plays. Just like the composition of the researcher side, the business office (aka administration office) started from scratch, instead of dragging in the traditional university system. The personnel worked hard to promote the mission KIPMU has – to be the best possible place in the world to pursue the unsolved mysteries. They listened to the researchers and found ways to solve the problem, because there are no manuals on which they can or should depend. For foreigners, interaction with the staff almost always leads to the solutions or so they assume, but the burden is on the staff. The staff accumulated and shared experiences. They are highly motivated and have pride in their contributions.

They assist in the procurement of necessary devices, manage and maintain cpu and gpu clusters, provide technical support, especially audio-visual for presentations at hybrid workshops, conferences, and meetings and ensure the integrity of the network services. Thus, researchers can focus on contents of presentations, instead of the switches. For business trips or visitor invitation, their service is almost one-stop, and the necessary paperwork is well streamlined. The continuation of famed Teatime at KIPMU, the place and time where researchers share their ideas and give constructive comments to each other owe so much to the staff on shift who setup and cleanup on every weekday.

Locally hired staff did not expect nor are not supposed to go through the changes in the job. Thanks to their high skill and willingness for innovations, KIPMU was able to perform job rotation inside the business office in June 2022 and June 2024. Even members skeptical in the beginning are now convinced, and some are looking forward to the next change.

During the annual emergency evacuation drill, they assist the non-Japanese speaking members. KIPMU provides a special English training session on AED usage. The emergency food stock includes pasta and bread in addition to rice. All these tasks come from the staff initiative.

Appendix 1 List of Center's Major Research Achievements

1. List of Major Refereed Papers

*List **up to 20 papers** representative of the Center's research activities during the period between FY 2021 and FY 2024, and give brief descriptions (within 5 to 10 lines) of them.
*For each, write the author name(s); year of publication; journal name, volume, page(s) (or DOI number), and article title. Any listing order may be used as long as format is the same. If a paper has many authors, underline those affiliated with the Center.
*If a paper has many authors (say, more than 10), all of their names do not need to be listed.

1. **Constraining Primordial Black Hole Formation from Single-Field Inflation**
Kristiano, J; Yokoyama, J
PHYSICAL REVIEW LETTERS 132(22), 2024
10.1103/PhysRevLett.132.221003
This paper investigates a key scenario for the formation of primordial black holes—namely, the collapse of large fluctuations generated during single-field inflation on small scales. The authors focus on a specific inflationary model that includes a sharp change in one of its parameters and compute quantum (one-loop) corrections to the power spectrum at large scales. Their analysis reveals that models capable of producing a significant number of primordial black holes also generate strong, nonperturbative effects at scales observed in the cosmic microwave background (CMB). This surprising link suggests that small-scale physics may leave measurable imprints on large-scale observations, offering a new way to constrain primordial black hole models through CMB data.

2. **Universal asymptotics for high energy CFT data**
Benjamin, N; Lee, J; Ooguri, H; Simmons-Duffin, D
JOURNAL OF HIGH ENERGY PHYSICS (3), 2024
10.1007/JHEP03(2024)115
This paper presents a detailed study of how conformal field theories (CFTs) behave at finite temperature using a framework called the thermal effective action. The authors show how this approach captures the growth in the number of quantum states based on energy and spin, including both standard and more subtle corrections. They test their results against known examples, including free theories and holographic models. A key innovation in the paper is the use of "hot spots" on complex geometries to extend these ideas to more intricate spaces, such as higher-dimensional analogues of genus-2 Riemann surfaces. This work offers new tools for understanding the thermal properties of CFTs in diverse settings.

3. **The Atacama Cosmology Telescope: DR6 Gravitational Lensing Map and Cosmological Parameters**
Madhavacheril, MS; Crowley, KT; Ferraro, S; Namikawa, T et al.
ASTROPHYSICAL JOURNAL 962(2), 2024
10.3847/1538-4357/acff5f
This study presents new cosmological constraints from a gravitational lensing map based on CMB data from the Atacama Cosmology Telescope, covering 9,400 square degrees. By combining this with other cosmological measurements, the authors tightly constrain key parameters like the matter clustering amplitude (σ_8) and the Hubble constant (H_0). Their results align well with the ΛCDM model and are consistent with Planck data, but show mild tension with galaxy lensing surveys (KiDS, DES, HSC). They also limit the sum of neutrino masses to less than 0.13 eV. The findings support a flat universe governed by general relativity and offer new tools for future lensing and neutrino studies.

4. **EMPRESS. XIII. Chemical Enrichment of Young Galaxies Near and Far at z ∼ 0 and 4-10: Fe/O, Ar/O, S/O, and N/O Measurements with a Comparison of Chemical Evolution Models**
Watanabe, K; Ouchi, M; Nakajima, K; Isobe, Y; Tominaga, N; Suzuki, A; Ishigaki, MN; Nomoto, K; Takahashi, K; Harikane, Y et al.
ASTROPHYSICAL JOURNAL 962(1), 2024
10.3847/1538-4357/ad13ff
This study investigates the chemical composition of 13 extremely metal-poor local galaxies (EMPGs) and compares them with 33 high-redshift (z ∼ 4–10) star-forming galaxies observed by the James Webb Space Telescope. Using new Keck/LRIS spectroscopic data and advanced chemical evolution models—including various types of supernovae—the authors explore the origins of key elemental abundance ratios. They find that high Fe/O ratios in

EMPGs likely require contributions from Type Ia supernovae, rather than exotic pair-instability supernovae (PISNe). Comparisons with high-z galaxies suggest similar enrichment patterns from core-collapse supernovae. The particularly high nitrogen levels observed in galaxy GN-z11 cannot be explained by known supernova models, but may originate from winds of rotating Wolf–Rayet stars.

5. **Quantum gravity effects on dark matter and gravitational waves**
King, SF; Roshan, R; Wang, X; White, G; Yamazaki, M
PHYSICAL REVIEW D 109(2), 2024
10.1103/PhysRevD.109.024057
This paper investigates how quantum gravity may subtly break discrete symmetries that are responsible for stabilizing dark matter and forming domain walls in the early universe. Using a simple theoretical model with two scalar fields and two symmetries—both explicitly broken by quantum gravity—the authors study possible observable signatures. They propose that such symmetry breaking could leave imprints in the cosmic microwave background and gravitational wave signals. In particular, they show that recent gravitational wave observations from pulsar timing arrays can place meaningful constraints on these quantum gravity effects.

6. **Categorical and K-theoretic Donaldson-Thomas theory of C3 (Part I)**
Padurariu, T; Toda, Y
Duke Mathematical Journal 173(10) pp.1973-2038, 2024
This paper reconstructs the zero-dimensional Donaldson–Thomas theory on C^3 within the framework of derived categories and K-theory. In particular, the authors construct a Hall algebra and its K-theoretic version for the category of coherent sheaves supported at the origin, and define new DT invariants. These can be interpreted as a K-theoretic refinement of the MacMahon function, and exhibit structures such as q-difference equations. This work represents an attempt to extend DT theory into a categorical and quantum-geometric context, opening new connections with mathematical physics and representation theory.

7. **Hyper Suprime-Cam Year 3 results: Cosmology from cosmic shear power spectra**
Dalal, R; Li, XC; Nicola, A; Zuntz, J; Strauss, MA; Sugiyama, S; Zhang, TQ; Rau, MM; Mandelbaum, R; Takada, M; More, S; Miyatake, H; Kannawadi, A; Taniguchi, T et al.
PHYSICAL REVIEW D 108 (12), 2023
10.1103/PhysRevD.108.123519
This paper presents cosmic shear power spectrum measurements from the 3-year weak lensing data of the Hyper Suprime-Cam (HSC) Subaru Strategic Program. Using high-quality imaging over 416 square degrees and more than 15 galaxies per square arcminute, the team achieved a high signal-to-noise detection of weak gravitational lensing effects across four tomographic redshift bins. Extensive mock tests and careful modeling—including blinding procedures and systematics control—ensure the robustness of their results. Their analysis yields a key cosmological parameter, S8=0.776, which aligns well with other HSC findings but shows a mild (~2σ) tension with the Planck 2018 results. Systematic uncertainties are found to have only a minor impact on this conclusion.

8. **Heavy-element production in a compact object merger observed by JWST**
Levan, AJ; Gompertz, BP; Salafia, OS; Bulla, M; Burns, E; Hotokezaka, K; Izzo, L; Lamb, GP; Malesani, DB; Oates, SR; Ravasio, ME; Escorial, AR; Schneider, B et al.
NATURE 2023,2023
10.1038/s41586-023-06759-1
This study reports on GRB 230307A, an unusually bright gamma-ray burst that offers strong evidence linking long-duration GRBs with compact object mergers like neutron star collisions. The event included a kilonova—similar to that seen in GW170817—and was observed in detail by the James Webb Space Telescope. Mid-infrared spectroscopy revealed tellurium and signs of lanthanide production, indicating the synthesis of heavy elements through the r-process. These findings confirm that such cosmic explosions contribute significantly to the creation of heavy elements in the universe.

9. **First Dark Matter Search with Nuclear Recoils from the XENONnT Experiment**
Aprile, E; Abe, K; Agostini, F; Bui, TK; Kato, N; Martens, K; Moriyama, S; Takeda, A; Yamashita, M; Maouloud, SA; Althueser, L; Andrieu, B; Angelino, E; Angevaare, JR; Antochi, VC; Martin, DA; Arneodo, F; Baudis, L et al.
PHYSICAL REVIEW LETTERS 131 (4), 2023
10.1103/PhysRevLett.131.041003
This paper presents the first dark matter search results from the XENONnT experiment, which uses a liquid xenon time projection chamber with 5.9 tons of sensitive target mass. In a 1.09 ton-year exposure, background levels from radioactive contaminants were reduced to record lows, enabling a highly sensitive search for weakly interacting massive particles (WIMPs). No significant nuclear recoil signal was observed, leading to the most stringent upper limit yet on spin-independent WIMP-nucleon interactions: $2.58\times10^{-47}\,cm^2$ for a 28 GeV WIMP. This result improves upon earlier XENON1T limits and includes constraints on spin-dependent interactions as well.

10. **Probing cosmic inflation with the LiteBIRD cosmic microwave background polarization survey**
Allys, E; Azzoni, S; Chinone, Y; Ghigna, T; Hasebe, T; Hazumi, M; Katayama, N; Komatsu, E; Matsumura, T; Namikawa, T; Sakurai, Y; Stever, S et al.
PROGRESS OF THEORETICAL AND EXPERIMENTAL PHYSICS 2023 (4), 2023
10.1093/ptep/ptac150
This paper introduces the LiteBIRD mission, led by JAXA to study the early universe and fundamental physics. The satellite will observe the cosmic microwave background (CMB) polarization from the Sun–Earth Lagrange point L2 for about three years. Using telescopes across 15 frequency bands (34–448 GHz), LiteBIRD aims to detect B-mode polarization—potential evidence of cosmic inflation. The mission also seeks to explore physics beyond the Standard Model, including aspects of quantum gravity. Kavli IPMU is playing important roles in a number of aspects.

11. **Asymptotic density of states in 2d CFTs with non-invertible symmetries**
Lin, YH; Okada, M; Seifnashri, S; Tachikawa, Y
JOURNAL OF HIGH ENERGY PHYSICS, (3), 2023
10.1007/JHEP03(2023)094
This paper extends the understanding of the asymptotic density of states in two-dimensional conformal field theories (2D CFTs) by incorporating non-invertible symmetries described by fusion categories. The authors generalize the known result that, for a finite symmetry group GGG, the density in an irreducible representation ρ\rhoρ scales with $(\dim\rho)^2$. They introduce the concept of "irreducible representations" for fusion categories and demonstrate how these structures influence the asymptotic state count. This work provides new insights into the role of generalized symmetries in quantum field theories.

12. **Search for the Majorana Nature of Neutrinos in the Inverted Mass Ordering Region with KamLAND-Zen**
Abe, S; Inoue, K; Kishimoto, Y; Koga, M; Chernyak, D; Kozlov, A; Berger, BE; Fujikawa, BK; Efremenko, Y; Tornow, W; Detwiler, JA; Enomoto, S; Decowski, MP; et al.
PHYSICAL REVIEW LETTERS, 130 (5), 2023
10.1103/PhysRevLett.130.051801
The KamLAND-Zen experiment has significantly advanced the search for neutrinoless double-beta decay in xenon-136, using a liquid scintillator enriched with xenon. In this latest study, an upgraded detector and nearly double the xenon mass improved the sensitivity, achieving an exposure of 970 kg·yr. With enhanced background rejection methods, the team set a new lower limit on the half-life of neutrinoless double-beta decay at 2.3×10^{26} years. This result places stringent constraints on the effective Majorana neutrino mass, narrowing it to 36–156 meV.

13. **Gel'fand-Fuchs cohomology in algebraic geometry and factorization algebras**
Hennion, B; Kapranov, M
JOURNAL OF THE AMERICAN MATHEMATICAL SOCIETY 36, 2023
10.1090/jams/1001
This paper formulates and studies the Gelfand–Fuchs cohomology of infinite-dimensional Lie algebras of differential forms within the framework of algebraic geometry. In particular, a new perspective using factorization algebras is introduced through structures related to the infinite jet sheaves of complex manifolds. This work is significant as it provides a new framework for precisely handling infinite-dimensional symmetries (such as the algebra of vector fields) in the language of algebraic geometry. Specifically, by connecting factorization algebras, which appear in physics (conformal field theory and quantum field theory), with classical differential geometric cohomology theories (Gelfand–Fuchs theory), it realizes a fusion of algebraic geometry, representation theory, and mathematical physics.

14. **Logarithmic Duality of the Curvature Perturbation**
Pi, Shi; Sasaki, Misao
PHYSICAL REVIEW LETTERS 131(1), 2023
10.1103/PhysRevLett.131.011002
This paper explores how tiny fluctuations during cosmic inflation affect the structure of the universe we see today. The authors focus on a simplified model where the inflationary potential is made of connected quadratic (parabola-like) segments. Using a method called the δN formalism, they find a general formula that describes how the initial fluctuations in the field and its speed influence the final curvature of space. The formula includes logarithmic terms and reflects how the system evolves over time. Interestingly, they show that this formula can sometimes simplify to just one logarithmic term, depending on certain conditions. This leads to specific patterns—such as exponential or Gumbel-like “tails”—in the statistical distribution of the curvature, which are important for understanding rare but significant cosmic events.

15. **Search for New Physics in Electronic Recoil Data from XENONnT**
Aprile, E; Abe, K; Bui, TK; Kato, N; Martens, K; Moriyama, S; Takeda, A; Yamashita, M; Agostini, F; Maouloud, SA et al.
PHYSICAL REVIEW LETTERS 129(16), 2022
10.1103/PhysRevLett.129.161805
This paper presents the results of a blinded analysis of low-energy electronic recoil data from the first science run of the XENONnT dark matter experiment. With an upgraded 5.9-ton liquid xenon target and new subsystems, the team reduced the background in the (1, 30) keV search region to the lowest levels ever achieved in dark matter detection—about five times lower than XENON1T. With an exposure of 1.16 ton-years, no excess above the background was observed, setting stringent new limits on solar axions, the neutrino magnetic moment, and bosonic dark matter.

16. **A repeating fast radio burst associated with a persistent radio source**
Niu, CH; Jiang, JA; Aggarwal, K; Li, D; Zhang, X; Chatterjee, S; Tsai, CW; Yu, W; Law, CJ; Burke-Spolaor, S; Cordes, JM; Zhang, YK; Ocker, SK et al.
NATURE 606(7916), 2022
10.1038/s41586-022-04755-5
This study reports the detection and precise localization of the repeating fast radio burst (FRB) 20190520B, which is associated with a compact, persistent radio source and a dwarf host galaxy with a high specific star formation rate at a redshift of 0.241. The estimated host-galaxy dispersion measure is significantly higher than the average for FRB host galaxies, far surpassing the dispersion from the intergalactic medium. These findings highlight the importance of accurate host-galaxy identification when inferring redshifts for FRBs, suggesting that the host-galaxy contribution may be substantial in some cases.

17. **New Constraint on Early Dark Energy from Planck and BOSS Data Using the Profile Likelihood**
Herold, L; Ferreira, EGM; Komatsu, E
ASTROPHYSICAL JOURNAL LETTERS 929(1), 2022
10.3847/2041-8213/ac63a3
This paper examines early dark energy (EDE) as a possible solution to the Hubble tension. While previous studies have shown conflicting results, the authors investigate the cause of these differences using Planck CMB and galaxy clustering data. By comparing grid sampling and profile likelihood methods, they find that volume effects in parameter estimation can bias the inferred EDE fraction. Their profile likelihood analysis avoids this issue and yields a constraint on the fraction of early dark energy as 0.072±0.036, offering a clearer assessment of EDE's role in resolving the Hubble tension.

18. **Third data release of the Hyper Suprime-Cam Subaru Strategic Program**
Aihara, H; Li, XC; Miyatake, H; More, S; Murayama, H; Oguri, M; Ouchi, M; Suzuki, N; Takada, M; Tang, SL; Turner, EL et al.
PUBLICATIONS OF THE ASTRONOMICAL SOCIETY OF JAPAN 74(2), 2022
10.1093/pasj/psab122
This paper presents the third data release of the Hyper Suprime-Cam Subaru Strategic Program (HSC-SSP), a wide-field imaging survey conducted with the Subaru 8.2 m telescope. The release includes data from 278 nights, covering approximately 670 square degrees at full depth in five optical bands (grizy) within the Wide layer. Including partially observed regions, the total area reaches 1470 square degrees. The Deep and UltraDeep layers are also complete, with adjusted observing strategies. Key improvements include an updated sky subtraction algorithm, significantly reducing false detections. While data quality has improved overall, users are advised to consult quality checks and known issues before use.

19. **Dark Energy Survey Year 3 results: Cosmological constraints from galaxy clustering and weak lensing**
Abbott, TMC; Aguena, M; Alarcon, A; Allam, S; Alves, O; Amon, A; Andrade-Oliveira, F; Annis, J; Avila, S; Bacon, D; Park, Y et al.
PHYSICAL REVIEW D 105(2), 2022
10.1103/PhysRevD.105.023520
This paper presents the first cosmological results from large-scale structure analyses using the full 5000 deg² of imaging data from the Dark Energy Survey (DES) Data Release 1. The study combines three two-point correlation functions—cosmic shear, galaxy clustering, and galaxy–galaxy lensing—based on over 100 million galaxies. Major improvements over previous analyses include enhanced modeling, calibration of shear and redshifts, and use of independent clustering samples. The results are consistent across all probes and align well with Planck 2018 CMB data under both ΛCDM and wCDM models. The combined DES data significantly improve cosmological constraints, particularly on the clustering amplitude S8, matter density Ωm, and the dark energy equation-of-state parameter w.

20. **Euler numbers of Hilbert schemes of points on simple surface singularities and quantum dimensions of standard modules of quantum affine algebras.**
Nakajima, H
Kyoto Journal of Mathematics 61 (2), 2021
10.1215/21562261-2021-0006
This paper shows that the generating function of the Euler numbers of Hilbert schemes on ADE-type simple surface singularities coincides with the quantum dimensions of the standard representations of the corresponding quantum affine algebras. This reveals a deep correspondence between algebraic geometry—particularly the resolution of singularities and Hilbert schemes—and quantum groups and representation theory, marking a significant development in geometric representation theory. Furthermore, by relating the combinatorial and representation-theoretic aspects of quantum dimensions to geometric invariants, the work also suggests connections to theoretical physics, especially to the counting of BPS states in string theory.

2. Major Invited Lectures, Plenary Addresses (etc.)

*List up to 10 main presentations made between FY 2021 and FY 2024 in order from most recent.
*For each, write the date(s), lecturer/presenter's name, presentation title and conference name.

Date(s)	Lecturer/Presenter's name	Presentation title	Conference name
Dec. 9, 2024	Jia Liu	Our Universe in Simulation	The Int'l Joint Workshop on the Standard Model and Beyond 2024
Oct. 23, 2024	Linda Blot	Numerical Cosmology	COSMO2024
Jun. 10, 2024	Hirosi Ooguri	The Future of String Theory	Strings 2024
Apr. 9, 2024	Masahiro Takada	Cosmology with Subaru HSC Year 3 Data	Starting the golden years: going strong after KiDS
Dec. 12, 2023	Jun'ichi Yokoyama	Primordial Black Holes from Single- field Inflation?	Future Perspectives on PBHs
Jul. 18, 2023	Hiraku Nakajima	A Mathematical Definition of Coulomb Branches of 3D N=4 Susy Gauge Theories	Int'l Congress of Basic Sciences
May 25, 2023	Mikhail Kapranov	Categorification of Euler's Continuants, N-Spherical Functors and Periodic Semi-orthogonal Decompositions	Int'l Conference "Homotopy Algebras and Higher Structures"
Jun. 2, 2022	Mark Vagins	A Gadolinium-Loaded Super-Kamiokande	Neutrino 2022
Sept. 7, 2021	Takeo Higuchi	Belle II: Status and Prospects	The 22nd Edition of Particles and Nuclei Int'l Conference (PANIC 2021)
Aug. 28, 2021	Hitoshi Murayama	Why Susy Is Great	SUSY 2021

3. Major Awards

*List main awards received between FY 2021 and FY 2024 in order from the most recent (within 10 awards)..
*For each, write the date issued, recipient's name and the name of award. In case of multiple recipients, underline those affiliated with the Center.

Date	Recipient's name	Name of award
Feb. 26, 2025	Miho Katsuragawa	2025 Fumiko Yonezawa Memorial Award
Feb. 14, 2025	Tomiyoshi Haruyama	2025 Samuel C. Collins Award
Nov. 3, 2024	Masayuki Nakahata	Medal with Purple Ribbon
Aug. 8, 2024	Tadashi Takayanagi	2024 ICTP Dirac Medal
Jun. 27, 2024	Naoki Yoshida	Philipp Franz von Siebold Award
Mar. 12, 2024	Masamune Oguri	Japan Academy Prize
Mar. 11, 2024	Masahiro Takada	Hayashi Chushiro Prize
Dec. 15, 2022	Masahito Yamazaki	19th JSPS Prize
Dec. 6, 2022	Eiichiro Komatsu	Nishina Memorial Prize
Jun. 4, 2022	Hiraku Nakajima	President of the International Mathematical Union

Appendix 2　FY 2024 List of Principal Investigators

NOTE:
*Underline names of principal investigators who belong to an overseas research institution.
*Indicate newly added researchers for FY 2021-2024 in the "Notes" column.

