

HIROSHIMA  
UNIVERSITY

# UP DA TE



HIROSHIMA UNIVERSITY

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and high-impact research here!



Hiroshima University 75th Anniversary  
Commemorative Ceremony and Events

Homecoming Day 2024



## HIROSHIMA UNIVERSITY

Embodying its founding principle of “a single unified university, free and pursuing peace,” Hiroshima University is one of the largest comprehensive research universities in Japan.

Today, HU is making steady progress as a global university, taking on worldwide challenges and strengthening its global educational network by signing international exchange agreements with universities around the world and opening overseas bases at strategic locations.



HIROSHIMA UNIVERSITY



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Meet our researchers making waves in science and technology. Chosen for prestigious government programs, they're working on projects that could shape society's future.

# HU's 75+75th Anniversary Commemorative Ceremony and Events

This year, Hiroshima University celebrated its 150th anniversary, marking 75 years since its founding in 1949 and an additional 75 years since the establishment of its oldest predecessor institution, the Hakushima School.

Since 2007, the Alumni Association has hosted the Homecoming Day on the first Saturday of November at the Higashi-Hiroshima Campus. This year, the festivities expanded to two days—November 2 and 3—as part of the "Hiroshima University 75+75th Anniversary Commemorative Ceremony and Events."

Despite heavy rain on the first day, many graduates, former faculty, and local residents gathered to enjoy lectures, performances, and student-led activities.

**In the photo:**

Hiroshima University Song performance by the "Hirodai Opera" members from the Music Culture Education program, directed by President Ochi.



## Commemorative Ceremony

The two-day event opened with a commemorative ceremony attended by distinguished guests, including former Japanese Prime Minister Fumio Kishida and Gakuji Ito, Director-General of the Higher Education Bureau of the country's Ministry of Education, Culture, Sports, Science and Technology. In his address, HU President Mitsuo Ochi expressed his heartfelt gratitude to the university's supporters—alumni, local citizens, businesses, and government.



**Fumio Kishida**  
Former Japanese  
Prime Minister



**Gakuji Ito**  
Director-General of the  
Higher Education Bureau,  
MEXT

Relive the key moments from the 75th-anniversary celebrations here:



# Commemorative Lectures

HU hosted lectures by distinguished speakers: Masaru Sato, writer and former senior analyst at Japan's Ministry of Foreign Affairs; Juichi Yamagiwa, Director-General of the Research Institute for Humanity and Nature and former President of Kyoto University; and Izumi Nakamitsu, Under-Secretary-General of the United Nations.



**Masaru Sato**  
Writer, former senior analyst of the Japanese Ministry of Foreign Affairs



**Juichi Yamagiwa**  
Director-General of the Research Institute for Humanity and Nature



**Izumi Nakamitsu**  
Under-Secretary General of the United Nations

# LOOK Hiroshima University

HU cosmochemist Professor Hikaru Yabuta and astrophysicist Professor Tohru Takahashi (Special Recognition) shared insights into cutting-edge research on the universe.



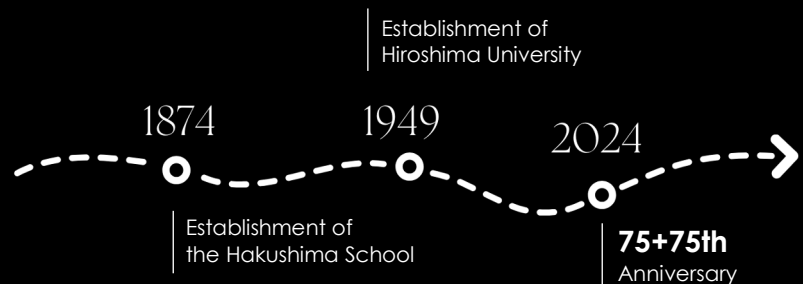
**Tohru Takahashi**  
Professor (Special Recognition) Graduate School of Advanced Science and Engineering



**Hikaru Yabuta**  
Professor Graduate School of Advanced Science and Engineering

# Talk Show

A talk show featured comedian Takushi Tanaka (*Ungirls, Angāruzu*/ School of Engineering graduate), joined by MC Kana Kubota (School of Letters graduate) and President Ochi.



# Other events

Over two days, students showcased a variety of performances. Booths featured local specialties and popular gourmet foods from Hiroshima and Fukushima Prefectures, areas with which the university has partnerships. Research facilities and museums were open to the public, while different undergraduate schools organized exhibitions and events.

# IDECA x SMASO Open Day

International students from the IDECA programs and the Graduate School of Innovation for Practice for Smart Society (SmaSo) also hosted performances and booths.



# University Festival



The University Festival, held near the School of Integrated Arts and Sciences, featured live performances, food stalls, and both indoor and outdoor events.



# Global Reunion 2024, HU welcomes alumni from around the world

Representatives from Hiroshima University's eight Overseas Alumni Associations—Indonesia, Korea, Cambodia, Taiwan, China, Brazil, Vietnam, and Malaysia.

The Hiroshima University Global Reunion 2024 took place on November 1 in Hiroshima City as part of the university's 75th anniversary celebrations. A total of 130 people attended, including around 60 international alumni from 23 countries and regions, along with host families, former academic supervisors and friends, members of Sendajuku, and others connected to the university.

The event began with an opening speech by President Mitsuo Ochi. "It is a great pleasure to see all of our international alumni reunited again in Hiroshima this year to celebrate our 75th anniversary," he said. After his address, representatives from HU's eight Overseas Alumni Associations (Indonesia, Korea, Cambodia, Taiwan, China, Brazil, Vietnam, and

Malaysia) took the stage, and on behalf of the international alumni, Chairman Ou Yuan Yun of the Taiwan Alumni Association delivered a congratulatory speech.

Executive Vice President for Global Initiatives Shinji Kaneko closed the event and highlighted that HU has established 22 overseas bases worldwide, including new Overseas Ecosystems in China and Vietnam, created this fiscal year to serve as satellite campuses.

"In the future, we will expand Hiroshima University's global network by further strengthening cooperation not only with overseas universities and companies, but also with alumni and overseas alumni associations," said Kaneko.



