# List of Supervisors and Research Fields

As of April 1, 2025

**Master's Course**

**Department of Mathematics, Graduate School of Science**

| Fields | Supervisors | | Keywords | Remarks |
|---|---|---|---|---|
| Algebra | Professor | ASAKURA Masanori | Arithmetic geometry | |
| | Professor | SHIBUKAWA Youichi | Yang-Baxter equations and quantum groups | |
| | Professor | YASUDA Seidai | Number theory, arithmetic geometry | |
| | Specially Appointed Professor | SAITO Mutsumi | Algebraic analysis, rings of differential operators | Scheduled to retire in March, 2026. |
| | Specially Appointed Professor | MATSUMOTO Keiji | Special functions | Scheduled to retire in March, 2027. |
| | Associate Professor | OUCHI Genki | Algebraic geometry, derived category of coherent sheaves, moduli space | |
| | Associate Professor | CAI, Yuanqing | Number theory, representation theory,automorphic L-functions, automorphic representations, covering groups | |
| | Associate Professor | SCRIMSHAW, Travis | Combinatorics, representation theory, Schubert calculus | |
| | Associate Professor | MATSUSHITA Daisuke | Algebraic geometry | |
| Geometry | Professor | AKITA Toshiyuki | Algebraic topology, group cohomology, quandle | |
| | Professor | INOGUCHI Junichi | Geometry, integrable systems, Lie group, homogeneous spaces | |
| | Professor | KOBAYASHI Shimpei | Differential geometry, integrable systems | |
| | Professor | FURUHATA Hitoshi | Differential geometry | |
| | Associate Professor | KASUYA Naohiko | Differential topology, contact structures, complex structures | |
| | Associate Professor | KAWASAKI Morimichi | Symplectic geometry, Geometric group theory, differential topology | |
| | Assistant Professor | KANDA Yutaka | Differential topology | |
| | Assistant Professor | SUGAWARA Sakumi | Low-dimensional topology, hyperplane arrangement | |
| Analysis | Professor | KUBO Hideo | Partial Differential Equations associated with Nonlinear Dynamics | |
| | Professor | KOBAYASHI Masaharu | Harmonic Analysis | |
| | Professor | HONDA Naofumi | Algebraic analysis | |
| | Professor | MIYAO Tadahiro | Mathematical physics, functional analysis, condensed matter physics | |
| | Specially Appointed Professor | HORA Akihito | Functional analysis, probability theory | Scheduled to retire in March, 2027. |
| | Associate Professor | UMETA Yoko | Exact WKB analysis, asymptotic analysis, higher order Painlevé equations, Stokes geometry | |
| | Associate Professor | SUZUKI Yuhei | Operator algebras | |
| | Associate Professor | HASEBE Takahiro | Probability theory, functional analysis | |
| | Associate Professor | HAMAMUKI Nao | Nonlinear partial differential equations, Theory of viscosity solutions | |
| | Assistant Professor | SATO Ryosuke | Probability theory, Operator algebras | |
| Applied Mathematics | Professor | SAKAI Akira | Probability theory, statistical mechanics, mathematical physics | |
| | Professor | NAGAYAMA Masaharu | Reaction-diffusion systems, mathematical modeling, numerical simulation | |
| | Professor | NAMIKI Takao | Ergodic theory, dynamical systems, complex systems | |
| | Professor | MASAKI Satoshi | Partial differential equations, harmonic analysis, variational analysis | |
| | Associate Professor | KURODA Hirotoshi | Partial differential equations, variational analysis | |
| | Associate Professor | SATO Yuzuru | Complex systems, chaotic dynamical systems | |
| | Associate Professor | TASAKI Sohei | Mathematical life sciences, Microbiology | |
| | Associate Professor | TABATA Koji | Online learning,data science,theory of computation | |
| | Associate Professor | NAKANO Yushi | Dynamical systems, ergodic theory, chaos | |
| | Assistant Professor | ISHII Hiroshi | Partial differential equations, Reaction-diffusion systems, Nonlocal effect | |
| | Assistant Professor | KITA Kosuke | Evolution equations, Partial differential equations, Nonlinear semigroups | |
| | Assistant Professor | FUKUSHIMA KIMURA, Bruno Hideki | Probability theory, statistical mechanics, mathematical physics | |

