

2020年4月入学 April 2020 Admission

広島大学大学院先進理工系科学研究科（博士課程後期）

学生募集要項

Graduate School of Advanced Science and Engineering (Doctoral Course)

Application Guidebook

量子物質科学プログラム
Quantum Matter Program

◆外国人特別選抜

Special Selection for International Students

2019年9月 September 2019



広島大学

Hiroshima University

Admission Policy of Graduate School of Advanced Science and Engineering

【Doctoral Course】

The Division of Advanced Science and Engineering of the Graduate School of Advanced Science and Engineering seeks students who have the following aspirations and motivation and have the basic academic abilities necessary for it:

- ① An ambition for taking the leading role in advanced and prominent academic and inter-disciplinary research;
- ② The will to take the leading role in professional occupations such as researchers and engineers in areas related to natural science, engineering, and information science;
- ③ A zeal for establishing the "science for sustainable development" from a multifaceted perspective and for solving regional and international issues by acquiring sophisticated knowledge and study skills for the academic areas related to natural science, engineering, and information science as well as a wide range of intelligence; and
- ④ Common sense as a member of society and ethics required for researchers and highly-professional engineers.

Table of Contents

1. Admission Policy of Quantum Matter Program	1
2. Requirements for application	1
3. Documents for application	1
4. Deadline of Applications	3
5. Admission	3
6. Fees	3
7. Others	4
8. Contact address	4
 Lists of Academic Staffs of the Quantum Matter Program, Graduate School of Advanced Science and Engineering	 5

Documents for application

Graduate School of Advanced Science and Engineering, Hiroshima University, is seeking new international students for its doctoral course to be enrolled in April 2020.

1. Admission Policy of Quantum Matter Program

【Doctoral Course】

The Quantum Matter Program seeks students who have the following aspirations and motivation and have the basic academic abilities necessary for it:

- ① The will to acquire sophisticated research ability and expertise to obtain the doctor degree and being engaged in advanced professional occupations such as researchers and engineers in area of the basic materials science, condensed material physics, material science and engineering, and electronic engineering;
- ② An ambition for unveiling new findings in physics and applying them in an engineering field and/or development of a integrated system regardless of the experience and background before entering the university;
- ③ A wish to build up new businesses as well as exploring scientific facts and applying scientific findings from the academic point of view;
- ④ A zeal for establishing the "science for sustainable development" from a multifaceted perspective and for solving regional and international issues by acquiring wide range of academic knowledge and study skills for the academic areas related to the basic materials science, condensed material physics, material science and engineering, and electronic engineering as well as a wide range of intelligence; and
- ⑤ Common sense as a member of society and ethics required for researchers and highly-professional engineers.

2. Requirements for application

A non-Japanese who is qualified with one of the following stipulations:

A: those who have received, or will receive by March 2020, a Master's degree;

B: those who have research experience for at least two years after graduation from a university;

C: Those who deemed to have attained an academic standard equivalent to the Master's degree in the preliminary selection by Hiroshima University Graduate School and will be 24 years old before or on March 31, 2020.

Applicants who wish to apply under the category B or C are required to submit documents for qualification by October 18, 2019. Please contact the Student Support Office of Graduate School of Advanced Sciences of Matter for more information.

3. Documents for application*

- Application form +
- Resume +
- Examination Card +
- Official grade academic transcripts (issued by all universities and graduate schools attended)
- Official certificate of Master's degree and one copy of Master's thesis (If you have completed a

Master's course, please make sure that the certificate includes information about your degree.) (category A) ※

- An interim report of research achievements after the graduation (category B or C)
- Proposed plan of study (more than 600 words)
- List of publication
- A letter of recommendation⁺ (written by applicant's supervisor or equivalent)
- Records of English language tests (TOEFL® , TOEIC® or equivalent)
- Application fee 30,000 Japanese yen[§]

(Use the attached form to transfer the application fee at the bank. The deadline of the payment is December 5, 2019. Submit the receipt of application fee together with other application documents. Applicants who are resident outside Japan should purchase a 30,000 Japanese yen postal money order in Japanese currency at a local post office. Do not fill in the remittee's name. Send the postal money order along with other application documents.)

- A copy of resident card
(This is required only for applicants residing in Japan. If applicant's address is written on the back side of the card, please make a both sided copy.)
- Certified Score Report of the GRE (if any)

*If the document is written in language other than English or Japanese, a translation into English or Japanese must be also submitted.

*The certificates to be submitted must be the originals or certified photocopies. Uncertified photocopies would not be recognized as official certificates.

