

An Outline of the Graduate School of Science

Department of Mathematics

As of April, 2019

Group	Academic Staff	Research Subjects
Algebra	SHIMADA, Ichiro (Professor) KIMURA, Shun-ichi (Professor) MATSUMOTO, Makoto (Professor) TAKAHASHI, Nobuyoshi (Assoc. Prof.)	Number Theory, Algebraic Geometry, Arithmetic Geometry, Motives, Singularities, Group Theory, Representation Theory, Commutative Algebra, Arithmetic Fundamental Group, Random Number Generation, Quasi-Monte Carlo Method, Coding Theory, Cryptography.
Geometry and Topology	SAKUMA, Makoto (Professor) ※ KODA, Yuya (Assoc. Prof.) DOI, Hideo (Assoc. Prof.) ※ OKUDA, Takayuki (Lecturer) TERAGAITO, Masakazu (Professor)*	Differential Geometry, Topology, Manifolds, 3 and 4 Dimensional Mathematics, Knots, Hyperbolic Geometry, Mapping Class Groups, Quantum Topology, Homogeneous Spaces, Symmetric Spaces, Representation Theory of Lie Groups, Singularities.
Mathematical Analysis	YOSHINO, Masafumi (Professor) ※ KAWASHITA, Mishio (Professor) TAKIMOTO, Kazuhiro (Assoc. Prof.) HIRATA, Kentaro (Assoc. Prof.) KAMIMOTO, Shingo (Lecturer) SHIMOMURA, Tetsu (Professor) * IKEHATA, Ryo (Professor) *	Dynamical Systems, Differential Equations, Differential Equations and Diophantine Phenomena, Nonlinear Analysis, Potential Theory, Complex Analysis, Scattering Theory, Algebraic Analysis, Asymptotic Analysis.
Probability Theory and Mathematical Statistics	INOUE, Akihiko (Professor) WAKAKI, Hirofumi (Professor) YANAGIHARA, Hirokazu (Professor) IWATA, Koichiro (Assoc. Prof.)	Probability Theory, Stochastic Processes, Financial and Insurance Mathematics, Random Fields, Theory for Multivariate Data Analysis and its Applications, Statistical Inference, Asymptotic Expansion for Statistical Distributions, Resampling Methods.
Geometric and Algebraic Analysis	AGAOKA, Yoshio (Professor) ※ ABE, Makoto (Professor) MIZUMACHI, Tetsu (Professor) HASHIMOTO, Shintaro (Assoc. Prof.) SHIBUYA, Kazuhiro (Assoc. Prof.)	Differential Geometry, Combinatorial Geometry, Complex Geometry, Several Complex Variables, Differential Equations, Mathematical Statistics

