Hokkaido University

# International Course in Graduate School of Science

2019 - 2020

- Mathematics
- Condensed Matter Physics
- Cosmosciences
- Natural History Sciences
  - Earth and Planetary Dynamics
  - Earth and Planetary System Science
  - Seismology and Volcanology
  - Biodiversity
  - Science Communication

HOKKAIDO UNIVERSITY

# Message from the Dean

I am delighted to introduce you to the Graduate School of Science at Hokkaido University, one of Japan' s top 10 research-intense universities. Graduate studies will enable you not only to deeply pursue your academic discipline in your chosen research field but also to develop skills and knowledge for a specific profession. The Graduate School of Science offers master' s and doctoral programs related to such advanced graduate studies in a wide range of sciences including mathematics, physics, cosmosciences, earth and planetary sciences, biodiversity, and science communication.

Our 197 teaching staff are all active in their research community, and have garnered recognition for their commitment to excellence in research and graduate education. They will serve as your supervisor, your mentor, and your instructor. If you are not proficient in Japanese, you are welcome to our International Course in Graduate School of Science, where education is fully conducted in English. Under the guidance of our expert staff, you will acquire advanced knowledge and skills, find problems to solve, and enjoy using your imagination in scientific endeavors. The course also provides you with interdisciplinary learning opportunities by linking up with the Inter-Graduate School Classes provided by Hokkaido University, where you can have occasions to improve your leadership skills for the betterment of global society.

I hope you will find our booklet informative and friendly. You can find more information on our website. If you are not currently a student here, I encourage you to contact our faculty members. If you have an opportunity to visit our Sapporo campus, you will definitely recognize that the Graduate School of Science at Hokkaido University is the right place for your graduate studies.

I look forward to welcoming you to Hokkaido University.

With best wishes,
Hiroshi Amitsuka, Prof. Ph.D.
Dean, Graduate School of Science

# Fact Sheet

## Graduate School of Science

- Originally established in 1953 (School of Science was established in 1930)
- Teaching staff: 197
- Graduate student enrollment: Master's course 269, Doctoral Course 157
- International student enrollment: Master's course 25, Doctoral Course 49, Research Student 3
- Distinguished alumni including Prof. Akira Suzuki, 2010 Nobel Prize Laureate in Chemistry

## Hokkaido University

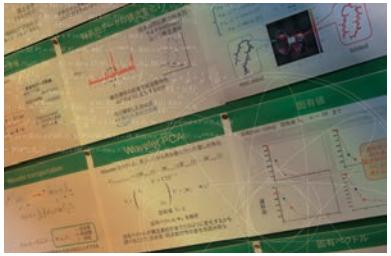
- Originally established in 1876
- Member of RU11 (Research University) in Japan
- One of 13 universities selected for government's Top Global University Project (Type A)
- Total student enrollment: 18,519
- International student enrollment: Approximately 2,160
- Teaching Staff: 2,054

## Sapporo

- Fifth largest city in Japan (Population approximately 1.9 million)
- Hosted 1972 Winter Olympics (First in Asia)
- Low cost of living: Average monthly rent ¥30,000-40,000
- Member city of UNESCO Creative Cities Network
- Regular direct flights to major Asian cities (Beijing, Seoul, Shanghai, Taipei, Hong Kong, Vladivostok, Bangkok, Singapore, Kuala Lumpur, Manila and etc.)

# Department of Mathematics

http://www.math.sci.hokudai.ac.jp/en/



Our department covers a wide range of research areas—from theory-driven approaches that mainly seek to achieve theoretical sophistication to more empirically oriented approaches that employ computers for calculations on various phenomena. Our research includes diverse fields such as hyperplane arrangements, representation theory, differential geometry, singularity theory, partial differential equations, mathematical physics, chaos, probability theory, and dynamical systems.

Every year, the department sponsors or participates in several research conferences in Sapporo that attract several hundred domestic and foreign researchers. A partial list of the conferences in 2018 gives a sense of the high level of research activity in our department:

- Mathematics Conference for Young Researchers (organized annually by graduate students)
- Sapporo Symposium on Partial Differential Equations (held annually)
- Northeastern Symposium on Mathematical Analysis (held annually)
- The 11th Mathematical Society of Japan (MSJ) Seasonal Institute (SI)
- Algebraic Analysis and Asymptotic Analysis in Hokkaido

These conferences provide students with first-hand glimpses into current research activities as well as opportunities to present their research results to world-renowned mathematicians. In addition, there are several weekly seminars that students are encouraged to attend. The department has an in-house library containing about 90,000 books and 525 journals, where students may study in a spacious and quiet environment. Graduate students are provided with their own desks in the department building. Our recent major achievements in receiving large research grants include: (1) the 21st Century Center of Excellence (COE) Program "Mathematics of Nonlinear Structure via Singularity" from 2003 to 2008, and (2) the Japan Society for the Promotion of Science (JSPS) International Training Program "The international sending-elevating project for young mathematicians based on singularity, topology and mathematical analysis: Hokudai model" from 2008 to 2012. The fruitful success of the COE program resulted in our founding the Research Center for Integrative Mathematics in 2008 which was reformed into Research Center of Mathematics for Social Creativity in RIES, later. Our department provides an advanced integrated education program "Ambitious leader's program" for graduate students from 2014.