<Principal Investigators at the end of FY 2024>　　Principal Investigators Total: 27

Name	Age	Affiliation (Position title, department, organization)	Academic degree, Specialty	Effort (%)*	Starting date of participation	Status of participation (Describe in concrete terms)	Note
Center director Jun'ichi Yokoyama	62	Director Professor Kavli IPMU, UTIAS, The Univ. of Tokyo Professor Department of Physics, The Univ. of Tokyo, School of Science	Doctor of Science in Physics	65	2/1/2008	Usually stay at the center with visits to Research Center for the Early Universe and Department of Physics at School of Science twice a week.	Assigned as a PI in November 2023
Hiromi Yokoyama	49	Deputy Director Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph.D. Science, Science and Society	100	4/1/2017	Usually stays at the center.	Assigned as a PI in April 2022
Tomoyuki Abe	41	Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph.D., Mathematical Science	100	4/1/2011	Usually stays at the center.	Assigned as a PI in July 2023
Alexey Bondal	63	Leading Scientific Researcher Steklov Mathematical Institute Russian Academy of Sciences Senior Fellow Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph.D., Mathematics	45	8/1/2010	Stays at the center for 5 months.	
Tomiyoshi Haruyama	75	Project Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph.D., Engineering	100	2013/4/1	Usually stays at the center.	Assigned as a PI in October 2024
Hiroaki Aihara	69	Counsel Project Professor Kavli IPMU, UTIAS, The Univ. of Tokyo Executive Vice President Professor The Univ. of Tokyo	Ph.D., Physics	10	10/1/2007	Joins a videoconference from another campus twice a month.	
Masashi Hazumi	60	Professor Institute of Particle and Nuclear Studies, High Energy Accelerator Research Organization Project Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Doctor of Science, High Energy Physics	7	10/1/2009	Stays at the center once a month, and join meetings and videoconference a few times a week.	Assigned as a PI in April 2022
Simeon John Hellerman	52	Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph.D., Physics	100	7/16/2008	Usually stays at the center.	Assigned as a PI in April 2022
Takeo Higuchi	50	Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph.D., Physics	100	11/1/2012	Usually stays at the center.	Assigned as a PI in April 2023
Kentaro Hori	59	Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph.D., Physics	100	11/1/2008	Works basically at home (due to COVID), joins online meetings four to five times per week.	
Yukari Ito	56	Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph.D., Mathematical Sciences	100	9/1/2017	Stays at Kavli IPMU full time.	Assigned as a PI in April 2022
Mikhail Kapranov	62	Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph.D., Mathematics	100	5/16/2014	Stays at Kavli IPMU full time.	
Shigeki Matsumoto	52	Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph.D., Physics	100	10/1/2010	Usually stays at the center.	Assigned as a PI in April 2022

Todor Eliseev Milanov	48	Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph.D., Mathematics	100	8/1/2010	Usually stays at the center.	Assigned as a PI in April 2022
Hitoshi Murayama	61	Professor Kavli IPMU, UTIAS, The Univ. of Tokyo MacAdams Professor of Physics, Univ. of California, Berkeley Core Faculty, Center for Japanese Studies, Univ. of California, Berkeley	Doctor of Science, Theoretical Physics	40	10/1/2007	Stays at the center a few months a year, at Berkeley satellite for the rest of the year.	
Hiraku Nakajima	62	Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph.D., Mathematics	100	4/1/2018	Usually stays at the center.	
Hirosi Ooguri	63	Professor Kavli IPMU, UTIAS, The Univ. of Tokyo Fred Kavli Professor and Director Walter Burke Institute for Theoretical Physics, California Institute of Technology	Doctor of Science, Theoretical Physics	20	10/1/2007	Stayed at the center a few months a year until October 2023. After that period, stays at the center a few times a year and joins video meetings.	
Misao Sasaki	72	Project Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Doctor of Science, Physics	100	4/1/2018	Full-time project professor at the institute.	Assigned as a PI in April 2022
John David Silverman	56	Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Doctor of Science, Astronomy	100	11/1/2009	Usually stays at the center.	Assigned as a PI in April 2022
Yuji Tachikawa	45	Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph.D., Physics	100	11/1/2010	Usually stays at the center.	Assigned as a PI in April 2022
Masahiro Takada	51	Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph. D., Astronomy	100	3/1/2008	Usually stays at the center.	
Tadayuki Takahashi	66	Project Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph.D., Physics	100	4/1/2018	Usually stays at the center.	
Yukinobu Toda	45	Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph.D., Mathematical Science	100	1/1/2008	Usually stays at the center.	
Mark Robert Vagins	59	Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph.D., Physics	100	5/16/2008	Usually based at Kavli IPMU's Kashiwa headquarters, plus about ten trips per year to Kavli IPMU's Kamioka Branch.	
Masahito Yamazaki	41	Project Professor Kavli IPMU, UTIAS, The Univ. of Tokyo Professor Department of Physics, The Univ. of Tokyo, School of Science	Ph.D., Science	58	6/1/2013	Usually stayed at the center until the end of September 2024. After January 1, 2025, stays at the center once a week.	Assigned as a PI in April 2022
Naoki Yasuda	57	Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	Ph.D. Science, Astronomy	100	3/1/2009	Usually stays at the center.	Assigned as a PI in April 2022
Naoki Yoshida	51	Project Professor Kavli IPMU, UTIAS, The Univ. of Tokyo Professor Department of Physics, The Univ. of Tokyo	Ph.D., Astronomy	40	4/1/2012	Stays at the center once a week, and join meetings and videoconference a few times a week.	

*Percentage of time that the principal investigator devotes to his/her work for the Academy center vis-à-vis his/her total working hours.

Principal Investigators resigned since FY 2021

Name	Next Affiliation (Position title, department, organization)	Period of participation
Kunio Inoue	Professor, Director Research Center for Neutrino Science, Tohoku Univ.	2007/10/1-2022/3/31
Takaaki Kajita	Professor Research Center for Cosmic Neutrinos ICRR, The Univ. of Tokyo	2007/10/1-2022/3/31
Stavros Katsanevas	Passed away in 2022.	2007/10/1-2022/3/31
Masahiro Kawasaki	Professor ICRR, The Univ. of Tokyo	2015/8/1-2022/3/31
Young-Kee Kim	Louis Block Distinguished Service Professor Dept. of Physics, Univ. of Chicago	2017/4/1-2022/3/31
Toshiyuki Kobayashi	Professor Graduate School of Mathematical Sciences, The Univ. of Tokyo	2011/6/1-2022/3/31
Toshitake Kohno	Professor School of Interdisciplinary Mathematical Sciences Meiji Univ.	2007/10/1-2022/3/31
Eiichiro Komatsu	Director Dept. of Physical Cosmology, Max Planck Institute for Astrophysics	2017/4/1-2022/3/31
Kai Uwe Martens	Associate Professor Kavli IPMU, UTIAS, The Univ. of Tokyo	2017/4/1-2022/3/31
Shigetaka Moriyama	Professor Kamioka Observatory, Institute for Cosmic Ray Research, The Univ. of Tokyo	2017/4/1-2022/3/31
Masayuki Nakahata	Professor Kamioka Observatory, Institute for Cosmic Ray Research, The Univ. of Tokyo	2017/4/1-2022/3/31
Mihoko Nojiri	Professor Institute of Particle and Nuclear Studies, High Energy Accelerator Research Organization	2007/10/1-2022/3/31
Yasunori Nomura	Director, Berkeley Center for Theoretical Physics, Univ. of California, Berkeley Professor, Dept. of Physics, Univ. of California, Berkeley Senior Faculty Scientist, Physics Division, Lawrence Berkeley National Laboratory	2017/4/1-2022/3/31
David Spergel	Emeritus Professor Department of Astrophysical Sciences, Princeton University Director, Center for Computational Astrophysics, Flatiron Institute	2007/10/1-2022/3/31
Naoshi Sugiyama	President Professor Nagoya University	2007/10/1-2022/3/31
Nobuhiko Katayama	Retired at the end of March 2023.	2012/4/1-2023/3/31

Appendix 3-1 Record of Center Activities (FY 2021-FY 2024)

1. Researchers and Center Staffs, Satellites, Partner Institutions

1-1. Researchers and Center Staffs Participated in the Center's Activities

- Enter the number of researchers and center staffs affiliated with the Center in the table in Appendix 3-1a.

Special mention

- Describe the Center's concrete plans for the future and already-established schedules for employing researchers, particularly principal investigators.
- As background to how the Center is working on the global circulation of world's best brains, give good examples, if any, of how career paths are being established for the Center's researchers; that is, from which top-world research institutions do researchers come to the Center and to which research institutions do the Center's researchers go, and how long are their stays at those institutions.
- In Appendix 3-1b, describe the positions that postdoctoral researchers acquire upon leaving the Center.

1-2. Satellites and Partner Institutions

- List the satellite and partner institutions, both domestic and overseas, in the table below.
- Indicate newly added and deleted institutions in the "Notes" column.

<Satellite institutions>

Institution name	Principal Investigator(s), if any	Notes
【Berkeley Satellite】 University of California Berkeley	Hitoshi Murayama	

< Partner institutions>

Institution name	Principal Investigator(s), if any	Notes
Institut des Hautes Études Scientifiques (IHES)		
Kyoto University, Yukawa Institute for Theoretical Physics		
Kyoto University, Department of Physics		
High Energy Accelerator Research Organization (KEK)	Masashi Hazumi	
National Astronomical Observatory of Japan (NAOJ)		
Princeton University, Department of Astrophysical Sciences		

2. Status of Collaboration with Overseas Satellites

2-1. Coauthored Papers

- List the refereed papers published between FY 2021 and FY 2024 that were coauthored between the Center's researcher(s) in domestic institution(s) (include satellite institutions) and overseas satellite institution(s). List them by overseas satellite institution in the below blocks.
- Transcribe data in same format as in Appendix 1. Italicize the names of authors affiliated with overseas satellite institutions.

Overseas Satellite 1 : University of California Berkeley (Total: 256 papers)

1	Maximum a posteriori Ly α estimator (MAPLE): band power and covariance estimation of the 3D Ly α forest power spectrum *Horowitz, B; de Belsunce, R; Lukic, Z* MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY 536(1), 2024 DOI: 10.1093/mnras/stae2653

2	Quantum parton shower with kinematics *Bauer, CW; Chigusa, S*; Yamazaki, M PHYSICAL REVIEW A 109(3), 2024 DOI: 10.1103/PhysRevA.109.032432
3	Firewalls at exponentially late times Blommaert, A; *Chen, CH; Nomura, Y* JOURNAL OF HIGH ENERGY PHYSICS (10), 2024 DOI: 10.1007/JHEP10(2024)131
4	TensorFlow Hydrodynamics Analysis for Ly-a Simulations Ding, J; *Horowitz, B*; *Lukic, Z* ASTRONOMY AND COMPUTING 48, 2024 DOI: 10.1016/j.ascom.2024.100858
5	The Simons Observatory: Pipeline comparison and validation for large-scale B-modes Alonso, D; Baccigalupi, C; *Lizancos, AB*; Brown, ML; Calabrese, E; Chluba, J; Dunkley, J; Fabbian, G; Galitzki, N; Jost, B et al. ASTRONOMY & ASTROPHYSICS 686, 2024 DOI: 10.1051/0004-6361/202346105
6	The Simons Observatory: Combining cross-spectral foreground cleaning with multitracer B- mode delensing for improved constraints on inflation *Lizancos, AB*; Azzoni, S; Abril-Cabezas, I; Alonso, D; Baccigalupi, C; Calabrese, E; Challinor, A; Errard, J; Jost, B et al. PHYSICAL REVIEW D 110(4), 2024 DOI: 10.1103/PhysRevD.110.043532
7	The dependence of galaxy properties on the underlying three-dimensional matter density field at 2.0 < z < 2.5 Momose, R; Lee, KG; Ata, M; *Horowitz, B*; Kartaltepe, JS PUBLICATIONS OF THE ASTRONOMICAL SOCIETY OF JAPAN 76(6), 2024 DOI: 10.1093/pasj/psae076
8	The Simons Observatory: Beam Characterization for the Small Aperture Telescopes Azzoni, S; Chesmore, GE; Fabbian, G; Ganga, K; Gerras, RG; Jaffe, AH; Johnson, BR; Keating, B; *Keskitalo, R*; *Kisner, TS* et al. ASTROPHYSICAL JOURNAL 961(1), 2024 DOI: 10.3847/1538-4357/ad0969
9	Impact of beam far side-lobe knowledge in the presence of foregrounds for LiteBIRD Leloup, C; Matsumura, T; *Cheung, K*; Hazumi, M; Hoang, TD; Jost, B; *Lee, AT*; Namikawa, T; Obata, I; Sakurai, Y; Stever, SL et al. JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS (6), 2024 DOI: 10.1088/1475-7516/2024/06/011
10	DESI Emission-line Galaxies: Unveiling the Diversity of [O ii] Profiles and Its Links to Star Formation and Morphology Prochaska, JX; *Aguilar, J*; *Claybaugh, T*; *Gontcho, S*; *Guy, J*; *Kisner, T*; *Lambert, A*; *Landriau, M*; *Poppett, C* et al. ASTROPHYSICAL JOURNAL 977(2), 2024 DOI: 10.3847/1538-4357/ad8f33
11	LiteBIRD science goals and forecasts. Mapping the hot gas in the Universe Namikawa, T; Tanimura, H; *Cheung, K*; Hazumi, M; Komatsu, E; Leloup, C; Matsumura, T; Sakurai, Y; Stever, SL; *Westbrook, B* et al. JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS (12), 2024 DOI: 10.1088/1475-7516/2024/12/026

12	LiteBIRD science goals and forecasts: primordial magnetic fields *Cheung, K*; Hazumi, M; Komatsu, E; Namikawa, T; Obata, I; Sakurai, Y; Stever, SL et al. JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS (7), 2024 DOI: 10.1088/1475-7516/2024/07/086
13	Multi-dimensional optimisation of the scanning strategy for the LiteBIRD space mission Takase, Y; Vacher, L; Ishino, H; Patanchon, G; Stever, SL; *Cheung, K*; Leloup, C; Namikawa, T; *Westbrook, B* et al. JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS (12), 2024 DOI: 10.1088/1475-7516/2024/12/036
14	Implications of scattering for CMB foreground emission modelling Li, JR; *Delabrouille, J*; Cai, YF; Zhang, DD ASTRONOMY & ASTROPHYSICS 691, 2024 DOI: 10.1051/0004-6361/202451643
15	Statistics of thermal gas pressure as a probe of cosmology and galaxy formation Chen, ZY; Jamieson, D; Komatsu, E; Bose, S; Dolag, K; *Hadzhiyska, B*; Hernández-Aguayo, C; Hernquist, L; Kannan, R; Pakmor, R; Springel, V PHYSICAL REVIEW D 109(6), 2024 DOI: 10.1103/PhysRevD.109.063513
16	LiteBIRD science goals and forecasts: a full-sky measurement of gravitational lensing of the CMB Namikawa, T; *Cheung, K*; Hazumi, M; Komatsu, E; Leloup, C; Matsumura, T; Obata, I; Sakurai, Y; Stever, SL; Tanimura, H et al. JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS (6), 2024 DOI: 10.1088/1475-7516/2024/06/009
17	The metamorphosis of the Type Ib SN 2019yvr: late-time interaction Folatelli, G; Bersten, M; *Sáez, MM* et al. MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY 529(1), 2024 DOI: 10.1093/mnrasl/slad195
18	A Search Using GEO600 for Gravitational Waves Coincident with Fast Radio Bursts from SGR 1935+2154 *Hellman, F*; Yokoyama, J; *Zhou, R* et al. ASTROPHYSICAL JOURNAL 977(2), 2024 DOI: 10.3847/1538-4357/ad8de0
19	Optical and near-infrared photometry of 94 type II supernovae from the Carnegie Supernova Project Bersten, M; *Filippenko, AV*; Folatelli, G; Li, W; *Nugent, P* et al. ASTRONOMY & ASTROPHYSICS 692, 2024 DOI: 10.1051/0004-6361/202244401
20	The Rise of Nova V1674 Herculis Quimby, RM; Metzger, BD; *Shen, KJ*; Shafter, AW; Corbett, H; Overton, M ASTROPHYSICAL JOURNAL 977(1), 2024 DOI: 10.3847/1538-4357/ad887f

21	Combined Pre-supernova Alert System with KamLAND and Super-Kamiokande Koga, M; *Berger, BE*; *Fujikawa, BK*; Efremenko, Y; Tornow, W; Detwiler, JA; Enomoto, S; Decowski, MP; Abe, K; Hayato, Y; Hiraide, K; Ieki, K; Ikeda, M; Kameda, J; Kataoka, Y; Miura, M; Moriyama, S; Nakahata, M; Nakayama, S; Sekiya, H; Shiozawa, M; Takeda, A; Takemoto, Y; Tanaka, H; Kearns, E; Scholberg, K; Walter, CW; Zsoldos, S; Takeuchi, Y; Nakaya, T; Wendell, RA; Koshio, Y; Nakajima, Y; de Perio, P; Fujita, S; Jesús-Valls, C; Martens, K; Tsui, KM; Vagins, MR; Xia, J et al. ASTROPHYSICAL JOURNAL 973(2), 2024 DOI: 10.3847/1538-4357/ad5fee
22	Complementarity for a dynamical black hole *Concepcion, B*; *Nomura, Y*; *Ritchie, K*; *Weiss, S* PHYSICAL REVIEW D 110(8), 2024 DOI: 10.1103/PhysRevD.110.086002
23	The Simons Observatory: Design, Integration, and Testing of the Small Aperture Telescopes *Corbett, L*; *Groh, JC*; *Kusaka, A*; *Lee, AT*; Sakurai, Y et al. ASTROPHYSICAL JOURNAL SUPPLEMENT SERIES 274(2), 2024 DOI: 10.3847/1538-4365/ad64c9
24	Axion detection via superfluid 3He ferromagnetic phase and quantum measurement techniques *Chigusa, S*; Kondo, D; *Murayama, H*; Okabe, R; Sudo, H JOURNAL OF HIGH ENERGY PHYSICS (9), 2024 DOI: 10.1007/JHEP09(2024)191
25	Weak lensing combined with the kinetic Sunyaev-Zel'dovich effect: a study of baryonic feedback *Ferraro, S*; Chen, A; *DeRose, J* et al. MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY 534(1), 2024 DOI: 10.1093/mnras/stae2100
26	Exploration of the polarization angle variability of the Crab Nebula with POLARBEAR and its application to the search for axionlike particles Adachi, S; *Adkins, T*; Chinone, Y; Hazumi, M; *Jeong, O*; *Kusaka, A*; *Lee, AT* et al. PHYSICAL REVIEW D 110(6), 2024 DOI: 10.1103/PhysRevD.110.063013
27	Observation of Gravitational Waves from the Coalescence of a 2.5-4.5 M⊙ Compact Object and a Neutron Star Abac, AG; *Hellman, F*; *Molina-Ruiz, M*; Yokoyama, J; *Zhou, R* et al. ASTROPHYSICAL JOURNAL LETTERS 970(2), 2024 DOI: 10.3847/2041-8213/ad5beb
28	Search for charged excited states of dark matter with KamLAND-Zen Inoue, K; Koga, M; *Berger, BE*; *Fujikawa, BK*; Efremenko, Y; Tornow, W; Detwiler, JA; Enomoto, S; Decowski, MP et al. PHYSICS LETTERS B 855, 2024 DOI: 10.1016/j.physletb.2024.138846
29	Luminosity Functions of the Host Galaxies of Supernova Liang, ZX; *Suzuki, N*; Doi, M; Tanaka, M; Yasuda, N ASTROPHYSICAL JOURNAL 970(1), 2024 DOI: 10.3847/1538-4357/ad4b19

30	Leptogenesis in parity solutions to the strong CP problem and Standard Model parameters *Carrasco-Martinez, J*; Dunsky, DI; *Hall, LJ*; Harigaya, K JOURNAL OF HIGH ENERGY PHYSICS (6), 2024 DOI: 10.1007/JHEP06(2024)048
31	LiteBIRD science goals and forecasts: improving sensitivity to inflationary gravitational waves with multitracer delensing Namikawa, T; *Sherwin, B*; *Cheung, K*; Hazumi, M; Komatsu, E; Leloup, C; Matsumura, T; Obata, I; Sakurai, Y; Stever, SL; Tanimura, H et al. JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS (6), 2024 DOI: 10.1088/1475-7516/2024/06/010
32	Radiative Majorana neutrino masses in a parity solution to the strong CP problem *Hall, LJ*; Harigaya, K; Shpilman, Y JOURNAL OF HIGH ENERGY PHYSICS (3), 2024 DOI: 10.1007/JHEP03(2024)047
33	Searches for baryon number violation in neutrino experiments: a white paper Dev, PSB; *Askins, M*; Takhistov, V; Wendell, RA et al. JOURNAL OF PHYSICS G-NUCLEAR AND PARTICLE PHYSICS 51(3), 2024 DOI: 10.1088/1361-6471/ad1658
34	A heavy QCD axion and the mirror world *Dunsky, DI*; *Hall, LJ*; Harigaya, K JOURNAL OF HIGH ENERGY PHYSICS (2), 2024 DOI: 10.1007/JHEP02(2024)212
35	De Sitter space is sometimes not empty Balasubramanian, V; *Nomura, Y*; Ugajin, T JOURNAL OF HIGH ENERGY PHYSICS (2), 2024 DOI: 10.1007/JHEP02(2024)135
36	Precipitable water vapour measurement using GNSS data in the Atacama Desert for millimetre and submillimetre astronomical observations Sugiyama, J; Nishino, H; *Kusaka, A* MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY 528(3), 2024 DOI: 10.1093/mnras/stae270
37	Cosmological Distance Measurement of Twelve Nearby Supernovae IIP with ROTSE-IIIb Quimby, RM; *Rykoff, E*; *Zheng, W* et al. ASTROPHYSICAL JOURNAL 962(1), 2024 DOI: 10.3847/1538-4357/ad17bc
38	The Simons Observatory: Cryogenic half wave plate rotation mechanism for the small aperture telescopes Sakurai, Y; *Ashton, PC*; *Corbett, L*; *Hill, CA*; Jost, B; *Kusaka, A*; *Lee, AT*; *Mangu, A*; *Song, X*; *Williams, PA* et al. REVIEW OF SCIENTIFIC INSTRUMENTS 95(2), 2024 DOI: 10.1063/5.0178066
39	Effects of finite material size on axion-magnon conversion *Chigusa, S*; Ito, A; Nakayama, K; Takhistov, V JOURNAL OF HIGH ENERGY PHYSICS (1), 2024 DOI: 10.1007/JHEP01(2024)185