Find out more about the reunion here:



A rock-paper-scissors tournament with a chance to win HU merchandise!

# University Presidents for Peace Conference 2024

University presidents discuss the role of higher education in promoting sustainable world peace.



Hiroshima University hosted the inaugural University Presidents for Peace Conference on August 6, bringing together about 30 participants—including presidents and vice presidents from 10 universities across 7 countries/regions (including HU).

In his opening remarks, HU President Mitsuo Ochi stressed the importance of international collaboration and cultural exchange in achieving world peace. "I strongly hope that university leaders and young people from around the world will visit Hiroshima, experience the reality of the atomic bombing, and have opportunities to think and act on peace and sustainability," he said.

University leaders presented their approaches to peace and sustainability, and Shinji Kaneko, HU's Executive

Vice President for Global Initiatives, proposed future initiatives to create international exchange opportunities for students and young researchers, aiming to develop leaders who can contribute to building a peaceful and sustainable future.

Discussions focused on the role of universities in promoting sustainable world peace. Key topics included providing peace education opportunities for students in Hiroshima, creating platforms for knowledge sharing among faculty and sustainability offices, engaging diverse stakeholders, and implementing localized actions with minimal resources. The meeting concluded with the adoption of the "University Presidents for Peace Declaration," reflecting the content of these discussions.



Round table discussion at the inaugural event

## University Presidents for Peace Conference - Africa Chapter

The University Presidents for Peace Conference - Africa Chapter was held on November 25 as part of the "Hiroshima University Africa Day." Leaders from African institutions, including the Pan-African University and Tlemcen University, reaffirmed their support for the August declaration. University presidents highlighted their campuses' features, shared peace and sustainability initiatives, and explored opportunities for collaboration between African universities and HU.

### HU first to sign exchange agreement with the African Union

Hiroshima University has become the **first Japanese university to sign an exchange agreement with the Pan-African University**, strengthening ties with the African Union and fostering academic collaboration. The agreement, finalized on November 25, will allow African students to study and receive academic guidance at HU.

Pan-African University President Jean Kouliadiati with HU President Ochi



First conference



Second conference



Learn more about both conferences here:

# HU and UNITAR partner for peacebuilding training



Hiroshima University has signed an agreement with the United Nations Institute for Training and Research (UNITAR) to collaborate on the implementation of the Program for Global Human Resource Development for Peacebuilding and Development in FY2024. Established by Japan's Ministry of Foreign Affairs (MOFA), this initiative seeks to strengthen civilian capacity in peacebuilding and development.

HU President Mitsuo Ochi and UNITAR Hiroshima Office Head Chisa Mikami at a joint press conference announcing the partnership.

The program includes various training courses and activities designed to support the career development of individuals aspiring to work in international organizations dedicated to peace and development.

Learn more about the project here:



# HU awards honorary doctorate to Indonesia's Minister of Industry

On September 24, Hiroshima University conferred an honorary doctorate to H.E. Mr. Agus Gumawang Kartasasmita, Minister of Industry of the Republic of Indonesia, in recognition of his contributions to Japanese industry, Hiroshima University, and the strong partnership between Indonesia and HU. Minister Kartasasmita has played an important role in promoting Japanese investment in Indonesia, increasing exports to Japan, developing

industrial parks, technology transfer, and EV development.

The visit also celebrated a new agreement signed on September 6 with the Indonesian Ministry of Industry to launch a scholarship program, under which HU will host five Indonesian administrative officers annually.



**Minister Kartasasmita with HU students**

Hiroshima University is currently home to 113 students from Indonesia.



# HU selected for Japanese government's advanced medical training project



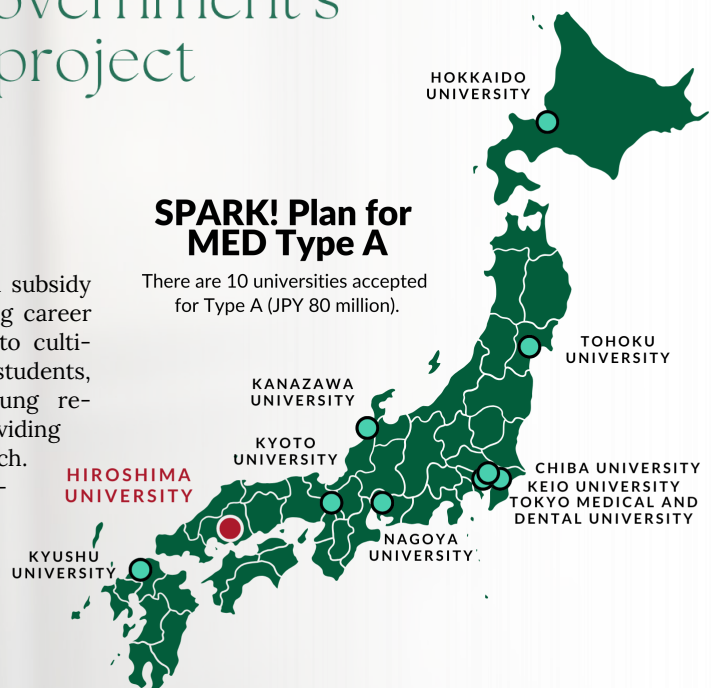
**HU's project was the only one selected in the Chugoku and Shikoku regions**

Hiroshima University's "Initiative for Training Human Resources Aimed at Integrating Clinical and Basic Sciences Based on Peace Science—SPARK! Plan for MED" has been selected as the only project in the Chugoku-Shikoku region for the Japanese Ministry of Education, Culture, Sports, Science and Technology's "Project for the Formation of Advanced Medical Human Resources Development Bases -Type A." From 2024 to 2030, the ini-

tiative will receive an annual subsidy of 80 million yen. By offering career support, the program aims to cultivate and retain medical students, graduate students, and young researchers, while also providing faculty more time for research. Additionally, it seeks to promote workstyle reforms for physicians, ultimately contributing to the realization of innovative and advanced medical care.

## SPARK! Plan for MED Type A

There are 10 universities accepted for Type A (JPY 80 million).