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As of April 1, 2025

**Master's Course**

## Department of Condensed Matter Physics, Graduate School of Science

| Laboratories | Supervisors | | Keywords | Remarks |
|---|---|---|---|---|
| Electronic Properties of Solids | Professor | YOSHIDA Hiroyuki | We develop new materials in strongly correlated electron systems by various chemical methods including high pressure synthesis, and elucidate their properties by both bulk physical properties measurements (electrical resistivity, magnetization, specific heat measurements, and precise measurements in ultra-high magnetic fields, etc) and microscopic measurements (μSR, neutron and synchrotron X-ray scattering, etc).<br>Specifically, we develop frustrated magnetic materials, multipole materials, skyrmion materials, novel actinide compounds and also search for quantum many-body states in high magnetic fields, cross-correlational phenomena, and new superconducting states and odd-parity multipoles. | |
| | Assistant Professor | KON Fusako | | |
| J-Material: Physics of Strongly Correlated Systems | Professor | AMITSUKA Hiroshi | J-material, Superconductivity, Magnetism, Heavy fermion, Quantum phase transition, Magnetoelectric effects, Very low temperatures, High magnetic fields, High pressure, Ultrasonic measurements, MuSR, Neutron scattering, RXS, Ferroelectrics, Multiferroics, Electronic ferroelectricity, Phase transition, Photoinduced cooperative phenomena | |
| | Professor | YANAGISAWA Tatsuya | | |
| | Associate Professor | TAKESADA Masaki | | |
| | Assistant Professor | HIDAKA Hiroyuki | | |
| Electronic Properties of Low-demensional Material | Professor | KAWAMOTO Atsushi | NMR, Strongly-correlated electrom systems, Superconductivity, Magnetism Low-dimensional organic conductors, Scanning tunneling microscopy (STM), Scanning tunneling spectroscopy (STS), Nonlinear conductivity, Symmetry of Cooper pairs, Spin density waves (SDWs), Chiral superconductivity, Mesoscopic systems, Topological phenomena | |
| | Associate Professor | MATSUNAGA Noriaki | | |
| | Lecturer | IHARA Yoshihiko | | |
| | Assistant Professor | NOBUKANE Hiroyoshi | | |
| | Assistant Professor | FUKUOKA Syuhei | | |
| Condensed Matter Dynamics | Assistant Professor | YAMAMOTO Sekika | We study the interaction of light with matter, mainly by spectroscopic measurements using laser light. Target systems include organic materials, metals, and semiconductors. In the case of molecular luminescence in solution, we deal with energy relaxation of a few milliseconds due to liquid dynamics; in the case of excited-state relaxation in semiconductors, we measure relaxation in microseconds to nanoseconds; and in the case of phonon spectroscopy in solids, we study relaxation phenomena on time scales of picoseconds or less. We also synthesize nanocrystals of a few nanometers in size by chemical synthesis methods and study various phenomena caused by quantum effects in the electron system confined in very small nanocrystals. | |

| Laboratories | Professors | | Keywords | Remarks |
|---|---|---|---|---|
| Statistical Physics | Professor | HAYAMI Satoru | We theoretically study novel physical phenomena in strongly-correlated electron systems based on quantum mechanics and statistical physics. We aim to systematically understand physical phenomena and explore the possibility of new electronic states and quantum phenomena. The recent research topics are the following.<br>(1) Classification of electronic physical properties based on microscopic multipoles<br>(2) Topological magnetism including magnetic skyrmions<br>(3) Emergent spin-orbit-coupled physics in magnetic materials<br>(4) Cross-correlated phenomena over electric, magnetic, elastic, heat, and light<br>(5) Exploring novel physics by using a machine-learning method<br>(6) Development of effective model calculation method based on DFT calculation and electronic multipole theory<br>(7) Elucidation of universal properties of chiral and ferroaxial materials<br><br>We also study efficiency of heat engines using nonequilibrium statistical mechanics and complex dynamics in pattern formation and chaos of coupled-oscillator systems, using not only theoretical analysis but also numerical simulation. | |
| | Lecturer | OIWA Rikuto | | |
| | Assistant Professor | OKUDA Koji | | |
| Mathematical physics | Professor | YAMAMOTO Shoji | Making full use of various—both analytical and numerical—quantum statistical methods, we explore novel quantum cooperative phenomena in strongly correlated electron systems. A recent keyword is "topology". Interpretation of phenomena must be our ultimate goal, but we often take further interest in the mathematical and methodological ways we can accomplish this. We construct microscopic theories on a variety of physics such as quantum spin liquid, photoinduced magnetism, nuclear magnetic resonance, inelastic neutron scattering, Raman scattering, optical conductivity, and angle-resolved photoemission spectroscopy. We sometimes enjoy theoretical formulation in itself and sometimes interpret observations in cooperation with experimentalists and chemist. | |
| | Associate Professor | OHARA Jun | | |
| | Assistant Professor | INOUE Takashi | | |
| Nanostructure Physics (RIES) | Professor | KOBAYASHI Kaya | Superconductors and magnets, novel materials synthesis, layered materials, transition metal dichalcogenides, van der Waals heterostructure, material characterization, thin flake devices, thin film, MBE, TEM | |
| | Associate Professor | KONDO Kenji | Qunatum field theory, Many-body perturbation theory, Spintronics devices, Magnetism, Electronic correlations, Dirac electron, Topological insulator | No acceptance for FY2025 |

