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<td>1</td>
<td>Research of new instruments for next-generation X-ray and gamma-ray observations</td>
<td>Research of new instruments for next-generation X-ray and gamma-ray observations and their integration into the X-ray and gamma-ray observatories. Understanding of the X-ray and gamma-ray instruments for the next international observatories and small satellites being studied. X-ray focusing mirror systems, hard X-ray telescopes, X-ray pixel detectors, Compton X-ray detectors, and related technologies such as space cryogenics and digital data processing. Other research themes based on applicant’s own new ideas are also welcome.</td>
<td>Research experience in physics and astrophysics, in particular, in experimental physics and/or any instruments in astronomy and astrophysics.</td>
<td>Applicant can select various research themes in high-energy astrophysics, instrument science, etc., since there are six supervisors with different research backgrounds.</td>
<td>Prof. K. Matuda, Prof. Yoshiaki, Prof. T. Isotani, Prof. M. Ichihashi, Assoc. Prof. Y. Yamada, and Assoc. Prof. M. Kikukawa</td>
<td>+81-50-3362-3621</td>
<td>5 : 5</td>
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<td>2</td>
<td>Researches in/on space radio astronomy</td>
<td>Both of (1) researches in space radio astronomy including space VLBI and (2) conceptual examinations or technical developments for a future space mission of radio astronomy are supposed to be conducted.</td>
<td>Understanding of basic of radio telescopes, interferometry, and VLBI.</td>
<td>Researches on solar physics or its relevant research field are required for applicants. Applicants are expected to promote his/her researches (either observationally or theoretically) based on observations including Hinode. Researchers should make contributions to further improvements on our knowledge on the Sun.</td>
<td>Prof. TSUBOI, Masato, Associate Prof. MURATA, Toshiyuki</td>
<td>+81-50-3362-2956</td>
<td>7 : 3</td>
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<tr>
<td>3</td>
<td>Solar physics researches based on Hinode observations</td>
<td>Research on solar physics or its relevant research field are required for applicants. Applicants are expected to promote his/her researches (either observationally or theoretically) based on observations including Hinode. Researchers should make contributions to further improvements on our knowledge on the Sun.</td>
<td>Research experience in solar physics or its relevant research field are required for applicants. Applicants are expected to promote his/her researches (either observationally or theoretically) based on observations including Hinode. Researchers should make contributions to further improvements on our knowledge on the Sun.</td>
<td>Researches can be promoted in deep collaboration with researchers in ISAS and NAOU. Also, applicants can promote research works with foreign residents at ISAS. The computers at ISAS allow researchers to access all the Hinode data on line. Applicants are highly encouraged to participate in scientific operations of Hinode. Such opportunities, he/she can realize new observations with Hinode.</td>
<td>Associate Professor Taro Sakao, Associate Professor Toshifumi Shimizu</td>
<td>+81-50-3362-4663</td>
<td>5 : 5</td>
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<td>4</td>
<td>Development of new methods and/or software for data analysis/instrument design with high-performance computing technology</td>
<td>Numerical simulations can virtually reproduce the space environment that is quite difficult to simulate by ground experiments, so that, they are expected to contribute design process of spacecraft system. Mission data obtained from the advanced science spacecrafts become huge volume, and complicated data process is required. Moreover, modern space science research styles require not only complex data analysis itself, but also cooperation with numerical modeling. Numerical simulation, which can be realized by high-performance computing system, is considered to be applied to various situations of space science missions, not only to theoretical numerical simulations. In this sense, we will develop the technique of numerical simulations to science data analysis or spacecraft subsystem design.</td>