# By the numbers: Research at Hiroshima University

2,945

Academic  
Papers in 2024

1,693

Faculty  
Members

1.74

Papers per  
Faculty

(As of January 2025)

## An inside look into Hiroshima University's research numbers

Hiroshima University is one of the largest comprehensive research universities in Japan, consistently producing numerous academic papers. Our increasing output highlights HU's significant research activities in recent years.

Trends in SCl papers and papers per faculty  
(including A&HCI and ESCI)



## HU ranks 10th in clinical medicine paper count among 82 Japanese universities with medical schools

HU ranked 10th among 82 Japanese universities with medical schools and 1st in the Chugoku-Shikoku region for the most number of clinical medicine papers published in Q1 journals in 2021. This ranking was announced by the editorial team of "Doctors LIFE-STYLE" on the "m3.com" site, based

on data compiled by analytics company Clarivate (published in 2021). The data primarily reflects papers published in 2021 and some early-access papers from 2022. Q1 journals refer to high-profile journals that rank in the top 25% based on the Journal Impact Factor.

### Clinical Medicine

Number of papers published in Q1 journals

Ranking	University	Number of Q1 journal articles	Ranking	University	Number of Q1 journal articles
1	The University of Tokyo	1,518	11	Tokyo Medical and Dental University	667
2	Kyoto University	1,430	12	Yokohama City University	617
3	Osaka University	1,174	13	Chiba University	561
4	Keio University	1,109	14	Kobe University	531
5	Nagoya University	921	15	Okayama University	515
6	Kyushu University	826	16	University of Tsukuba	510
7	Tohoku University	824	17	Kumamoto University	488
8	Hokkaido University	792	18	Kindai University	458
9	Juntendo University	721	19	The Jikei University School of Medicine	441
10	<b>Hiroshima University</b>	<b>700</b>	20	Kanazawa University	420

## 1<sup>st</sup> in the Chugoku- Shikoku region

HU also leads the Chugoku-Shikoku region in the number of medical papers and studies published in the top 10% of journals.

Find more  
about HU in  
our Integrated  
Report





## When is a hole not a hole? Researchers investigate the mystery of 'latent pores'

Researchers have explored how a particular chemical can selectively trap certain molecules in the cavities of its structure—even though in normal conditions it has no such cavities.

This innovative material with now-you-see-them-now-you-don't holes could lead to more efficient methods for separating and capturing chemicals right across industry. Their study was published in *Nature Communications*.

In recent years, there has been increased interest in the fabrication of synthetic materials with pores—tiny holes—within the molecules themselves. These pores have specific sizes, shapes and other chemical attributes wherein only certain compounds whose characteristics match the 'hole' can fit. Think of the toddler's classic hammer-and-bench toy, with square, circular, triangular and star-shaped wooden pegs that can each only fit in the correspondingly shaped hole in the bench. But in this case, fitting into a given pore depends on many more characteristics than just the shape of the toddler's peg, allowing certain pores to select for some substances over others—what chemists call the “selectivity” of “molecular encapsulation,” or just selective encapsulation.

Recently, one material in particular has piqued the interest of researchers: macrocyclic molecular crystals. These are solids formed from large molecules with a significant number of atoms, often including elements like carbon, nitrogen or oxygen, arranged in a ring. The interior of this ring—in general—forms the cavity or pore where only certain substances “fit.”

On top of this, there are types of macrocyclic molecular crystals where the pore only appears in the presence of certain conditions such as heat or pressure or that of other, “guest” molecules. The rest of the time, there is no pore. This now-you-see-it-now-you-don't type of cavity is called a “latent pore”.

“By designing materials with latent pores, we potentially can create systems that respond dynamically to environmental changes, enhancing their functionality and selectivity,” said Takeharu Haino, a materials scientist with the Graduate School of Advanced Science and Engineering. “The trouble is: until now, we didn't always know why this latency was happening.”



**Takeharu Haino**

Professor,  
Graduate School of  
Advanced Science  
and Engineering

To investigate what was going on, the researchers opted to have a deeper look at a particular type of latent-pore-bearing macrocyclic molecular crystal: planar tris(phenylisoxazolyl)benzene. They chose this one to investigate because other options involve very large molecules, but planar tris(phenylisoxazolyl)benzene is a simple flat molecule. It also has already been used in development of organic semiconductors, light-emitting diodes (LEDs) and a number of other, proven, industrial applications.

They wanted to investigate the ability of the substance's latent pores to separate two different forms of decalin—a colourless liquid at room temperature that is often used as a solvent, as well as in the production of various resins and polymers.

It also comes in two different structures—the same number of atoms, but arranged differently. There is cis-decalin, where a grouping of hydrogen and carbon atoms lies on the same side of the molecule, and also trans-decalin, where the hydrogen and the carbon atoms lie on opposite sides. This changes the decalin's physical and chemical properties and so makes the substance a good candidate for exploring selective encapsulation.

They used two types of x-ray diffraction analysis to explore the encapsulation process as it happened.

What they found was that planar tris(phenylisoxazolyl)benzene is a superb selector, correctly encapsulating the one form of decalin over the other 96 times out of a hundred. They also discovered that it was the intermolecular forces affecting the substance—the various interactions between the molecules that are strong but still weaker than atomic within the molecules that contributed to the pore's stability and determines its remarkable selectivity. Other materials may be porous and selective but remain insufficiently stable for industrial applications. This substance ticks all the selective-encapsulation boxes.

This particular proof of concept could be used in a wide range of applications, such as gas entrapment, oil separation, and removal of trace elements from water, but the researchers want to seek out unique encapsulation functions that can only be achieved with latent pores.



## Team uses achiral hard banana-shaped particles to assemble skyrmions and blue phases

Potential applications in photonics and memory devices

A research team has discovered that achiral hard banana-shaped particles can spontaneously form exotic structures like skyrmions and blue phase III phases. Skyrmions are tiny vortex-like structures found in various condensed-matter systems. Blue phase III is an amorphous phase of liquid crystals that possesses strong optical activity. Achiral particles are particles that can be superimposed on their mirror image. Their work was published in *Nature Communications*.

They used extensive particle-based simulations to demonstrate that achiral hard banana-shaped particles, governed solely by excluded-volume interactions, spontaneously stabilize skyrmion structures.