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As of April 1, 2025

**Master's Course**

## Department of Cosmosciences, Graduate School of Science

| Laboratories | Supervisors | | Keywords | Remarks |
|---|---|---|---|---|
| Observational Astronomy | Professor | SORAI Kazuo | Observational astronomy, extragalacitc astronomy, interstellar matter, development of observational instruments and system for the Antarctic THz telescope | |
| | Assistant Professor | SALAK Dragan | | Institute for the Advancement of Higher Education |
| Theoretical Particle Physics and Cosmology | Professor | SUZUKI Hisao | Particle physics, beyond the standard model, dark matter, dark energy, grand unified theory, superstrings, supersymmetry, early universe | |
| | Professor | KOBAYASHI Tatsuo | | |
| | Professor | SETO Osamu | | |
| | Lecturer | SUEHIRO Kazuhiko | | |
| | Assistant Professor | DAS Arindam | | Institute for the Advancement of Higher Education |
| Theoretical Nuclear Physics | Associate Professor | NOMURA Kosuke | Nuclear structure and dynamics, and related quantum many-body techniques; Microscopic description of nuclear deformations and collective motions, nuclear density functional theory, collective models; exotic nuclear deformations and collective excitations, octupole deformation, and shape coexistence; beta decays relevant to the nucleosynthesis in the early universe, neutrinoless double beta decay, electric dipole moments, fundamental nuclear processes; numerical simulations using high-performance computers; international collaborations. | |
| Theoretical Astrophysics | Professor | OKAMOTO Takashi | Theoretical astronomy, numerical simulations, semi-analytic modelling, first star formation, first galaxy formation, galaxy evolution, galaxy clusters, supermassive black holes, interstellar matter, star formation | |
| | Assistant Professor | SUGIMURA Kazuyuki | | |
| Planetary and Space Group | Professor | KURAMOTO Kiyoshi | 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 | |
| | Professor | TAKAHASHI Yukihiro | | |
| | Professor | ISHIWATARI Masaki | | |
| | Professor | SATO Mitsuteru | | |
| | Associate Professor | KAMATA Shunichi | | |
| | Specially Appointed Associate Professor | KUBOTA Hisayuki | | |
| | Lecturer | TAKAGI Seiko | | |

| Laboratories | Supervisors | | Keywords | Remarks |
|---|---|---|---|---|
| Astrophysical Chemistry | Professor | WATANABE Naoki | Interstellar molecules, ice dust, amorphous solid water, surface reactions, nanoparticle, crystallization, nucleation, electron microscopy, microgravity | |
| | Professor | KIMURA Yuki | | |
| | Associate Professor | OBA Yasuhiro | | |
| | Associate Professor | YAMAZAKI Tomoya | | |
| | Assistant Professor | HIDAKA Hiroshi | | |
| | Assistant Professor | TSUGE Masashi | | |
| Phase Transition Dynamics | Professor | SAZAKI Gen | Phase transition dynamics, crystal growth, ice, snow, interferometry, advanced optical microscopy, atomic force microscopy | |
| | Assistant Professor | NAGASHIMA Ken | | |
| | Assistant Professor | MURATA Ken-ichiro | | |
| Information Media Science | Professor | FUSE Izumi | Learning science, learning platforms, open education | |
| | Assistant Professor | YAMAMOTO Yuichi | | |
| Nuclear Reaction Data Science | Associate Professor | HIRABAYASHI Yoshiharu | Nuclear data, nuclear reactions, evaluation | Information Initiative Center |
| | Visiting Professor | FUKAHORI Tokio | | Inter-field Cooperation with the Japan Atomic Energy Agency (JAEA) in the field of nuclear data. |
| | Visiting Professor | IWAMOTO Nobuyuki | | |
| Spacecraft Observation Group | Visiting Professor | SATO Takehiko | Planetary exploration, infrared astronomy from space, radio astronomy from space | Inter-field Cooperation with the Japan Aerospace Exploration Agency (JAXA) in the field of spacecraft observation. |
| | Visiting Professor | FUJIMOTO Ryuichi | | |
| | Visiting Associate Professor | YAMAMURA Issei | | |