<td>The project researchers of this application are expected to propose new ideas for science data analysis techniques or onboard subsystem design utilizing high-performance computing technology.</td>
<td>The project researchers will do their research topics under the collaboration with JAXA staffs related to their theme. The JAXA super computer is also available for this research application.</td>
<td>Associate Prof. Shu Shirohara, Associate Prof. Ryoji Takagi</td>
<td>+81-50-3362-3279</td>
<td>7 : 3</td>
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<td>5</td>
<td>Higher animal research on hibernation mechanisms and biological effects of space environment</td>
<td>Biological effects of space environment on living organisms and hibernation mechanism shall be investigated by physiochemical, metabolic, and behavioral methods. Higher animals, especially rodents, shall be used as experimental animals. In addition, gene expression analysis will be utilized to reveal molecular mechanisms involved in the hibernation process and to understand the underlying physiological mechanisms.</td>
<td>It is necessary to have experience of higher animal research with physiochemical and/or peripheral methods.</td>
<td>Professor will give direct research with 1 researcher and 2 outside collaborators. The researcher is on his/her own with various facilities at JAXA (ISAS, JSPEC, etc.). A PC for design and analysis use will be provided to the researcher.</td>
<td>Associate Professor Yuuki Kawakatsu</td>
<td>+81-50-3362-7924</td>
<td>5 : 5</td>
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<td>6</td>
<td>Deep Space Mission Design</td>
<td>Unlike earth-orbiting satellites, deep space explorers must reach their target objects by themselves. Trajectory design is the first step of deep space mission planning, which strongly constrains schedule and scope of the mission and provides critical conditions for the spacecraft design. Accordingly, trajectory design is one of the mission critical factors.</td>
<td>What is required to perform this research is a wide range of knowledge and capability in space technology. In particular, to have research experience in the field of astrodynamics (incl. operation plan, and program management. For this reason, it is called &quot;mission design&quot;. Therefore, a researcher is expected to join the study team on future deep space missions and to cope with the problems on mission analysis and spacecraft design.</td>
<td>The research is done under the lead of research staffs in ISAS Department of Space Systems and Aerosciences, as well as the collaboration with other research staffs in JAXA (ISAS, JISPCN, etc.). A PC for design and analysis use will be provided to the researcher, and the JAXA super computer is also available on research necessity.</td>
<td>Associate Professor Yasuhiro Kawakatsu</td>
<td>+81-50-3362-7836</td>
<td>5 : 5</td>
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<td>7</td>
<td>Technology demonstration test research of hybrid rocket engine</td>
<td>Basic researches of technology for hybrid rocket engines to improve engine performances are carried out. Improvement of regression rate, improvement of combustion efficiency, development of numerical computation code for turbulent boundary layer combustion, and so on are achieved. It is time to step up to demonstrate the hybrid rocket technology. The mission design is the first step to develop and demonstrate the hybrid rocket engine of thrust level of 5 kN and improve the hybrid rocket technology such as swirling oxidizer flow or regenerative cooling nozzle for vaporizing liquid oxygen. The outputs of these researches are useful for more actual hybrid rocket engine in the future.</td>
<td>Knowledge of industrial dynamics, heat transfer engineering, fluid dynamics, industrial chemistry at the level of a bachelor’s degree</td>
<td>Research activities such as the numerical computation and the combustion tests are supported and advised by professors which study hybrid rocket engines. Technical support is expected to design and simulate the facility to cut the costs for the combustion tests. Conducting the combustion test is supported by technicians in Akiruno facility.</td>
<td>Professor, Toru Shimada</td>
<td>+81-50-3362-2501</td>
<td>7 : 3</td>
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The study and development of active phased array antennas