Courtesy of Marjolein Dijkstra/WPI-SKCM<sup>2</sup>



Marjolein Dijkstra

Professor, WPI-SKCM<sup>2</sup>

Skyrmions typically arise from chiral interactions, that is, a molecular interaction that occurs between molecules that both possess chirality. These structures are topologically protected. An energy barrier has to be overcome to remove the vortex-like structure. Because of these qualities, these systems have potential applications for information storage and processing. Researchers attribute the emergence of skyrmions in such systems to the absence of inversion symmetry (or chirality) and the presence of interactions that arise because of spin orbit coupling.

“These structures, comprising a racemic mixture of left- and right-handed skyrmions, show resilience against thermal fluctuations while remaining responsive to external fields, offering intriguing possibilities for manipulation,” said Marjolein Dijkstra, from Utrecht University and Hiroshima University’s International Institute for Sustainability with Knotted Chiral Meta Matter (WPI-SKCM<sup>2</sup>).

Without the geometric frustration that results from confinement, the team noted that a blue phase III may emerge. The team’s findings provide valuable insights into stabilizing skyrmion lattices and blue phases. Looking ahead, they hope to actually use these liquid crystal skyrmions in memory and information processing devices.

## NPJ SCIENCE OF FOOD

VOL 8, 51 (2024)



## Adding sweetener to coffee enhances ‘night-owl’ effects of caffeine

Adding sugar or artificial sweeteners to coffee disrupted the body clocks in mice more than coffee on its own, researchers have found, with it causing day and night to be reversed in some mice. If this holds for humans as well, adding sweetener to coffee would have significant health ramifications. The findings were published in *npj Science of Food*.

If you need a morning boost, or a late-night pick-me-up for work or school, many turn to coffee or grab an energy drink containing caffeine — well known for its “night-owl” effects. Experiments on animals and cells have shown how caffeine works to extend the waking period of the internal body clock. But a group of researchers discovered that changes in the activity rhythms of mice were affected even more strongly when they mixed caffeine with sugar or other sweeteners.

The team gave sweetened caffeine water containing 0.1% caffeine, which is half the concentration of espresso and either 1% sucrose, which is one-tenth the concentration of most energy drinks, or 0.1% saccharine.

“The added sweetness did not change the amount of this

caffeine water that the mice drank, so the effects could not be the result of just drinking more caffeine,” said Yu Tahara, associate professor in the Graduate School of Biomedical and Health Sciences. “It had to be the combination of caffeine and sweetener.”

The mice that had consumed the caffeine-sweetener mix experienced a very long “free-running” sleep-wake period of 26-30 hours, and some even switched from a nocturnal circadian rhythm to a daytime-based one.

These effects continued to happen even when the mice were subjected to persistent darkness, suggesting that the caffeine-sweetener effect is operating independently of the central regulator of the internal body clock, the suprachiasmatic nucleus (SCN), which lies in the hypothalamus in the brain. That central regulator itself is normally governed by light and the natural day-night cycle, and it in turn ensures a synchronization of clocks situated in organ tissue elsewhere in the body.

The researchers believe that the combination of caffeine and sweetness may be creating a conflicting signal within the body possibly mediated dopamine. They now aim to explore this link and the effect is replicated in humans.



Yu Tahara

Associate Professor,  
Graduate School of  
Biomedical and  
Health Sciences



## Crustacean with panda-like coloring confirmed to be a new species



**Decades after it was first found in Japan, a crustacean species with unique black-and-white coloring resembling a panda has been confirmed to be new to science.**

Decades after it was first found in Japan, a species of crustacean with unique black-and-white coloring that resembles a panda has been confirmed to be new to science. Melitid amphipods are shrimp-like crustaceans found worldwide. The newly classified *Melita panda* — named after the charismatic mammal — was first found in the 1990s.



New species of amphipod, *Melita panda*  
© Ko Tomikawa

Details of the discovery and morphological analysis were published in [ZooKeys](#).

The discovery of the *Melita panda* highlights the importance of studying species taxonomy, which is the naming and classification of organisms, for conservation efforts. It is impossible to know if a species is in danger of disappearing if it hasn't even been identified.

“Despite the fact that biodiversity conservation is a global issue, species diversity and other aspects of biodiversity are still not fully understood. As a first step toward species conservation, we conducted a taxonomic study of amphipod Crustacea, which boasts high species diversity around Japan,” said Ko Tomikawa, a professor at the Graduate School of Humanities and Social Sciences.

Before the discovery of *Melita panda*, there were 63 known species of *Melita* amphipods, with 16 of those found in Japan. *Melita panda* was found in intertidal waters in Wakayama Prefecture, Japan. There are likely even more unidentified and undescribed species of *Melita* amphipods in Japan's coastal waters.

“Study on the amphipod Crustacea in the coastal zone of Japan is lagging behind. In order to accurately assess species diversity, taxonomic studies are necessary. We hope the discovery of a new species of amphipod with the familiar coloring of the panda pattern will increase the public's interest in biodiversity and taxonomy,” said Tomikawa.

To identify the *Melita panda*, researchers did both a morphological study and molecular phylogeny using genomic DNA. The morphological description of *Melita panda* found unique features including its panda-like colors and other physical characteristics, while molecular phylogeny is used to identify how closely related the *Melita panda* is to other *Melita* amphipods. This information is used to create a phylogenetic tree or evolutionary tree of the known *Melita* amphipods. Phylogenetic trees are diagrams that show the evolutionary relationships between species.

The molecular phylogeny found that *Melita panda* is closely related to two other *Melita* amphipods, the *Melita nagatai* and *Melita koreana*. The panda-like coloring distinguishes *Melita panda* from these two other amphipods, along with other physical differences. Its gnathopods, which are claws that extend from the second thoracic segment, sit more forward than other *Melita* amphipods, covering another one of its appendages. Its setae, which are hair-like structures that look like bristles, are also distinguishable from other *Melita* amphipods. Together, the *Melita nagatai*, *Melita koreana*, and newly discovered *Melita panda* form a monophyletic group. This means they have a common evolutionary ancestor. In this case, it is the *Melita hoshinoi*.