* Also faculty members of the Graduate School of Education

※ Staff is expected to retire in March, 2020 or transfer to another institution

Department of Physical Science

Laboratory	Academic Staff	Research Subjects
Elementary Particle Theory	MOROZUMI, Takuya (Assoc. Prof.) ISHIKAWA, Ken-ichi (Assoc. Prof.)	Elementary particle physics. Physics of mesons and baryons. Dynamical symmetry breaking. Origin of mass and CP violation. Effective theory of QCD. Lattice QCD.
Astrophysics	KOJIMA, Yasufumi (Professor)	Physics of neutron stars and black holes. Gravitational waves. Dark matter. Gravitational lens. Cluster of galaxy. Cosmic structure formation. Cosmic microwave background. Inflation cosmology.
Quark Physics	SHIGAKI, Kenta (Professor)	Experimental study of a new state of matter, quark-gluon-plasma, in high-energy nuclear collisions. Investigation of properties and space-time evolution of such quark matter, which could have existed in 10 micro-sec after the Big-Bang. R&D of new particle detectors.
High-Energy Astrophysics	FUKAZAWA, Yasushi (Professor) MIZUNO, Tsunefumi (Assoc. Prof)*	Study of high-energy astrophysical phenomena through cosmic X-rays and Gamma-rays observations. Astronomical objects of interest are neutron stars, black holes of various masses, supernova remnants, galaxies and clusters, and gamma-ray bursts. Group members participate actively in the Fermi gamma-ray space telescope, Suzaku X-ray satellite, KANATA telescope, next X-ray satellite Astro-H project, and so on. R & D of new radiation detectors is also an important research target.
Optical and Infrared Astronomy	KAWABATA, Koji (Professor)* UEMURA, Makoto (Assoc. Prof)*	Observational Astronomy using the 1.5m telescope at Higashi-Hiroshima Observatory, especially in collaboration with High-Energy Astrophysics group. R&D for new astronomical instruments is also pursued.
Structural Physics	KUROIWA, Yoshihiro (Professor) MORIYOSHI, Chikako (Professor.)	Electron charge density study of ferroelectric and related materials by using synchrotron radiation. X-ray and neutron crystal structure analysis to study the phase-transition mechanism and relationship between crystal structure and physical properties.
Electronic Properties of Solids	NAKAJIMA, Nobuo (Assoc. Prof.)	Study of correlation between electronic states and physical properties in magnetic materials and/or dielectric materials by means of X-ray spectroscopy (XAS, MCD, XLD, PES, XES) and X-ray diffractometry using synchrotron radiation. Investigation of the physical properties under extreme conditions.
Synchrotron Radiation Physics of Solids	KIMURA, Akio (Professor)	Photoemission and inverse photoemission study of magnetic materials and semiconductors. Spin-resolved photoemission and inverse photoemission spectroscopies of magnetic thin films and surfaces. High-resolution photoemission and soft x-ray spectroscopy of strongly correlated materials. Study on structures of surfaces and adsorbates using STM and AFM.
Molecular Photoscience	SEKITANI, Tetsuji (Assoc. Prof.)	Study of photoscience on various molecular systems such as gas, liquid, surface ad molecule, nanocrystal by means of absorption spectroscopy, electron spectroscopy, ion spectroscopy, time division spectroscopy etc. using synchrotron radiation, free electron laser and optical laser. Basic research on creation of new materials. Development of new experimental method using synchrotron radiation and laser.
Synchrotron Radiation Materials Science	NAMATAME, Hirofumi (Professor)** SHIMADA, Kenya (Professor)** OKUDA, Taichi (Professor)** SATO, Hitoshi (Assoc. Prof.)** SAWADA, Masahiro (Assoc. Prof)** MATSUO, Koichi (Assoc. Prof)** MIYAMOTO, Koji (Assoc. Prof)**	Investigation of electronic and spin structures of materials by high-resolution photoemission spectroscopy, highly efficient spin- and angle-resolved photoemission spectroscopy, and soft X-ray magnetic circular dichroism using synchrotron radiation (SR) in the ultraviolet and soft X-ray region, study of biomolecule structures using vacuum-ultraviolet circular-dichroism spectroscopy, and the development of advanced SR instruments for materials science at Hiroshima Synchrotron Radiation Center (HiSOR).
Accelerator and Beam Physics	KATO, Masahiro (Professor)**	Researches on particle accelerators, particularly synchrotron light sources. Beam physics studies on electron dynamics and electromagnetic radiation in synchrotrons. Researches and developments of accelerator technology for advanced light sources.

* Staff of the Hiroshima Astrophysical Science Center ** Staff of the Hiroshima Synchrotron Radiation Center

