

List of Supervisors and Research Fields

As of September 1, 2024

Doctoral 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 (μ SR, neutron and synchrotron X-ray scattering, etc). 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, μ SR, Neutron scattering, XRS, Ferroelectrics, Multiferroics, Electronic ferroelectricity, Phase transition, Photoinduced cooperative phenomena	
	Professor	YANAGISAWA Tatsuya		
	Associate Professor	TAKESADA Masaki		
	Assistant Professor	HIDAKA Hiroyuki		
Electronic Properties of Low-dimensional Material	Professor	KAWAMOTO Atsushi	NMR, Strongly-correlated electron 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	Associate Professor	MISHINA Tomobumi	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.	Will retire in March, 2025.
	Assistant Professor	YAMAMOTO Sekika		
Statistical Physics	Professor	NEMOTO Koji	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. (1) Classification of electronic physical properties based on microscopic multipoles (2) Topological magnetism including magnetic skyrmions (3) Emergent spin-orbit-coupled physics in magnetic materials (4) Cross-correlated phenomena over electric, magnetic, elastic, heat, and light (5) Exploring novel physics by using a machine-learning method	Will retire in March, 2025.
	Professor	KITA Takafumi		Will retire in March, 2025.
	Associate Professor	HAYAMI Satoru		
	Assistant Professor	OKUDA Koji		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.

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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.	
	Lecturer	OHARA Jun		
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	Quantum field theory, Many-body perturbation theory, Spintronics devices, Magnetism, Electronic correlations, Dirac electron, Topological insulator	No acceptance for FY2025
Condensed Matter Theory Field of Advanced Functional Materials and Physics (NIMS).	Visiting Professor	YAMASE Hiroyuki	Quantum many-body theory, Superconductivity, Magnetism, Critical phenomena, Electronic nematic liquids	
Nano-system Photonics Field of Advanced Functional Materials and Physics (NIMS)	Visiting Professor	NAGAO Tadaaki	Surface physics, Nanophotonics, Energy conversion, Nanomaterials	
Solid State of Physics in High Magnetic Fields Field of Advanced Functional Materials and Physics (NIMS)	Visiting Professor	IMANAKA Yasutaka	Magneto-Spectroscopy, High magnetic field, Terahertz wave, Cyclotron resonance, Quantum Hall effect, Dirac Fermion, Topological insulator	
Surface Quantum Phase Materials Field of Advanced Functional Materials and Physics (NIMS)	Visiting Professor	UCHIHASHI Takashi	Surface and interface, Atomic layer, Two-dimensional, Quantum materials, Superconductivity, Topological state, Ultrahigh vacuum, Nanotechnology, Scanning tunneling microscopy, Electron transport	
Muon Spin Resonance Laboratory Field of Spin Resonance Material Science (RIKEN)	Visiting Professor	WATANABE Isao	μ SR 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 Laboratory Field of Spin Resonance Material Science (RIKEN)	Visiting Associate Professor	OSHIMA Yugo	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.	

※There is a possibility that the members of supervisors change. Please get the latest information from the website of the Graduate School of Science.