## Research Groups

### Algebra

Keywords : Algebraic combinatorics, Algebraic geometry, Arithmetic geometry, Combinatorics, Representation theory, Rings of differential operators, Singularity theory, Special functions, Vertex algebras, Yang-Baxter equations and quantum groups

### Geometry

Keywords : Complex geometry, Differential geometry, Differential topology, Dynamical systems, Mathematical physics, Painlevé systems, Real algebraic geometry, Singularity theory, Topology, Hyperplane arrangement

### Analysis

Keywords : Algebraic analysis, Differential equations, Functional analysis, Harmonic analysis, Mathematical fluid dynamics, Mathematical physics, Operator algebras, Partial differential equations, Potential theory, Probability theory, Real analysis

### Applied Mathematics

Keywords : Applied analysis, Biophysical complex systems, Biophysics, Chaotic dynamical systems, Complex systems, Computational neuroscience, Computational topology, Ergodic theory, Free boundary problems, Mathematical modeling, Nonequilibrium statistical mechanics, Numerical analysis, Numerical simulation, Partial differential equations, Probability theory, Reaction-diffusion system, Scattering theory, Time series analysis, Variational methods



# Department of Condensed Matter Physics

https://phys.sci.hokudai.ac.jp/cond-mat/index_eng.html

In the Department of Condensed Matter Physics, our staff members conduct cutting-edge research on the physical properties of materials and provide quality physics education. Our department branches into the fields of theoretical physics (2 laboratories), experimental physics (5 laboratories), advanced functional materials and physics (3 laboratories), and material science (2 laboratories). Research in the department covers a wide range of areas, including complex liquids, semi-conductors, high-$T_c$ superconductors, organic molecular crystals and organic polymers, nano-materials, multiferroic materials, complex networks, electron correlations in quantum materials, thermaly-, pressure-, and photo-induced phase transitions, glass transitions, magnetism, spin electronics, nonlinear optics and photovoltaic devices as well as many other topics. These studies not only provide us with a greater understanding of natural phenomena but can also lead to a discovery of novel functional materials. Condensed matter physics is thus one of the most important research fields for the progress in science and technology in our society.

Part of our department belongs to the cooperative graduate school with "National Institute for Materials Science (NIMS)" and "RIKEN", which are the leading research institutions in Japan. The laboratories in the field of "advanced functional materials and physics" and those in the field of "material science" are operated by researchers from NIMS and RIKEN, respectively. These laboratories accept doctoral students from our department. The students can study physics and take part in research projects within the excellent environment at NIMS and RIKEN. Our department is further participating in an interdisciplinary education and research program provided by the "Center of Education & Research for Topological Science & Technology". This program covers the fields of mathematics, condensed matter physics, astrophysics, material science, life science, information engineering and economics. Graduate students as well as young researchers from our department will find an opportunity to interact with the different fields and gain a new insight into their own projects.

Based on this closer connection among the various fields, we aim to cross-fertilize research and education, and foster world-class human resources with creative talent. Students can expand their knowledge of modern physics through the curriculum and can improve their logical thinking skills and capabilities for problem-finding and problem-solving through their research activities. Our graduates will open up a new frontier in natural science and will be bearers of the future of science and technology.

## Research Groups and Laboratories

### Theoretical Physics

#### Statistical Physics

Keywords : Statistical physics, Non-equilibrium, Non-linearity, Random systems, Complex networks, Phase transition, Self-organization, Critical phenomena, Scale-free structures, Numerical simulation, Superconductivity, Superfluidity, Bose-Einstein condensation, Condensed matter physics, Magnetism, Multiferroics, Heavy fermion

#### Mathematical Physics

Keywords : Transition-metal complexes, Organic polymers, Single-molecule nanomagnets, Photoinduced phase transition, Optically switchable magnetism, Nuclear magnetic relaxation

### Experimental Physics

#### Electronic Properties of Solids

Keywords: High-temperature cuprate superconductors, Frustrated spin systems, Surface & nano-structure magnetism, material research, Scanning tunneling microscopy/spectroscopy (STM/STS), Spin-polarized STM

#### J-Material: Physics of Strongly Correlated Systems

Keywords : J-material, Superconductivity, Magnetism, Heavy fermion, Quantum phase transition, Magnetoelectric effects, Very low temperatures, High magnetic fields, High pressure, Ultrasonic measurements, μSR, Neutron scattering, Resonant X-ray Scattering (RXS), Ferroelectrics, Multiferroics, Electronic ferroelectricity, Phase transition, Photoinduced cooperative phenomena