40	The Atacama Cosmology Telescope: reionization kSZ trispectrum methodology and limits MacCrann, N; Qu, FJ; Namikawa, T; *Ferraro, S* et al. MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY 532(4), 2024 DOI: 10.1093/mnras/stae1746
41	White paper on light sterile neutrino searches and related phenomenology *Berryman, JM*; *Smiley, M*; Wendell, RA; *Gann, GDO*; Takhistov, V; *Yang, G* et al. JOURNAL OF PHYSICS G-NUCLEAR AND PARTICLE PHYSICS 51(12), 2024 DOI: 10.1088/1361-6471/ad307f
42	Atacama Cosmology Telescope: High-resolution component-separated maps across one third of the sky Coulton, W; *Crowley, KT*; *Ferraro, S*; Namikawa, T et al. PHYSICAL REVIEW D 109(6), 2024 DOI: 10.1103/PhysRevD.109.063530
43	The Atacama Cosmology Telescope: A Measurement of the DR6 CMB Lensing Power Spectrum and Its Implications for Structure Growth Qu, FJ; *Crowley, KT*; *Ferraro, S*; Namikawa, T et al. ASTROPHYSICAL JOURNAL 962(2), 2024 DOI: 10.3847/1538-4357/acfe06
44	The Atacama Cosmology Telescope: DR6 Gravitational Lensing Map and Cosmological Parameters Madhavacheril, MS; *Crowley, KT*; *Ferraro, S*; Namikawa, T et al. ASTROPHYSICAL JOURNAL 962(2), 2024 DOI: 10.3847/1538-4357/acff5f
45	Review of Particle Physics Hayato, Y; *Klein, SR*; Nakamura, K; *Safdi, B*; *Seljak, U*; *Smoot, GF*; *White, M*; Yokoyama, M et al. PHYSICAL REVIEW D 110(3), 2024 DOI: 10.1103/PhysRevD.110.030001
46	Photon noise correlations in millimeter-wave telescopes *Hill, CA*; *Kusaka, A* APPLIED OPTICS 63(7), 2024 DOI: 10.1364/AO.504979
47	A Method of Measuring TES Complex ETF Response in Frequency-Domain Multiplexed Readout by Single Sideband Power Modulation Zhou, Y; de Haan, T; Akamatsu, H; Kaneko, D; Hazumi, M; Hasegawa, M; *Suzuki, A*; *Lee, AT* JOURNAL OF LOW TEMPERATURE PHYSICS 216(1-2), 2024 DOI: 10.1007/s10909-024-03107-z
48	Anti-reflection coating with mullite and Duroid for large-diameter cryogenic sapphire and alumina optics Sakaguri, K; Sakurai, Y; *Farias, N*; *Hill, CA*; *Kusaka, A*; *Lee, AT*; Matsumura, T et al. APPLIED OPTICS 63(6), 2024 DOI: 10.1364/AO.515508
49	Detecting unresolved lensed SNe Ia in LSST using blended light curves Bag, S; *Kim, A*; *Linder, E*; More, A et al. ASTRONOMY & ASTROPHYSICS 691, 2024 DOI: 10.1051/0004-6361/202450485

50	The Simons Observatory: Development and Optical Evaluation of Achromatic Half-Wave Plates Sugiyama, J; Sakurai, Y; *Kusaka, A*; *Lee, A*; Matsumura, T et al. JOURNAL OF LOW TEMPERATURE PHYSICS 214(3-4), 2024 DOI: 10.1007/s10909-023-03036-3
51	Mapping Obscured Star Formation in the Host Galaxy of FRB 20201124A Dong, YX; *Margalit, B*; Prochaska, JX et al. ASTROPHYSICAL JOURNAL 961(1), 2024 DOI: 10.3847/1538-4357/ad0cbd
52	Host Galaxies for Four Nearby CHIME/FRB Sources and the Local Universe FRB Host Galaxy Population Bhardwaj, M; *Leung, C*; Prochaska, JX et al. ASTROPHYSICAL JOURNAL LETTERS 971(2), 2024 DOI: 10.3847/2041-8213/ad64d1
53	Ultralight vector dark matter search using data from the KAGRA O3GK run *Hellman, F*; Obata, I; *Zhou, R* et al. PHYSICAL REVIEW D 110(4), 2024 DOI: 10.1103/PhysRevD.110.042001
54	First Sagittarius A* Event Horizon Telescope Results. VII. Polarization of the Ring Akiyama, K; Ikeda, S; *Plambeck, R* et al. ASTROPHYSICAL JOURNAL LETTERS 964(2), 2024 DOI: 10.3847/2041-8213/ad2df0
55	First Sagittarius A* Event Horizon Telescope Results. VIII. Physical Interpretation of the Polarized Ring Akiyama, K; Ikeda, S; *Plambeck, R* et al. ASTROPHYSICAL JOURNAL LETTERS 964(2), 2024 DOI: 10.3847/2041-8213/ad2df1
56	Ordered magnetic fields around the 3C 84 central black hole Paraschos, GF; Ikeda, S; *Plambeck, R* et al. ASTRONOMY & ASTROPHYSICS 682, 2024 DOI: 10.1051/0004-6361/202348308
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2-2. Status of Researcher Exchanges

- Using the below tables, indicate the number of researcher exchanges between the Center (include domestic satellite institutions) and overseas satellite institutions during the period of FY 2021-FY 2024. Enter by institution and fiscal year.
- Write the number of principal investigator visits in the upper space and the number of other researcher visits in the lower space.

Overseas Satellite 1: University of California Berkeley

<To overseas satellite>

	FY 2021	FY 2022	FY 2023	FY 2024	Total
Principal investigators	0	3	5	3	11
Other researchers	0	1	3	6	10
Total	0	4	8	9	21

<From overseas satellite>

	FY 2021	FY 2022	FY 2023	FY 2024	Total
Principal investigators	4	6	6	9	25
Other researchers	4	10	12	15	41
Total	8	16	18	24	66

3. Holding and Participating in International Research Meetings

3-1. Holding international Research Meetings

- Indicate the number of international research conferences or symposiums held between FY 2021 and FY 2024, and give up to **five examples** of the most representative ones using the table below.

FY 2021: 12 meetings	FY 2022: 12 meetings	FY 2023: 12 meetings	FY 2024: 19 meetings

Major examples (meeting titles, places and dates held)	Number of participants
Kashiwa-no-ha Dark Matter and Cosmology Symposium Satellite workshop of COSMO 2024, Kavli IPMU Lecture Hall, October 28-November 1, 2024	From domestic institutions: 122 From overseas institutions: 168
27th International Conference on Particle Physics and Cosmology (COSMO2024), Kyoto University, October 21-25, 2024	From domestic institutions: 149 From overseas institutions: 358
AI-driven discovery in physics and astrophysics, Kavli IPMU Lecture Hall, January 21-26, 2024	From domestic institutions: 53 From overseas institutions: 73
The world of Mathematical Sciences, Kavli IPMU Lecture Hall, August 24-25, 2023	From domestic institutions: 120 From overseas institutions: 7
Number Theory, Strings and Quantum Physics, Online, June 1-4, 2021	From domestic institutions: 78 From overseas institutions: 209

3-2. Participating in International Research Meetings

- Give up to five examples of the most representative case in which the Center, not individual researchers, participated in international research meetings to enhance the visibility and brand of the Center or of the overall WPI Program

Meeting titles, places, dates held and number of participants	Form of participation (e.g. operating a booth)	Number of participants from the Center
2025 AAAS Annual Meeting, BOSTON, Massachusetts, USA, 13/02/2025 – 15/02/2025, Number of participants: 4000	Participated in closed meetings.	1
13th Annual WPI Science Symposium: "A World Made Bigger With Science", Kyoto University Clock Tower Centennial Hall, November 16, 2024, Number of participants: 301	Exhibited a booth and one young researcher participated in the social event "WPI Researcher/ Highschool Student Poster Presentation."	5
InterActions Collaboration Meeting 2023, High Energy Accelerator Research Organization, Tsukuba, Japan, 08/11/2023 – 10/11/2023, Number of participants:17	Participated in roundtable discussions.	1
11th Annual WPI Science Symposium: "The Infinite Possibilities Opened by Science", Ito Hall, The University of Tokyo & Online (Zoom), November 23, 2022 Number of participants: 284 (51 onsite, 233 online)	Operating a booth.	4

10th Annual WPI Science Symposium: "To the Future NanoWorld", Ishikawa Ongakudo & Online (Zoom), December 18, 2021 Number of participants: 567	Exhibited a booth and participated in a social event "WPI × Highschool Students Research Exchanges" as one of experts.	4

4. List of the Cooperative Research Agreements with Overseas Institutions

- Indicate the number of agreements concluded with overseas institutions still in effect as of the end of FY 2024 (March 31, 2025). Give five examples of the most representative agreements.

Number of effective agreements (as of March 31, 2025): 13

Five examples of the most representative agreements:

1. Name of the Agreement: MEMORANDUM OF UNDERSTANDING
   Dates of the Agreement: 4 May, 2017
   Counterpart in the Agreement:
   The Kavli Foundation (USA), Kavli Institute for Astronomy
   Astrophysics at Peking University (China)
   Summary of the Agreement: This MOU aims to support excellent research in astrophysics by early-career researchers, advance promising early-career researchers and promote enhanced opportunities for diverse career pathways, promote collaborations and share of resources between KIAA and Kavli IPMU as well as strength the scientific output and international visibility of KIAA and Kavli IPMU.

2. Name of the Agreement: Agreement for Cooperation
   Dates of the Agreement: 20 July, 2017
   Counterpart in the Agreement: Mainz Institute for Theoretical Physics at Johannes Gutenberg University Mainz (MITP)
   Summary of the Agreement: The purpose of this agreement is to encourage scientific exchange visits and collaborations between researchers at Kavli IPMU and MITP in order to promote progress in all research areas of common interest and to build academic ties between the two institutions.

3. Name of the Agreement: Memorandum of Understanding Regarding IPMU-ISSP-JHU collaborative program in Physics and Astronomy
   Dates of the Agreement: 11 December,2018
   Counterpart in the Agreement:
   Department of Physics and Astronomy, The Johns Hopkins University (JHU)
   The Institute for Solid State Physics, The University of Tokyo (ISSP)
   Summary of the Agreement: Under the recognition on a joint interest in particle physics, astrophysics, and condensed matter physics, complementary scientific expertise, and the importance of providing an international perspective to students and postdocs, three institutions establishes the IPMU-ISSP-JHU collaborative program in Physics and Astronomy for implementing the periodic workshop, the students and postdoc exchange as well as the researchers exchange.

4. Name of the Agreement: Memorandum of Understanding
   Dates of the Agreement: 22 June, 2009
   Counterpart in the Agreement: Department of Physics, University of California, Berkeley
   Summary of the Agreement: The primary purpose of this relationship is to establish close collaboration between IPMU and the Berkeley Center for Theoretical Physics (BCTP), and to permit IPMU to provide funding to support joint research to be administered by BCTP.

5. Name of the Agreement: AGREEMENT FOR THE CREATION OF AN INTERNATIONAL RESEARCH LABORATORY International Laboratory for Astrophysics, Neutrino and Cosmology Experiments ILANCE
   Dates of the Agreement: 31 March, 2021
   Counterpart in the Agreement: Centre National de la Recherche Scientifique (CNRS)
   Summary of the Agreement: This agreement aims to promote academic research and collaborative activities in areas of mutual interest. In this context, the creation of the international research laboratory ILANCE between UTokyo and IN2P3-CNRS will perfectly coincide with the start of new research programs in Japan and around the world, with a very great potential for first-class discoveries. Strengthening existing collaborations for fundamental research in physics, and

developing new common research areas will be the objective of this program. The ILANCE should help strengthen the partnership over a long period of time.
In search of new discoveries, physicists explore what the universe is made of and what are its fundamental laws at the smallest and largest scales. The scientific fields concerned by ILANCE are elementary particle physics, cosmology, astro-particles and astrophysics. This new laboratory will promote joint research projects between the Institute for Cosmic Ray Research (ICRR), the Kavli Institute for Physics and Mathematics of the Universe (Kavli IPMU) under the UTokyo Institute of Advanced Studies (UTIAS), International Center for Elementary Particles Physics (ICEPP), and School of Science on one side, and on the date of signature ten laboratories operated by IN2P3 on the other. More than fifty physicists from these different institutions or laboratories in France and Japan will participate in ILANCE's activities.

5. Postdoctoral Positions through Open International Solicitations

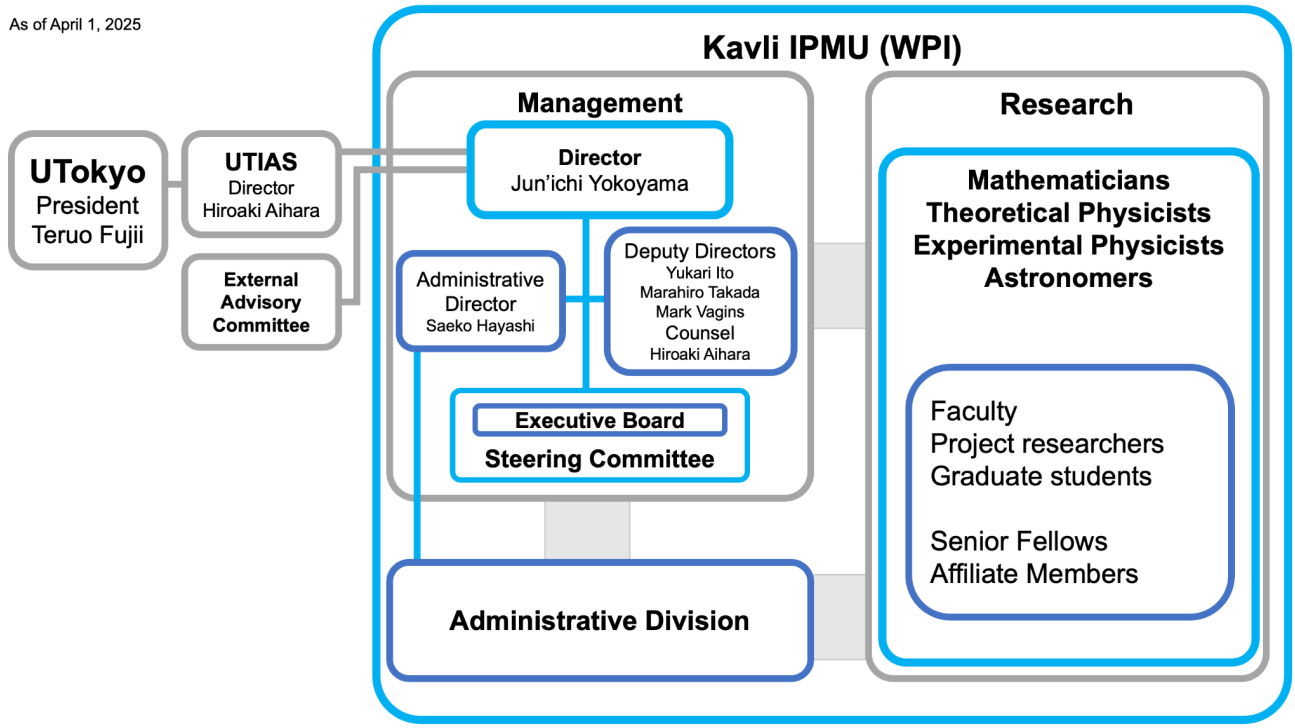
- In the columns "number of applications" and "number of selections," put the total number (upper) and the number and percentage of overseas researchers in the < > brackets (lower).
- In Appendix 3b, describe the status of employment of postdoctoral researchers.

Fiscal year	Number of applications	Number of selections
FY 2021	928	16
	〈 889 , 95.80 %〉	〈 13 , 81.25 %〉
FY 2022	1,071	16
	〈 875, 81.70 %〉	〈 15 , 93.75 %〉
FY 2023	1,069	14
	〈 1,042 , 97.47 %〉	〈 14 , 100 %〉
FY 2024	1,237	20
	〈 1,212 , 97.98 %〉	〈 18 , 90.00 %〉

6. Diagram of Management System

6-1.

- Diagram the Center's management system within the Center in an easily understood manner.
- If any changes have been made in the Center's management system vis-à-vis that stated in the application for WPI Academy center certification, describe them. Especially describe any important changes made in such as the center director, administrative director, head of host institution, and officer(s) in charge at the host institution (e.g., executive vice president for research).



Changes from the WPI Academy Center certificate application:

1. EAC (External Advisory Committee) was directly connected to UTIAS and UTokyo, not with KIPMU. From 2022, the diagram changed and EAC is now directly connected to the Director.

2. Director changed from Hirosi Ooguri to Jun'ichi Yokoyama in November 2023.

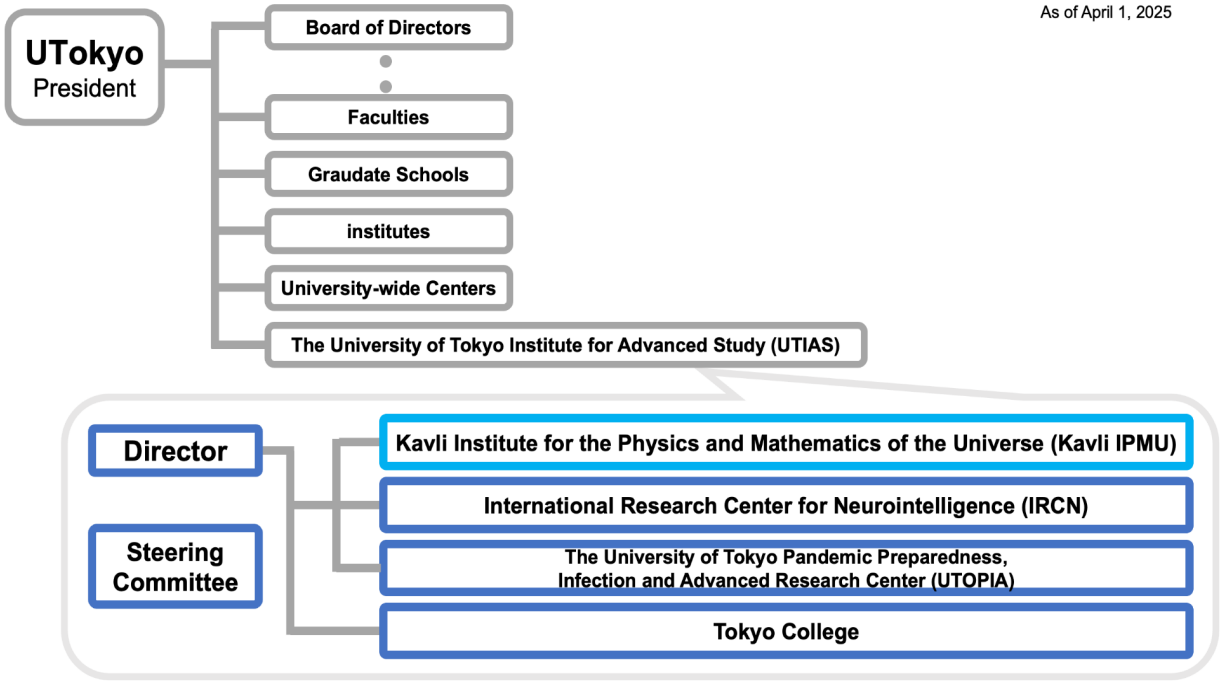
3. Administrative Director changed from Tomiyoshi Haruyama to Saeko Hayashi in October 2024.

4. Deputy Directors changed.
   Masahiro Takada in place of Misao Sasaki, as of September 2024.
   Yukari Ito and Mark Vagins started as of April 2025 in place of Hiromi Yokoyama and Tomiyoshi Haruyama.

5. Likewise the Executive Board and Steering Committee membership changed according to the changes of deputy directors.

6-2.
- Make a diagram of the organizational chart to show Center's position **within the host institution**.

