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Japan Science and Technology Agency (JST)

JST and UK's EPSRC to Jointly Fund Three Research Projects under the ASPIRE Program on "Quantum Technologies for Innovation"

The Japan Science and Technology Agency (JST) has approved funding for three new research projects jointly supported by the Engineering and Physical Sciences Research Council (EPSRC) of the United Kingdom and the ASPIRE Japan-UK Joint Call for Quantum Technologies for Innovation.

The ASPIRE program aims to maintain and improve Japan's scientific and technological capabilities by connecting top researchers in Japan with those in advanced STI countries and regions through international joint research and talent circulation. The program focuses on promoting cutting-edge R&D, fostering the next generation of research leaders, and supporting their international mobility.

This partnership program aims to support internationally competitive collaborative research projects between Japan and the UK focusing on the development of quantum technologies, building leading international researcher networks, and nurturing early-career researchers to create a thriving quantum sector in both countries.

JST and EPSRC received a total of 27 proposals for this call, and three projects were selected for funding after assessment by a panel of experts in Japan and the UK and a joint funding meeting. The research period will be five years and three months (63 months).

Attachments
Appendix 1. List of the Funded Projects
Appendix 2. Experts in Japan for the Evaluation
Annex. Evaluation Criteria

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“Empowering Science, Inspiring Futures”

Our world faces unprecedented global challenges — such as climate change, energy crises, and emerging infectious diseases — that demand innovative solutions. JST will rise to these challenges through “Science and Technology,” as a national research and development agency that plays a central role in implementing Japan’s science, technology, and innovation policy. We support fundamental research and startups to create new value, develop R&D strategies, foster the next generation of talent, disseminate vital information, and manage the Japan University Fund. Like a compass guiding ships through turbulent waters, JST will chart the way towards a vibrant and secure future by empowering science through a multifaceted approach.

Appendix 1

List of the Funded Projects

	Project Title	Principal Investigator (Japan) Project Lead (United Kingdom)	Affiliation	Research Outline
1	Massive Scaling of Semiconductor Quantum-Dot Technologies	KODERA Tetsuo	Associate Professor, School of Engineering, Institute of Science Tokyo	This project aims to bring together internationallyleading experts in the fields of spin qubits, charge pumps, cryogenic high-frequency measurements, thermopower measurements, and machine learning to scale up semiconductor quantum dot device technology. By the end of the project, we aim to achieve device integration to enable 100 to 1,000 devices operating simultaneously on a chip. Quantum technologies are expected to lead to the realization of complex computing, highly sensitive sensors, and high-precision measurement standards that cannot be achieved with classical technology alone. With Japan and the UK as team members, we will form a community that shares knowledge and skills through personnel exchanges and workshops. The project will aim to advance quantum device technologies by fusing and expanding knowledge of different research topics. In anticipation that the development of quantum technologies requires many years of continuing progress, this project will contribute to the development of futuregenerations of quantum device researchers through active personnel exchanges, especially among early-career researchers.
		KATAOKA Masaya	Principal Scientist, Quantum Technologies Department, National Physical Laboratory, UK	

	Project Title	Principal Investigator (Japan) Project Lead (United Kingdom)	Affiliation	Research Outline
2	Distributed and Secure Quantum Computation with Ion-Trap Nodes and Photonic Links	MURAO Mio	Professor, Graduate School of Science, The University of Tokyo	Quantum technology holds the potential to fundamentally transform computation, communication, and the very nature of scientific research. In this project, leading research groups from the United Kingdom and Japan will collaborate to develop a full-stack architecture that enables distributed and secure quantum computation with scalability, security, and verifiability over a network integrating ion-trap quantum processors and photonic links. The project will pursue an integrated co-design and validation of hardware, middleware, and applications, and will demonstrate federated quantum machine learning that preserves the privacy of sensitive data. Through applications addressing real-world challenges, we aim to establish a scalable and reliable quantum computing infrastructure that accelerates the social implementation and innovation of quantum technologies across diverse fields, including medicine, drug discovery, and finance. In parallel, the project will also contribute to the international standardization of quantum internet technologies and the training of the next generation of quantum researchers.
		David Lucas	Professor, Department of Physics, University of Oxford	