#### Physical Properties of Low-dimensional Materials

Keywords : Low-dimensional organic conductors, Strongly-correlated electron systems, Superconductivity, Magnetism, Spin liquid, Symmetry of Cooper pairs, Spin density wave (SDW), Chiral superconductivity, Mesoscopic systems, NMR, Scanning Tunneling Microscopy (STM), Scanning Tunneling Spectroscopy (STS), Nonlinear conductivity, Specific heat measurement

#### Condensed Matter Dynamics

Keywords : Microscopic dynamics of condensed matters, Dielectric and optical spectroscopy from 1 μHz to 10 PHz, Raman scattering, Femtosecond pump-probe spectroscopy, Terahertz time-domain spectroscopy, Solids, Complex liquids, Hydrogen-bonding systems, Semiconductors, Nonlinear optical phenomena, Biological materials

#### Nanostructure Physics

(Research Institute for Electronic Science)

Keywords : Nano-structured devices, New photovoltaic devices, Next-generation solar cells, Clean unit system platforms, Quantum field theory, Many-body perturbation theory, Spintronics devices, Magnetism, Electronic correlations, Dirac electron, Topological insulator

### Advanced Functional Materials and Physics

( Cooperative Graduate School with National Institute for Materials Science )

#### Condensed Matter Theory

Keywords : Quantum many-body theory, Superconductivity, Magnetism, Critical phenomena, Electronic nematic liquids

#### Nanosystem Photonics

Keywords : Surface physics, Nanophotonics, Energy conversion, Nanomaterials

#### Solid State Physics in High Magnetic Field

Keywords : Spectroscopy, High magnetic field, Terahertz wave, Quantum Hall effect, Dirac fermion, Topological insulator

#### Surface Quantum Phase Materials

Keywords : Atomic-layer superconductors, STM, Metal nanostructures, Molecular motors

### Material Science

( Cooperative Graduate School with RIKEN )

#### Muon Spin Resonance

Keywords : μSR material science at the RIKEN-RAL Muon Facility in the UK. Experimental and theoretical studies on the magnetism, superconductivity, industrial applications, non-destructive element analysis, muon hyperfine interactions in metals, insulators and organic molecules. Muon site and magnetic spin structural analysis by the density functional theory.

#### Electron Spin Resonance

Keywords : Electron Spin Resonance (ESR) from X-band to millimeter and sub-millimeter waves, High magnetic field, Strongly-correlated materials, Molecular magnets, Molecular conductors, Spin-liquid system, Nano-carbon materials

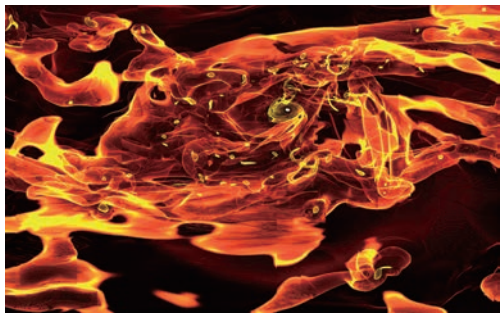
# Department of Cosmosciences

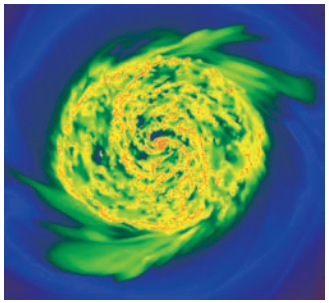
http://www.ep.sci.hokudai.ac.jp/~cosmo/index-e.htm

Many discoveries about the Universe in recent years have prompted us to reshape established paradigms, academic disciplines and our view of the world. For example, we now know that expanding Universe is also accelerating, that there are many planets outside of our Solar System, that dark matter and dark energy are the dominant components in the Universe, and that cosmic dust has been discovered in the very early Universe. These advances have been obtained by breaking down the conventional boundaries between physics, astronomy, planetary science and Earth science, allowing scientists to understand the Universe from its smallest elements through a full range of scientific methods.

Researchers at Hokkaido University have applied their wide selection of expertise to exploring the Universe over its breathtaking scale. Our interests run from elementary particles and atomic nuclei through to celestial objects such as the Earth and planets and the scale and formation of the Universe itself. In addition, we are committed to sharing these research activities through continuous education.

Our department, which was newly established in 2006, consists of three laboratories belonging to the Department of Physics, one laboratory belonging to the Department of Earth and Planetary Sciences, two laboratories belonging to the Institute of Low Temperature Science (ILTS), and one laboratory belonging to the Information Initiative Center (IIC). In addition to this, researchers in the Nuclear Reaction Data Centre, and Spacecraft Observation join our department. In our department, education and research in physics, astronomy, planetary science and Earth science are combined closely with the goal of breaking free from the boundaries separating observation, experiment and theory. We hope that our students will go on to use their knowledge both in science, and also throughout society with their wide and flexible knowledge base.