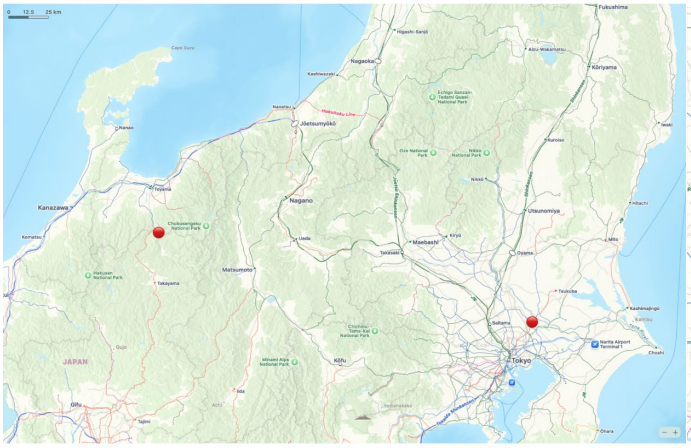
As of April 1, 2025

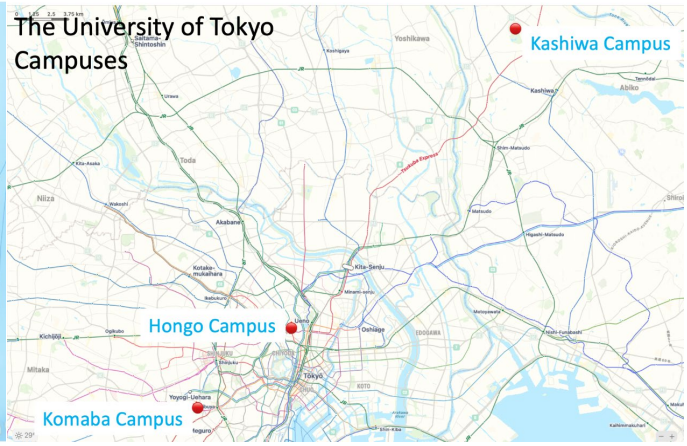


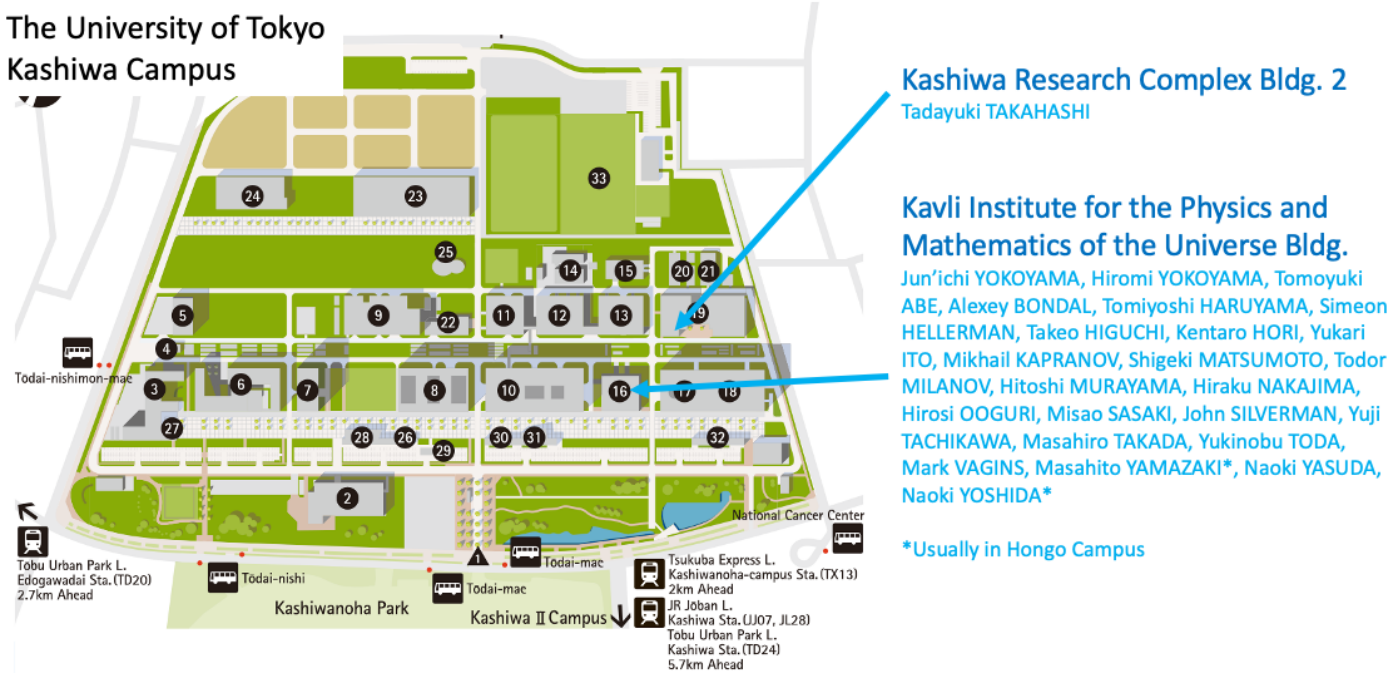
7. Campus Map

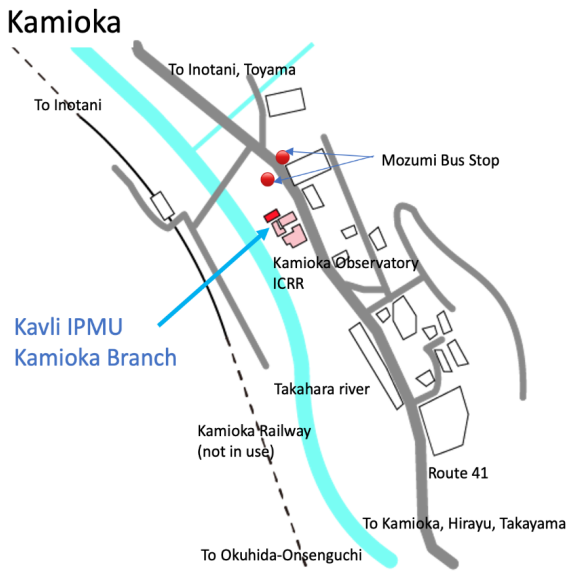
- Draw a simple map of the campus showing where the main office and principal investigator(s) are located.

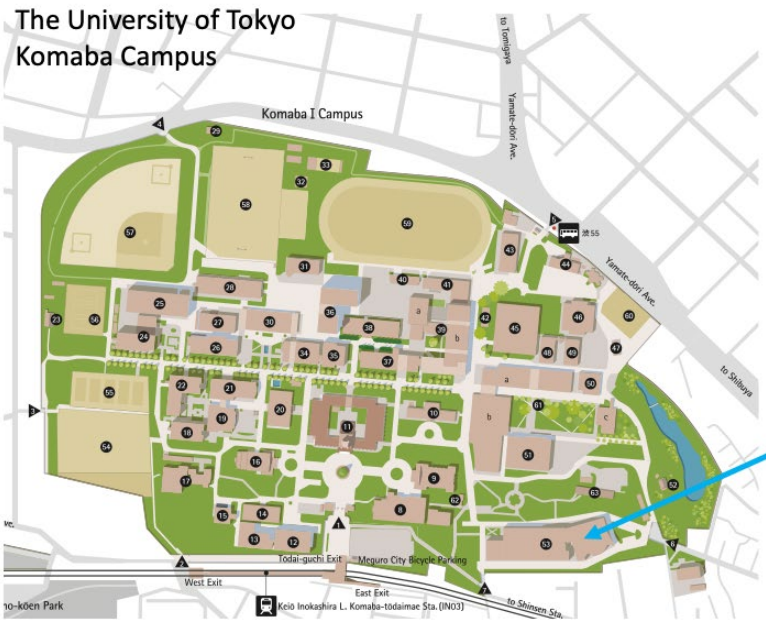
Kavli IPMU and its Kamioka Branch







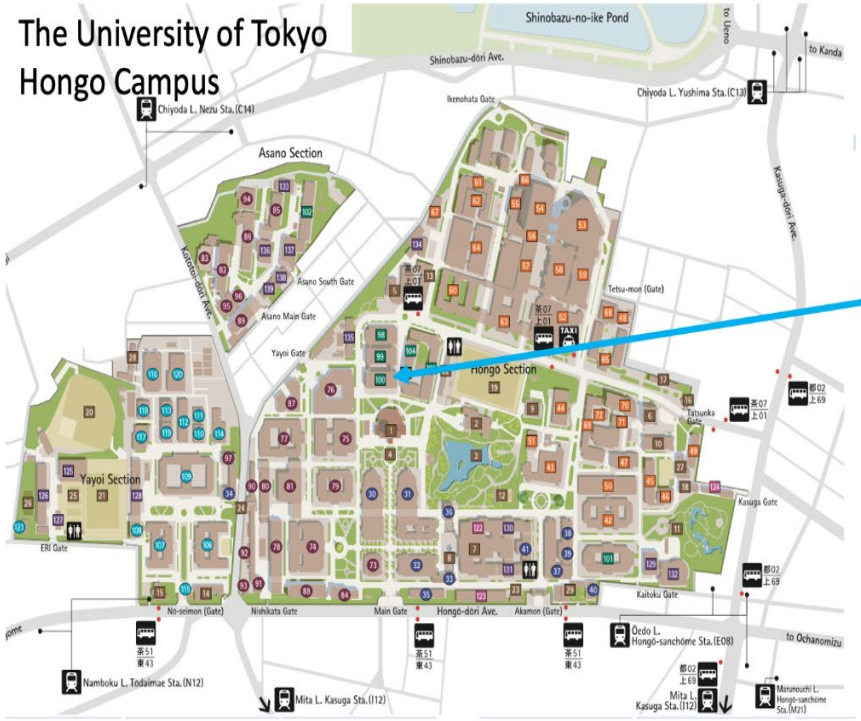




Graduate School of Mathematical Sciences Buldg.

Algebra: Tomoyuki ABE*, Yukari ITO*, Mikhail KAPRANOV*, Yukinobu TODA*
Geometry and Topology: Todor MILANO*, Hiraku NAKAJIMA*, Masahito YAMAZAKI **

*Usually in Kashiwa Campus
**Usually in Hongo Campus



Faculty of Science Bldg.

Physics: Hiroaki AIHARA, Masahito YAMAZAKI, Naoki YOSHIDA

Appendix3-1a Number of Center Personnel FY 2021-FY 2024

		FY 2021		FY 2022		FY 2023		FY 2024	
		Number of persons	%	Number of persons	%	Number of persons	%	Number of persons	%
Researchers		265		266		251		267	
	Overseas researchers	119	45	124	47	111	44	123	46
	Female researchers	31	12	32	12	37	15	39	15
	Principal investigators (PIs)	28		24		26		27	
	Overseas PIs	8	29	7	29	6	23	7	26
	Female PIs	2	7	2	8	2	8	2	7
	Other researchers	187		187		178		191	
	Overseas researchers	75	40	75	40	68	38	73	38
	Female researchers	20	11	19	10	23	13	24	13
	Postdocs	50		55		47		49	
	Overseas Postdocs	36	72	42	76	37	79	43	88
	Female Postdocs	9	18	11	20	12	26	13	27
Research support staffs		27		28		27		27	
Administrative staffs		11		11		11		10	
TOTAL		303		305		289		304	

Number of persons who were/have been paid using the host institution's operating budget (excluding indirect funding) among the above persons.

	FY 2021	FY 2022	FY 2023	FY 2024
Principal investigators (PIs)	17	24	25	26
Other researchers	58	57	51	47
Postdocs	20	58	51	44
Research support staffs	9	28	28	28
Administrative staffs	0	10	9	10

※ Make consistent with the number of persons reported in Appendix 3-2.

	FY 2021		FY 2022		FY 2023		FY 2024	
	Number of persons	%	Number of persons	%	Number of persons	%	Number of persons	%
Doctoral students	28		26		29		36	
Employed	1	3.6	1	3.8	2	6.9	4	11.1

※ The number of doctoral students indicated in the lower table can also include those in the upper table of Total numbers.

Changes vis-à-vis the Center's application for academy center certification

※ If changes have been made vis-à-vis the Center's application for academy center certification, describe the main changes and the reasons for them.

Appendix 3-1b　　Career Path of WPI Postdocs

Enter the information below during the period from the start of the center through the end of FY 2024.

* For each person, fill in the spaces to the right. More spaces may be added.
* Leave "Position as of April 2025" blank if unknown.

Japanese Postdocs

Employment period	Position before employed at WPI center		Next position after WPI center		Position as of April 2025*	
	Position title, organization	Country where the organization is located	Position title, organization	Country where the organization is located	Position title, organization	Country where the organization is located
2008/4/1- 2008/6/30	Researcher, High Energy Accelerator Research Organization	Japan	Assistant Prof., Tohoku Univ.	Japan	Prof., Shizuoka Univ.	Japan
2008/4/1- 2008/9/30	JSPS Fellow, McGill Univ.	Canada	Research Associate, Durham Univ.	UK	Associate Prof., Kyushu Univ.	Japan
2008/4/16- 2008/10/31	Research Fellow, Kyoto Univ.	Japan	Assistant Prof., Kavli IPMU	Japan	Associate Prof., Middle East Technical Univ.	Turkey
2008/4/1- 2008/10/31	JSPS Fellow, Inst. of Advanced Scientific Studies	France	Assistant Prof., Kyushu Univ.	Japan	Prof., Fukuoka Univ.	Japan
2008/4/16- 2009/3/6	JSPS Fellow, Univ. of Tokyo	Japan	Visiting Scholer, Technical Univ. Munich	Germany	Assistant Prof., Tohoku Univ.	Japan
2008/4/1- 2009/9/30	JSPS Fellow, Univ. of Tokyo	Japan	Assistant Prof., Kobe Univ.	Japan	Prof., Yokohama National Univ.	Japan
2009/4/1- 2010/3/31	PhD Student, Univ. of Tokyo	Japan	Project Researcher, Max Planck Inst. for Astrophysics	Germany	Financial engineer, Data Scientist, Company	Japan
2010/4/1- 2010/8/31	PhD Student, Univ. of Tokyo	Japan	Postdoc, Princeton Univ.	USA	Prof., University of Tokyo	Japan
2009/4/1- 2011/3/31	PhD Student, Kyoto Univ.	Japan	Postdoc, Kyoto Univ.	Japan	Associate Prof., Nagoya Univ.	Japan
2008/4/1- 2011/3/31	Postdoc, Nagoya Univ.	Japan	Postdoc, Toho Univ.	Japan	Prof., Tokyo Univ. of Tech.	Japan
2010/4/1- 2011/11/30	JSPS Fellow, Kavli IPMU	Japan	Assistant Prof., National Astronomical Observatory of Japan	Japan	Prof., Tohoku Univ.	Japan
2010/8/16- 2012/3/31	Postdoc, Perimeter Inst. for Theoretical Physics	Canada	Associate Prof., Kyoto Univ.	Japan	Prof., Kyushu Univ.	Japan
2009/1/1- 2012/3/31	Postdoc, Tsukuba Univ.	Japan	Project Researcher, Kyoto Sangyo Univ.	Japan	Associate Prof., Shikoku Gakuin Univ.	Japan
2011/4/1- 2012/3/31	PhD Student, Kyoto Univ.	Japan	Postdoc, RIKEN	Japan	Medical Intern, Nara Medical Univ. Hospital	Japan
2010/4/1- 2013/3/31	PhD Student, Univ. of Tokyo	Japan	JSPS Fellow, Observatory of Paris	France	Associate Prof., Kyoto Sangyo Univ.	Japan
2010/1/1- 2013/3/31	Fellow, European Southern Observatory	Germany	Project Assistant Prof., National Astronomical Observatory of Japan	Japan	Associate Prof., National Astronomical Observatory of Japan	Japan
2013/4/1- 2013/9/30	PhD Student, Univ. of Tokyo	Japan	Software Engineer, Company	Japan	Software Engineer, Company	Japan
2012/4/1- 2014/2/28	Project Researcher, Univ. of Tokyo	Japan	Lecturer, Tokyo Univ. of Agriculture	Japan	Associate Prof., Tokyo Univ. of Agriculture	Japan
2013/4/1- 2014/3/31	PhD Student, Kyoto Univ.	Japan	Postdoc, Univ. of Kentucky	USA	Associate Prof., Univ. of South China	China
2011/4/1- 2014/3/31	PhD Student, Kyoto Univ.	Japan	Assistant Prof., Univ. of Tokyo	Japan	Associate Prof., Inst. of Sci. Tokyo	Japan
2008/9/1- 2014/3/31	Postdoc, Hokkaido Univ.	Japan	Assistant Prof., National Astronomical Observatory of Japan	Japan	Special Visiting Researcher, National Astronomical Observatory of Japan	Japan
2010/5/1- 2014/3/31	Researcher, Ehime Univ.	Japan	Researcher, Univ. of Tokyo	Japan	Postdoc, Univ. of Hyogo	Japan
2013/4/1- 2014/3/31	PhD Student, Osaka Univ.	Japan	Postdoc, Univ. of Tokyo	Japan	Assistant Prof., Niigata Univ.	Japan
2010/9/1- 2014/4/30	Postdoc, Tohoku Univ.	Japan	Project Lecturer, Nagoya Univ.	Japan	Associate Prof., Gifu Shotoku Gakuen Univ.	Japan
2013/4/1- 2014/8/31	Postdoc, Univ. of California, Davis	USA	Research Associate, Univ. of Cambridge	UK	Associate Prof., Kyoto Univ.	Japan
2013/4/1- 2014/9/30	PhD Student, Tohoku Univ.	Japan	Postdoc Fellow, Technion - Israel Inst. of Tech.	Israel	Assistant Prof., National Sun Yat-sen Univ.	Taiwan
2014/4/1- 2014/9/30	PhD Student, Nagoya Univ.	Japan	JSPS Fellow, Kyoto Univ.	Japan	Data Analyst, Company	Japan
2012/4/1- 2014/10/31	Postdoc, Univ. of Tokyo	Japan	Postdoc Fellow, Sapienza Univ. of Rome	Italy	Tenure-track Research Prof., Zhejiang Univ.	China

2013/9/1- 2015/2/28	Postdoc, Academia Sinica	Taiwan	Assistant Prof., Hiroshima Univ.	Japan	Associate Prof., Hiroshima Univ.	Japan
2013/4/1- 2015/4/30	Postdoc, Univ. of California, Berkeley	USA	Assistant Prof., High Energy Accelerator Research Organization	Japan	Researcher, Japan Synchrotron Radiation Research Inst.	Japan
2014/4/1- 2015/8/31	JSPS Fellow, Princeton Univ.	USA	Postdoc Scholar, Jet Propulsion Laboratory	USA	Associate Prof., Nagoya Univ.	Japan
2014/4/1- 2015/8/31	PhD Student, Univ. of Tokyo	Japan	Postdoc, Univ. of Minnesota	USA	Assistant Prof., University of Tokyo	Japan
2011/9/1- 2016/3/31	Senior Research Fellow, California Inst. of Tech.	USA	Associate Prof., Rikkyo Univ.	Japan	Prof., Kyoto Univ.	Japan
2013/4/1- 2016/3/31	JSPS Fellow, Univ. of California, Berkeley	USA	Postdoc, Max Planck Inst. for Astrophysics	Germany	Assistant Prof., Missouri Univ. of Sci. and Tech.	USA
2015/4/1- 2016/3/31	Postdoc, Hiroshima Univ.	Japan	JSPS Fellow, University of Tokyo	Japan	Instructor, Shibaura Inst. of Tech.	Japan
2014/4/1- 2016/3/31	PhD Student, Tohoku Univ.	Japan	Assistant Prof., Osaka Univ.	Japan	Assistant Prof., Univ. of Tokyo	Japan
2015/7/1- 2016/3/31	Researcher, High Energy Accelerator Research Organization	Japan	Researcher, National Inst. of Advanced Industrial Sci. and Tech.	Japan	Principal Investigator, High Energy Accelerator Research Organization	Japan
2015/4/1- 2016/9/30	PhD Student, Tohoku Univ.	Japan	Postdoc, National Astronomical Observatory of Japan	Japan	Lecturer, National Inst. of Tech., Sendai	Japan
2013/9/1- 2016/9/30	PhD Student, Univ. of Minnesota	USA	Postdoc, McGill Univ.	USA	Senior Research Scientist, RIKEN	Japan
2016/4/1- 2016/9/30	PhD Student, Graduate Univ. for Advanced Studies	Japan	Postdoc, Korea Advanced Inst. of Science and Tech.	Korea	Assistant Prof., High Energy Accelerator Research Organization	Japan
2014/1/1- 2016/12/31	Research Fellow, Ewha Women's Univ.	Korea	Associate Research Fellow, Academia Sinica	Taiwan	Research Fellow (Prof.), Academia Sinica	Taiwan
2015/4/1- 2017/3/31	INFN Fellow, Univ. of Padua	Italy	Assistant Prof., National Inst. of Tech., Kagawa College	Japan	Associate Prof., Suwa Univ. of Sci.	Japan
2013/4/1- 2017/3/31	PhD Student, Univ. of Tokyo	Japan	Postdoc, Inst. for Advanced Study	USA	Associate Prof., University of Tokyo	Japan
2016/4/1- 2017/3/31	PhD Student, Univ. of Tokyo	Japan	Company	Japan	Machine Learning Researcher, Company	Japan
2014/6/1- 2017/6/15	PhD Student, Kyoto Univ.	Japan	Postdoc, Chinese Univ. of Hong Kong	HK	Assistant Prof., Shanghai Tech Univ.	China
2015/8/1- 2018/3/31	Postdoc, Inst. for Advanced Study	USA	Assistant Prof., Kyushu Univ.	Japan	Associate Prof., Tohoku Univ.	Japan
2017/4/1- 2018/3/31	PhD Student, Univ. of Tokyo	Japan	Special Postdoc , RIKEN	Japan	Associate Prof., Hokkaido Univ.	Japan
2015/4/1- 2018/3/31	PhD Student, Nagoya Univ.	Japan	Postdoc, Inst. of Statistical Mathematics	Japan		
2015/4/1- 2018/3/31	PhD Student, Univ. of Tokyo	Japan	Postdoc, German Electron Synchrotron	Germany	Assistant Prof., High Energy Accelerator Research Organization	Japan
2015/8/1- 2018/10/31	Project Academic Support Specialist, Kavli IPMU	Japan	Lecturer, Keio Univ.	Japan	Lecturer, Keio Univ.	Japan
2013/4/1- 2019/1/31	Project Researcher, National Astronomical Observatory of Japan, Hawaii	USA	Postdoc, Tohoku Univ.	Japan	Assistant Prof., National Astronomical Observatory of Japan, Hawaii	USA
2014/10/1- 2019/3/31	Postdoc, King's College London, Univ. of London	UK	Associate Prof., Nagoya Univ.	Japan	Prof., Sun Yat-sen Univ.	China
2015/4/1- 2019/3/31	PhD Student, Univ. of Tokyo	Japan	Lecturer, Osaka Univ.	Japan	Associate Prof., Josai Univ.	Japan
2014/11/1- 2019/3/31	PhD Student, Tohoku Univ.	Japan	Assistant Prof., National Astronomical Observatory of Japan	Japan	Assistant Prof., National Astronomical Observatory of Japan	Japan
2016/4/1- 2019/3/31	Lady Davis Fellow, Hebrew Univ. of Jerusalem	Israel	Researcher, National Astronomical Observatory of Japan	Japan		
2019/4/1- 2019/9/30	PhD Student, Univ. of Tokyo	Japan	Research Fellow, Univ. of Edinburgh	UK	Lecturer, Univ. of Liverpool	UK
2019/4/1- 2019/9/30	JSPS Fellow, Univ. of Tokyo	Japan	Postdoc, National Center for Theoretical Sciences	Taiwan		Japan

