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Japan Science and Technology Agency (JST)  
5-3, Yonbancho, Chiyoda-ku, Tokyo

## **Strategic International Collaborative Research Program (SICORP) Researcher New-mode Mobility Accelerator Program (ReNewMAP) Announcement of Selected Projects**

The Japan Science and Technology Agency (JST) has decided to fund nine new projects as part of the Research New-Mode Mobility Accelerator Program (ReNewMAP) under the Strategic International Collaborative Research Program (SICORP)<sup>1</sup> framework (see Appendix 1).

SICORP funds strategically prioritized international collaborative research as guided by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) through interministerial agreements.

ReNewMAP is an initiative to promote the development of young researchers who are expected to contribute to Japan's future science and technology through supporting international research activities which foster opportunities for future international activities, including long-term studies, academic posts abroad and international joint research.

The call covered several advanced fields of research, including digital sciences, AI and quantum technology, for international collaboration with researchers in the United States, the United Kingdom, Germany, Italy, Australia, France, Canada, Spain, the Netherlands, Switzerland and Sweden (see Appendix 2).

JST received and selected 9 proposals in total for funding following an evaluation by a panel of experts (see Appendix 3). Research is planned to commence in February 2023 and will be supported for approximately 1 year.

<sup>1</sup> About SICORP: <https://www.jst.go.jp/inter/>

### **Appendices**

Appendix 1 : Outline of Selected Projects

Appendix 2 : Outline of Call for Proposals

Appendix 3 : List of Evaluation Panel Experts

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## Outline of Selected Projects

### 1. Projects in collaboration with the United States

Project Title		Principal Investigators	Project Outline
1	Promotion of Interdisciplinary Research between AI and High Performance Computing by International Joint Research	KATAGIRI Takahiro (Japan)  Professor, Information Technology Center, Nagoya University	<p>There is a pressing need to both enable a large number of scientific and technical computing applications to run at high performance in an exascale supercomputer environment, and at the same time to increase the development efficiency and reduce the maintenance costs involved.</p> <p>As a part of this research project, a doctoral student from Japan will participate in the research activities of the U.S. Department of Energy's Exascale Computing Project (ECP), including research in the IDEAS-ECP project on software development productivity, as well as automatic tuning and FFTX, an open-source FFT library for modern heterogeneous architectures. The program aims to apply AI techniques to the FFTX library in order to enable problem-solving research using high-performance computing (HPC).</p>
		Marques Osni (United States)  Staff Scientist, Computational Research Division, Lawrence Berkeley National Laboratory	
2	International Collaboration of Next-Generation Researchers leading Advanced Quantum Control of Cold Atoms and Molecules	MASUDA Takahiko (Japan)  Project Associate Professor, Research Institute for Interdisciplinary Science, Okayama University	<p>In recent years, several precision measurement techniques based on quantum control of cold atoms and molecules have been developing at a rapid pace, especially in North America.</p> <p>In connection with this research, this project will support a researcher visiting laboratories in the United States pursuing quantum technology for electron measurement, with a goal of promoting cold molecule research in Japan. Several prominent laboratories in the United States will host the researcher to participate in experiments and foster future collaboration in cold molecule research.</p>
		Gerald Gabrielse (United States)  Board of Trustees Professor, Center for Fundamental Physics, Northwestern University	