## Laboratories

**Observational Astronomy**

Keywords : Observational astronomy, Galactic and extragalactic astronomy, Interstellar matter, Star formation

**Theoretical Astrophysics**

Keywords : Theoretical astronomy, Numerical simulations, Galaxy formation, Galaxy clusters, Supermassive blackholes, Interstellar matter, Star formation, Interstellar dust

**Theoretical Particle Physics**

Keywords: Particle physics, Beyond the standard model, Dark matter, Dark energy, Grand unified theory, Superstring, Supersymmetry, Early Universe

**Theoretical Nuclear Physics**

Keywords : Quantum many body problems, Nuclear force, Unstable nuclei, Nucleosynthesis, Hadronic Matter

**Planetary and Space Group**

Keywords : Origin and evolution of planets and satellites, Material evolution during planetary system formation, Structure and dynamics of Earth and planetary atmospheres, Comparative planetology, Space exploration and ground based observation, Experimental studies, Theory and hierarchical numerical simulation models, Applications of information technology

**Astrophysical Chemistry / Ice and Planetary Science (ILTS)**

Keywords : Interstellar molecules, Ice dust, Amorphous solid water, Surface reactions

**Phase Transition Dynamics (ILTS)**

Keywords : Phase transition dynamics, Crystal growth, Ice, Snow, Surface/Interface science, In-situ observation

**Information Media Science**

Keywords : Learning science, Learning platforms, Open education

**Nuclear Reaction Data Science**

Keywords : Nuclear data, Nuclear reactions, Evaluation

**Spacecraft Observation**

(Cooperative Graduate School with Japan Aerospace Exploration Agency)

Keywords : Planetary exploration, Infrared astronomy from space, Radio-astronomy from space

# Department of Natural History Sciences

https://www.sci.hokudai.ac.jp/graduateschool/en/guide



The Department of Natural History Sciences encompasses three main research areas: 1) Earth and Planetary Sciences, 2) Biodiversity and Organismal Evolution, and 3) Science Communication. The scientific interests of this department span a size scale from molecules to the solar system, and a time scale from microseconds to billions of years. We also recognize the importance of disseminating cutting-edge scientific results to the public.

## Earth and Planetary Dynamics (Division)

The Division of Earth and Planetary Dynamics conducts basic researches across a broad range of both temporal and spatial scales to better understand the Earth as a dynamic system constituted by the solid Earth, the oceans, and the atmosphere. We investigate diverse topics in geophysics, including crust and mantle dynamics, earthquakes, volcanic activity, and atmosphere-ocean circulation. To elucidate the nature of the dynamic Earth, we take a comprehensive approach based on theoretical and experimental studies, analyses of geophysical data, and fieldwork that takes advantage of the distinctive location of Hokkaido University. There are four laboratories in this Division: Meteorology, Physical Oceanography and Climate, Space Geodesy, and Seismology

## Earth and Planetary System Science (Division)

The Division of Earth and Planetary System Science has a rich tradition of leadership in geoscience research and education, consolidated through 80 years of accumulated experience and expanding in new directions. The Division offers graduate courses in a wide range of fields in the modern Earth and planetary sciences to allow students to understand the Earth as a system of interrelated physical, chemical, and biological processes, encompassing the lithosphere, atmosphere, hydrosphere, and biosphere. There are six laboratories in this Division: Petrology and Volcanology, Paleobiology, Geochemistry, Earth Materials Science, Earth System Evolution, and Geotectonics.

## Seismology and Volcanology (Division)

When, where, and why do earthquakes and volcanic eruptions take place, and how large will they be? While earthquakes, tsunamis and volcanic eruptions are often a threat to public safety, they can also provide important clues to understanding Earth dynamics and evolution. Earthquakes and volcanoes are surface manifestations of the internal activity of the Earth, and thus understanding their mechanisms and processes is a fundamental issue in the geosciences. We investigate the physical background of seismic and volcanic activity based on a multi-disciplinary approach, including seismology, geodesy, geothermics, fluid dynamics, electromagnetics, and geology, in collaboration with domestic and international universities and research institutes. Hokkaido provides good opportunities for students to apply the wide range of knowledge they have learned to real earthquakes, tsunamis and volcanoes.

## Biodiversity (Division)

There exists today an amazing diversity of organisms, all of which are the consequence of evolution. In addition, during the evolutionary history of the earth, many more species have gone extinct than those surviving today. In the Division of Biodiversity, we investigate patterns of diversity and the processes generating these patterns. Through molecular, morphological, and ecological analyses, we study diversity at various levels of the biological hierarchy, including geographic patterns of genetic variation, patterns of phylogenetic relationships relevant to macroevolution and the classification of life, and the process of speciation by which new biological species arise.

## Science Communication (Division)

Science communication has received much more attention in recent years than previously. This is due to increased awareness that science communication plays important roles in helping the public understand the aims and significance of scientific research, and in fostering greater interest in science among young students. It also behooves scientific researchers to be involved in science communication, because this helps scientists understand what the public expects of them, and in the process helps them gain the public' s confidence. The Division of Science Communication was founded in response to the above needs. Its fields of study include social studies of science, philosophy of science, museum studies, and science education.