2017/4/1- 2020/3/31	Project Academic Support Specialist, Kavli IPMU	Japan	(Homemaker)		(Homemaker)	
2016/4/1- 2020/3/31	Lecturer, Bunkyo Univ.	Japan	Postdoc, Chiba Univ.	Japan	Assistant Prof., National Inst. of Tech., Asahikawa College	Japan
2016/4/1- 2020/3/31	Research Assistant, Aoyama Gakuin Univ.	Japan	Researcher, Tohoku Univ.	Japan	Researcher, Inst. of Sci. Tokyo	Japan
2016/10/1- 2020/3/31	PhD Student, Yale Univ.	USA	JSPS Fellow, Nagoya Univ.	Japan	Assistant Prof., Academia Sinica	Taiwan
2017/10/1- 2020/3/31	PhD Student, Univ. of Tokyo	Japan	Assistant Prof., Osaka Univ.	Japan	Associate Prof., Kyoto Univ.	Japan
2017/4/16- 2020/3/31	Assistant Prof., Nagoya Univ.	Japan	Assistant Prof., Kyoto Sangyo Univ.	Japan	Associate Prof., Kyoto Sangyo Univ.	Japan
2016/8/1- 2020/7/31	PhD Student, Univ. of Tokyo	Japan	Postdoc, High Energy Accelerator Research Organization	Japan	Assistant Prof., High Energy Accelerator Research Organization	Japan
2016/1/16- 2020/8/31	JSPS Fellow, Univ. of Tokyo	Japan	Postdoc, Academia Sinica	Taiwan	Technical Engineer, Company	Japan
2020/6/1- 2020/9/30	Postdoc, Laboratory of the Linear Accelerator	France	Assistant Prof., National Astronomical Observatory of Japan	Japan	Assistant Prof., National Astronomical Observatory of Japan	Japan
2020/8/16- 2020/10/6	Postdoc, Kyoto Univ.	Japan	Postdoc, Mathematics Inst. of Jussieu–Paris Rive Gauche	France	Assistant Prof., Kyoto Univ.	Japan
2018/10/1- 2020/10/31	JSPS Fellow, Kyoto Univ.	Japan	Researcher, Company	Japan	Researcher, Company	Japan
2020/5/16- 2020/12/15	PhD Student, Univ. of Tokyo	Japan	Postdoc, TRIUMF	Canada	Assistant Prof., High Energy Accelerator Research Organization	Japan
2020/11/1- 2021/1/31	Research Fellow, Inst. for Basic Sci.	Korea	Assistant Prof., Univ. of Warsaw	Poland	Assistant Prof., Univ. of Warsaw	Poland
2020/10/16- 2021/3/31	Assistant Researcher, Kyoto Univ.	Japan	Postdoc, Univ. of Tokyo	Japan	Assistant Prof., Osaka Univ.	Japan
2018/4/1- 2021/3/31	Postdoc, High Energy Accelerator Research Organization	Japan	Special Researcher, National Inst. for Environmental Studies	Japan	Assistant Prof., Univ. of Tokyo	Japan
2021/1/1- 2021/3/31	Researcher, High Energy Accelerator Research Organization	Japan	Associate Prof., Iwate Prefectural Univ.	Japan	Product Development Leader, Company	Japan
2020/4/1- 2021/3/31	PhD Student, Univ. of Tokyo	Japan	Member(JSPS Fellow), Inst. for Advanced Study	USA	Researcher, High Energy Accelerator Research Organization	Japan
2018/4/1- 2021/3/31	PhD Student, Kyoto Univ.	Japan	Lecturer, Waseda Univ.	Japan	Lecturer, Yamato Univ.	Japan
2015/4/1- 2021/8/31	JSPS PD, Hiroshima Univ.	Japan	Assistant Prof., National Astronomical Observatory of Japan, Hawaii	USA	Assistant Prof., National Astronomical Observatory of Japan, Hawaii	USA
2021/4/1- 2021/8/31	PhD Student, Univ. of Tokyo	Japan	Postdoc Research Associate, Univ. of Arizona	USA	JSPS Postdoctoral Fellow, Kyoto Sangyo Univ.	Japan
2016/2/1- 2021/9/30	Adjunct Researcher, Waseda Univ.	Japan	Assistant Prof., Okayama Univ.	Japan	Associate Prof., Suwa Univ. of Sci.	Japan
2018/1/1- 2021/9/30	Lecturer, Shiga Univ.	Japan	Associate Prof., Kanazawa Univ.	Japan	Associate Prof., Kanazawa Univ.	Japan
2021/4/1- 2021/9/30	PhD Student, Nagoya Univ.	Japan	Postdoc, Karlsruhe Inst. of Tech.	Germany	Assistant Prof., Nagoya Univ.	Japan
2021/3/1- 2021/9/30	Postdoc, Kyoto Univ.	Japan	Assistant Prof., Kyoto Univ.	Japan	Assistant Prof., Kyoto Univ.	Japan
2020/4/1- 2022/3/31	JSPS Fellow, Georgia Inst. of Tech.	USA	Engineer, Company	Japan	Engineer, Company	Japan
2021/8/1- 2022/3/31	Postdoc, Univ. of Tokyo	Japan	Postdoc, Carnegie Institution for Sci.	USA	Postdoctoral Fellow, Carnegie Institution for Sci.	USA
2021/4/1- 2022/3/31	PhD Student, Univ. of Tokyo	Japan	JSPS Fellow, Univ. of Alberta	Canada	Overseas Research Fellowships (JSPS) , Univ. of Alberta	Canada
2019/4/1- 2022/3/31	Assistant Teaching Staff, Kyoto Univ.	Japan	Postdoc, National Taiwan Univ.	Taiwan	Assistant Prof., Kyushu Univ.	Japan
2019/4/1- 2022/8/31	PhD Student, Tohoku Univ.	Japan	Postdoc, Ohio State Univ.	USA	Postdoc, Academia Sinica	Taiwan
2015/4/1- 2023/3/31	Project Researcher, National Astronomical Observatory of Japan, Hawaii	USA	Assistant Prof., National Astronomical Observatory of Japan, Hawaii	USA	Assistant Prof., National Astronomical Observatory of Japan, Hawaii	USA

2021/4/1- 2023/3/31	Postdoc, Univ. of Alberta	Canada	Project Researcher, Univ. of Tokyo	Japan	Assistant Prof., Univ. of Toyama	Japan
2019/4/1- 2023/3/31	Researcher, National Cancer Center Japan	Japan	Visiting Researcher, Kyoto College of Medical Sci.	Japan	Visiting Researcher, Kyoto College of Medical Sci.	Japan
2022/10/1- 2023/3/31	PhD Student, Univ. of Tokyo	Japan	Assistant Prof., Kyoto Univ.	Japan	Assistant Prof., Kyoto Univ.	Japan
2021/4/1- 2023/3/31	Project Researcher, Japan Aerospace Exploration Agency	Japan	Process Engineer, Company	Japan	Process Engineer, Company	Japan
2023/4/1- 2023/8/31	PhD Student, Univ. of Tokyo	Japan	Postdoc, Univ. of Pennsylvania	USA	Postdoctoral Researcher, Univ. of Pennsylvania	USA
2021/10/1- 2023/9/30	Postdoc, Hunan National Univ.	China	Unknown			
2023/4/1- 2023/9/30	PhD Student, Univ. of Tokyo	Japan	Postdoc, Max Planck Inst. for Astrophysics	Germany	Postdoc, Max Planck Inst. for Astrophysics	Germany
2021/12/2- 2023/9/30	Postdoc, French National Centre for Scientific Research	France	Assistant Prof., Tohoku Univ.	Japan	Assistant Prof., Tohoku Univ.	Japan
2019/4/1- 2024/3/31	PhD Student, Univ. of Tokyo	Japan	Assistant Prof., Kyoto Univ.	Japan	Assistant Prof., Kyoto Univ.	Japan
2023/4/1- 2024/3/31	PhD Student, Japan Aerospace Exploration Agency	Japan	Postdoc, QUP	Japan	Postdoc, High Energy Accelerator Research Organization	Japan
2022/4/1- 2024/3/31	JSPS Fellow, Kavli IPMU	Japan	Assistant Prof., Kyushu Univ.	Japan	Assistant Prof., Kyushu Univ.	Japan
2022/10/1- 2024/3/31	Postdoc, Inst. of Space Astrophysics	Italy	Research Administrator, Hokkaido Univ.	Japan	Research Administrator, Hokkaido Univ.	Japan
2021/10/1- 2024/9/30	Research Fellow, Univ. of Groningen	Germany	(Accompanying a family member on a job transfer)	Germany	(Accompanying a family member on a job transfer)	Germany
2022/10/1- 2025/3/31	Postdoc, Max Planck Inst. for Astrophysics	Germany	Project Assistant Prof., High Energy Accelerator Research Organization	Japan	Project Assistant Prof., High Energy Accelerator Research Organization	Japan
2021/6/1- 2025/3/31	PhD Student, Univ. of Tokyo	Japan	JSPS Fellow, Tohoku Univ.	Japan	JSPS Fellow, Tohoku Univ.	Japan
2023/11/1- 2025/3/31	Kavli Astrophysics Fellow, Kavli Inst. for Astronomy and Astrophysics, Peking Univ.	China	Assistant Prof., Waseda Univ.	Japan	Assistant Prof., Waseda Univ.	Japan

Overseas Postdocs

Employment period	Position before employed at WPI center		Next position after WPI center		Position as of April 2025*		Nationality
	Position title, organization	Country where the organization is located	Position title, organization	Country where the organization is located	Position title, organization	Country where the organization is located	
2008/9/1- 2009/10/4	PhD Student, State Univ. of New York	USA	Staff Research Member, Inst. for Defense Analysis	USA			USA
2009/4/16- 2009/12/31	Postdoc, Univ. of Chicago	USA	Omidyar Fellow, Santa Fe Inst.	USA	Associate Prof., Carnegie Mellon Univ.	USA	USA
2009/5/16- 2010/1/18	PhD Student, Kapteyn Inst., Univ. of Groningen	Netherlands	Postdoc, Canadian Inst. for Theoretical Astrophysics	Canada	A.I. Lead, Company	Netherlands	India
2008/9/19- 2010/3/1	JSPS Fellow, High Energy Accelerator Research Organization	Japan	Staff, Harvard Univ.	USA	Associate Prof., Harvard Univ.	USA	Germany
2009/5/1- 2010/3/31	PhD Student, Univ. of Toronto	Canada	Associate Researcher, Chinese Academy of Sciences	China	Associate Prof., Chinese Academy of Sciences	China	China
2009/9/1- 2010/7/15	Visiting Fellow, Harish-Chandra Research Inst.	India	Assistant Prof., Nat. Inst. of Sci. Education and Research	India	Associate Prof., Nat. Inst. of Sci. Education and Research	India	India
2009/10/1- 2010/8/15	Dickson Instructor, Univ. of Chicago	USA	Assistant Prof., Iowa State Univ.	USA	Associate Prof., Iowa State Univ.	USA	India

2009/9/1- 2010/8/31	Assistant Prof., Univ. of South California	USA	Adjunct Prof., Santa Monica College	USA	Prof., Santa Monica College	USA	USA
2009/4/3- 2010/9/30	Postdoc, Center for Particle Physics of Marseilles	France	Postdoc, Inst. for Corpuscular Physics	Spain	Senior Researcher, National Inst. for Materials Sci.	Japan	France
2009/8/1- 2010/9/30	PhD Student, Ludwig Maximilian Univ. of Munich	Germany	Simons Postdoc Fellow, Univ. California, Berkeley	USA	Staff, Univ. of Geneva	Switzerland	Germany
2008/10/16- 2010/9/30	Postdoc, Princeton Univ.	USA	Assistant Research Fellow, Inst. of Astronomy and Astrophysics, Academia Sinica	Taiwan	Research Fellow (Prof.), Inst. of Astronomy and Astrophysics, Academia Sinica	Taiwan	Taiwan
2008/11/13- 2010/11/12	PhD Student, International School for Advanced Studies	Italy	Postdoc, Scuola Normale Superiore	Italy	CEO & Scientist. for Corpuscular Physics Director, Company	Italy	Italy
2008/8/8- 2010/12/15	Research Assistant, Durham Univ.	UK	Assistant Prof., Arizona State Univ.	USA	Associate Prof., Arizona State Univ.	USA	USA
2008/11/1- 2011/2/21	Research Fellow, Seoul National Univ.	Korea	Assistant Prof., Chonnam National Univ.	Korea	Prof., Yonsei Univ. Observatory	Korea	South Korea
2008/9/1- 2011/5/31	PhD Student, Univ. of Wisconsin	USA	Research Prof., Zhejiang Univ.	China	Prof., Zhejiang Univ.	China	China
2008/11/1- 2011/6/30	PhD Student, Univ. College London	UK	Postdoc Fellow, Chinese Univ. of Hong Kong	HK			China
2008/10/1- 2011/6/30	JSPS Fellow, Univ. of Tokyo	Japan	Assistant Prof., McGill Univ	Canada	Associate Prof., McGill Univ	Canada	France
2011/1/1- 2011/7/15	Postdoc, Inst. of Advanced Scientific Studies	France	Assistant Prof., Chinese Univ. of Hong Kong	HK	Prof., Chinese Univ. of Hong Kong	HK	China
2010/2/1- 2011/8/14	Postdoc, Seoul National Univ.	Korea	Postdoc, U. of Florida	USA	Associate Prof. （Senior Researcher）, Seoul National Univ.	Korea	South Korea
2008/5/1- 2011/8/14	PhD Student, Michigan State Univ.	USA	Postdoc, Argonne National Laboratory	USA	Prof., National Taiwan Normal Univ.	Taiwan	Taiwan
2008/8/16- 2011/8/15	PhD Student, Harvard Univ.	USA	Postdoc, Max Planck	Germany	Prof., Chinese Academy of Sciences	China	China
2010/9/16- 2011/8/29	PhD Student, Univ. of Sao Paulo	Brazil	Postdoc, Korea Astronomy and Space Sci. Inst.	Korea	Senior Lecturer in Data Sci., Chair of the Cosmostatistics Initiative, Univ. of Hertfordshire	UK	Brazil
2010/9/16- 2011/8/29	PhD Student, Federal Univ. of Rio de Janeiro	Brazil	Postdoc, Univ. of Sao Paulo	Brazil	CNRS Research Engineer, Laboratoire de Physique de Clermont	France	Brazil
2008/9/1- 2011/8/31	PhD Student, Univ. of Chicago	USA	Postdoc, International School for Advanced Studies	Italy	Prof., Peking Univ.	China	China
2008/9/1- 2011/8/31	Postdoc, Wayne State Univ.	USA	Postdoc, Ludwig Maximilian Univ. of Munich	Germany	Prof., Fudan Univ.	China	Italia
2008/10/1- 2011/9/30	Postdoc, U. of Amsterdam	Netherlands	CERN Fellow, CERN	Switzerland	Prof., Univ. of Bern	Switzerland	Germany
2008/10/1- 2011/9/30	Postdoc, U. of Neuchatel	Switzerland	CERN Fellow, CERN	Switzerland	Senior Researcher, National Inst. of Nuclear Physics, Padova	Italy	Italy
2008/10/16- 2011/10/15	JSPS Fellow, Inst. of Sci. Tokyo	Japan	Engineer, Company	UK	Senior Software Engineer, Company	UK	UK
2009/5/1- 2012/4/30	PhD Student, Steklov Math Inst.	Russia	Postdoc, Univ. of Vienna	Austria	Associate Prof., Pontifical Catholic Univ. of Rio de Janeiro	Russia	Russia
2008/5/1- 2012/6/30	Researcher, Tohoku Univ.	Japan	Assistant Prof., Kavli IPMU	Japan	Prof., Moscow Engineering Physics Inst., Nat. Research Nuclear Univ.	Russia	Australia

2011/8/1-2012/7/31	PhD Student, Chinese Univ. of Hong Kong	HK	BP Fellow, Harvard Univ.	USA	Associate Prof., Boston Univ.	USA	China
2010/4/1-2012/8/31	Assistant Prof. (Lecturer), Viena Univ. of Tech.	Austria	Assistant Prof., Vienna Univ. of Tech.	Australia	Senior Lecturer (Associate Prof.), Univ. of Melbourne	Australia	Austria
2009/9/1-2012/8/31	Fellow, CERN	Switzerland	Prof., Univ. of Sci.s and Tech. of China	China	Prof., Univ. of Sci.s and Tech. of China	China	China
2011/7/1-2012/8/31	Research Assistant, Univ. of Illinois	USA	Assistant Prof., Stony Brook Univ.	USA	Prof., Stony Brook Univ.	USA	Germany
2009/6/1-2012/8/31	PhD Student, Univ. of Pennsylvania	USA	Humboldt Fellow, Max Planck	Germany	Expert Senior Manager, Company	Germany	Hong Kong, China
2009/9/1-2012/8/31	Scientist, Max Planck	Germany	Postdoc, Inst. Math de Jussieu	France	Associate Prof., Univ. of Los Andes	Columbia	Russia
2009/9/1-2012/8/31	Assistant, Univ. of California, San Diego	USA	Postdoc, Univ. of Copenhagen	Denmark	Digital Product Manager, Company	USA	USA
2009/9/16-2012/9/15	PhD Student, Univ. of Michigan	USA	Research Associate, Univ. of Minnesota	USA	Associate Prof., Shanghai Jiao Tong Univ.	China	USA
2010/10/4-2012/10/31	Postdoc, Univ. of Oviedo	Spain	Special Researcher, RIKEN	Japan	Research Staff, Company	USA	Germany
2010/9/1-2012/11/15	Instructor, Harvard Univ.	USA	Assistant Prof., Univ. of Tsukuba	Japan	Associate Prof., Univ. of Tsukuba	Japan	USA
2010/8/1-2012/12/31	Assistant, Univ. of Southern California	USA	Lecturer, Univ. of New South Wales	Australia	Senior Lecturer, Univ. of New South Wales	Australia	Romania
2011/9/16-2013/1/31	Fellow, Lawrencde Berkeley Lab	USA	Assistant Prof., Kavli IPMU	Japan	Associate Prof., Univ. of California, Santa Cruz	USA	France
2010/7/1-2013/6/30	PhD Student, Univ. of California, Berkeley	USA	Research Staff, Inst. for Defense Analyses	USA	Head of AI, Company	USA	USA
2013/4/1-2013/7/31	PhD Student, Univ. of Tokyo	Japan	Postdoc Researcher, Univ. of Chile	Chile	Research Fellow, Univ. of Turku	Finland	Indonesia
2010/9/1-2013/8/31	PhD Student, Harvard Univ.ni	USA	Postdoc, California Inst. of Tech.	USA	Assistant Prof., Univ. of Missouri	USA	USA
2010/9/1-2013/9/30	Research Scientist, Boston Univ.	USA	Postdoc, Univ. of Oxford	UK	Data Scientist, Company	USA	Canada
2010/9/16-2013/9/30	PhD Student, Univ. of Minnesota	USA	Postdoc, Univ. of Nottingham	UK	Research Fellow, Univ. of Portsmouth	UK	Turkey
2012/9/1-2013/10/31	Postdoc, McGill Univ.	Canada	S.Hawking Fellowship, Univ. of Cambridge	UK	Prof., Hong Kong Univ. of Sci. and Tech.	HK	China
2010/12/1-2013/11/29	PhD Student, Swiss Federal Inst. of Tech. Zürich	Swiss	Postdoc, Australian National Univ.	Australia	Reader (Associate Prof.), Cardiff Univ.	UK	Switzerland
2012/9/1-2014/2/28	KICP Fellow, Kavli Inst., Univ. of Chicago	USA	Assistant Prof., Kavli IPMU	Japan	Prof., Inter-Univ. Center for Astronomy and Astrophysics	India	India
2011/5/1-2014/6/30	Ph.D., Univ. of Potsdam	Germany	Project Researcher, National Astronomical Observatory of Japan	Japan	Unknown, Univ. of Potsdam	Germany	Germany
2009/11/2-2014/7/31	Ph.D., ETH Zurich	Swiss	Postdoc, Ludwig-Maximilians Univ.	Germany	Patent Attorney, Company	Germany	Germany
2011/8/1-2014/7/31	PhD Student, Texas A&M Univ.	USA	Unknown		Postdoc, Ohio State Univ.	USA	Taiwan
2011/8/16-2014/8/15	PhD Student, Univ. of Sci.s and Tech. of China	China	Postdoc, Kyoto Univ.	Japan	Assistant Prof., Jagiellonian Univ.	Poland	China
2009/10/1-2014/8/21	Postdoc, Max Planck	Germany	Assistant Prof., U. of South Dakota	USA	Associate Prof., Univ. of South Dakota	USA	China
2011/9/1-2014/8/31	Research Fellow, Korea Ins. Of Advanced Study	Korea	IBS Fellow, Pohang Univ. of Sci. and Tech.	Korea	Prof., Sun Yat-sen Univ.	China	China
2013/6/1-2014/8/31	PhD Student, Univ. of Michigan	USA	Postdoc, Stanford Univ.	USA	Associate Prof., Univ. of Oregon	USA	China

