



The International Center for Quantum-field Measurement Systems for Studies of the Universe and Particles (QUP) solicits applications for its Postdoctoral Fellowship program.

QUP was established on December 16, 2021, at [High Energy Accelerator Research Organization \(KEK\)](#) as one of the research centers under [the World Premier International Research Center Initiative \(WPI\)](#) of the Japanese government.

QUP's main laboratories are located on the Tsukuba campus of KEK in Tsukuba science city, 60 km northeast of Tokyo, Japan. In addition, QUP is opening up three satellite laboratories at [the University of California Berkeley](#), [the Institute of Space and Astronautical Sciences \(ISAS\) at Japan Aerospace Exploration Agency \(JAXA\)](#), and [Toyota Central R&D Labs](#).

QUP sets the following missions:

1. Integrate particle physics, astrophysics, condensed matter physics, measurement science, and systems science.
2. Invent and develop new systems for measuring quantum fields (space-time with particles and quasiparticles created and annihilated, and associated physical quantities).
3. Bring innovation to measurements in cosmological observations and particle experiments, and elucidate the true nature of space-time and matter.
4. Establish a new measurement science, quantum field measurement systemology, as a science of means through the above practices.
5. Last but not least, we will create a new level of fusion of various research areas beyond physics and new social values through application to other fields and social implementation.

In short, QUP will bring "new eyes" to humanity.

We are seeking candidates who are interested in our broad range of sciences and engineering. Our postdoctoral fellows are for three years with the possibility of a 2-year renewal based upon satisfactory job performance, continuing availability of funds, and ongoing operational needs, and provided with salaries comparable to those at other prestigious institutions. Applicants should have a Ph.D. in Physics or a related field by the time the appointment begins. We may offer a higher position, at the rank of assistant professor, for five years with the possibility of a 2-year renewal to outstanding candidates. Each appointee will receive financial support for starting-up research, and have opportunities to work with 13 initial PIs who are active in experimental cosmology, experimental and theoretical particle physics, data science, electromagnetic analyses, and device



engineering. More information on their research activities can be found at the end. As a WPI research center, QUP is designed to establish an international environment where more than 30% of researchers are non-Japanese. English is the official language of QUP. QUP is an Equal Opportunity employer that will build a diverse community of scientists. We welcome qualified applicants from all over the world, including women, persons with disabilities, and underrepresented minorities, without regard to race, color, religion, gender identity, etc. About 40% of initial PIs at QUP are female.

The posting shall remain open until the positions are filled, however for full consideration, we encourage all candidates to apply by February. 28, 2022. Applicants should submit curriculum vitae (with an email address and citizenship), a statement of research interests with name(s) of PI with whom they wish to work, and a list of publications. Applicants should also ensure that at least three letters of reference are submitted on their behalf. They should be uploaded at [Application Form\( https://academicjobsonline.org/ajo/programs/21028 \)](https://academicjobsonline.org/ajo/programs/21028).

Note that they need to sign up with [AcademicJobsOnline.org.](https://academicjobsonline.org)

Email inquiries regarding the application process may be sent to [qup\\_job\\_inquiry@ml.post.kek.jp](mailto:qup_job_inquiry@ml.post.kek.jp).

### **List of initial PIs and research descriptions**

#### [Daniela Bortoletto](#)

Development of novel analysis techniques and instrumentation to study the Higgs boson including deep learning and next-generation monolithic and hybrid pixel detector systems. Interested in candidates who will take a leading role in the LHC-ATLAS physics program in the study of the Higgs boson and/or with skills in ultra-fast silicon detector design, ASIC design and testing, and AI optimization of detector designs.

#### [Maurice Garcia-Sciveres](#):

Development of quantum sensors for low mass particle dark matter detection, including carrying out searches for low mass DM particles. Interested in candidates with skills in cryogenics, low noise electronics, superconducting devices, dark matter search experiments.

Development of next-generation hybrid pixel readout chips. Interested in candidates with skills in ASIC design and testing, picosecond timing applications, pixel tracker operation, and simulation.

#### [Masaya Hasegawa](#)

Development of key technologies for low-noise and large format superconducting detector arrays



in future CMB missions. Interested in candidates with skills in cryogenics, control engineering, quantum sensor, large-scale data processing, characterization of CMB telescope.

#### [Kaori Hattori](#)

Development of superconducting single-photon detectors (optical transition-edge sensors) for new dark matter search experiments and nuclear clock (229Th isomer). Interested in candidates with experiences in the development of detectors and skills in cryogenics, detector fabrication, array readout, optics.

#### [Masashi Hazumi \(QUP Director\)](#)

Development and characterization of the new superconducting detector system for LiteBIRD, JAXA's strategic L-class mission to map polarization of the Cosmic Microwave Background (CMB), as QUP's flagship mission. Interested in candidates willing to take on new challenges, with experiences in cosmology, particle physics, superconducting sensor development, or related fields.

#### [Hideo Iizuka:](#)

My research activities in QUP include a challenge for experimental demonstration of Casimir force. Interested in candidates with knowledge and skills of electromagnetics, nano-fabrication, nano-mechanics, and/or robotics. Candidates with expertise in other research areas and wish to tackle this research topic are also welcome.

#### [Adrian Lee](#)

Development of the detector system for the LiteBIRD CMB polarization space mission. The detector system consists of monolithic silicon arrays with TES bolometers and SQUID-based readout multiplexers. The focal planes are coupled to the telescopes with horns or lenslet-coupled antennas. Desirable experience includes work with superconducting detectors, microwave design, readout multiplexers, SQUIDs, cryogenics, optics, and CMB experiment.

#### [Masaya Miyahara](#)

Development of an analog/digital-mixed signal ASIC using high-speed ADCs for various physics experiments. Seeking candidates who are interested in reconfigurable analog ASICs or design automation techniques for analog circuits.

#### [Yu Nakahama](#)

Development and application of new analysis techniques, including machine learning. Interested



in candidates who will take a leading role in the LHC-ATLAS Run 2 and 3 physics analyses related to one of these topics (studies of di-Higgs productions, Long-Lived Particles, and Dark Matter). Expertise in machine-learning techniques and/or trigger developments is an advantage.

#### Kazunori Nakayama

I am working on theoretical particle physics and cosmology with topics including inflation, dark matter, axion, and new particle search. Seeking candidates interested in interdisciplinary research fields, including particle physics and condensed matter physics, and their applications to new ideas for detecting light dark matter or other new particles.

#### Nanae Taniguchi

Development of new radiation-hard devices with high rate tolerance, including new FPGAs with atomic switch technology, and applications to high-energy physics experiments.

We seek candidates interested in R&D on detector readout electronics with the new FPGA and the development of system tools for users.

#### Manabu Togawa

Development of a super radiation-hard semiconductor detector for the high-energy and/or high-intensity beam experiment. We seek candidates interested in semiconductor detectors with non-silicon material (CIGS, GaN for example) and novel technologies for detector integration.

#### Noriko Yamasaki

Development of TES (Transition Edge Sensor) detectors in broad applications, including dark matter search and material analysis. Interested in candidates with experiences in detector system development, such as sensor fabrication, readout system R&D, and cryogenic tests. We also welcome candidates from other fields with visions to apply new detection technology in particle physics and/or astrophysics.