## Divisions and Laboratories

### Earth and Planetary Dynamics

**Meteorology**
Keywords: Meteorology, Dynamics and Forecast, Cyclones and Fronts, Theory and Numerical Modelling, Meso-scale phenomena, Cloud, Rain and Snow, Material Transport, Applied meteorology

**Physical Oceanography and Climate**
Keywords : Physical oceanography, Meteorology, Air-Sea interaction, Climate variability & change, Ocean's role in climate, Multi-disciplinary challenges, Numerical modelling, Data analysis

**Space Geodesy**
Keywords : Space geodesy, GNSS, GPS, InSAR, GRACE, Gravity, Earth rotation, Atmospheric sensing, Crustal deformation, Glaciology, Planetary geodesy, Ionosphere

**Seismology**
Keywords : Seismic wave propagation, Internal structure of the Earth, Seismic tomography, Broadband waveform analysis, Lateral heterogeneity and anisotropy

### Earth and Planetary System Science

**Petrology and Volcanology**
Keywords : Petrology and geochemistry of igneous rocks, Magmatology, Volcanic geology and physical volcanology, Long-term eruption forecasting and mitigation of volcanic disaster

**Paleobiology**
Keywords : Vertebrate, Marine biota, Evolution, Phylogenetic relationships, Comparative anatomy, Embryology, Extinction, Biogeography, Global environmental change

**Geochemistry**
Keywords : Cosmochemistry, Galaxies, Planets, Meteorites, Earth, Environment, Life, Geofluid, Mass spectrometry, Microscopy, Solar system evolution, Planetary exploration

**Earth Materials Science**
Keywords : Mineralogy, Crystallography, Crystal growth, Physics and chemistry of minerals

**Earth System Evolution**
Keywords : Organic Geochemistry, Earth's hydrocarbon resources, Molecular paleobiology, Biogeochemistry of sedimentary organic matter, Carbonate geochemistry, Paleoenvironmental reconstruction

**Geotectonics**
Keywords : Microtectonics, Seismogenesis, Formation of continental crust, Magmatic processes in mid-ocean ridge, Oman ophiolite, Water-rock interaction

### Seismology and Volcanology

**Seismological Observation**
Keywords : Seismology, Tsunamis, Earthquake prediction, Observational seismology and volcanology, Crustal deformation, Earthquake source physics

**Ocean Bottom Seismology and Tsunami**
Keywords : Ocean bottom seismology, Elastic wave propagation theory, Paleo-seismology, Tsunami science, Disaster mitigation

**Volcano Physics**
Keywords : Physical volcanology, Volcanic eruption prediction, Geodesy, Geomagnetism and geoelectricity, Seismology, Remote sensing, Geothermics

**Subsurface Structure**
Keywords : Subsurface structure, Seismogenic zone, Volcanoes, Electromagnetic field change, Airborne geophysical exploration

### Biodiversity

**Animal Systematics**
Keywords : Bryozoa, Nemertea, Insect, Invertebrates, Evolution, Taxonomy, Biodiversity, Population, Phylogeography, Ocean acidification, Molecular phylogeny, DNA

**Algal and Protist Systematics**
Keywords : Biodiversity, Chemotaxonomy, Endosymbiosis, Environmental DNA, Macroalgae, Microalgae, Molecular phylogeny, Protists, Seaweeds, Taxonomy, Ultrastructure.

**Ornithology, Island Biology**
Keywords : ornithology, life history, breeding biology, inbreeding avoidance, acoustic communication, oceanic island, continental island

**Genetic Diversity**
Keywords : Molecular phylogenetics, Population genetics, Biogeography, Mammals, Birds, Archaeological remains, Osteology, Bone collagen, DNA

### Science Communication

**Communication of Science and Technology**
Keywords : Sociology of science, Science and technology studies, Public participation, Governance and policy, Technology assessment

**Philosophy of Science and Technology**
Keywords : Philosophy of science, Ethics of science and technology, Philosophy of risk, Statistical inference of cause

**Museum Education**
Keywords : Museum communication, Museum education, Museum evaluation

**Science Education**
Keywords : Self-efficacy, Cognitive bias, Creativity, Human-computer interactions, Higher education, Educational technology, Open education, Faculty development, research

# Faculty Listings

## Department of Mathematics

### Algebra (Research Group)

| | |
|---|---|
| Professor | Masanori Asakura |
| | Mutsumi Saito |
| | Keiji Matsumoto |
| | Hiroshi Yamashita |
| Associate Professor | Youichi Shibukawa |
| | Simona Settepanella |
| | Kenichiro Tanabe |
| | Daisuke Matsushita |
| Assistant Professor | Hiraku Atobe |

### Geometry (Research Group)

| | |
|---|---|
| Professor | Toshiyuki Akita |
| | Goo Ishikawa |
| | Katsunori Iwasaki |
| | Masahiko Yoshinaga |
| Associate Professor | Shimpei Kobayashi |
| | Masao Jinzenji |
| | Hitoshi Furuhata |
| Assistant Professor | Yutaka Kanda |