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Department of Chemistry

Laboratory	Academic Staff	Research Subjects
Structural Physical Chemistry	INOKUCHI, Yoshiya (Professor) TAKAHASHI, Osamu (Assoc. Prof.)	Studies on the structure and dynamics of molecular complexes and functional molecules by uses of nonlinear laser spectroscopy and ab initio molecular orbital calculations. Theoretical studies on the electronic structures and reactions of excited molecules.
Solid Material Chemistry	INOUE, Katsuya (Professor) NISHIHARA, Sadafumi (Assoc. Prof.)	Synthesis, crystal structure, magnetic, optical, and conducting properties for molecule-based materials, studied by SQUID, magnetic resonance, MCD, and X-ray diffraction.
Coordination Chemistry	MIZUTA, Tsutomu (Professor) KUME, Shoko (Assoc. Prof.)	Preparation, structures, and properties of transition metal complexes having phosphorus ligand(s) with novel functionality. Control of catalytic activity using External-stimuli responsive coordination compounds.
Analytical Chemistry	ISHIZAKA, Shoji (Professor)	Studies on the physical and chemical responses or phenomena of single particles levitated in air by means of a laser trapping technique.
Organic Stereochemistry	HAINO, Takeharu (Professor) SEKIYA, Ryo (Assoc. Prof.)	Study on the developments of supramolecular assembly and polymer generated from hetero- and homotopic monomers linked through multiple non-covalent forces, and their innovative functions.
Photochemistry of Advanced Materials	SAITOW, Ken-ichi (Professor) *	Advanced nanomaterials synthesis based on physical chemistry method. Optoelectrical properties of nanostructured material. Development of basic structure for next-generation photovoltaic and LED. Optical properties of condensed phase.
Physical Chemistry of Kinetics	YAMASAKI, Katsuyoshi (Professor) KOHGUCHI, Hiroshi (Assoc. Prof.)	Experiments based on the selective detection of a single quantum state of atoms and molecules by laser spectroscopy. Studies on the kinetics and dynamics of the chemical reactions and energy transfer processes in atomic and molecular collisions.
Quantum Chemistry	AIDA, Misako (Professor) ※ OKADA, Kazumasa (Assoc. Prof.)	Chemical reactions in solution or specific recognition reactions in biological systems using quantum mechanical and molecular dynamics simulations. Experimental studies on the electronic states of molecules and the reactions induced by X-ray photon or electron impact.
Organic Main Group Chemistry	YAMAMOTO, Yohsuke (Professor) ※ NAKAMOTO, Masaaki (Assoc. Prof.) RONG Shang (Assis. Prof.)	Studies on the synthesis and reaction mechanism of organic compounds of main group elements. Chemistry of hypervalent molecules.
Organic Reaction Chemistry	ABE, Manabu (Professor) HATANO, Sayaka (Lecturer)	Organic photochemistry, reactive intermediate chemistry, synthesis of biologically active compounds.
Radiation Reaction Chemistry	NAKASHIMA, Satoru (Professor) *	Chemistry related to radiation or studied by Mössbauer spectroscopy. Control of mixed-valence state and spin state by crystal construction. Study on environmental radioactivity and study for decontamination of radioactive cesium.

* Staff member of the Natural Science Center for Basic Research and Development

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Department of Earth and Planetary Systems Science

Group	Academic Staff	Research Subjects
Earth and Planetary Material Science	Jun-ichi Ando (Professor) Ken-ichi Hoshino (Assoc. Prof.) Yasutaka Hayasaka (Assoc. Prof.) Kaushik Das (Assoc. Prof.) Kouji Okumura (Professor)*	Tectonics of East Asia, Continental evolution, Deformation microstructure, Water-rock interaction, Crystal chemistry
Earth and Planetary Chemistry	Tomoyuki Shibata (Professor) Hikaru Yabuta (Professor) Masaaki Miyahara (Assoc. Prof.)	Magma genesis, Astrobiology, Space exploration, Earth environmental change, Microbial mineralization, Planetary collision process
Earth and Planetary Physics	Naoki Suda (Professor) Toru Inoue (Professor) Ikuo Katayama (Professor) Tomoko Sato (Assoc. Prof.)	Fault mechanics, Earthquake, Internal structure of the Earth, Mineral physics, Material transport, Mantle convection

* Also faculty members of the Graduate School of Letters

Institute for Interdisciplinary Science

Group	Academic Staff	Research Subjects
Integrative Earth and Ocean Sciences	Tsuyoshi Ishikawa (Visiting Prof.)* Takehiro Hirose (Visiting Prof.)* Motoo Ito (Visiting Prof.)* Naotaka Tomioka (Visiting Prof.)* Tatsuhiko Hoshino (Visiting Assoc.prof.)*	Geochemical cycles and environmental changes recorded in sedimentary rocks Microbiological and geochemical explorations of subseafloor biosphere Physico-chemical processes in earthquake fault zones Development of analytical techniques of isotopes and trace elements in core samples Diversity and ecology of microbes inhabiting the deep-biosphere

* Staff of Japan Agency for Marine-Earth Science and Technology

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