Looking ahead, researchers will continue to study the *Melita panda*.

“Hopefully, a detailed study of the ecology and behavior of *Melita panda* will reveal the reason for its panda pattern,” said Tomikawa.

Beyond *Melita panda*, Tomikawa emphasized that there is still more to study.

“Further taxonomic studies on amphipods in uninvestigated areas are expected to lead to the discovery of additional new species. Continued taxonomic studies are expected to elucidate the biodiversity in the coastal environments of the Japanese archipelago and provide important basic data for species conservation,” he said.



**Ko Tomikawa**

Professor, Graduate School of Humanities and Social Sciences

## Job embeddedness impacts voluntary turnover in the midst of job insecurity



During the Great Resignation, the United States experienced a significant uptick in voluntary employee resignations about one year into the Covid-19 pandemic. The early stages of the pandemic, however, were plagued by high unemployment. In order to stay competitive, business leaders were compelled to identify which factors affect an employee's decision to voluntarily leave or stay in a particular position when job insecurity is high.

To better understand this phenomenon, researchers performed two studies to better characterize the effects of job embeddedness, or factors that influence an employee's commitment to their job, on voluntary turnover in the face of job insecurity. The research team based the framework of their study on the conservation of resources theory, which states that individuals accumulate and guard valuable resources to prevent future resource loss. The results were published in the *Journal of Organizational Behavior*.

In the first study, the researchers analyzed the effect of on-the-job embeddedness between job insecurity and job search. "We found that job search mediates the positive relationship between job insecurity and voluntary turnover and that employees with higher...

on-the-job embeddedness, such as links, fit, and sacrifices associated with leaving the organization, are less likely to search for jobs despite job insecurity," said Vesa Peltokorpi, professor in the Graduate School of Humanities and Social Sciences.

In the second study, the authors used a new group of full-time employee study participants to determine the effects of both on- and off-the-job embeddedness, including at-home and community commitments and relationships, between job insecurity and an employee's turnover intentions. With this second study, the researchers were able to not only replicate the findings of the first study but also measure the effects of both types of embeddedness on turnover intentions and voluntary turnover.

Replacing employees due to voluntary turnover is expensive: by some estimates, the cost to employers may be as high as 90 to 200% of an employee's annual salary. While the study authors are confident that this work will help business leaders and academics better understand voluntary turnover motivations, the team concedes there is more work to be done.



**Vesa Peltokorpi**  
Professor, Graduate School of Humanities and Social Sciences



## Locally optimized urban form reduces carbon dioxide emissions

As CO2 levels and energy consumption drive climate change, interest in energy-conserving urban planning is growing. Unfortunately, research in energy-optimized urban forms is lacking, often only focusing on macro-scale factors and lacking standardization. To address this, researchers designed a study to investigate the effects of urban form on carbon emissions using more detailed assessment methods in three different U.S. cities. They published their results in the *Journal of Environmental Management*.

"This study employs the Local Climate Zones (LCZ) framework to investigate the relationship between urban form and CO2 emissions at the micro level," said Ayyoob Sharifi, professor at the IDEC Institute. The LCZ framework is a way of universally classifying urban forms, ten of which are built (such as low-rise buildings, high-rise buildings and heavy industry) and seven that are natural. The research team applied this framework to Baltimore, Indianapolis, and Los Angeles, using remote sensing methods, such as satellite imagery data. These cities were selected because of their differences in both climate and population density to determine whether or not differences in LCZ could account for differences in CO2 emissions over

the course of an entire year or individual seasons.

"The results demonstrate that the relationship between urban form and CO2 emissions is complex and dynamic. Patterns could be different depending on the context and factors such as climatic conditions and size and function of the city. Patterns observed in a specific city cannot necessarily be generalized to other cities. This means that one-size-fits-all approaches cannot be applied to determine optimized urban forms," said Sharifi. The study revealed that urban open and green spaces are paramount.



Ranks in the top 1% worldwide by citations

HU Professor Ayyoob Sharifi has been named among Clarivate's Highly Cited Researchers 2024. It recognizes researchers who have published multiple papers ranking in the top 1% by citations in their fields and publication years over the past decade. Only a select group of scholars with exceptional achievements is included. In 2024, 6,886 researchers made the list, including 78 primarily affiliated with Japan institutions.

Issue 1 | January 2025

## Feature

# HIROSHIMA UNIVERSITY'S RESEARCH TRAILBLAZERS

Meet our researchers making waves in science and technology. Chosen for prestigious government programs, they're working on groundbreaking projects that could shape the future of society.

At Hiroshima University, researchers are working on exciting projects supported by prestigious Japanese government programs designed to foster innovation in science and technology. In this series, we'll introduce you to some who are part of these initiatives. The **JST FOREST (Fusion Oriented Research for Disruptive Science and Technology) Program** provides young researchers with long-term support for bold, cross-disciplinary projects, while the **JST Strategic Basic Research Programs**—including **CREST**, **PRESTO**, and **ACT-X**—address major scientific and societal challenges. Meanwhile, the **AMED Advanced Research & Development Programs for Medical Innovation**—like **AMED-CREST** and **PRIME**—focus on creating new drugs, medical devices, and transformative technologies through cross-disciplinary collaboration. These programs are helping to support research that has the potential to bring meaningful advancements in science and medicine.

Get to know more about our Leading Researchers [here](#).



*\*Answers in the questions were edited for clarity and brevity.*

Selected for **JST's FOREST Program Fund**

## Makoto Chikaraishi

Professor

Graduate School of Advanced  
Science and Engineering



Learn more about Chikaraishi's research [here](#).



Engineer Makoto Chikaraishi specializes in urban and transportation studies. He examines activity-travel behavior and how daily behavioral decisions collectively shape society.

### Q: What scientific problem are you trying to answer?

**A:** I believe the evolution of transportation systems and the creation of cities are two of the most significant innovations shaping social systems. However, we still have limited understanding of the micro-mechanisms behind how these changes have influenced society. My research aims to explore this both theoretically and empirically.