2011/9/1-2014/8/31	Postdoc, Tata Inst.	India	Assistant Prof., Indian Inst. of Sci.	India	Associate Prof., The Indian Inst. of Sci.	India	India
2011/9/1-2014/8/31	PhD Student, Tata Inst.	India	Postdoc, Durham Univ.	UK	Assistant Prof., Indian Inst. of Tech. Bombay	India	India
2011/9/1-2014/8/31	Postdoc, California Inst. of Tech.	USA	Associate Prof., San Diego State Univ.	USA	Prof./ Director, San Diego State Univ.	USA	USA
2011/9/16-2014/9/15	PhD Student, Univ. of California, Santa Barbara	USA	Postdoc, McGill Univ.	Canada	Associate Research Scientist, Company	Korea	USA
2011/9/16-2014/9/15	PhD Student, Univ. of California, Santa Cruz	USA	Postdoc, Vanderbilt Univ.	USA	Lecturer, Univ. of Pennsylvania	USA	USA
2010/10/1-2014/9/30	PhD Student, Univ. of Chile	Chile	Scientific Researcher (Faculty), Inst. of Astronomy and Space Physics/NSTRC	Argentina	Scientific Researcher (Faculty), Inst. of Astronomy and Space Physics	Argentina	Argentina
2010/10/1-2014/9/30	Postdoc, Univ. of Chile	Chile	Scientific Researcher (Faculty), Inst. of Astronomy and Space Physics/NSTRC	Argentina	Scientific Researcher (Faculty), Inst. of Astronomy and Space Physics	Argentina	Argentina
2011/10/1-2014/9/30	PhD Student, Univ. of California, Berkeley	USA	Postdoc, Paris Mathematical Sci.s Foundation	France	Senior Data Scientist, Company	Germany	Romania
2013/10/1-2014/9/30	Postdoc, CERN	Switzerland	Adjunct Prof., Pohang Univ. of Sci. and Tech.	Korea	Associate Prof., Seoul Nat. Univ. of Sci. and Tech.	Korea	South Korea
2012/10/1-2014/9/30	PhD Student, Univ. of California, Berkeley	USA	Postdoc, Imperial College London	UK	Assistant Prof., Univ. of Massachusetts, Boston	USA	USA
2011/10/1-2014/12/31	Visiting Assist. Prof., Duke Univ.	USA	Assistant Prof., Kyoto Univ.	Japan	Associate Prof., Duke Kunshan Univ.	China	UK
2012/8/16-2015/5/15	PhD Student, Yale Univ.	USA	Assistant Prof., Kyoto Univ.	Japan	Associate Prof., Hong Kong Univ. of Sci. and Tech.	HK	Canada
2012/9/1-2015/5/31	PhD Student, Princeton Univ.	USA	Data Sci. Fellow, Company	USA	Product Analyst, Company	USA	USA
2012/8/16-2015/8/15	PhD Student, Univ. of Pennsylvania	USA	Postdoc, Pacific Northwest National Lab.	USA	Software Engineer, Company	USA	USA
2012/7/16-2015/9/15	PhD Student, Univ. of California Santa Barbara	USA	Postdoc, Inst. of Space Astrophysics, Univ. Paris Saclay	USA	Associate Prof., Shanghai Inst. for Mathematics and Interdisciplinary Sci.s	China	Chile
2013/9/16-2015/9/17	PhD Student, Stanford Univ.	USA	Postdoc, Univ. of California, Berkeley	USA	Applied Researcher (Machine Learning), Company	USA	USA
2012/9/1-2015/9/20	PhD Student, Univ. of California, Berkeley	USA	Postdoc, Fudan Univ.	China	Artificial Intelligence Researcher, Company	Japan	USA
2012/9/8-2015/9/30	Postdoc, Univ. of Crete	Greece	Postdoc Associate, Stony Brook Univ.	USA	Associate Prof., Julius Maximilian Univ. of Würzburg	Germany	Germany
2012/10/1-2015/9/30	PhD Student, Harish-Chandra Research Inst.	India	Postdoc Associate, Univ. of Pittsburgh	USA	Associate Prof., Indian Association for the Cultivation of Sci.	India	India
2012/10/16-2015/10/15	Postdoc, Carnegie Mellon Univ.	Qatar	Postdoc, Melbourne Univ.	Australia	Senior Staff Researcher (Associate Prof.), Italian National Inst. for Astrophysics	Italy	Italy
2012/11/1-2015/10/31	PhD Student, German Electron Synchrotron	Germany	Postdoc, Max-Planck Inst. For Nuclear Physics	Germany	Junior Prof., Univ. Munster	Germany	Germany
2012/11/1-2015/11/30	Postdoc, Technion, Israel Inst of Tech	Israel	Reader, Tata Inst. of Fund Res	Inidia	Tenured Faculty, Tata Inst. of Fund Res	India	India
2013/1/16-2016/1/15	Visiting Assist. Prof., Duke Univ.	USA	Assistant Prof., Clark Univ.	USA	Associate Prof., Clark Univ.	USA	USA

2014/4/16-2016/2/29	Postdoc, Indian Inst. of Sci., Bangalore	India	Reader-Faculty, Inst of Physics, Bhubaneswar	India	Associate Prof., Nat. Inst. of Sci. Education and Research	India	India
2015/9/7-2016/7/31	Assistant Prof., Ohio State Univ.	USA	Associate Prof., Aarhus Univ.	Denmark	Prof., BIMSA (Beijing Inst. of Math. Sc. Appli.)	China	Iran
2013/9/1-2016/8/31	PhD Student, Univ. of Chicago	USA	Postdoc, Univ. of California, Riverside	USA	Associate Research Scientist, Shandong Inst. of Advanced Tech.	China	China
2013/10/1-2016/9/30	Postdoc, KIAA, Peking Univ.	China	Postdoc, National Astronomical Observatory of Japan	Japan	Data Scientist, Company	Germany	Germany
2013/10/1-2016/9/30	Junior Scientist, National Centre for Nuclear Research	Poland	Senior Postdoc, National Center for Theoretical Sci.s	Taiwan	Researcher, Chinese Academy of Sci.s	China	Taiwan
2014/11/2-2016/11/1	PhD Student, Univ. of Liverpool	UK	Research Engineer, Company	Japan	Technical Lead, Company	Japan	UK
2013/9/1-2017/1/15	PhD Student, Massachusetts Inst. of Tech.	USA	Postdoc, Okinawa Inst. of Sci. and Tech.	Japan	Lecturer, Mahidol Univ.	Thailand	Thailand
2013/11/1-2017/1/31	Postdoc, Univ. of Ottawa	Canada	Associate Prof., Moscow Inst. of Physics and Tech.	Russia	Associate Prof., Moscow Inst. of Physics and Tech.	Russia	Russia
2014/8/1-2017/2/14	PhD Student, Nanjing Univ.	China	Postdoc, Univ. of California, Santa Cruz	USA	Associate Prof., Tsinghua Univ., Beijing	China	China
2014/10/1-2017/3/31	Research Fellow, Korea Inst. for Advanced Study	Korea	Postdoc, Seoul National Univ.	Korea	Associate Prof., Seoul National Univ.	Korea	Korea
2014/5/1-2017/4/30	Postdoc, Kyoto Univ.	Japan	Assistant Prof., Univ. of Tokyo	Japan	Research Associate, Yokohama National Univ.	Japan	France
2014/3/16-2017/7/10	Lecturer, Chulalongkorn Univ.	Thai	Lecturer, Chulalongkorn Univ.	Thai	Deputy Director, National Astronomical Research Inst. of Thailand	Thai	Thailand
2014/10/16-2017/8/13	PhD Student, Univ. of Edinburgh	UK	Postdoc Associate, Univ. of Arizona	USA	Associate Prof., Xiamen Univ.	Malaysia	Sri Lankan
2014/10/1-2017/9/30	PhD Student, Univ. of California, Santa Cruz	USA	Data Scientist, Company	USA	Senior Software Engineer, Company	USA	USA
2013/8/1-2017/12/31	Postdoc, Max Planck	Germany	Principal Investigator, Company	Japan	Principal Investigator, Company	Japan	Australia
2015/11/1-2018/3/15	Fellow, CERN	Switzerland	Associate Prof., Sun Yat-sen Univ.	China	Associate Prof., Sun Yat-sen Univ.	China	China
2014/11/1-2018/5/31	Research Assistant, Univ. of Edinburgh	UK	Assistant Prof., Yau Math Sci.s Center, Tsinghua Univ.	China	Associate Prof., Tsinghua Univ., Beijing	China	UK
2012/9/1-2018/6/30	Postdoc, Kavli Inst., Univ. of Chicago	USA	Data Scientist, Inter-Univ. Center for Astronomy and Astrophysics	India	Research Faculty, Inter-Univ. Center for Astronomy and Astrophysics	India	India
2015/4/1-2018/8/19	Research Assistant, Tohoku Univ.	Japan	Assistant Prof., Tsinghua Univ.	China	Associate Prof., Tsinghua Univ., Beijing	China	China
2016/7/1-2018/8/31	Postdoc, Durham Univ.	UK	Associate Prof., Shanghai JiaoTong Univ.	China	Associate Prof., Shanghai Jiao Tong Univ.	China	China
2015/9/1-2018/8/31	Postdoc, Princeton Univ.	USA	Postdoc, Univ. of Parma	Italy	Lecturer, Univ. of Southampton	UK	Israel
2015/9/1-2018/8/31	Postdoctral Scholar, Univ. of California,LA	USA	Postdoc, Leiden Observatory	Netherlands	Associate Prof. (Tenure-track), Shanghai Jiao Tong Univ.	China	Italy
2017/10/1-2018/9/5	PhD Student, Univ. of California,LA	USA	Data Scientist, Company	USA	Machine Learning Engineer, Company	USA	USA
2016/10/1-2018/9/30	Postdoc, U. of Pennsylvania	USA	Postdoc, Liverpool John Moores Univ.	UK	Research Software Engineer, Univ. of Cambridge	UK	Australia
2015/8/1-2018/9/30	PhD Student, Brown Univ.	USA	Postdoc, Max Planck	Germany	Data Scientist, Company	UK	Greece

2014/4/1-2018/9/30	Postdoc, RIKEN	Japan	Researcher, Open Univ. of Japan	Japan	Team Leader (Software Development, Company	Russia	Russia
2017/10/1-2018/10/11	PhD Student, King's College London	UK	Senior Research Scientist, Company	UK	Research Software Engineer, Company	UK	UK
2017/10/21-2018/11/30	PhD Student, Institut d' Astrophysique de Paris	France	Assistant Prof., Univ. of Tokyo	Japan	Chief Data Scientist, Misc Academia (Umweltbundesamt)	Germany	Germany
2016/4/1-2019/1/21	JSPS Fellow, Univ. of Tokyo	Japan	Project Researcher, Mathematical Sci.s Research Inst.	USA	Associate Prof., Fudan Univ.	China	China
2015/9/16-2019/3/31	Postdoc, Asia Pacific Center for Theoretical Physics	Korea	Research Fellow, Korea Inst. for Advanced Study	Korea	Associate Prof., Sun Yat-sen Univ.	China	China
2016/11/1-2019/4/30	Research Associate, Imperial College London	UK	Self-employed company	France	Self-employed company	France	France
2016/5/1-2019/6/21	PhD Student, Univ. of Paris - Sud XI	France	Postdoc, Univ. of South Dakota	UK	Postdoc, Univ. of Alabama	USA	Ukraine
2016/11/1-2019/8/15	PhD Student, Leiden Univ.	Netherlands	Data Scientist at , Company	Germany	Data Scientist, Company	Germany	Germany
2016/9/1-2019/8/31	PhD Student, Univ. of Melbourne	Australia	Postdoc, Univ. of Melbourne	Australia	Lecturer, Univ. of Melbourne	Australia	Australia
2017/6/1-2019/8/31	Postdoc, Durham Univ.	UK	Associate Researcher, Shanghai JiaoTong Univ.	China	Researcher, Shanghai Jiao Tong Univ.	China	China
2016/9/1-2019/8/31	PhD Student, Duke Univ.	USA	ML Researcher, Company	Germany	ML Researcher, Company	Germany	Italy
2015/9/1-2019/8/31	PhD Student, Seoul National Univ.	Korea	Postdoc, Univ. of Nebraska	USA	Senior Research Associate, Univ. of Nebraska	USA	South Korea
2018/9/16-2019/8/31	Postdoc Prize Fellow, California Inst. of Tech.	USA	Postdoc, Princeton Univ.	USA	Postdoc, Princeton Univ.	USA	Switzerland
2016/8/1-2019/8/31	Postdoc, National Tsing Hua Univ.	Taiwan	Postdoc, Yonsei Univ.	Korea	Assistant Prof., National Tsing Hua Univ.	Taiwan	Taiwan
2015/9/1-2019/8/31	PhD Student, Univ. of North Carolina at Chapel Hill	USA	Postdoc, Haverford College	USA	Staff Scientist II, Space Telescope Sci. Inst.	USA	USA
2016/9/1-2019/9/10	PhD Student, Indian Inst. of Sci.	India	Research Fellow, Trinity College Dublin	Ireland	Consultant, Raman Research Inst.	India	India
2016/4/1-2019/9/29	Postdoc, Univ. California, Berkeley	USA	Flatiron Research Fellow, Flatiron Inst, Simons Foundation	USA	Research Scientist, Company	China	China
2015/8/1-2019/9/30	PhD Student, Chinese Univ. of Hong Kong	HK	Postdoc, California Inst. of Tech.	USA	Assistant Prof., SUNY Polytechnic Inst.	USA	China
2017/10/16-2019/9/30	Postdoc, Max Planck	Germany	Associate Prof., Shanghai JiaoTong Univ.	China	Associate Prof., Shanghai Jiao Tong Univ.	China	China
2015/10/16-2019/10/15	PhD Student, LMU, Munich	Germany	Postdoc Researcher, RIKEN	Japan			Austria
2016/10/1-2019/10/31	PhD Student, Technion, Israel Inst of Tech	Israel	Postdoc, Univ. of Milano - Bicocca	Japan	Associate Prof., Univ. of Haifa	Israel	Israel
2016/11/1-2019/11/30	Assistant Prof., Univ. of Western Ontario	Canada	Assistant Prof., Univ. of Pisa	Italy	Associate Prof., Univ. of Pisa	Italy	Italy
2017/9/1-2019/12/31	Research Associate, Kyoto Univ.	Japan	Assistant Prof., French National Centre for Scientific Research (CNRS)	France	Assistant Prof., French National Centre for Scientific Research (CNRS)	France	France
2018/10/1-2019/12/31	Postdoc, CERN	Switzerland	Assistant Prof., Durham Univ.	UK	Associate Prof., Durham Univ.	UK	Spain
2018/9/1-2020/1/19	Visiting Assistant Prof., Univ. of Massachusetts	USA	Lecturer, Univ. of Queensland	Australia	Lecturer (Assistant Prof.), Univ. of Glasgow	UK	Hungary
2016/9/1-2020/2/29	Postdoc, John Hopkins Univ.	USA	Postdoc, Univ. of California, Santa Cruz	USA	Assistant Prof., National Taiwan Univ.	Taiwan	Taiwan
2017/3/1-2020/2/29	Hodge Fellow, Inst. of Advanced Scientific Studies	France	Associate Prof., Osaka Univ.	Japan	Co-Founder, Company	Estonia	UK

2019/2/1-2020/3/31	PhD Student, Univ. Paris-Sud/Paris-Sadav	Japan	Assistant Prof., Okayama Univ.	Japan	Senior Quantum Systems Engineer, Company	Finland	USA
2017/9/1-2020/8/31	PhD Student, Univ. of Illinois	USA	Special Postdoc , RIKEN	Japan	Assistant Prof., National Taiwan Univ.	Taiwan	Taiwan
2017/10/16-2020/10/15	PhD Student, Univ. of Sydney	Australia	Senior Research Fellow, Inst. for Basic Sci.	Korea	Research Associate, Univ. of Sydney	Australia	Australia
2018/4/1-2020/10/24	Researcher Assistant Prof., Kyoto Univ.	Japan	Associate Prof., Chinese Academy of Sci.s	China	Prof., Chinese Academy of Sci.s	China	China
2019/8/1-2020/10/31	Postdoc, Univ. of Mainz	Germany	Assistant Prof., Kavli IPMU	Japan	DECRA Fellow (Senior Lecturer), Univ. of Sydney	Australia	Australia
2018/9/1-2021/1/4	Visiting Assistant Prof., Univ. of Massachusetts	USA	Lecturer, Univ. of Glasgow	UK	Senior Lecturer, Univ. of Glasgow	UK	USA
2020/1/16-2021/2/28	Postdoc, Univ. of Victoria	Canada	Assistant Prof., Univ. of Barcelona	Spain	Associate Prof., Univ. of Barcelona	Spain	France
2018/12/1-2021/3/31	Lab Demonstrator, Univ. of Queen’s Land	Australia	Research Associate, Univ. of York	UK	Research Associate, Univ. of York	UK	Australia
2020/11/12-2021/3/31	PhD Student, Peking Univ.	China	Postdoc, Univ. of Hawaii	USA	Research Fellow, Univ. of Nottingham	UK	China
2020/10/9-2021/3/31	Postdoc, Univ. of Cambridge	UK	Research Fellow, Flatiron Inst., Simons Foundation	USA	Senior Kavli Fellow, Kavli Inst. for Cosmology, Univ. of Cambridge	UK	UK
2017/7/15-2021/3/31	PhD Student, Univ. of California, San Diego	USA	Assistant Prof., JAXA	Japan	Assistant Prof., JAXA	Japan	USA
2021/1/14-2021/5/10	Postdoc Associate, Inst. for Research in Fundamental Sci.s	Iran	Postdoc, Johannes Guterberg Univ. Mainz	Germany	Postdoctoral Researcher, Univ. of Mainz	Germany	Iran
2018/7/16-2021/5/16	Postdoc, Shanghai Jiao Tong Univ.	China	Assistant Prof., Univ. of Sci. and Tech. of China	China	Assistant Prof., U Sci. and Tech. China	China	China
2018/11/1-2021/5/31	Research Associate, Imperial College London	UK	Lead Research Scientist, Company	Japan	Machine Learning Researcher, Company	USA	India
2018/9/1-2021/6/30	Postdoc, National Astronomical Observatory of Japan	Japan	Research Fellow, National Astronomical Observatory of Japan	Japan	Project Assistant Prof., Univ. of Tokyo	Japan	USA
2016/8/1-2021/7/15	PhD Student, Chinese Univ. of Hong Kong	HK	Newton Int’l Fellow, Univ. of Oxford	UK	Associate Prof., Chinese Academy of Sci.s	China	China
2019/9/1-2021/7/31	Postdoc, Univ. of Bonn	Germany	Assistant Prof., National Taiwan Univ.	Taiwan	Associate Prof., National Taiwan Univ.	Taiwan	France
2018/9/1-2021/8/31	Research Scholar, Virginia Polytechnic Inst. and State Univ.	USA	Postdoc, Univ. of Amsterdam	Netherlands	Assistant Prof., San Francisco State Univ.	USA	Colombia
2020/11/1-2021/9/30	PhD Student, Univ. of Milano-Bicocca	Italy	Research Associate, Imperial College London	UK	Postdoc Fellow, Queen Mary, Univ. of London	UK	Iran
2018/9/1-2021/9/30	PhD Student, Stanford Univ.	USA	Postdoc, CERN	Switzerland	Postdoctoral Fellow, CERN	Switzerland	USA
2019/1/16-2021/10/31	Postdoc, Korea Astronomy and Space Sci. Inst.	Korea	Postdoc Researcher, Lawrence Berkeley National Lab	USA	Postdoc, Univ. of Tsukuba	Japan	Korea
2018/11/1-2021/10/31	PhD Student, Texas A&M Univ.	USA	Postdoc, Swinburne Univ. of Tech.	Australia	Postdoctoral Researcher, Swinburne Univ. of Tech.	Australia	Thailand
2018/12/1-2021/11/30	PhD Student, Tohoku Univ.	Japan	Postdoc, Tokyo Metropolitan Univ.	Japan	Postdoc, Tokyo Metropolitan Univ.	Japan	Brazil
2019/10/2-2022/1/1	PhD Student, Univ. of Angers	France	Metrology Design Engineer, Company	Netherlands	Metrology Design Engineer, Company	Netherlands	France
2019/1/16-2022/1/15	Postdoc, Univ. of Trieste	Italy	Unknown	Italy			Italy
2019/1/16-2022/1/15	PhD Student, Univ. of Groningen	Netherlands	AI/Data Sci. Researcher, Company	Japan	AI/Data Sci. Researcher, Company	Japan	Netherlands