	Project Title	Principal Investigators	Project Outline
3	Development of Collaborative Networks for Complementary Data Analysis between Molecular Simulations and Experiments on Biomolecular Systems	<p>MITSUTAKE Ayori (Japan)</p> <p>Associate Professor, Department of Physics, School of Science and Technology, Meiji University</p> <hr/> <p>WAKATSUKI Soichi (United States)</p> <p>Professor of Photon Science, SLAC National Accelerator Laboratory / Professor of Structural Biology, School of Medicine, Stanford University</p>	<p>The principal investigators of this project have developed physics-based computational methods for molecular simulations of protein systems, in particular relaxation mode analysis methods for data analysis.</p> <p>In relation to this research, this project will support a first-year doctoral student to visit a United States laboratory to run large-scale molecular simulations based on recent experimental data. By linking computation and experimentation, the team will advance research on the understanding of protein functional mechanisms.</p>
4	International Collaborative Research Network Focused on the Innovative Interactome Analysis In Vivo BioID	<p>YANAGISAWA Masashi (Japan)</p> <p>Director, International Institute for Integrative Sleep Medicine, University of Tsukuba</p> <hr/> <p>Scott Soderling (United States)</p> <p>George Barth Geller Distinguished Professor for Research in Molecular Biology, School of Medicine, Duke University</p>	<p>In recent years, the principal investigators of this project have discovered several sleep-related genes, whose protein interactions with various intra- and extracellular factors may hold keys to understanding molecular biological mechanism of sleep-wake regulation.</p> <p>In relation to this research, this project will support an assistant professor as a visiting researcher to visit a leading United States laboratory to study the techniques and methods of in vivo proximity-dependent biotin labeling (in vivo BioID), an innovative interactome analysis method, and to build an international joint research network.</p>

## 2. Project in collaboration with the United Kingdom

	Project Title	Principal Investigators	Project Outline
5	Towards Introduction of Society 5.0 in Biology with International Collaboration and Ultrasound	<p data-bbox="480 320 828 705">FUSHIMI Tatsuki (Japan)  Assistant Professor, Faculty of Library Information and Media Science, University of Tsukuba / Vice Director of R&amp;D Center for Digital Nature</p> <p data-bbox="480 779 828 1041">Ruchi Gupta (United Kingdom)  Associate Professor of Biosensors, School of Chemistry, University of Birmingham</p>	<p data-bbox="847 309 1425 779">As deep learning and quantum chemical computation accelerate the automated discovery of scientific knowledge in digital space, scientific research in Society 5.0 will need to enable fast and parallel manipulation of large numbers of target compounds in physical space. To this end, we have developed an ultrasonic digital microfluidic manipulation platform (ultrasonic DMF) capable of automating experiments in various fields, though it remains necessary to establish in which areas this platform can be utilized.</p> <p data-bbox="847 786 1425 1102">In this project, a master's student researcher will be supported to visit the University of Birmingham to work with a laboratory specializing in microfluidic experiments in biology to verify the performance of ultrasonic DMF in various environments and identify issues in automating experiments, to strengthen research collaboration between Japan and the UK.</p>

### 3. Projects in collaboration with Australia

Project Title	Principal Investigators	Project Outline
6	<p>AI for Protestware Detection within Software Ecosystems</p> <p>Raula Gaikovina Kula (Japan)</p> <p>Assistant Professor, Graduate School of Science and Technology, Nara Institute of Science and Technology</p> <hr/> <p>Christoph Treude (Australia)</p> <p>Senior Lecturer, School of Computing and Information Systems, University of Melbourne</p>	<p>This research project aims to use AI technologies to develop methods for detecting and analyzing the harmful impact of protestware on society.</p> <p>The research team will travel to the University of Melbourne to meet with experts and conduct data collection, processing, and model building. The goal is to accelerate the development of new detection and analytical models, and to create new networking opportunities.</p>
7	<p>Development of Smart System Integrated Gait-Aid Device</p> <p>MIZUKAMI Katsuyoshi (Japan)</p> <p>Professor, Faculty of Health and Sport Sciences, University of Tsukuba</p> <hr/> <p>Rezaul Begg (Australia)</p> <p>Professor, Institute for Health and Sport, Victoria University</p>	<p>This project aims to develop a smart system equipped walking support device by drawing on machine learning via wearable sensors. Specifically, this project focuses on accelerometers-based gait analysis technology with exercise science to develop an active exoskeleton for fall prevention and smart shoes capable of injury risk and prevention in addition to other gait support devices.</p> <p>As a part of these activities, a doctoral student researcher will visit a research team at Victoria University specialized in this area of research.</p>