### Q: Are there any exciting upcoming projects you would like to share?

**A:** We've recently launched a new research project under JST FOREST (FY2024–FY2031) focused on how urban and transport systems shape collective actions and their impacts. One intriguing hypothesis we're testing is that higher mobility may not always lead to improved collective actions or greater impacts.

### Q: From your perspective, what are the economic or social implications of your research?

**A:** Currently, urban and transport systems are mainly designed to minimize negative externalities. My research highlights the need to shift attention toward the positive aspects when designing these systems.

### Q: How does your work align with the UN Sustainable Development Goals (SDGs), and how important is that to you?

**A:** Our work is closely aligned with it, as urban and transportation systems significantly shape daily behavior, directly impacting various SDG indicators.

### Q: What real-world problems do you hope your research will address in the near future?

**A:** At the moment, I'm focused on local revitalization, as the decline of regional areas is often tied to poorly designed urban and transport systems.

### Q: What advice would you give to young researchers?

**A:** I believe the most important thing is to enjoy and love what you do, with studying hard coming next. Studying hard without fascination can feel empty.

Selected for **JST's FOREST Program Fund**

## So Fujiyoshi

Assistant Professor

Center for the Planetary  
Health and Innovation Science,  
The IDEC Institute (PHIS)



Learn more  
about Fujiyoshi's  
research [here](#).



Ecologist So Fujiyoshi's research focuses on environmental microbiology, studying how microbial communities live in drinking water and atmospheric environments while exploring their hidden potential.

### Q: What scientific problem are you addressing?

**A:** I'm investigating how microorganisms live and interact within environmental systems, with a focus on their potential roles in atmospheric processes. My work is driven by a deep curiosity about how microscopic life influences Earth's larger systems, offering fresh insights into environmental science.

### Q: Are there any aspects of your research that particularly surprised you?

**A:** The highly localized nature of atmospheric microorganisms has highlighted the need for globally diverse sampling sites. What's particularly challenging is that there are no standardized methods for this research yet—we're pioneering fundamental data collection approaches while exploring these microbe-atmosphere connections.

### Q: What real-world challenges do you aim to tackle with your research in the near future?

**A:** By studying microorganisms that drive environmental processes, I aim to explore new ways to understand how human activities can better adapt to and harmonize with interact with Earth's systems. This work could pave the way for sustainable solutions that benefit both the planet and public health.

### Q: Could you share your thoughts on receiving the JST FOREST Program grant in 2022?

**A:** Receiving the FOREST Program grant has been invaluable both professionally and personally. Its seven-year funding framework fosters crucial multi-disciplinary collaboration and provides continuous engagement with expert advisors and researchers, building a network that has greatly advanced my work.

### Q: What specific aspect of your research was highlighted in this program? Could you share some insights into that work?

**A:** I focus on the critical relationship between microorganisms and cloud formation. The program's interdisciplinary approach greatly complements our work, enabling a deeper analysis of these complex environmental interactions.

Selected for **AMED PRIME Fund**

## Tetsuya Yoshimoto

Assistant Professor  
(Special Designation)

Innovation & Precision Dentistry,  
Hiroshima University Hospital



Learn more  
about Yoshimoto's  
research [here](#).



Periodontist Tetsuya Yoshimoto investigates the molecular mechanisms of osteocyte senescence, a key area closely tied to osteoporosis. His work is especially relevant to addressing the challenges of an aging society, such as Japan's.

### Q: What scientific problem are you trying to solve?

**A:** I'm working to uncover how aging triggers osteocyte senescence and what factors accelerate this process. My research revealed that osteocytes influence immune responses and may contribute to bacterially induced bone destruction—a finding that has significantly shaped my current focus.

### Q: What do you find most exciting or rewarding about your work?

**A:** During my medical studies, I was fascinated to learn that bones aren't just structural but dynamic organs with complex roles. Uncovering the mysteries of our own bodies is deeply exciting, and the thought that my research could make a meaningful impact on society keeps me motivated.

### Q: Are there any aspects of your research that particularly surprised you?

**A:** I was surprised to discover a potential link between the immune system and osteocyte aging. While osteocytes are typically seen as bone metabolism regulators, my findings suggest they have a much broader role, possibly influencing various diseases—a revelation that's both unexpected and exciting.

### Q: From your perspective, what are the economic or social implications of your research?

**A:** My work could pave the way for new treatments to slow osteoporosis progression, potentially extending healthy lifespans and reducing healthcare costs. By addressing the challenges of aging populations, this research supports a more sustainable and inclusive society.

### Q: What advice would you give to young researchers who aspire to make a similar impact in their fields?

**A:** Stay curious and keep asking "why." Embrace failures as learning opportunities and stay resilient through challenges. Building an international network can also open doors to fresh ideas and valuable collaborations.

## UNLOCKING THE COSMOS

# A Glimpse into Hiroshima's Astrophysical Science Center

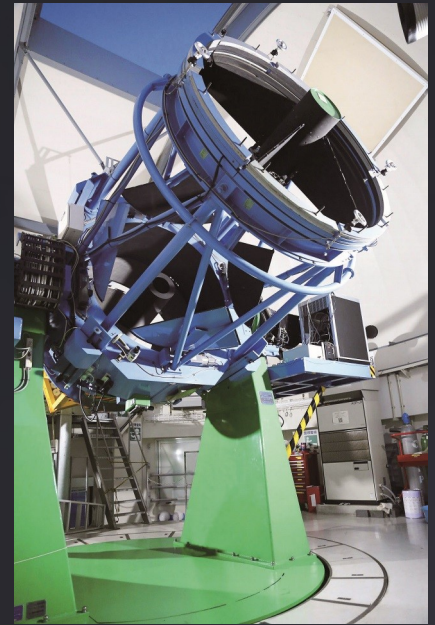
Have you ever wondered what it takes to unlock the universe's secrets? At Hiroshima University's (HU) Hiroshima Astrophysical Science Center (HASC), sophisticated technology meets unrelenting curiosity to explore everything from black holes to gamma-ray bursts.