Recent satellites and spacecrafts trends to development of high performance satellite with an active phased array antennas. This type of antenna system requires functions of small-size, light-weight transmitter and receiver and a planar antenna.

In particular, high efficiency and low-loss devices and circuits are necessitated.

The purpose of this study is to develop a small active integrated antenna module, which is a space electronic module. The active integrated antenna includes with semiconductor devices, MMICs and planar antennas. This technique is applied in order to realize the planar active phased array radar in a small satellite and a solar sail satellite.

The semiconductor device and microwave and millimeter wave technologies are requested in this research for the development of a semiconductor circuit, the test fabrication of an active integrated phased array antenna, the measurement of characteristics of both the circuit and modules. In addition, you can study an advanced RF ID tag, MMICs and modulation/demodulation analysis in terms of the system. Applicants are expected in the experience of use of the CADs and measurement equipments.

You can join Kawanishi research group and the DE communication and data transmission group. Equipments and CADs such as 2D, 3D and test facilities include the measurement equipments, boards, EB, and a clean room are available. You can use these tools under our regulations.

Research leader: Professor Shigeshi Kikawada

Research Project contribution: 5 : 5

Research: 8

Details of topics

1) Development of a small active phased array antennas
2) Proposal and performance of a new sounding rocket experiment on the upper atmospheric physics
3) Study on the upper atmospheric physics with the sounding rocket

The Suzaku observatory which was put into the orbit in July 2005. There are many research themes in a small satellite and a solar sail satellite.

The active integrated antenna is made with semiconductor devices, MMICs and planar antennas.

This position requires (1) a research background and a doctoral degree in physics, electronics engineering or artificial intelligence.

The project researchers are requested to promote data analysis studies using AKEBONO and GEOTAIL data in the international multi-point observations, under the condition that the latest datasets of a number of magnetospheric observatories, such as AKEBONO, GEOTAIL, Cluster, THEMIS and others can be easily used. It is desirable to have English ability required for the above international research promotion.

The staff scientists of AKEBONO and GEOTAIL data projects will collaborate with project researchers. The project researchers can use scientific datasets of AKEBONO and GEOTAIL as well as the data analysis computer facilities.

The Suzaku project will provide all necessary environments such as the design of the new instrument with his/her own idea and make a proposal of new experiment.

Research experience in physics and astrophysics, data analysis in using UNIX computers.

Applicants are requested to have good knowledge of physics or astrophysics. For applicants who aim to carry out engineering study, basic knowledge and research interest in the relevant area are required. It is desired that the applicants have experience in hardware R&D studies on physics and/or astrophysics. It is requested that the candidates are familiar with technical studies on physics in activities with other institutions inside or outside JAXA whenever needed. Those who have strong will to push next generation space solar physics forward through hardware development are highly welcomed.

For further information on the project, please visit http://astro-h.isas.jaxa.jp.

Applicants are to have good knowledge of physics or astrophysics. For applicants who aim to carry out engineering study, basic knowledge and research interest in the relevant area are required. It is desired that the applicants have experience in hardware R&D studies on physics and/or astrophysics. It is requested that the candidates are familiar with technical studies on physics in activities with other institutions inside or outside JAXA whenever needed. Those who have strong will to push next generation space solar physics forward through hardware development are highly welcomed.

Related to the research, ISAS solar physics group (SOlar-R project) are conducting related research and it is expected to use various test facilities in ISAS. Meanwhile, collaborative research activities with solar physics group at NAU (with which ISAS solar physics group has ongoing collaborative research activities) as well as use of test facilities at NAU are also available and encouraged.

Research: 9

Details of topics

1) Development of the X-ray Satellite, ASTRO-H
2) The study of upper atmospheric physics with the sounding rocket

ASTRO-H mission is the next major X-ray mission in Japan. ASTRO-H will carry two Hard X-ray Telescopes for the Hard X-ray Imager, and two Soft X-ray Telescopes, one with a micro-calorimeter spectrometer array with excellent energy resolution of less than 0.01 eV, and the other with a large area CCD in their respective focal planes. In order to extend the energy coverage to the soft gamma-ray region up to 600 keV, the Soft Gamma-ray Detector, which is based on the concept of Si/CdTe Compton Gamma Camera, will be implemented as a non-focusing detector. Applicants are expected to participate in the project to develop these instruments and also to work on science achieved by the mission. Contribution to the field of the data processing and satellite bus system is also of interest. For further information on the project, please visit http://astro-h.isas.jaxa.jp.

Background of physics or astrophysics. It would be desirable if applicants have some experiences on design and actual development of radiation detectors for X-rays and gamma-rays.

Research will be performed under supervision by professors in the department of high energy astrophysics and related departments. In addition to perform research in the field of high energy astrophysics for access to cutting-edge technologies implemented in the instruments to be onboard the ASTRO-H satellite, this project also aims at advanced X-ray and gamma-ray detectors, Space flight network, and analysis of ISL.

Study on the upper atmospheric physics with the sounding rocket

In-situ observation of the lower ionosphere and thermosphere at altitude of 80–200 km can be made by the sounding rocket only, and therefore the limited data are available. However, it is becoming possible to approach various unresolved problems from new viewpoint due to recent advances on measurement technology.