#### 4. Projects in collaboration with Australia

Project Title	Principal Investigators	Project Outline
8	<p>Problem- Encoding for Quantum-Inspired Artificial Intelligence</p>	<p>IMAI Hiroshi (Japan)  Professor, Graduate School of Information Science and Technology, The University of Tokyo</p> <hr/> <p>Jin-Kao Hao (France)  Professor, Department of Computer Science, University of Angers</p> <p>In recent years, several novel quantum- inspired algorithms have been developed to run on ordinary computer hardware, including algorithms for quadratic unconstrained binary optimization (QUBO), which have shown particular promise. As a part of this project, a specially- appointed associate professor and a doctoral student from Japan will be supported to carry out research on integer encoding, quantum computation and artificial intelligence at the University of Angers in order to gain a better of artificial intelligence systems from a problem- encoding perspective, supervised by Professor Hao who is an expert on QUBO. The activities are expected to give them a better understanding of the French university system and to stimulate internationalization activities of graduate schools of informatics in Japan.</p>
9	<p>Development of Quantum Control for Precise Measurements to Realize Super- Smart Society</p>	<p>SOMIYA Kentaro (Japan)  Associate Professor, School of Science, Tokyo Institute of Technology</p> <hr/> <p>Antoine Heidmann (France)  Professor, Optomechanics and Quantum Measurements Group, Kastler Brossel Laboratory</p> <p>Improved sensitivity in precise measurement technology is key in a super smart society where such technology plays an important role. In achieving this, opto- mechanical coupling (optical spring) is one of several promising techniques, one which has been used in macroscopic quantum measurement and gravitational-wave telescope technology. In this project, a doctoral student from Japan is visiting the Kastler Brossel Laboratory to study the design and fabrication of mechanical oscillators with a low heat dissipation through embedding phononic crystals in optical springs. By doing this, through an optical dilution effect, a sensitivity beyond the standard quantum limit can be achieved. Additionally, digital control techniques, which are essential for the simultaneous operation of multi- degrees of freedom in including the relative phase of a nonlinear optical parametric amplifier, will also be studied.</p>

## Outline of Call for Proposals

### 1. Call requirements

International collaborative research with must be currently receiving, or expecting to receive, research support by an eligible funding agency in one of the partner countries.

### 2. Call eligibility

Any independent researcher personally affiliated with (and actively conducting research at) a domestic Japanese research institution is eligible to apply.

### 3. Period of support

From February 2023 to March 2024.

### 4. Level of support

Up to a total of 4 million yen per project, inclusive of overhead costs (30% of direct costs).

### 5. Evaluation method

Evaluation by a panel of experts.

### 6. Evaluation criteria

#### I General criteria

- a) Relevance to call and expected contribution to Japan's scientific and technological capabilities through international research collaboration
- b) Feasibility of research plan and objectives
- c) Estimated cost-benefit of proposal, based on its budget
- d) Other relevant objectives deemed necessary in relation to the proposal

#### II Call-specific criteria

- a) Potential for long-term contribution to development of science and technology in Japan
- b) Quality of plan for research exchange activities, including for that of visiting researchers to be hosted by destination country
- c) Appropriateness of background (academic and professional achievements, etc.) of researchers and visiting researchers for implementing the research plan
- d) Reasonableness of research visit as a part of proposed research plan
- e) Potential for continued international research activities of proposed visiting researchers, including study abroad, academic posts and ability to pursue international joint research activities

**List of Evaluation Panel Experts**

Name	Affiliation
MIYANO Kenjiro	Fellow, National Institute for Material Science
TANIGUCHI Tadahiro	Professor, Department of information and Engineering, Ritsumeikan University
HAYASHI Kumiko	Associate Professor, School of Engineering, Tohoku University
HIGASHINO Teruo	Professor, Faculty of Engineering, Kyoto Tachibana University
HIRANO Takuya	Professor, Department of Physics, Gakushuin University