HASC's Kanata telescope at the Higashi-Hiroshima Astronomical Observatory is built for action when a new transient event is discovered. With its quick-moving design and rotating dome, it can reposition faster than most telescopes with similar sizes. It's equipped to capture visible light, near-infrared radiation, and even polarization data, making it an incredible tool for diving into space phenomena that are here one moment and gone the next. HU's contributions to NASA's Fermi Satellite, including the development of its primary sensors by Professor Emeritus Takashi Oosugi, have

supported its mission to detect over 6,000 gamma-ray-emitting celestial bodies, significantly advancing our understanding of high-energy phenomena like black holes.

But it's not just about the science—it's about the people. Students at the center get hands-on experience building instruments, collecting original data, and publishing their findings. And twice a year, the observatory opens its doors to the public, giving visitors a chance to marvel at the Moon's craters, Saturn's rings, and other cosmic wonders.

In this Q&A, astrophysicist and HASC Director Koji Kawabata gives us a closer look at what makes their institute a special place. From groundbreaking discoveries to the joy of stargazing, find out how their vibrant team is bringing the universe's mysteries closer to home.



*Exploring gamma-ray bursts and other cosmic phenomena, and inspiring students and the public with space research.*

## Q&A

We spoke with HASC director Professor **Koji Kawabata** to explore the institute's pioneering work.



**Q: What makes the observatory a unique and exciting place for students to study?**

**A:** Astronomical research often relies on databases and archived data these days, but university observatories offer something special—the chance for students to collect original data based on their own ideas. They can develop and install their own observational equipment, carry out experiments, and gain hands-on experience with tasks like maintaining and operating complex instruments and systems.

**Q: What mentorship or support can students get in the observatory's programs?**

**A:** Students receive plenty of support beyond their supervisors, with staff and senior students working together to guide Kanata Telescope operations, equipment maintenance, and data analysis. Observations are conducted remote-

ly from the Higashi-Hiroshima campus, and beginners are trained by experienced students and staff. We also involve students in hands-on tasks at the observatory, like maintenance and stargazing events, and often offer part-time wages for their contributions.

**Q: What are your recent discoveries that are drawing interest from researchers?**

**A:** Using data from the IXPE satellite, launched in 2021, we're exploring the magnetic field structure of the Crab Nebula and the jet ejection mechanisms of supermassive black holes. Our research also delves into supernova explosions from massive stars nearing the end of their life cycles. Recently, we detected significant polarization in the optical afterglow of a gamma-ray burst—a phenomenon linked to the creation of new black holes. This breakthrough, which sheds light on mag-

netic fields in the emitting region, was featured in *Nature Astronomy* in November 2023.

**Q: How does the observatory's work inspire community interest in science?**

**A:** As science and technology advance, I worry that they can feel intimidating to kids and the general public. Astronomy, with its vast scale and accessible wonders, offers a great way to spark interest in science. Since the Higashi-Hiroshima Observatory opened, we've partnered with the city to host outreach activities, bringing the excitement of discovery to the community. We aim to continue serving as Hiroshima University's bridge to the local community and inspire curiosity, especially among children.





# Hiroshima University at a Glance

(as of May 1, 2024)

**12** SCHOOLS  
(UNDEGRADUATE)

- Integrated Arts and Sciences
- Letters
- Education
- Law
- Economics
- Science
- Medicine
- Dentistry
- Pharmaceutical Sciences
- Engineering
- Applied Biological Science
- Informatics and Data Science

**4** GRADUATE  
SCHOOLS



- Integrated Sciences for Life
- Biomedical and Health Sciences
- Humanities and Social Sciences
- Advanced Science and Engineering

**1** RESEARCH  
INSTITUTE

- Graduate School of Innovation and Practice for Smart Society

STUDENTS

**15,000+**

UNDERGRADUATE AND GRADUATE



Hiroshima University hosts students worldwide, with the highest number coming from CHINA, INDONESIA and VIETNAM.

INTERNATIONAL STUDENTS  
**1,900+**

FROM 90+ COUNTRIES & REGIONS  
(as of November 1, 2023)



INTERNATIONAL  
EXCHANGE AGREEMENTS

369 AGREEMENTS WITH  
413 INSTITUTIONS IN

**56** COUNTRIES  
& REGIONS



OVERSEAS BASES

**22**

IN 14 COUNTRIES & REGIONS



QS WORLD  
UNIVERSITY  
RANKINGS  
2025

**474**

IN THE WORLD

ADMISSIONS

For admissions inquiries or to learn more about the graduate degrees offered at HU, please click or scan the QR codes below.