⁺Use the forms supplied

[§]Applicants supported by the Japanese Government (Monbukagakusho) Scholarship are exempt from the application fee in most cases. Please contact the Student Support Office of Graduate School of Advanced Sciences of Matter for more details.

※ If you have completed or are expected to complete a Master's Course in China (excluding Taiwan, Hong Kong and Macau), please obtain the following document by requesting it at “中国高等教育学历证书查询(CHSI)” (<http://www.chsi.com.cn/xlcx/bgys.jsp>), and submit it to us together with “毕业证书(Certificate of Graduation)” and “硕士学位证书 (Master's Diploma)”.

- Applicants who have completed a Master's Course: Online Verification Report of Higher Education Qualification Certificate (教育部学历证书电子注册备案表)
- Applicants who are expected to complete a Master's Course: Online Verification Report of Student Record (教育部学籍在线验证报告)

Please note that applicants must pay the issuing fee for the Online Verification Report (2 元/ certificate) by themselves. Also be sure that there are 15 or more days left until the expiration date of the online verification at the time of its submission.

Prior to the application, every applicant must contact one of the supervisors under whom the applicant wishes to study at Hiroshima University. The supervisors and their research subjects are listed at the end of this document.

Applicants must send all documents all together by a registered mail marked in red with “Quantum Matter Program Entrance Exam Application” on the envelope to

Student Support Office
Graduate School of Advanced Sciences of Matter
Hiroshima University
1-3-1 Kagamiyama, Higashi-Hiroshima, 739-8530 Japan

Any changes in application materials after submission will not be allowed. Application materials and application fee will not be returned by any reasons.

4. **Deadline of Applications**

- December 5, 2019

5. **Admission**

- Applicants who are resident outside Japan will be selected after a thorough review of their submitted materials and a direct interview test by e-mails or the Internet.
- Applicants who are resident in Japan will be requested to appear for interview additionally. Details of the interview will be announced individually by mail to the applicants.
- Oral Examination about :
 - Reason for application
 - Preferred research subject and plan in the Doctoral Course
 - Master's thesis
 - Basic knowledge※
- ※Basic knowledge about
 - applicants who wish to study under supervisors marked with ” ① “ in the lists of p.5~p.7
 - Engineering Field: Electromagnetism, Quantum mechanics, Semiconductor engineering
 - Science Field: Classical mechanics, Electromagnetism, Quantum mechanics, Statistical thermodynamics
 - applicants who wish to study under supervisors marked with ” ② “ in the lists of p.5~p.7
 - Electromagnetism, Electronic circuits, Semiconductor engineering, Quantum mechanics
- Announcement of admission
 - January 21, 2020

A written notice will be sent to all applicants. Neither telephone nor facsimile inquiries will be accepted.

6. **Fees**

- Enrollment fee: 282,000 Japanese yen
- Tuition fee: 267,900 Japanese yen for one semester
535,800 Japanese yen for one year

Enrollment and tuition fee amounts are shown as of April 2019. Should the amount be revised at the time of or after enrollment, students will be required to pay the revised fee. Detailed information on how and when to pay enrollment and tuition fees and our exemption system of these fees will be also informed together with enrollment procedure details. Students supported by the Japanese Government (Monbukagakusho) Scholarship are exempt from both fees.

7. Others

- The regular entrance examination for Japanese students is also open for international students.
- Any forgery or falsification of the documents and/or academic fraud would result in cancellation of acceptance even after passing examination or admission.
- If an applicant could not graduate from the university before the admission date, he/she would lose the eligibility to enter our graduate school in this session.
- All personal data contained in any application documents, which includes name, date of birth, gender and other personal information, will be used for selection, notification of the result and enrollment formalities. After enrollment, the data will be under the control of Hiroshima University and will be used for student supports, such as application for scholarships and exemption from tuitions. It will not be used for any other purposes and will be provided only to the University's faculty members concerned.

8. Contact Address

Student Support Office
Graduate School of Advanced Sciences of Matter
Hiroshima University

1-3-1 Kagamiyama, Higashi-Hiroshima, 739-8530 Japan
TEL:082-424-7008, 7009 (Inside Japan) +81-82-424-7008,7009 (Outside Japan)
E-mail: sentan-gaku-sien@office.hiroshima-u.ac.jp
URL: <https://www.hiroshima-u.ac.jp/en/adsm>

(Towards a smoke-free campus)

Smoking will be prohibited entirely in all HU campuses from January, 2020.