### Analysis (Research Group)

| | |
|---|---|
| Professor | Akihito Hora |
| | Naofumi Honda |
| | Jun Masamune |
| Associate Professor | Masaharu Kobayashi |
| | Reiji Tomatsu |
| | Takahiro Hasebe |
| | Nao Hamamuki |
| | Tadahiro Miyao |

### Applied Mathematics (Research Group)

| | |
|---|---|
| Professor | Shin-ichiro Ei |
| | Hideo Kubo |
| | Shuichi Jimbo |
| | Masaharu Nagayama(RIES) |
| | Michiko Yuri |
| Associate Professor | Hirotoshi Kuroda |
| | Yasuaki Kobayashi(RIES) |
| | Akira Sakai |
| | Yuzuru Sato |
| | Hiroshi Teramoto(RIES) |
| | Takao Namiki |
| | Kenji Matsumoto |
| Assistant Professor | Masakazu Akiyama (RIES) |

## Department of Condensed Matter Physics

### Theoretical Physics (Research Group)

#### Statistical Physics (Laboratory)

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|---|---|
| Professor | Koji Nemoto |
| Associate Professor | Takafumi Kita |
| Assistant Professor | Koji Okuda |
| | Satoru Hayami |

#### Mathematical Physics (Laboratory)

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|---|---|
| Professor | Shoji Yamamoto |
| Lecturer | Jun Ohara |

### Experimental Physics (Research Group)

#### Electronic Properties of Solids (Laboratory)

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|---|---|
| Professor | Migaku Oda |
| Associate Professor | Hideo Matsuyama |
| | Hiroyuki Yoshida |
| Assistant Professor | Tohru Kurosawa |

#### J-Material: Physics of Strongly Correlated Systems (Laboratory)

| | |
|---|---|
| Professor | Hiroshi Amitsuka |
| Associate Professor | Masaki Takesada |
| | Tatsuya Yanagisawa |
| Assistant Professor | Hiroyuki Hidaka |

#### Physical Properties of Low-dimensional Materials (Laboratory)

| | |
|---|---|
| Professor | Atsushi Kawamoto |
| Associate Professor | Noriaki Matsunaga |
| Lecturer | Yoshihiko Ihara |
| Assistant Professor | Hiroyoshi Nobukane |
| | Shuhei Fukuoka |

#### Condensed Matter Dynamics (Laboratory)

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|---|---|
| Professor | Ryusuke Nozaki |
| Associate Professor | Tomobumi Mishina |
| Assistant Professor | Sekika Yamamoto |

#### Nanostructure Physics (Laboratory) (RIES)

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|---|---|
| Professor | Akira Ishibashi |
| Associate Professor | Kenji Kondo |

### Advanced Functional Materials and Physics (Research Group)(Cooperative Graduate School with NIMS)

#### Condensed Matter Theory (Laboratory) (NIMS)

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|---|---|
| Professor | Hiroyuki Yamase |

#### Nanosystem Photonics (Laboratory) (NIMS)

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| Professor | Tadaaki Nagao |

#### Solid State Physics in High Magnetic Field (Laboratory) (NIMS)

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| Professor | Yasutaka Imanaka |

#### Surface Quantum Phase Materials (Laboratory) (NIMS)

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| Professor | Takashi Uchihashi |

### Material Science (Research Group)(Cooperative Graduate School with RIKEN)

#### Muon Spin Resonance (Laboratory) (RIKEN)

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| Professor | Isao Watanabe |

#### Electron Spin Resonance (Laboratory) (RIKEN)

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| Associate Professor | Yugo Oshima |

## Department of Cosmosciences

#### Observational Astronomy (Laboratory)

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|---|---|
| Associate Professor | Kazuo Sorai |

#### Theoretical Astrophysics (Laboratory)

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|---|---|
| Lecturer | Takashi Okamoto |
| Assistant Professor | Alexander Pettitt* |

#### Theoretical Particle Physics (Laboratory)

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|---|---|
| Professor | Hisao Suzuki |
| | Tatsuo Kobayashi |
| Associate Professor | Ryuichi Nakayama |
| | Osamu Seto* |
| Lecturer | Kazuhiko Suehiro |
| Assistant Professor | Eun-Kyung Park |

#### Theoretical Nuclear Physics (Laboratory)

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|---|---|
| Associate Professor | Masaaki Kimura |
| Lecturer | Wataru Horiuchi |
| Assistant Professor | Bo Zhou* |

#### Planetary and Space Group (Laboratory)

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|---|---|
| Professor | Kiyoshi Kuramoto |
| | Yukihiro Takahashi |
| Associate Professor | Masaki Ishiwatari |
| | Junichi Kurihara* |
| | Hisayuki Kubota* |
| Lecturer | Mitsuteru Sato |
| Assistant Professor | Masatsugu Odaka |
| | Shunichi Kamata* |
| | Tetsuro Ishida* |
| | Seiko Takagi |