THE UNIVERSITY IMPACT  
RANKINGS 2024



TOP  
**100**

IN THE WORLD  
FOR 7 SDG  
CATEGORIES

Admissions



Graduate  
Degrees at HU



## Campus location & access

# Hiroshima University



### Tokyo to Hiroshima

- ✈ 70 minutes by plane
- 🚄 4 hours by bullet train

### Osaka to Hiroshima

- 🚄 90 minutes by bullet train

### Hiroshima Airport to Higashi-Hiroshima Campus

- 🚗 30 minutes by public transport



Higashi-Hiroshima Campus  
Higashihiroshima City

### Hiroshima Airport to Kasumi Campus · Higashi-Senda Campus

- 🚗 50 minutes by public transport

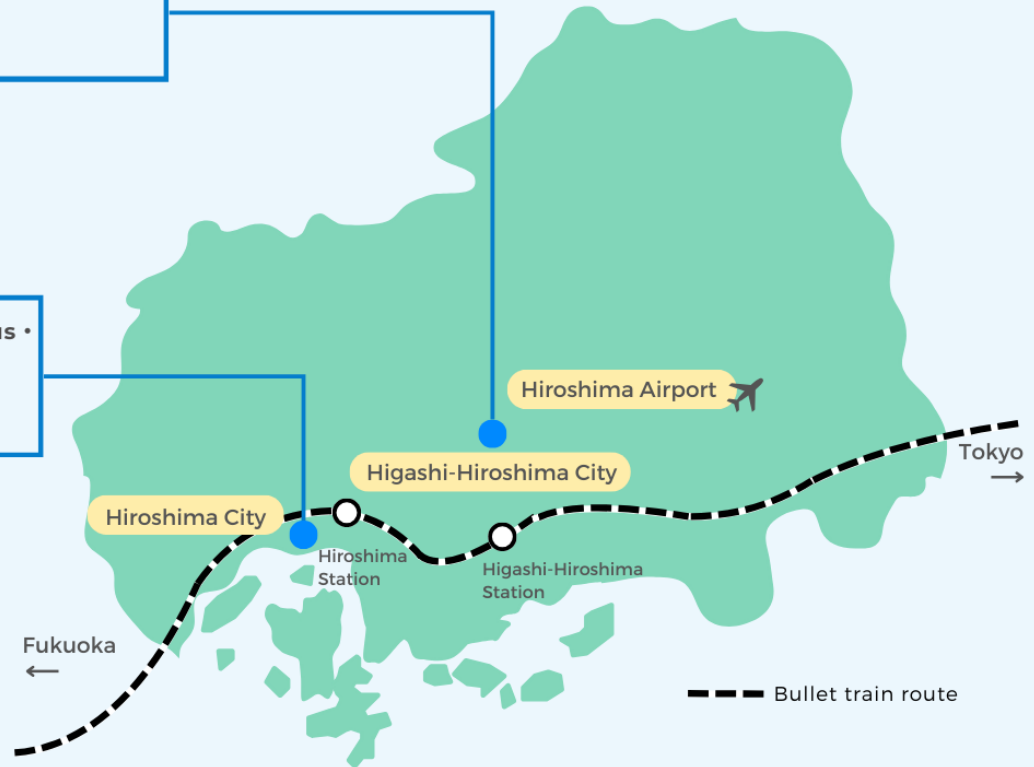


Kasumi Campus  
Hiroshima City



Higashi-Senda Campus  
Hiroshima City

## Hiroshima



## WHAT'S NEW ON CAMPUS



**20**  
**SEP**  
2024

### Autumn Term Commencement Ceremony

Hiroshima University celebrated the graduation of 312 students, including 30 undergraduates and 282 graduate students. Among them, 211 were international students.

**1**  
**OCT**  
2024

### Autumn Term Entrance Ceremony

Hiroshima University welcomed 313 new students at the 2024 Autumn Term Entrance Ceremony, including 269 international students.

### HU Original Goods

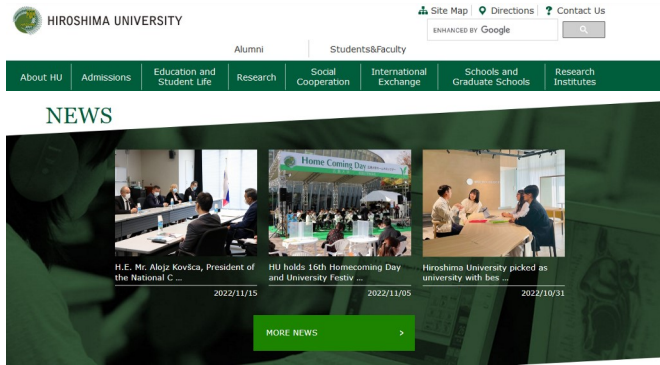
HU has launched a new line of original merchandise, including a green hoodie and dry t-shirt. Both items incorporate the university's emblem and its signature green color, blending tradition with a timeless design aesthetic.

# FIND MORE ABOUT HU

## HU OFFICIAL WEBSITE – ENG

Latest News, Events and Research, as well as links to each university section are available from this webpage.

<https://www.hiroshima-u.ac.jp/en>



## RESEARCHER DIRECTORY

Introducing the Researcher Directory, HU's search system for exploring the fields and expertise of around 1,900 affiliated researchers. Search by topic, SDGs, carbon neutrality, discipline, alphabetical order, or keywords.

<https://www.guidebook.hiroshima-u.ac.jp/en>



## UPDATES FROM OUR LABORATORY

This webpage is the source for visitors worldwide to stay updated about what happens in the lab at HU.

<https://www.hiroshima-u.ac.jp/en/laboratory-updates>



## Donate to Hiroshima University

Your donation helps students overcome financial challenges, supports research, sports, peace initiatives, and more. Contributions to the HU Fund support both local and international students and advance important educational programs.



Donate today to make a difference!

<https://www.hiroshima-u.ac.jp/en/yakudou>



## SOCIAL MEDIA ACCOUNTS



HU Facebook  
[@HiroshimaUniv.en](https://www.facebook.com/HiroshimaUniv.en)



HU Instagram  
[@hiroshima\\_univ](https://www.instagram.com/hiroshima_univ)

HU Research Facebook  
[@HiroshimaUniversityResearch](https://www.facebook.com/HiroshimaUniversityResearch)



HU LinkedIn  
[HiroshimaUniv.en](https://www.linkedin.com/company/HiroshimaUniv.en)



HU X (formerly Twitter)  
[@HiroshimaUnivEn](https://twitter.com/HiroshimaUnivEn)

HU Research Twitter  
[@HiroshimaUniv](https://twitter.com/HiroshimaUniv)



HU YouTube  
[HiroshimaUniv](https://www.youtube.com/HiroshimaUniv)

[Connect](#) with us!



## 75+75th Anniversary Project Commemorative Goods

Available now are a 315-piece jigsaw puzzle and a scarf, both featuring the most iconic sites of HU. These items, created by Hiroshima-based illustrator Hirofumi Kamigaki, were specially designed to commemorate HU's 75+75th anniversary.



HIROSHIMA UNIVERSITY UPDATE



# Hiroshima University 75+75th Anniversary Project



Introducing new  
catchphrase and logo

Born under a new system in 1949, Hiroshima University's history dates back to 1874, when the Hakushima School – its oldest predecessor school – was founded. In over 140 years, the university has produced numerous talented individuals.

In this sense, 2024 marks 75 years since the foundation of HU and 150 years since the founding of its oldest predecessor school.

As part of HU's 75+75th anniversary project, the university has created a new catchphrase and logo.



Catchphrase

***Row out into a sea of chaos; go  
beyond the horizon of creativity.***



**HIROSHIMA UNIVERSITY**

*University of World-wide Repute and  
Splendor for Years into the Future*

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Hiroshima University  
Public Relations Office  
E-mail: [koho@office.hiroshima-u.ac.jp](mailto:koho@office.hiroshima-u.ac.jp)