※The Kasumi Campus has been smoke-free since April, 2018.

Lists of Academic Staffs and Research Subjects

Quantum Matter Program

* For more detailed information, please see AdSM website (<https://www.hiroshima-u.ac.jp/en/adsm>).

Position	Name	Subjects of Research	Examination
Professors	OKAMOTO, Hiromi	Study of charged-particle beams and non-neutral plasmas.	①
	ONIMARU, Takahiro	Experimental research on magnetic property of rare-earth compounds and thermal property of clathrate compounds. Macroscopic measurements and neutron scattering experiments are performed to reveal origins of new phenomena.	①
	KADOYA, Yutaka	Development of the devices for generation and detection of terahertz waves using ultrafast pulse lasers, and the devices for lightwave control using artificial material (meta-material).	①
	KURIKI, Masao	Theoretical and experimental study for beam dynamics. Research and development of high energy accelerator and its applications for light source, X-ray source. Research for high brightness (polarized) electron and (polarized) positron sources and study for photo-cathode and laser as key technologies of the high brightness particle sources.	①
	SHIMAHARA, Hiroshi	Mechanism of anisotropic superconductivity and interplay between magnetism and superconductivity in strongly correlated electron systems and quasi-low-dimensional systems. Superconductivity in high magnetic fields including the Fulde-Ferrell-Larkin-Ovchinnikov state. Magnetism in low and quasi-low dimensional systems.	①
	SUZUKI, Takashi	Experimental studies on the strongly correlated electron systems and new multiferroics in multiple extreme conditions (low temperature, high magnetic field and high pressure). Recently, we focus on exotic properties of compounds with a chiral structure.	①
	TAKANE, Yositake	Theory of quantum electron transport in mesoscopic systems and low-dimensional electron systems.	①
Associate Professors	SUZUKI, Hitoshi	Experimental study of the mechanisms of self-assembled/self-organized structures consisting of organic molecules with scanning probe microscopes and their application for nanotechnology. Development of new analysis methods of organic molecules and/or bio-molecules and new application techniques of bio-molecules(motor protein, etc.) using micro/nano structures.	①
	TAKAHASHI, Tohru	High Energy Physics and its application: Physics of Tera-scale by high energy electron-positron collider R&D of intense photon sources by the Laser-Compton scattering Physics in intense electromagnetic fields	①
	TANAKA, Arata	Theoretical studies on the 3d and 4f electrons and high-energy spectroscopies in transition-metal and rare-earth compounds.	①
	NISHIDA, Munehiro	Theoretical study of resonant optical response produced by surface plasmons in metallic nano-structures, and development of fast electromagnetic simulation softwares.	①
	HIGAKI, Hiroyuki	Experimental research on trapped charged particles and related physics. Production of low energy particle beams and their application for atomic physics, plasma physics, and beam physics research.	①
	HIGUCHI, Katsuhiko	Development of the energy-band theory beyond the local density approximation and its application to solids.	①
	Holger F. HOFMANN	Theoretical research on quantum optics and quantum information; quantum computation and communication using highly non-classical states of light	①

Quantum Matter Program

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Position	Name	Subjects of Research	Examination
Associate Professors	MATSUMURA, Takeshi	Experimental study on ordered structures and fluctuations of charge, spin, orbital, and higher multipole moments in strongly correlated electron systems by means of neutron and resonant x-ray scatterings. Also by studying thermal and transport properties, we aim at total understanding from microscopic and macroscopic points of view.	①
	YAGI, Ryuta	Experimental investigation of nano-scale physics. Quantum coherence, single electron phenomena and non-equilibrium transport are studied by fabricating extremely small structures and measuring low-temperature transport.	①
	UME0, Kazunori	Studies of the thermal, transport and magnetic properties of rare-earth and transition-metal compounds under high pressures. Main research subjects are pressure-induced quantum critical phenomena of heavy-fermion systems, anomalous magnetism in geometrically frustrated systems under pressure, and pressure dependence of the quasi-localized vibrational modes in clathrates.	①
	MIYAOKA, Hiroki	Experimental study of fundamental material properties and reactivity for light elements based materials. Main subjects are research and development of hydrogen production, hydrogen storage, and material conversion. Functional materials are newly created through research on material properties and reaction mechanism by original sample synthesis methods and various analyses from wide points of view.	①
Lecturer	TOMINAGA, Yoriko	Crystal growth of semiconductor thin films and quantum structures, investigation of their optical characteristics, and development of novel optical devices.	①
Assistant Professors	IINUMA, Masataka	Experimental studies on quantum optics and its application; applications to quantum information science, fundamental physics, and bioengineering by quantum optical methods and techniques.	①
	ITO, Kiyokazu	Experimental study on collective motions in charged particle systems. Application of non-neutral plasma systems to beam physics. Production of nano-ion beam sources.	①
	SAKAUE, Hiroyuki	Experimental studies on the fabrication of the surfaces and films with new properties by using 2- or 3-dimensional self-assembled integration of molecules and nanoparticles.	①
	HIGA, Nonoka	Experimental study in strongly correlated electron systems by means of neutron, resonant x-ray and nuclear magnetic resonance under multiple extreme conditions. We clarify the electronic properties on a microscopic point of view.	①