#### Astrophysical Chemistry / Ice and Planetary Science (Laboratory) (ILTS)

| | |
|---|---|
| Professor | Akira Kouchi |
| | Naoki Watanabe |
| Associate Professor | Yuki Kimura |
| Assistant Professor | Tetsuya Hama |
| | Hiroshi Hidaka |
| | Yasuhiro Oba |

#### Phase Transition Dynamics (Laboratory) (ILTS)

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|---|---|
| Professor | Gen Sazaki |
| Assistant Professor | Ken Nagashima |
| | Ken-ichiro Murata |

#### Information Media Science (Laboratory) (IIC)

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|---|---|
| Professor | Izumi Fuse |
| Assistant Professor | Yuichi Yamamoto |

#### Nuclear Reaction Data Science (Laboratory)

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|---|---|
| Professor | Tokio Fukahori (JAEA) |
| | Nobuyuki Iwamoto(JAEA) |
| Associate Professor | Yoshiharu Hirabayashi |

#### Spacecraft Observation (Laboratory) (JAXA)

| | |
|---|---|
| Professor | Takehiko Sato |
| Associate Professor | Yasuhiro Murata |
| | Issei Yamamura |

## Department of Natural History Sciences

### Earth and Planetary Dynamics (Division)

#### Meteorology (Laboratory)

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|---|---|
| Professor | Masaru Inatsu |

#### Physical Oceanography and Climate (Laboratory)

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|---|---|
| Professor | Shoshiro Minobe |
| Associate Professor | Yoshinori Sasaki |

#### Space Geodesy (Laboratory)

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|---|---|
| Professor | Masato Furuya |
| | Kosuke Heki |
| Associate Professor | Youichiro Takada |

#### Seismology (Laboratory)

| | |
|---|---|
| Professor | Kiyoshi Yomogida |
| Associate Professor | Kazunori Yoshizawa |

### Earth and Planetary System Science (Division)

#### Petrology and Volcanology (Laboratory)

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|---|---|
| Professor | Mitsuhiro Nakagawa |
| Associate Professor | Takeshi Kuritani |
| Assistant Professor | Shumpei Yoshimura |

#### Paleobiology (Laboratory)

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|---|---|
| Associate Professor | Yoshitsugu Kobayashi (HUM) |
| | Yasuhiro Iba |

#### Geochemistry (Laboratory)

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|---|---|
| Professor | Hisayoshi Yurimoto |
| Associate Professor | Junji Yamamoto (HUM) |
| Assistant Professor | Ken-ichi Bajo |
| | Noriyuki Kawasaki |

#### Earth Materials Science (Laboratory)

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|---|---|
| Professor | Takaya Nagai |
| Associate Professor | Jun Kawano |
| Assistant Professor | Ayako Shinozaki |

#### Earth System Evolution (Laboratory)

| | |
|---|---|
| Associate Professor | Ken Sawada |
| Lecturer | Tsuyoshi Watanabe |

#### Geotectonics (Laboratory)

| | |
|---|---|
| Professor | Toru Takeshita* |
| Associate Professor | Jun Kameda |
| Assistant Professor | Marie Python |

### Seismology and Volcanology (Division)

#### Seismological Observation (Laboratory)

| | |
|---|---|
| Professor | Hiroaki Takahashi |
| Associate Professor | Kei Katsumata |
| Lecturer | Mako Ohzono |

#### Ocean Bottom Seismology and Tsunami (Laboratory)

| | |
|---|---|
| Professor | Yuichiro Tanioka |
| Associate Professor | Yoshio Murai |
| | Yuichi Nishimura |

#### Volcano Physics (Laboratory)

| | |
|---|---|
| Professor | Makoto Murakami* |
| Associate Professor | Hiroshi Aoyama |

#### Subsurface Structure (Laboratory)

| | |
|---|---|
| Professor | Takeshi Hashimoto |

### Biodiversity (Division)

#### Animal Systematics (Laboratory)

| | |
|---|---|
| Associate Professor | Helena Fortunato |
| | Hiroshi Kajihara |
| | Toru Katoh |
| Lecturer | Keiichi Kakui |

#### Algal and Protist Systematics (Laboratory)

| | |
|---|---|
| Professor | Takeo Horiguchi |
| | Kazuhiro Kogame |
| Lecturer | Tsuyoshi Abe (HUM) |
| Assistant Professor | Kevin Wakeman* |

#### Ornithology and Island Biology (Laboratory)

| | |
|---|---|
| Professor | Masaoki Takagi |

#### Genetic Diversity (Laboratory)

| | |
|---|---|
| Professor | Ryuichi Masuda |
| Lecturer | Masaki Eda (HUM) |
| Assistant Professor | Yoshinori Nishita |

### Science Communication (Division)

#### Communication of Science and Technology (Laboratory)

| | |
|---|---|
| Associate Professor | Naoyuki Mikami (IAHE) |
| | Shishin Kawamoto |