	Project Title	Principal Investigator (Japan) Project Lead (United Kingdom)	Affiliation	Research Outline
3	Quantum Control and Sensing (QCS) : - Enhancing high-precision quantum sensing in noisy environments via optimised control	UEDA Masahito	Professor, Department of Physics, The University of Tokyo	High-sensitivity quantum sensors and the quantum state control they enable are highly susceptible to environmental noise. This joint Japan-UK research project aims to improve quantum sensor performance and control of quantum many-body states by mitigating the effects of environmental noise through a combination of information gain obtained from measurements and Bayesian parameter estimation. The Japanese team advances unique research in information thermodynamics, ultracold atom theory, and topological control. The UK team is a global leader in Bayesian quantum thermodynamic parameter estimation and possesses cutting-edge technology in ultracold atom experiments and quantum technologies. This project leverages the complementary strengths of the Japanese and British teams to enhance the performance of present-day magnetic sensors with applications in brain imaging, gravity/acceleration sensors, fiber-optic sensors, and will also enable similar improvements in quantum computing applications. The research will also address fundamental questions of how to control non-equilibrium states of quantum many-body systems and explore opportunities for creating states of the system that are better for accurate sensing. This fundamental research provides ideas for future designs of sensing setups. The teams bring together a diverse set of people who work closely together to build new ideas and methods of how to sense tiny signals in an environment with loud noise.
		Janet Anders	Professor, Department of Physics and Astronomy, University of Exeter	

Appendix 2

Experts in Japan for the Evaluation

ASPIRE Program Director

MIYANO Kenjiro: Emeritus Fellow, National Institute for Materials Science

Name	Affiliation	Role
TARUCHA Seigo	Group Director, RIKEN	Program Officer
HIRAKAWA Kazuhiko	Director, Canon Medical Systems Corporation	Advisor
HIRAYAMA Yoshiro	Director, National Institute for Quantum Science and Technology (QST)	Advisor
KOBAYASHI Kensuke	Professor, The University of Tokyo	Advisor
MAENO Yoshiteru	Collaboration Center Professor, Toyota Riken-Kyoto University Research Center (TRiKUC)	Advisor
TSUDA Hiroyuki	Professor, Keio University	Advisor

(Advisors are listed in alphabetical order.)

(Positions and organizations are as of the time of evaluation.)

Annex

Evaluation Criteria

Criteria	Description of the criteria
i. Vision	To what extent has the applicant explained how their proposed work: • is of excellent quality and importance within or beyond the field(s) or area(s) • has the potential to advance current understanding, and generates new knowledge, thinking or discovery within or beyond the field or area • is timely given current trends, context, and needs • impacts world-leading research, society, the economy, or the environment • is relevant to the scope of the call including at least one of the priority areas of joint interest for JST and EPSRC
ii. Approach	To what extent has the applicant demonstrated that they have designed their approach so that it: • is effective and appropriate to achieve their objectives • is feasible and comprehensively identifies any risks to delivery and how they will be managed • if applicable, uses a clear and transparent methodology • if applicable, summarizes the previous work and describes how this will be built upon and progressed • will maximize translation of outputs into outcomes and impacts • describes how their, and if applicable their team's, research environment (in terms of the place, and relevance to the project) will contribute to the success of the work
iii. Research partnership	To what extent has the applicant demonstrated how the research partnership: • involves high-level international joint research aimed at enhancing scientific and technological capabilities for both countries • deliver the research strengths, added value and synergies that can be achieved through UK-Japan collaboration • demonstrates a clear and feasible division of roles between the Japanese and UK research, throughout the research period • has an appropriate approach for building and expanding the international collaboration and a world-leading network with clear and concrete mobility plans • involves research exchanges and collaborations that are equitable and mutually beneficial for both countries • advances the research field in both Japan and the UK

iv. Plan for early career researchers and international researcher mobility	To what extent has the applicant, and if relevant their team, demonstrated they: • include appropriate goals set to achieve career development of early career researchers through international mobility activities • involve a sufficient number of early career researchers • are effective for developing early career researchers to become the next generation of leading researchers (succession planning) and promote the development of early career researchers • demonstrate the ability to support early career researchers and international talent mobility for the proposed project aids with researcher mobility
v. Applicant and team capability to deliver	To what extent has the applicant, and if relevant their team, demonstrated they have: • the relevant experience (appropriate to career stage) to deliver the proposed work • the right balance of skills and expertise to cover the proposed work • the appropriate leadership and management skills to deliver the work and your approach to develop others • contributed to developing a positive research environment and wider community • sufficient research achievements to demonstrate current or potential high level of international standing within global research community within relevant research fields
vi. Resources and cost justification	To what extent has the applicant demonstrated that the resources needed for the proposed work: • are comprehensive, appropriate, and justified • represent the optimal use of resources to achieve the intended outcomes • maximize potential outcomes and impacts