2019/4/1-2022/3/31	PhD Student, Univ. of Tokyo	Japan	Postdoc, National Astronomical Observatory of Japan	Japan	Project Prof., Univ. Sci. and Tech. China	China	China
2019/4/1-2022/4/30	PhD Student, Univ. of Gottingen	Germany	Postdoc, Technical Univ. of Munich	Germany	Postdoc, Technical Univ. of Munich	Germany	Germany
2019/9/16-2022/6/30	Postdoc, Swiss Federal Inst. of Tech. in Lausanne	Switzerland	Research Engineer, Company	Japan	Research Engineer, Company	Japan	USA
2020/11/26-2022/7/31	PhD Student, Univ. of Oxford	UK	Postdoctral Fellow, QUP	Japan	Project Assistant Prof., QUP	Japan	Italy
2019/9/1-2022/8/31	PhD Student, Univ. of Chicago	USA	Assistant Prof., ShanghaiTech Univ.	China	Assistant Prof., ShanghaiTech Univ.	China	China
2019/9/1-2022/8/31	Postdoc, Univ. of California, Berkeley	USA	Senior Researcher, Inst for Information Transmission Problems of the Russia	Russia	Senior Researcher, Inst. for Information Transmission Problems of the Russian Academy of Sci.s	Russia	Russia
2020/10/1-2022/8/31	Postdoc, Univ. of California, LA	USA	Assistant Prof., QUP	Japan	Associate Prof., QUP	Japan	USA
2018/11/16-2022/9/12	Postdoc, National Inst. of Nuclear Physics	Italy	Assistant Prof., Univ. of Allahabad	India	Assistant Prof., Indian Inst. of Tech. Bombay	India	India
2018/9/16-2022/9/15	Postdoc Research Associate, Univ. of Arizona	USA	Quantitative Researcher, Company	UK	Quantitative Researcher, Company	UK	Korea
2018/6/16-2022/9/30	PhD Student, Univ. of Potsdam	Germany	Postdoc, Stockholm Univ.	Sweden	Posdtoc, Stockholm Univ.	Sweden	Germany
2020/6/1-2022/9/30	Postdoc, High Energy Accelerator Research Organization	Japan	Assistant Prof., High Energy Accelerator Research Organization	Japan	Assistant Prof., High Energy Accelerator Research Organization	Japan	Taiwan
2020/6/16-2023/1/31	Postdoc, Indiana Univ. Bloomington	USA	Analyst, Company	Hong Kong	Analyst, Company	Hong Kong	Hong Kong
2021/3/1-2023/2/28	Postdoc, KIAA, Peking Univ.	China	Associate Prof., Shanghai Astronomical Observatory, Chinese Academy of Sci.s	China	Associate Prof., Shanghai Astronomical Observatory, Chinese Academy of Sci.s	China	Ethiopia
2022/4/1-2023/3/31	Research Associate, Imperial College London	UK	Postdoc Fellow, Imperial College London	UK	Researcher, Univ. of Vienna	Austria	USA
2021/4/1-2023/3/31	Postdoc, Osaka Univ.	Japan	Postdoc, High Energy Accelerator Research Organization, QUP	Japan	QUP Postdoc Fellow, High Energy Accelerator Research Organization	Japan	Viet Nam
2020/8/1-2023/4/30	Postdoc, TRIUMF(Canada's Particle Accelerator Centre)	Canada	Senior Lecturer (Associate Prof.), Univ. of Southampton	UK	Senior Lecturer (Associate Prof.), Univ. of Southampton	UK	Australia
2020/9/16-2023/5/31	Postdoc Associate, New York Univ.	USA	Research Scientist, RIKEN (iTHEMS)	Japan	Research Scientist, RIKEN (iTHEMS)	Japan	Canada
2020/10/16-2023/6/14	PhD Student, Univ. of Victoria	Canada	Forrest Fellow, Univ. of Western Australia	Australia	Forrest Fellow, Univ. of Western Australia	Australia	Canada
2019/6/16-2023/6/15	Postdoc, Southern Federal Univ.	Russia	Postdoc, Pontifical Catholic Univ. of Valparaiso	Chile	Postdoc, Pontifical Catholic Univ. of Valparaiso	Chile	Russia
2019/11/2-2023/7/31	PhD Student, Leiden Univ.	Netherlands	Machine Learning Engneer, Company	Japan	Machine Learning Scientist, Company	Germany	Armenia
2022/10/1-2023/7/31	Research Fellow, Harvard Univ.ni	USA	Quantitative Researcher, Company	USA	Quantitative Researcher, Company	USA	Hong Kong
2020/11/16-2023/8/31	Postdoc, Stanford Univ.	USA	Associate Prof., Shanghai Jiao Tong Univ.	China	Associate Prof., Shanghai Jiao Tong U	China	China
2020/11/5-2023/8/31	PhD Student, Princeton Univ.	USA	Postdoc, Stony Brook Univ.	USA	Assistant Prof., Kavli Inst. for Theoretical Sci.s, Univ. of Chinese Academy of Sci.	China	China
2022/8/29-2023/8/31	Researcher, Asian PacInst. for Corpuscular Physics Center for Theoretical Physics	Korea	Postdoc, Tsinghua Univ., Beijing	China	Postdoctoral Fellow, Tsinghua Univ., Beijing	China	Korea
2021/11/4-2023/9/4	PhD Student, Wuhan Univ.	China	Postdoc Associate, Rochester Inst. of Tech.	USA	Postdoc Research Associate, Rochester Inst. of Tech	USA	China

2020/11/13-2023/9/10	Postdoc, Weizmann Inst. of Sci.	Israel	Postdoc, Stockholm Univ.	Sweden	Postdoc, Stockholm Univeristy	Sweden	USA
2019/11/16-2023/9/30	KIAA Fellow, KIAA, Peking Univ.	China	Project Assistant Prof., Kavli IPMU	Japan	Project Assistant Prof., Kavli IPMU	Japan	China
2020/11/1-2023/9/30	Research Fellow, National Univ. of Singapore	Singapore	Postdoc, Univ. of Bern	Germany	Postdoc, Univ. of Bern	Germany	Malaysia
2020/11/1-2023/10/31	PhD Student, Vienna Univ. of Tech.	Austria	Scientist, MPI for Mathematics in the Sci.s	Germany	Scientist, MPI for Mathematics in the Sci.s	Germany	India
2021/11/1-2023/10/31	Researcher, Vietnam Academy of Sci. and Tech.	Vietnam	Postdoc, Univ. of Minnesota	USA	Postdoc, Univ. of Minnesota	USA	Viet Nam
2020/12/14-2023/11/30	PhD Student, Univ. of Chicago	USA	Machine Learning Engneer, Company	Japan	Technical Staff, ML, Company	Japan	USA
2020/9/1-2024/1/31	Postdoc, Univ. of California, LA	USA	Associate Prof., Wuhan Univ.	China	Prof., Wuhan Univ.	China	China
2021/7/1-2024/2/6	PhD Student, Chinese Academy of Sci.	China	Director, Zarqa Uni, Astronomy and Space Sci.s Research Center	Jordan	Director, Zarqa Univ., Astronomy and Space Sci.s Research Center	Jordan	Jordan
2023/10/1-2024/3/31	PhD Student, Univ. of Tokyo	Japan	Postdoc, Shanghai Jiao Tong Univ.	China	Postdoc, Shanghai Jiao Tong Univ.	China	China
2021/11/1-2024/4/30	PhD Student, International School for Advanced Studies	Italy	Lecturer (Faculty Position), Chulalongkorn Univ.	Thailand	Lecturer (Faculty Position), Chulalongkorn Univ.	Thailand	Thailand
2021/7/3-2024/7/2	PhD Student, Massachusetts Inst. of Tech.	USA	Associate Prof., Beijing Inst. of Tech.	China	Associate Prof., Beijing Inst. of Tech.	China	China
2021/10/1-2024/7/31	Postdoc, Univ. of California, LA	USA	Assistant Prof., Vassar Univ.	USA	Assistant Prof., Vassar Univ.	USA	USA
2021/8/16-2024/8/15	Postdoc, Center for High Energy Physics, Kyungpook National Univ.	Korea	Assistant Prof., Kavli IPMU	Japan	Assistant Prof., Kyungpook National Univ.	Korea	Korea
2021/9/16-2024/9/15	PhD Student, Univ. of Cambridge	UK	Research Fellow, International School for Advanced Studies	Italy	Research Fellowship, International School for Advanced Studies	Italy	UK
2021/11/1-2024/10/31	PhD Student, Univ. of Michigan	USA	Unknown				China
2022/11/1-2024/10/31	PhD Student, Univ. of Tokyo	Japan	Research Associate, SLAC National Accelerator Lab	USA	Research Associate, SLAC National Accelerator Lab	USA	China
2024/10/1-2024/11/30	PhD Student, Univ. of Tokyo	Japan	Postdoc, Univ. of Southern Denmark	Denmark	Postdoc, Univ. of Southern Denmark	Denmark	China
2022/10/16-2025/1/15	PhD Student, Univ. of Waterloo	Canada	Assistant Prof., Shanghai Inst. for Mathematics and Interdisciplinary Sci.s	China	Assistant Prof., Shanghai Inst. for Mathematics and Interdisciplinary Sci.s	China	China
2023/1/16-2025/2/28	PhD Student, Paris Cite Univ.	France	Kavli Astrophysics Fellow, KIAA, Peking Univ.	China	Joint-Kavli Astrophysics Fellow, KIAA, Peking Univ.	China	India
2022/4/1-2025/3/31	Postdoc, Hiroshima Univ.	Japan	Assistant Prof., National Inst. of Tech., Tokuyama College	Japan	Assistant Prof., National Inst. of Tech., Tokuyama College	Japan	China
2022/10/1-2025/3/31	Boas Assistant Prof., Northwestern Univ.	USA	Postdoc Researcher, Kyoto Univ.	Japan	Postdoc Researcher, Kyoto Univ.	Japan	Turkey

Project Expenditures FY2024

(Thousand yens)

	Amount	Details	Operational subsidies to National University Corporations/Incorporated Administrative Agency		Funding by WPI Academy		Government Subsidies except Funding from WPI Academy		Donations		Indirect funding		Joint research projects		Competitive funding		Others	
			Total costs	Details (no. of persons)	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details
Personnel	1,216,317	Operational subsidies to National University Corporations/Incorporated Administrative Agency	21,057	Center director 1														
	15,744	Funding by WPI Academy	12,083	Administrative direct 1														
	-	Government Subsidies except Funding from WPI Academy	355,946	Principal investigator 25	-	Principal investigator 0	-	0	-	0	-	0	-	0	-	0	-	0
	-	Donations	236,181	・Full-time／Japane 19		・Full-time／Japanese												
	278	Indirect funding		・Concurrent／Japanese		・Concurrent／Japanese												
	-	Joint research projects	119,765	・Full-time／Overse 6		・Full-time／Overseas												
	-	Competitive funding		・Concurrent／Overseas		・Concurrent／Overseas												
	-	Others	328,822	Other researchers 47	-	Other researchers 0	-	0	-	0	-	0	-	0	-	0	-	0
			145,125	・Associate professor /Assistant professor 19		・Associate professor /Assistant professor												
			183,697	・Others 28		・Others												
			243,667	Postdocs 44	15,744	Postdocs 6												
			170,141	Research support staffs 28		Research support staffs		Research support staffs			278	Research support staff 1						
			84,601	Administrative staffs 10		Administrative staffs		Administrative staffs										
Subtotal	1,232,339		1,216,317	156	15,744	6	-	0	-	0	278	1	-	0	-	0	-	0
Project activities	150,594	Operational subsidies to National University Corporations/Incorporated Administrative Agency	28,107	Research startup cost	2,482	Other costs			25,137	Cost of utilities	1,024	Cost of consumables						
	2,482	Funding by WPI Academy	4,017	Cost of international symposiums					31,770	Other costs	27,403	Cost of utilities						
		Government Subsidies except Funding from WPI Academy	816	Rental fees for facilities							12,185	Other costs						
	56,907	Donations	2,893	Cost of consumables														
	40,612	Indirect funding	1,517	Cost of utilities														
	-	Joint research projects	113,244	Other costs														
	-	Competitive funding																
	-	Others																
Subtotal	250,595		150,594		2,482		-		56,907		40,612		-		-		-	
Travel	36,441	Operational subsidies to National University Corporations/Incorporated Administrative Agency	7,700	Domestic travel costs	11,774	Overseas travel costs												
	11,774	Funding by WPI Academy	10,346	Overseas travel costs														
	-	Government Subsidies except Funding from WPI Academy	15,594	Travel and accommodations cost for invited scientists														
	-	Donations	2,801	Travel cost for scientists on transfer														
	-	Indirect funding																
	-	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	48,215		36,441		11,774		-		-		-		-		-		-	
Equipment	13,309	Operational subsidies to National University Corporations/Incorporated Administrative Agency	595	Laser projector VPL-PHZ51 WUXGA 5300lm														
	-	Funding by WPI Academy	660	L2 Switch SR-S332TR1														
	-	Government Subsidies except Funding from WPI Academy	1,682	Entrance/exit surveillance camera system														
	-	Donations	851	Server PowerEdge R350 3700009312556.1														
	-	Indirect funding	693	Laser projector VPL-PHZ51 WUXGA 6400lm														
	-	Joint research projects	990	PowerEdge R360 Server														
	-	Competitive funding	902	PowerEdge R360 Server Intel Xeon E-246														
	-	Others	649	UPS for GPU SMX3000RMHV2UJ APC Smart-UPS X 3														
			1,859	Backup Storage Server QNAP TS-1273AU-RP														
			715	65-inch interactive whiteboard LCD-CB653														
			1,440	ISO-K-400 vacuum container														
			776	Exhaust equipment														
			928	Desktop power supply DT5521HEM														
			569	Wall sign installation work														
Subtotal	13,309		13,309		-		-		-		-		-		-		-	
Research projects	44,326	Operational subsidies to National University Corporations/Incorporated Administrative Agency	44,326	Operational subsidies to National University Corporations/Incorporated Adminis			8,486	Government Subsidies except	27,379	Donations			31,577	Joint research projects	197,566	KAKENHI	94	Others
	-	Funding by WPI Academy													88,568	Commissioned research projects		
	8,486	Government Subsidies except Funding from WPI Academy																
	27,379	Donations																
	-	Indirect funding																
	31,577	Joint research projects																
	286,134	Competitive funding																
	94	Others																
Subtotal	397,996		44,326		-		8,486		27,379		-		31,577		286,134		94	
Others	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency																
	-	Funding by WPI Academy																
	-	Government Subsidies except Funding from WPI Academy																
	-	Donations																
	-	Indirect funding																
	-	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	-		-		-		-		-		-		-		-		-	
Total	1,942,454		1,460,987		30,000		8,486		84,286		40,890		31,577		286,134		94	

Operational subsidies to National University Corporations/Incorporated Administrative Agency	運営費交付金
Funding by WPI Academy	WPIアカデミー国際頭脳循環の加速・拡大事業
Government Subsidies except Funding from WPI Academy	機関補助金（WPIアカデミー国際頭脳循環の加速・拡大事業を除く
Donations	寄付金
Indirect funding	間接経費
Joint research projects	共同研究費
Competitive funding	競争的資金
Others	その他

Project Expenditures FY2023

(Thousand yens)

	Amount	Details	Operational subsidies to National University Corporations/Incorporated Administrative Agency		Funding by WPI Academy		Government Subsidies except Funding from WPI Academy		Donations		Indirect funding		Joint research projects		Competitive funding		Others	
			Total costs	Details (no. of persons)	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details
Personnel	1,205,117	Operational subsidies to National University Corporations/Incorporated Administrative Agency	37,604	Center director 1														
	14,593	Funding by WPI Academy	16,930	Administrative direct 1														
	-	Government Subsidies except Funding from WPI Academy	339,674	Principal investigator 24	-	Principal investigator 0	-	0	-	0	-	0	-	0	-	0	-	0
	-	Donations	221,334	・Full-time／Japane 18		・Full-time／Japanese												
	273	Indirect funding		・Concurrent／Japanese		・Concurrent／Japanese												
	-	Joint research projects	118,340	・Full-time／Overse 6		・Full-time／Overseas												
	-	Competitive funding		・Concurrent／Overseas		・Concurrent／Overseas												
	-	Others	350,166	Other researchers 51	-	Other researchers 0	-	0	-	0	-	0	-	0	-	0	-	0
			132,773	・Associate professor /Assistant professor 18		・Associate professor /Assistant professor												
			217,393	・Others 33		・Others												
			212,509	Postdocs 51	14,593	Postdocs 4												
			163,285	Research support staffs 28		Research support staffs		Research support staffs			273	Research support staff 1						
			84,949	Administrative staffs 9		Administrative staffs		Administrative staffs										
Subtotal	1,219,983		1,205,117	165	14,593	4	-	0	-	0	273	1	-	0	-	0	-	0
Project activities	225,587	Operational subsidies to National University Corporations/Incorporated Administrative Agency	4,335	Temporary staffing expenses	2,520	Other costs			2,462	Cost of utilities	176	Cost of consumables						
	2,520	Funding by WPI Academy	23,760	Research startup cost							21,078	Cost of utilities						
	-	Government Subsidies except Funding from WPI Academy	2,230	Cost of international symposiums							8,417	Other costs						
	2,462	Donations	5,885	Rental fees for facilities														
	29,671	Indirect funding	58,989	Cost of consumables														
	-	Joint research projects	29,014	Cost of utilities														
	-	Competitive funding	101,374	Other costs														
	-	Others																
Subtotal	260,240		225,587		2,520		-		2,462		29,671		-		-		-	
Travel	26,493	Operational subsidies to National University Corporations/Incorporated Administrative Agency	4,135	Domestic travel costs	13,787	Overseas travel costs												
	13,787	Funding by WPI Academy	9,197	Overseas travel costs														
	-	Government Subsidies except Funding from WPI Academy	7,012	Travel and accommodations cost for invited scientists														
	-	Donations	6,149	Travel cost for scientists on transfer														
	-	Indirect funding																
	-	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	40,280		26,493		13,787		-		-		-		-		-		-	
Equipment	4,554	Operational subsidies to National University Corporations/Incorporated Administrative Agency	1,104	10G Network firewall equipment FortiGate														
	-	Funding by WPI Academy	1,104	10G Network firewall equipment FortiGate														
	-	Government Subsidies except Funding from WPI Academy	752	A0 Large-format inkjet printer SC-T57DRC1														
	-	Donations	976	10G Network switch equipment FUJITSU 10GBASE-SR SFP＋SJSFPASR														
	-	Indirect funding	618	10G network switch spare unit FUJITSU Secure Switch SR-S352TR1														
	-	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	4,554		4,554		-		-		-		-		-		-		-	
Research projects	44,445	Operational subsidies to National University Corporations/Incorporated Administrative Agency	44,445	Operational subsidies to National University Corporations/Incorporated Adminis			9,282	Government Subsidies except	101,648	Donations			75,748	Joint research projects	193,876	KAKENHI		
	-	Funding by WPI Academy													12,905	Commissioned research projects		
	9,282	Government Subsidies except Funding from WPI Academy																
	101,648	Donations																
	-	Indirect funding																
	75,748	Joint research projects																
	206,781	Competitive funding																
	-	Others																
Subtotal	437,904		44,445		-		9,282		101,648		-		75,748		206,781		-	
Others	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency																
	-	Funding by WPI Academy																
	-	Government Subsidies except Funding from WPI Academy																
	-	Donations																
	-	Indirect funding																
	-	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	-		-		-		-		-		-		-		-		-	
Total	1,962,961		1,506,196		30,900		9,282		104,110		29,944		75,748		206,781		-	

Operational subsidies to National University Corporations/Incorporated Administrative Agency	運営費交付金
Funding by WPI Academy	WPIアカデミー国際頭脳循環の加速・拡大事業
Government Subsidies except Funding from WPI Academy	機関補助金（WPIアカデミー国際頭脳循環の加速・拡大事業を除く
Donations	寄付金
Indirect funding	間接経費
Joint research projects	共同研究費
Competitive funding	競争的資金
Others	その他

Project Expenditures FY2022

（Thousand yens）

	Amount	Details	Operational subsidies to National University Corporations/Incorporated Administrative Agency		Funding by WPI Academy		Government Subsidies except Funding from WPI Academy		Donations		Indirect funding		Joint research projects		Competitive funding		Others	
			Total costs	Details (no. of persons)	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details
Personnel	1,275,185	Operational subsidies to National University Corporations/Incorporated Administrative Agency	47,918	Center director 1														
	18,434	Funding by WPI Academy	16,898	Administrative director 1														
	-	Government Subsidies except Funding from WPI Academy	321,843	Principal investigators 23	-	Principal investigators 0	-	0	-	0	-	0	-	0	-	0	-	0
	-	Donations	203,823	・Full-time／Japanese 16		・Full-time／Japanese												
	268	Indirect funding		・Concurrent／Japanese		・Concurrent／Japanese												
	-	Joint research projects	118,020	・Full-time／Overseas 7		・Full-time／Overseas												
	-	Competitive funding		・Concurrent／Overseas		・Concurrent／Overseas												
	-	Others	389,550	Other researchers 57	-	Other researchers 0	-	0	-	0	-	0	-	0	-	0	-	0
			168,583	・Associate professor /Assistant professor 22		・Associate professor /Assistant professor												
			220,967	・Others 35		・Others												
			252,359	Postdocs 58	18,434	Postdocs 10												
			161,905	Research support staffs 28		Research support staffs		Research support staffs			268	Research support sta 1						
			84,712	Administrative staffs 10		Administrative staffs		Administrative staffs										
Subtotal	1,293,887		1,275,185	178	18,434	10	-	0	-	0	268	1	-	0	-	0	-	0
Project activities	109,481	Operational subsidies to National University Corporations/Incorporated Administrative Agency	591	Temporary staffing expenses	1,877	Cost of international symposiums			7	Cost of consumables	5,068	Rental fees for facilities						
	5,031	Funding by WPI Academy	12,587	Research startup cost	3,154	Other costs			50,475	Cost of utilities	179	Cost of consumables						
	-	Government Subsidies except Funding from WPI Academy	5,461	Cost of international symposiums					30,693	Other costs	8,183	Cost of utilities						
	81,175	Donations	816	Rental fees for facilities							24,052	Other costs						
	37,482	Indirect funding	26,367	Cost of consumables														
	-	Joint research projects	1,026	Cost of utilities														
	-	Competitive funding	62,633	Other costs														
	-	Others																
Subtotal	233,169		109,481		5,031		-		81,175		37,482		-		-		-	
Travel	66,545	Operational subsidies to National University Corporations/Incorporated Administrative Agency	7,857	Domestic travel costs	16,402													
	16,402	Funding by WPI Academy	36,833	Overseas travel costs														
	-	Government Subsidies except Funding from WPI Academy	12,490	Travel and accommodations cost for invited scientists														
	-	Donations	9,365	Travel cost for scientists on transfer														
	-	Indirect funding																
	-	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	82,947		66,545		16,402		-		-		-		-		-		-	
Equipment	13,369	Operational subsidies to National University Corporations/Incorporated Administrative Agency	1,936	KVM Server 2022（PowerEdge R6515server）														
	-	Funding by WPI Academy	4,493	Ultra Pure Water Treatment System Model														
	-	Government Subsidies except Funding from WPI Academy	572	Blackboard (enamel grey) Aluminum Frame														
	-	Donations	505	14inch MacBookPro-space gray														
	-	Indirect funding	2,112	Automatic Liquid Nitrogen Supply System XL-151000 Nitrogen Gas Generator GN10I														
	-	Joint research projects	1,969	Data Analysis Storage GNAS3-RM2U8B-873 G22-00875 1														
	-	Competitive funding	1,782	Z Axis Motorized Stages 3D Measurement Software														
	-	Others																
Subtotal	13,369		13,369		-		-		-		-		-		-		-	
Research projects	671	Operational subsidies to National University Corporations/Incorporated Administrative Agency	671	Operational subsidies to National University Corporations/Incorporated Administrative			15,466	Government Subsidies except	38,402	Donations			42,958	Joint research projects	276,918	KAKENHI		
	-	Funding by WPI Academy													10,774	Commissioned research projects		
	15,466	Government Subsidies except Funding from WPI Academy																
	38,402	Donations																
	-	Indirect funding																
	42,958	Joint research projects																
	287,692	Competitive funding																
	-	Others																
Subtotal	385,189		671		-		15,466		38,402		-		42,958		287,692		-	
Others	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency																
	-	Funding by WPI Academy																
	-	Government Subsidies except Funding from WPI Academy																
	-	Donations																
	-	Indirect funding																
	-	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	-		-		-		-		-		-		-		-		-	
Total	2,008,561		1,465,251		39,867		15,466		119,577		37,750		42,958		287,692		-	