Academic staffs below are in charge of plural programs including this program.

Staff	Other Program
Professor EKINO, Toshikazu	Transdisciplinary Science and Engineering Program
Professor OGITA, Norio	Transdisciplinary Science and Engineering Program
Professor HIGASHITANI, Seiji	Transdisciplinary Science and Engineering Program
Assistant Professor SUGIMOTO, Akira	Transdisciplinary Science and Engineering Program
Assistant Professor NAGATO, Yasushi	Transdisciplinary Science and Engineering Program
Assistant Professor HASEGAWA, Takumi	Transdisciplinary Science and Engineering Program

Quantum Matter Program

* For more detailed information, please see AdSM website (<https://www.hiroshima-u.ac.jp/en/adsm>).

Position	Name	Subjects of Research	Research Field	Examination
Professors	HIGASHI, Seichiro	Research on novel thin-film semiconductor processing techniques such as crystalline growth, low-temperature deposition of insulator films, and junction formation and their application to large-area electronics (solar cells, flat panel displays, etc) and ULSI devices.	Semiconductor Engineering	②
	FUJISHIMA, Minoru	Research on system architecture, circuit design, layout optimization, active/passive device modeling and measurement for ultrahigh-frequency millimeter-wave and terahertz wireless communication and sensors with nanometer CMOS integrated circuits.	Ultrahigh-Frequency LSI and Systems	②
	IWASAKA, Masakazu	Research on optical and magnetic properties of biogenic crystals and living cells in tissue engineering. Electromagnetic manipulation of biological materials in bio-MEMS for biomedical science and biotechnology.	Nanobio-Electromagnetics Engineering	②
	KUROKI, Shin-Ichiro	Silicon-Carbide (SiC) harsh-environment electronics for space exploration, decommissioning of nuclear power stations and medical, SiC power semiconductor devices and silicon thin-film devices.	Nanodevice Engineering	②
	TERAMOTO, Akinobu	Research on device structures, advanced process technology, and evaluation system for advanced LSI, and research on new device structures, process technology of wide bandgap semiconductor (GaN) for power devices and high-speed communication.	Nanoprocess Engineering	②
Associate Professors	AMAKAWA, Shuhei	RF/microwave/millimeter-wave CMOS circuit design. Circuit theory. Microwave and millimeter-wave measurement. Device characterization and modeling.	RF Electronics	②
	SASAKI, Mamoru	Analysis, synthesis and design of architecture and RF circuit in CMOS technology. High-speed transceivers for wireless and wired communications between LSI chips. Development of design method combining communication, mount and circuit technique.	Integrated Systems	②
	YOSHIDA, Takeshi	Low-power and low-noise circuit techniques for analog-digital merged system LSIs. Architecture and circuit technologies for Bio-Sensor LSI, which realize sensing a neural signal.	Advanced System LSI	②
	KOIDE, Tetsushi	Architecture and circuit technologies for LSIs, which realize real-time recognition systems for flexible and intelligent information-processing based on reconfigurable logic-in-memory architecture approaches, and the systems development of medical / agricultural engineering applications.	Intelligent Integrated Circuits Engineering	②
	NAKAJIMA, Anri	Researches of ultra small-size or new functional devices (such as quantum device and single-electron memory) and the development of atomic- or nano-scale process and large-scale integration technologies to make LSI more large and fast.	Nanoprocess Engineering	②
	MIYAKE, Masataka	Model developments of unipolar and bipolar devices for circuit design, and their expansions to power devices with next-generation semiconductor materials.	Compact Modeling of Semiconductor Devices for Circuit Design	②
Assistant Professors	HANAFUSA, Hiroaki	Development of new thin-film structure formation technology and research of its application to quantum-effect devices.	Semiconductor Devices and Materials	②