By using the sounding rocket, the Institute of Space and Astronautical Science (ISAS) is trying to elucidate various phenomena occurring in the upper atmosphere where the neutral and charged particles coexist. Following subjects are expected in this study:

1) Development of a new instrument for the sounding rocket experiment
2) Proposal and performance of a new sounding rocket experiment on the upper atmospheric physics
3) Study on the upper atmospheric physics with currently available data sets.

Professional knowledge on the thermosphere and ionosphere is required. It is desirable for a candidate to conduct the sounding rocket experiment by communicating cooperatively with staffs not only inside ISAS but outside JAXA. Also, we expect that a candidate aggressively approaches a development of the new instrument with his/her own idea and make a proposal of new experiment.
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<td>15</td>
<td>Research on plant physiology and microbial dynamics in space environment</td>
<td>Qualification: It is necessary to have experience of plant physiology and microbial research and a promotion abilities of international coordination and to build a space experiment. It’s better to be at home both in environmental science and in environmental microbiology. It’s also desirable to have a daily conversation skill in English.</td>
<td>Academic research environment: The staffs include 2 researchers and 3 technicians. The laboratory is so well equipped with various devices for nucleic acids or protein analyses, including laser ionization time–of–flight mass spectrometry and laser confocal microscope. It is available to use HPLC, UPLC, and cell culture facility. It is necessary to participate JAXA’s life science projects in cooperation with them, and to conduct your research activities.</td>
<td>Research: Project contribution: 8 : 5</td>
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<td>16</td>
<td>Experimental study on space plasma and hypervelocity impact</td>
<td>Qualification: We expect a candidate who has experience on working experimental research related to the above or related subjects. In particular, a candidate who enthusiastically promotes research by developing a new subject is very welcome. It is desirable to have experimental techniques such as building of measurement systems, making of electronic circuits, and working of test equipment tools. Also, we encourage research in relation to data obtained by satellite or sounding rocket observations. It is also desirable for a candidate to be able to give good advice and insight for the researchers who come to our institute for the collaborative study.</td>
<td>Academic research environment: The staffs of the Committee for Space Plasma Science provide a guidance. We have two main facilities: 1) Space plasma science chamber (3m in diameter, 4m length); 2) hypervelocity impact accelerator (possible to launch the projectiles with a velocity of 7km/s several times a day). It is possible to conduct very unique and large-scale experiment with these facilities.</td>
<td>Research: Project contribution: 8 : 4</td>
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<td>17</td>
<td>Radiation Effects on Lattice-Mismatched Multi–Junction Thin Film Solar Cells</td>
<td>Qualification: 1. One must have the knowledge of operation principle of a solar cell and its design concepts. 2. One must have the knowledge and the experience on semiconductor material growth and defect analysis. 3. One must have the knowledge on radiation effects in semiconductor materials and also an experience on irradiation experiment. 4. One should have a carrier as a researcher in a foreign country and sufficient English skill.</td>
<td>Research: Project contribution: 8 : 2</td>
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<td>18</td>
<td>Active control of combustion instabilities in jet-engine combustors.</td>
<td>Qualification: Control of combustion instabilities is a major technological challenge in the development of low emissions LPP type jet-engine combustors. Conventionally, passive control strategies have been applied, such as attenuation of the thermoacoustic driving (via modifications of the fuel nozzle design, or enhancement of the damping factor using resonators). However, the application of passive control is effective only over some narrow range of operating conditions. If the combustor’s geometry or operating conditions change, then the passive control scheme must be redesigned. Therefore more robust control methods that are effective over a range of operating conditions are required. Active control strategies are a very promising solution to this problem, since a given controller is typically effective over a wide range of operating conditions. We therefore propose conducting both experimental and theoretical studies on active control of combustion instabilities. The research will be an important contribution towards the development of low emissions jet-engine combustors.</td>
<td>Research: Project contribution: 7 : 3</td>
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<td>19</td>
<td>EOSLIS (Air and water revitalization) for Manned Exploration</td>
<td>Qualification: It is desirable to have experience of analysis of gas and water. It is desirable to have knowledge of gas adsorption and desorption, catalysis, electrochemistry, chemical engineering. In addition, it is desirable to have a basic knowledge material balance, energy balance. It is desirable to have a wide range of knowledge and interest can combine studies and the project.</td>
<td>Research: Project contribution: 6 : 4</td>
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