#### Philosophy of Science and Technology (Laboratory)

| | |
|---|---|
| Professor | Masahiro Matsuou |

#### Museum Education (Laboratory)

| | |
|---|---|
| Professor | Makiko Yuasa (HUM) |

#### Science Education (Laboratory)

| | |
|---|---|
| Professor | Toshiyuki Hosokawa (IAHE) |
| | Makoto Suzuki (IAHE) |
| Associate Professor | Fumihito Ikeda (IAHE) |
| | Katsusuke Shigeta (IIC) |
| | Kunimasa Yamada (IAHE) |

■ CRIS : Creative Research Institution, Hokkaido University ■ HUM : The Hokkaido University Museum ■ IAHE : Institute for the Advancement of Higher Education, Hokkaido University ■ IIC : Information Initiative Center, Hokkaido University ■ ILTS : Institute of Low Temperature Science, Hokkaido University
■ RIES : Research Institute for Electronic Science, Hokkaido University ■ JAEA : Japan Atomic Energy Agency ■ JAXA : Japan Aerospace Exploration Agency (Tsukuba) ■ NIMS : National Institute for Materials Science (Tsukuba) ■ * : Specially appointed staff

# Useful Links

Admissions
https://www.sci.hokudai.ac.jp/graduateschool/en/

Scholarship information
https://www.global.hokudai.ac.jp/admissions/scholarships/

Faculty of Science
http://www.sci.hokudai.ac.jp/faculty/en/

Facebook
https://www.facebook.com/OIAS.Sci

Hokkaido University
https://www.global.hokudai.ac.jp/

## Related Graduate Schools

Graduate School of Life Science
http://www.lfsci.hokudai.ac.jp/en/

Graduate School of Chemical Sciences and Engineering
https://www.cse.hokudai.ac.jp/english/

# Contact


Office for International Academic Support
Faculty of Science, Hokkaido University

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Tel +81-(0)11-706-2915 Fax +81-(0)11-706-2907
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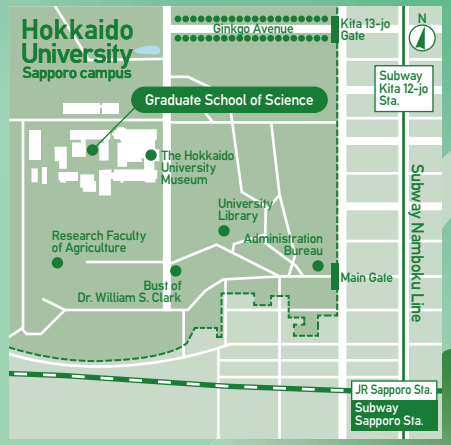


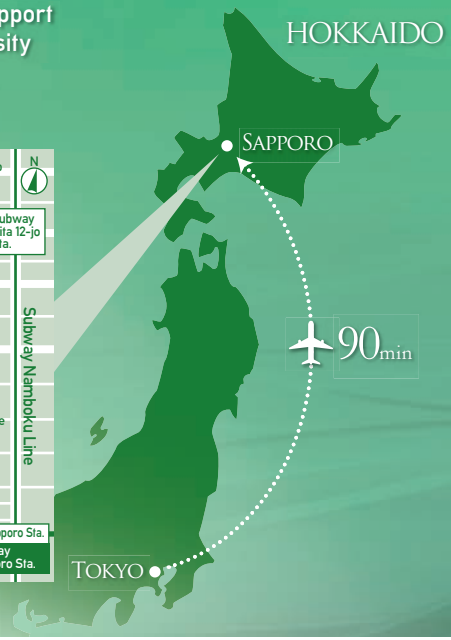


# Step-by-step Guide To Entry

You need to have completed Step 1 at least six months prior to your intended enrollment !

## STEP 1 Find a Supervisor

Graduate and research students conduct research under the guidance of a supervisor. To enter the Graduate School of Science as a research or graduate student, you need to find a faculty member who is willing to give you instruction on your research. Find a prospective supervisor from our website:

### 1. Graduate School of Science Website

https://www.sci.hokudai.ac.jp/graduateschool/en/

Please refer to the "International Course in Graduate School of Science" > "Study Field". Supervisor list is also available in the application guidelines. (see "Application Guidelines").

### 2. Hokkaido University Website>RESEARCH AND EDUCATION>Find a Researcher

https://researchers.general.hokudai.ac.jp/search/index.html?lng=en

### 3. HUSCAP

https://eprints.lib.hokudai.ac.jp/dspace/?locale=en&lang=en

## STEP 2 Apply to the graduate school

You can check how to apply in the application guidelines. Applicants must pay the examination/application fee at the time of application.

## STEP 3 Take the entrance screening (For Residing Abroad)

Screening procedures for research students are conducted on the basis of documentation submitted whilst screening procedures for graduate level students differ between each department.

## STEP 4 Commence enrollment procedures

After passing the screening process, you will be required to submit necessary documentation, pay the entrance fee, and complete other necessary procedures to become enrolled.


R100
古紙パルプ配合率100%再生紙を使用
Utilizing 100% post-consumer recycled paper pulp



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