Operational subsidies to National University Corporations/Incorporated Administrative Agency	運営費交付金
Funding by WPI Academy	WPIアカデミー国際頭脳循環の加速・拡大事業
Government Subsidies except Funding from WPI Academy	機関補助金（WPIアカデミー国際頭脳循環の加速・拡大事業を除く）
Donations	寄付金
Indirect funding	間接経費
Joint research projects	共同研究費
Competitive funding	競争的資金
Others	その他

Project Expenditures FY2021

(Thousand yens)

	Amount	Details	Operational subsidies to National University Corporations/Incorporated Administrative Agency		Funding by WPI Academy		Government Subsidies except Funding from WPI Academy		Donations		Indirect funding		Joint research projects		Competitive funding		Others	
			Total costs	Details (no. of persons)	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details
Personnel	802,379	Operational subsidies to National University Corporations/Incorporated Administrative Agencies			41,541	Center director 1												
	560,985	WPI grant			16,866	Administrative director 1												
	-	Government subsidies except WPI grant	223,708	Principal investigators 17	-	Principal investigators 0	-	0	-	0	-	0	-	0	-	0	-	0
	-	Donations	101,232	・Full-time／Japanes 8		・Full-time／Japanese												
	265	Indirect funding	41,193	・Concurrent／Japa 5		・Concurrent／Japanese												
	-	Joint research projects	81,283	・Full-time／Overse 4		・Full-time／Overseas												
	-	Competitive funding		・Concurrent／Overseas		・Concurrent／Overseas												
	-	Others	443,475	Other researchers 58	81,844	Other researchers 8	-	0	-	0	-	0	-	0	-	0	-	0
			201,414	・Associate professor /Assistant professor 26	23,388	・Associate professor /Assistant professor 2												
			242,061	・Others 32	58,456	・Others 6												
			74,924	Postdocs 20	237,818	Postdocs 46												
			60,272	Research support staffs 9	98,758	Research support staffs 18		Research support staffs			265	Research support staffs 1						
				Administrative staffs	84,158	Administrative staffs 11		Administrative staffs										
Subtotal	1,363,629		802,379	104	560,985	85	-	0	-	0	265	1	-	0	-	0	-	0
Project activities	473,322	Operational subsidies to National University Corporations/Incorporated Administrative Agencies	2,911	Temporary staffing expenses	396	Gratuities and honoraria paid to invited principal investigators			228	Cost of consumables	3,254	Cost of consumables						
	141,272	WPI grant	8,909	Research startup cost	11,980	Research startup cost			225	Other costs	1,389	Cost of utilities						
	-	Government subsidies except WPI grant	157,704	Cost of consumables	1,316	Cost of international symposiums					27,332	Other costs						
	453	Donations	2,693	Cost of utilities	5,885	Rental fees for facilities												
	31,975	Indirect funding	301,105	Other costs	23,998	Cost of consumables												
	-	Joint research projects			38,885	Cost of utilities												
	-	Competitive funding			58,812	Other costs												
	-	Others			-													
					-													
					-													
Subtotal	647,022		473,322		141,272		-		453		31,975		-		-		-	
Travel	16,821	Operational subsidies to National University Corporations/Incorporated Administrative Agencies	1,501	Domestic travel costs	558	Domestic travel costs			773	Overseas travel costs								
	7,743	WPI grant	11,909	Overseas travel costs	1,042	Overseas travel costs												
	-	Government subsidies except WPI grant	3,411	Travel cost for scientists on tr	2,746	Travel and accommodations cost for invited scientists												
	773	Donations			3,397	Travel cost for scientists on transfer												
	-	Indirect funding																
	-	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	25,337		16,821		7,743		-		773		-		-		-		-	
Equipment	44,504	Operational subsidies to National University Corporations/Incorporated Administrative Agencies	677	Personal computer							678	File server						
	-	WPI grant	608	Desktop power supply														
	-	Government subsidies except WPI grant	795	DC voltage/current source														
	-	Donations	14,131	Distributed database system														
	678	Indirect funding	859	Personal computer														
	-	Joint research projects	6,545	Digital microscope														
	-	Competitive funding	2,193	3D printer														
	-	Others	1,266	High voltage source meter														
			4,070	3D printer														
			1,557	Portable X-Ray spectrometer														
			1,083	Digital pulse processor														
			1,425	Direct motor BBM2 metallizing and refurbishment work														
			5,830	Rotor magnetic circuit for polarization modulator														
			935	Holder for fixing large circular basis														
			2,530	Ultra-low temperature and high temperature digital gap test equipment														
Subtotal	45,182		44,504		-		-		-		678		-		-		-	
Research projects	330,140	Operational subsidies to National University Corporations/Incorporated Administrative Agencies	330,140	Operational subsidies to National University Corporations/Incorporated Administrativ			4,551	Government subsidies except	12,652	Donations			39,538	Joint research projects	113,672	KAKENHI		
	-	WPI grant													21,716	Commissioned research projects		
	4,551	Government subsidies except WPI grant													412	Commissioned project expenses		
	12,652	Donations																
	-	Indirect funding																
	39,538	Joint research projects																
	135,800	Competitive funding																
	-	Others																
Subtotal	522,681		330,140		-		4,551		12,652		-		39,538		135,800		-	
Others	-	Operational subsidies to National University Corporations/Incorporated Administrative Agencies																
	-	WPI grant																
	-	Government subsidies except WPI grant																
	-	Donations																
	-	Indirect funding																
	-	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	-		-		-		-		-		-		-		-		-	
Total	2,603,851		1,667,166		710,000		4,551		13,878		32,918		39,538		135,800		-	

Operational subsidies to National University Corporations/Incorporated Administrative Agencies	運営費交付金
WPI grant	国際研究拠点形成促進事業補助金
Government subsidies except WPI grant	機関補助金（WPI補助金を除く）
Donations	寄付金
Indirect funding	間接経費
Joint research projects	共同研究費
Competitive funding	競争的資金
Others	その他

Appendix 4 Outreach Activities and Their Results

List up to three of the Center's outreach activities carried out during the period between FY 2021 and 2024 that have contributed to enhancing the brand or recognition of your Center and/or the brand of the overall WPI program, and describe its concrete contents and effect in narrative style. (Where possible, indicate the results in concrete numbers.)

Examples:
- As a result of using a new OO press-release method, a OO% increase in media coverage was obtained over the previous year.
- By holding seminars for the public that include people from industry, requests for joint research were received from companies.
- We changed our public relations media. As a resulting of using OO to disseminate information, a OO% increase in inquiries from researchers was obtained over the previous year.
- As a result of vigorously carrying out OO outreach activity, \OO in external funding was acquired.

Enter a list of your outreach activities in Attachment 4a.

Example 1: NHK Switch Interview: A Conversation with Filmmaker Takeshi Kitano

On August 17, 2024, filming took place inside the Fujiwara Hall of Kavli IPMU where two experts in different fields exchanged stories about their careers and their own philosophies for the NHK General TV special "Switch Interview". One expert was international film director and comedian Takeshi Kitano, and the other was Kavli IPMU Professor Hitoshi Murayama, whom Kitano had been wanting to meet for years. Kitano talked about his childhood fascination with physics and mathematics, his work in the performing arts and films, but went on to talk about cosmology, particle physics, and more mathematics. The show was aired in two parts; the first on September 24, and the second on October 4. With the show airing on NHK's most watched NHK General channel, the show was able to reach a wider range of audiences than typical science shows. Thanks to the show being filmed inside Kavli IPMU, and including credits to Kavli IPMU, WPI, the show contributed to promoting the WPI brand.

Example 2: The Completion and Start of the Prime Focus Spectrograph: Press Conference and Promotion

The Prime Focus Spectrograph (PFS) is an international project led by the Kavli IPMU, and including the National Astronomical Observatory (NAOJ) of Japan and Princeton University. Before official operations using the device were scheduled to begin in February 2025, NAOJ, which owns the Subaru Telescope to which the PFS is being attached to, and the Kavli IPMU hosted a press conference in Tokyo on January 10, 2025. Twenty-eight journalists from 12 media companies, and including 7 freelance journalists, participated in the press conference, highlighting the public interest for space-related stories. The press conference coincided with the release of content to journalists overseas and was picked up by several media companies in Hawaii, where the Subaru Telescope where the Subaru Telescope is located. As a result of these efforts, more than 110 stories were published by the media, and it was an ideal opportunity for the Kavli IPMU to show its longtime commitment to developing the PFS, and what scientists expected to uncover by using the PFS in future studies.

Example 3: In Depth Stories about Research: Showcasing Kavli IPMU through the Asia Research News magazine

The Kavli IPMU has been featuring its researchers and their work in the annual Asia Research News magazine since 2017. From the 2022 edition, the institute has been writing its own feature articles for the magazine. In 2022, the magazine featured mathematician and Kavli IPMU Professor Yukari Ito, her research, and a story about how the COVID-19 pandemic changed how mathematics researchers worked around the world. In 2023, the magazine featured profile stories of 5 early career women researchers and a feature article on the longtime career of visiting senior scientist Ken'ichi Nomoto in the field of supernova research. In 2024, the magazine featured Kavli IPMU Director Jun'ichi Yokoyama, and his longtime fascination with gravitational waves and cosmology from a time when gravitational waves was considered an unrealistic idea on paper. In the latest magazine, the 2025 edition, the magazine features Kavli IPMU Professor John Silverman and his work using large scale telescopes including the James Webb Space Telescope to study galaxy evolution. The magazine is sent to 70 universities around the world, directly to 5000 noted scientists, university vice-chancellors, and government agency workers. Its digital copy is shared with 1 million journalists. All of these activities have contributed to making Kavli IPMU widely known around the world.

Appendix 4a　State of Outreach Activities from FY 2021 to FY 2024

* For each activity, enter the number of times that the activity was held each fiscal year.

Activities	FY 2021 (number of activities, times held)	FY 2022 (number of activities, times held)	FY 2023 (number of activities, times held)	FY 2024 (number of activities, times held)
PR brochure, pamphlet	2	2	4	5
Lectures, seminars for general public	10	8	8	6
Teaching, experiments, training for elementary, secondary and high school students	3	2	2	2
Science café	3	3	2	3
Open house	1	1	1	1
Participating, exhibiting in events	3	1	3	2
Press releases	28	36	21	29
Publications of popular science books	6	14	12	9
Others（　　）				

*If there are activities that the center hasn’t implemented, delete those lines. If you have other activities, list them in the space between parentheses after “Others” and state the number of times they were held in the spaces on the right. Another line under “Others” can be added, if needed.

<Notes>

WPI Academy

Submittal of List of Center's Research Results

Prepare the following two materials and submit them with your Activities Report.

1. Refereed Papers published from 2021 to 2024 (Free format)

List only the Center's refereed papers published during the period from 2021 to 2024. (Note: The list should be for the calendar year, not the fiscal year.)

Divide the papers into two categories, A and B.

A. WPI papers
List papers whose author(s) can be identified as affiliated with the WPI program (e.g., that state "WPI" and the name of the WPI center (WPI-center name)). (Not including papers in which the names of persons affiliated with the WPI program are contained only in the acknowledgements.)

B. WPI-related papers
List papers related to the WPI Academy center but whose authors are not noted in the institutional affiliations as WPI affiliated. (Including papers whose acknowledgements contain the names of researchers affiliated with the WPI program.)

Note: On 14 December 2011, the Basic Research Promotion Division (the Basic and Generic Research Division at present) in MEXT's Research Promotion Bureau circulated an instruction requiring paper authors to include the name or abbreviation of their WPI center among their institutional affiliations.

Method of listing paper

- For each, write the author name(s); year of publication; journal name, volume, page(s) (or DOI number), and article title. Any listing order may be used as long as format is consistent. (The names of the center researchers do not need to be underlined.)
- If a paper has many authors (say, more than 10), all of their names do not need to be listed.

2. Submission of electronic data of refereed papers published in 2024

- Among the papers listed in the Item 1, provide a .csv file output of the papers published in 2024 from the Web of Science (e.g.) or other database giving the paper's raw data including Document ID. (Note: the Document ID is assigned by paper database.)
- The papers should be divided into A or B categories on separate sheets, not divided by paper categories.

3. Use in assessments

- The list of papers will be used in assessing the state of WPI Academy center's research progress.
- It will be used as reference in analyzing the trends and overall state of research in the WPI Program and/or the said WPI Academy center, not for evaluating individual researcher performance.
- The special characteristics of each research domain will be considered when conducting assessments.

1. Refereed Papers published from 2021 to 2024 (Free format)

A. WPI papers

1	Leptophilic fermion WIMP: Role of future lepton colliders Horigome, SI; Katayose, T; Matsumoto, S; Saha, I PHYSICAL REVIEW D 104 (5), 2021 10.1103/PhysRevD.104.055001
2	Admissible restrictions of irreducible representations of reductive Lie groups: symplectic geometry and discrete decomposability Kobayashi, T PURE AND APPLIED MATHEMATICS QUARTERLY 17 (4), pp1321-1343, 2021
3	Matrixmodel for the total descendant potential of a simple singularity of type D Alexandrov, A; Milanov, T LETTERS IN MATHEMATICAL PHYSICS 111 (4), 2021 10.1007/s11005-021-01431-z
4	Superconformal index with surface defects for class Sk Ito, Y; Yoshida, Y NUCLEAR PHYSICS B 962, 2021 10.1016/j.nuclphysb.2020.115277
5	Chiral composite asymmetric dark matter Ibe, M; Kobayashi, S; Watanabe, K JOURNAL OF HIGH ENERGY PHYSICS (7), 2021 10.1007/JHEP07(2021)220
6	Fock Space Representation of the Circle Quantum Group Sala, F; Schiffmann, O INTERNATIONAL MATHEMATICS RESEARCH NOTICES 2021 (22), 2021 10.1093/imrn/rnz268
7	Gravitational waves from type II axion-like curvaton model and its implication for NANOGrav result Kawasaki, M; Nakatsuka, H JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS (5), 2021 10.1088/1475-7516/2021/05/023
8	Strong clustering of primordial black holes from Affleck-Dine mechanism Kawasaki, M; Murai, K; Nakatsuka, H JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS (10), 2021 10.1088/1475-7516/2021/10/025
9	Affleck-Dine inflation in supergravity Kawasaki, M; Ueda, S JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS (4), 2021 10.1088/1475-7516/2021/04/049
10	Probing oscillons of ultra-light axion-like particle by 21 cm forest Kawasaki, M; Nakano, W; Nakatsuka, H; Sonomoto, E JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS (4), 2021 10.1088/1475-7516/2021/04/019
11	Alternative minimal U(1)B-L Asai, K; Nakayama, K; Tseng, SY PHYSICS LETTERS B 814, 2021 10.1016/j.physletb.2021.136106
12	4d F(4) gauged supergravity and black holes of class F Hosseini, SM; Hristov, K JOURNAL OF HIGH ENERGY PHYSICS (2), 2021 10.1007/JHEP02(2021)177

13	Sommerfeld-enhanced dark matter searches with dwarf spheroidal galaxies Ando, S; Ishiwata, K PHYSICAL REVIEW D 104 (2), 2021 10.1103/PhysRevD.104.023016
14	Fast Calculation of Gravitational Lensing Properties of Elliptical Navarro-Frenk-White and Hernquist Density Profiles Oguri, M PUBLICATIONS OF THE ASTRONOMICAL SOCIETY OF THE PACIFIC 133 (1025), 2021 10.1088/1538-3873/ac12db
15	Oscillons of axion-like particle: mass distribution and power spectrum Kawasaki, M; Nakano, W; Nakatsuka, H; Sonomoto, E JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS (1), 2021 10.1088/1475-7516/2021/01/061
16	Amino BODIPY-Based Blue Fluorescent Probes for Aldehyde Dehydrogenase 1-Expressing Cells Yagishita, A; Ueno, T; Tsuchihara, K; Urano, Y BIOCONJUGATE CHEMISTRY 32 (2), 2021 10.1021/acs.bioconjchem.0c00565
17	Global view of axion stars with nearly Planck-scale decay constants Eby, J; Street, L; Suranyi, P; Wijewardhana, LCR PHYSICAL REVIEW D 103 (6), 2021 10.1103/PhysRevD.103.063043
18	Revisiting CMB constraints on dark matter annihilation Kawasaki, M; Nakatsuka, H; Nakayama, K; Sekiguchi, T JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS (12), 2021 10.1088/1475-7516/2021/12/015
19	Minimal k-inflation in light of the conformal metric-affine geometry Mikura, Y; Tada, Y; Yokoyama, S PHYSICAL REVIEW D 103 (10), 2021 10.1103/PhysRevD.103.L101303
20	Branching laws of unitary representations associated to minimal elliptic orbits for indefinite orthogonal group O(p, q) Kobayashi, T ADVANCES IN MATHEMATICS 388, 2021 10.1016/j.aim.2021.107862
21	Covariance of the matter power spectrum including the survey window function effect: N-body simulations versus fifth-order perturbation theory on grids Taruya, A; Nishimichi, T; Jeong, D PHYSICAL REVIEW D 103 (2), 2021 10.1103/PhysRevD.103.023501
22	Rotating multi-charge spindles and their microstates Hosseini, SM; Hristov, K; Zaffaroni, A JOURNAL OF HIGH ENERGY PHYSICS (7), 2021 10.1007/JHEP07(2021)182
23	Universal AdS Black Holes in Theories with 16 Supercharges and Their Microstates Hosseini, SM; Zaffaroni, A PHYSICAL REVIEW LETTERS 126 (17), 2021 10.1103/PhysRevLett.126.171604
24	Searches for sterile neutrinos and axionlike particles from the Galactic halo with eROSITA Dekker, A; Peerbooms, E; Zimmer, F; Ng, KCY; Ando, S PHYSICAL REVIEW D 104 (2), 2021 10.1103/PhysRevD.104.023021

25	Thermal real scalar triplet dark matter Katayose, T; Matsumoto, S; Shirai, S; Watanabe, Y JOURNAL OF HIGH ENERGY PHYSICS (9), 2021 10.1007/JHEP09(2021)044
26	The benefits of diligence: how precise are predicted gravitational wave spectra in models with phase transitions? Guo, HK; Sinha, K; Vagie, D; White, G JOURNAL OF HIGH ENERGY PHYSICS (6), 2021 10.1007/JHEP06(2021)164
27	Cosmological phase transitions: is effective field theory just a toy? Postma, M; White, G JOURNAL OF HIGH ENERGY PHYSICS (3), 2021 10.1007/JHEP03(2021)280
28	Super-Eddington Mass Growth of Intermediate-mass Black Holes Embedded in Dusty Circumnuclear Disks Toyouchi, D; Inayoshi, K; Hosokawa, T; Kuiper, R ASTROPHYSICAL JOURNAL 907 (2), 2021 10.3847/1538-4357/abcfc2
29	Decaying dark matter in dwarf spheroidal galaxies: Prospects for x-ray and gamma-ray telescopes Ando, S; Barik, SK; Feng, ZR; Finetti, M; Chaves, AG; Kanuri, S; Kleverlaan, J; Ma, YX; Di Serracapriola, NM; Meinema, MSP et al. PHYSICAL REVIEW D 104 (2), 2021 10.1103/PhysRevD.104.023022
30	Tempered Homogeneous Spaces III Benoist, Y; Kobayashi, T JOURNAL OF LIE THEORY 31 (3), pp833-869, 2021
31	A minimal power-spectrum-based moment expansion for CMB B-mode searches Azzoni, S; Abitbol, MH; Alonso, D; Gough, A; Katayama, N; Matsumura, T JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS (5), 2021 10.1088/1475-7516/2021/05/047
32	Probing PeV scale SUSY breaking with satellite galaxies and primordial gravitational waves Choi, GJ; Jinno, R; Yanagida, TT PHYSICAL REVIEW D 104 (9), 2021 10.1103/PhysRevD.104.095018
33	What if ALP dark matter for the XENON1T excess is the inflaton Takahashi, F; Yamada, M; Yin, W JOURNAL OF HIGH ENERGY PHYSICS (1), 2021 10.1007/JHEP01(2021)152
34	Unified approach to secondary effects on the CMB B-mode polarization Namikawa, T; Naruko, A; Saito, R; Taruya, A; Yamauchi, D JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS (10), 2021 10.1088/1475-7516/2021/10/029
35	Neutron Star Mergers and Gamma-Ray Bursts: Stripping Model Blinnikov, SI; Nadyozhin, DK; Kramarev, N; Yudin, A ASTRONOMY REPORTS 65 (5), 2021 10.1134/S1063772921050012
36	Probing dark matter self-interaction with ultrafaint dwarf galaxies Hayashi, K; Ibe, M; Kobayashi, S; Nakayama, Y; Shirai, S PHYSICAL REVIEW D 103 (2), 2021 10.1103/PhysRevD.103.023017

37	Testing the Sunyaev-Zeldovich-based tomographic approach to the thermal history of the Universe with pressure-density cross correlations: Insights from the Magneticum simulation Young, S; Komatsu, E; Dolag, K PHYSICAL REVIEW D 104 (8), 2021 10.1103/PhysRevD.104.083538
38	Preheating from target space curvature and unitarity violation: Analysis in field space Ema, Y; Jinno, R; Nakayama, K; van de Vis, J PHYSICAL REVIEW D 103 (10), 2021 10.1103/PhysRevD.103.103536
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B. WPI-related papers

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