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**Master's Course**

## Department of Natural History Sciences, Graduate School of Science

As of April 1, 2025

| Research Fields | Research Groups & Laboratories | Supervisors | | Keywords | Remarks |
|---|---|---|---|---|---|
| Earth and Planetary Dynamics | Meteorology | Professor | INATSU Masaru | Meteorology, dynamics and forecast, cyclones and fronts, theory and numerical modelling, development of numerical model, meso-scale phenomena, cloud, rain, snow, aerosol, lightning, material transport, and their application. | |
| | Physical Oceanography and Climate | Professor | MINOBE Shoshiro | Physical oceanography, meteorology, air-sea interactions, climate variability & change, oceans' role in climate, multidisciplinary challenges, numerical modelling, data analysis | |
| | | Associate Professor | SASAKI Yoshinori | | |
| | Space Geodesy | Professor | FURUYA Masato | Space geodesy, GNSS, GPS, INSAR, GRACE, gravity, Earth rotation, atmospheric sensing, crustal deformation, glaciology, planetary geodesy, ionosphere | |
| | | Associate Professor | TAKADA Youichiro | | |
| | Seismology | Professor | YOSHIZAWA Kazunori | Seismic wave propagation, Earth structure, seismic tomography, waveform analysis, seismic source process, microfracture, heterogeneity and anisotropy | |
| | | Associate Professor | NAOI Makoto | | |

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As of April 1, 2025

| Research Fields | Research Groups & Laboratories | Supervisors | | Keywords | Remarks |
|---|---|---|---|---|---|
| Earth and Planetary System Science | Petrology and Volcanology | Professor | KURITANI Takeshi | Field geology, igneous petrology, experimental volcanology, geochemistry, material circulation, magma genesis, magmatic differentiation, magma plumbing system, volcanic eruption, crystal growth | |
| | | Associate Professor | YOSHIMURA Shumpei | | |
| | | Assistant Professor | MUJIN Mayumi | | |
| | | Assistant Professor | PYTHON Marie | Petrography and chemistry of the crust and mantle in ophiolites and the Pacific Ocean, mantle melting, magmatic evolution of the oceanic crust, hydrothermal circulation, interactions within the oceanic crust and mantle | |
| | | Assistant Professor | KITANO Ippei | Geology, metamorphic petrology, metamorphic rocks, plutonic rocks, mobile belts, crustal evolution | Hokkaido University Museum |
| | Geochemistry | Associate Professor | KAWASAKI Noriyuki | Geochemistry, cosmochemistry, planetary chemistry, galaxies, stars, planetary systems, protoplanetary disks, planets, meteorites, Earth, core, mantle, crust, oceans, atmosphere, life, magma, geofluids, mass spectrometry, spectroscopy, microscopy, dust formation, crystal growth, high pressure, solar system evolution, planetary exploration | |
| | | Assistant Professor | BAJO Ken-ichi | | |
| | Earth Materials Science | Professor | NAGAI Takaya | Mineralogy, crystallography, crystal growth, physics and chemistry of minerals | |
| | | Associate Professor | KAWANO Jun | | |
| | | Associate Professor | SHINOZAKI Ayako | | |
| | Paleobiology | Professor | YAMADA Toshihiro | Paleontology, Paleobotany, Stratigraphy | |
| | | Professor | KOBAYASHI Yoshitsugu | Vertebrate evolution, dinosaurs, reptiles, birds, phylogenetic relationships, functional morphology, comparative anatomy, embryology | Hokkaido University Museum |
| | | Associate Professor | IBA Yasuhiro | Evolution of Mesozoic marine biota, paleobiogeographic responses, global environmental change, origin of modern marine biota | |

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| Research Fields | Research Groups & Laboratories | Supervisors | | Keywords | Remarks |
|---|---|---|---|---|---|
| Earth and Planetary System Science | Earth Biosphere Geocience | Professor | SAWADA Ken | Paleoenvironmental reconstruction, Organic sedimentology, Molecular paleobiology, Macromolecular biogeochemistry, biomarker paleoclimatology | |
| | | Lecturer | WATANABE Tsuyoshi | High-resolution reconstruction of palaeoenvironments, biogeochemical cycles in reef ecosystems on the geological time scale | |
| | | Assistant Professor | IKEDA Masashi | Organic Geochemistry, Biogeochemistry, Paleomycology, Paleoecology, molecular fossils, evolution of fungi, lichen | |

