

## *Unit Name*

Quantum Machines Unit

## *Collaborations*

Masaki Ando, University of Tokyo, Japan, Vibration isolation for low frequencies

Fedor Jelezko, University of Ulm, Germany, Spin systems in diamond for quantum sensors

Kentaro Somiya, Institute of Science Tokyo, Japan, Magnetic Levitation for Gravity Wave Detection

Takeshi Ohshima, Institute of Quantum Science and Technology, Japan, Diamond quantum science and technologies

Gerard Milburn, University of Sussex, United Kingdom, Quantum Machine Learning and nonlinear dissipative quantum systems

James Downes, Macquarie University, Australia, Magnetic Levitation

Jingbo Wang, University of Western Australia, Australia, Algorithms for quantum sensing

Mutsuko Hatano, Institute of Science Tokyo, Japan, Diamond quantum science and technologies

## *Research Personnel*

Fernando Quijandria, Staff Scientist, Research Scientist at RIKKEN, Japan

A Kani, Staff Scientist, Faculty at University of Hyderabad, India

Anil Kumar, Staff Scientist

Jinjin Du, Staff Scientist

Mohamed Hatifi, Postdoctoral Scholar, Attaché Temporaire d'Enseignement et de Recherche at Aix-Marseille Université

Tatiana Iakovleva, PhD Student

Daehee Kim, PhD Student

Alexander Henry Hodges, PhD Student

Iakovleva Tatiana, PhD Student

Anshuman Nayak, PhD Student

Andrii Yakymenko, PhD Student

## *Scholarly Contributions and Creative Productions (by Faculty)*

### *Journal Article*

1. Tian, S.; Jadeja, K.; Kim, D.; Hodges, A.; Hermosa, G.; Cusicanqui, C.; Lecamwasam, R.; Downes, J.; Twamley, J. M.  
Feedback Cooling of an Insulating High-Q Diamagnetically Levitated Plate. Applied Physics Letters 2024, 124, 124002.
2. Twamley, J. M.

Squeezed Microwave and Magnonic Frequency Combs. APL Quantum 2024.

3. Twamley, J. M.  
Quantum Metrology with Linear Lie Algebra Parameterizations. Physical Review Research 2024.
4. Lecamwasam, R.; Iakovleva, T.; Twamley, J.  
Quantum Metrology with Linear Lie Algebra Parameterizations. Physical Review Research 2024, 6, 043137.

#### **Patent and Intellectual Property**

1. Twamley, J. M.; Quijandria, F.  
Automatic Self-Correcting Quantum Systems. WO2024/029633, 2024.

#### **Presentation at Conference**

1. Twamley, J. M.  
Magnetic Control of Quantum Systems towards Quantum States of Motion. SQUINT 2024.
2. Twamley, J. M.  
Magnetic Levitation of Test Masses. GWADW 2024.

#### **Seminars**

1. Twamley, J. M.  
Controlling Quantum Machines Using Magnetic Forces 2024.

#### **Scholarly Contributions (For Unit Members Only)**

Name of Unit Member (Author-Presenter)	Type	Title	Outlet	Publisher	Year Pub
Ruvi Lecamwasam	Journal Article	Relative Entropy of Coherence Quantifies Performance in Bayesian Metrology	Physical Review X	American Physical Society	2024
Steven Sagona-Stophel	Journal Article	Enhancing Quantum Memories with Light-Matter Interference	Nature Photonics	Nature	
Mohamed Hatifi	Journal Article	Relativistic Bohmian mechanics revisited: A covariant reformulation for spin-1-2 particles	Physics Letters A	Elsevier	2024
Jinjin Du	Journal Article	Imaging a Chain of Rydberg Superatoms Enabled by F- <sup>19</sup> F-Raman-Resonance-Enhanced Interaction	Arxiv	Arxiv	2024
Mohamed Hatifi	Journal Article	Quantum Gravity Without Metric Quantization: From Hidden Variables to Hidden Spacetime Curvatures	Nature Communications	Nature	
Daehee Kim	Poster Presentation at Conference	Magnetically-levitated high-Q resonator for ultraprecise sensing	Quantum Physics with Trapped Particles		
Tatiana Iakovleva	Poster Presentation at Conference	Linear lie algebra parameterisations for quantum fisher information and dynamics	Quantum Innovation 2024		

Name of Unit Member (Author-Presenter)	Type	Title	Outlet	Publisher	Year Pub
Steven Sagona-Stophel	Presentation at Conference	Toward Magnon-Mediated Microwave Photon-Photon Nonlinearities	Quantum Innovation 2024		

**Honors, Awards & Fellowships (only by unit members)**

2025-04-01

Alexander Hodges, JSPS DC1 Fellowship, 2025 年度 特別研究員-DC1 , 2025, JSPS, 3 year fellowship with stipend

**External Service**

2024-02-29

Co-Chair of the UK Quantum Technology Hub Final Evaluation Panel, UK Engineering and Physical Sciences Research Council (EPSRC), The UK Quantum Technology Hubs funds large consortia of Universities and Industries within the UK towards developing advanced quantum science and technologies including quantum computers, quantum networks, quantum sensors and other quantum devices. The panel recommended to the UK government, via interviews and final reviews, the awarding of 100 million UKP to advance UK's quantum R&D portfolio.

**Other Institutional Service**

2025-02-01

Science Festival OIST, (Twamley - Quantum Machines Unit)

2024-12-01

Schrodinger Cats: the quest to find the edge of the quantum world, (Twamley - Quantum Machines Unit)

2024-09-01

Quantum Engineering of Levitated Systems, (University)

**Outreach Activities (For Unit Members Only)**

2025-02-12

Alexander Hodges, Career talk for Nanao High School, OIST

2025-02-02

Daehee Kim, OIST Science Festival 2025, OIST

2024-12-13

Alexander Hodges, Kaiho Super Science High School Career Day, OIST

2024-12-11

Alexander Hodges, Science demo for visiting Nagasaki High School, OIST

2024-10-09

Alexander Hodges, Poster feedback for Yokohama High school, OIST

2024-07-24

Daehee Kim, Onna X OIST Children's School of Science

2024-03-06

Alexander Hodges, Workshop with Fukui Wakasa High School, OIST

**Workshops and Seminars (Organized and Hosted by Faculty/Units)**

Speaker Name(s)	Title	Location	Date
Workshop	Schrödinger Cats - The Quest to Find the Edge of the Quantum World	OIST	2024-12-09
Prof Kentaro Somiya	[Seminar] Introduction to Gravity Wave Detection at Tokyo Tech	OIST	2024-10-07
Mr. Ali Pedram	[Seminar] Nonlocal Quantum Polarimetry via Entangled Photons	OIST	2024-08-28

Speaker Name(s)	Title	Location	Date
Prof Farhan Saif	[Seminar] Surface Probe Microscopy using Ultra-Cold Atoms	OIST	2024-08-26
Mr. Miao Cai	[Seminar] Machine-learning-assisted optimization of single-photon generation and storage in cavity-based system	OIST	2024-08-14
Prof Keyu Xia	[Seminar] Quantum nonreciprocity and applications	OIST	2024-08-09
Dr. Carolyn Wood	[Seminar] Quantum Machine Learning with a Bosonic Kernel	OIST	2024-07-30
Prof Harald Giessen	[Seminar] 3D printed complex microoptics: Fundamentals and first benchmark applications	OIST	2024-05-07
Dr. Jack Clarke	Cavity Quantum Optomechanical Nonlinearities	OIST	2024-04-18
Dr. Josephine Dias	[Seminar] Strategies for charging open quantum batteries	OIST	2024-04-11