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As of April 1, 2025

| Research Fields | Research Groups & Laboratories | Supervisors | | Keywords | Remarks |
|---|---|---|---|---|---|
| Biodiversity | Biodiversity | Professor | TAKAGI Masaoki | Biodiversity III:<br>Ecology,evolution,island,bird | |
| | | Professor | KOGAME Kazuhiro | Biodiversity II:<br>Taxonomy, phylogeny, evolution, seaweeds | |
| | | Professor | KAJIHARA Hiroshi | Biodiversity I:<br>Marine invertebrates, Nemertea, taxonomy, phylogeny, morphology | |
| | | Associate Professor | KATOH Toru | Biodiversity I:<br>Evolution, phylogeny, populations, insects | |
| | | Associate Professor | ABE Tsuyoshi | Biodiversity II:<br>Seaweeds, taxonomy, phylogeny, chemotaxonomy | Hokkaido University Museum |
| | | Lecturer | KAKUI Keiichi | Biodiversity I:<br>Marine invertebrates, Crustacea, Tanaidacea, taxonomy, phylogeny, morphology | |
| | | Lecturer | NAKADA Takashi | Biodiversity II:<br>Taxonomy, phylogeny, evolution, microalgae, Chlorophyceae | |
| | | Assistant Professor | Kevin Wakeman | Biodiversity II :<br>Biodiversity, evolution, protists, Apicomplexa, dinoflagellates | Institute for the Advancement of Higher Education |

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As of April 1, 2025

| Research Fields | Research Groups & Laboratories | Supervisors | | Keywords | Remarks |
|---|---|---|---|---|---|
| Science Communication | Communication of Science and Technology | Associate Professor | KAWAMOTO Shishin | science and technology studies, communication in science and technology, transdisciplinary, dual-use | Advancement of Recurrent Education Division |
| | Philosophy of Science and Technology | Professor | MATSUOU Masahiro | Philosophy of science, ethics of science and technology, philosophy of risk, statistical inference of cause | |
| | Educational Design | Associate Professor | IWAMA Norikazu | Psychological Statistics, Educational Measurement, Test Theory, Educational Technology, Instructional Design, Self-regulated Learning | Institute for the Advancement of Higher Education |
| | | Associate Professor | OKUMOTO Motoko | | Institute for the Advancement of Graduate Education |
| | | Associate Professor | ISHIKAWA Naoko | | Institute for the Advancement of Higher Education |
| | Communication Media | Professor | SHIGETA Katsusuke | Communication Media, Educational Technology, Information and Communication Technology, Learning Effectiveness, e-learning, Hybrid Learning, Educational Practice Research. | Information Initiative Center, Hokkaido University |
| | | Associate Professor | SUGIURA Mayumi | | Institute for the Advancement of Graduate Education |
| | | Associate Professor | YAMAMOTO Kenichi | | Institute for the Advancement of Graduate Education |
| | | Associate Professor | FUJIOKA Kazuya | | Institute for the Advancement of Graduate Education |

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As of April 1, 2025

| Research Fields | Research Groups & Laboratories | Supervisors | | Keywords | Remarks |
|---|---|---|---|---|---|
| Seismology and Volcanology | Seismological Observation | Professor | OHZONO Mako | Earthquake geophysical observation, seismographs, GNSS, gravity, subduction great earthquakes, inland earthquakes, statistical seismology, land and ocean bottom crustal deformation, regional tectonics in northeastern Asia, geothermal exploration, earthquake disaster mitigation | |
| | | Professor | TAKAHASHI Hiroaki | | |
| | | Associate Professor | KATSUMATA Kei | | |
| | Ocean Bottom Seismology and Tsunami | Associate Professor | MURAI Yoshio | Subsurface structure at subduction zones,elastic wave propagation, earthquake source processes, generation and propagation of tsunamis, international field science, disaster mitigation | |
| | | Associate Professor | YAMANAKA Yusuke | | |
| | Volcano Physics | Professor | AOYAMA Hiroshi | Volcanology, volcanic seismology, eruption prediction, transport processes, volcano hydrology, crustal deformation, space geodesy, geo-electromagnetism, spectroscopy of volcanic plume, volcano monitoring system | |
| | | Assistant Professor | TANAKA Ryo | | |
| | Subsurface Structure | Professor | HASHIMOTO Takeshi | Subsurface exploration in seismogenic zones and active volcanoes, tectono-electromagnetism, magnetotellurics, geomagnetic field observation, conductivity anomaly | |

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