



The New World of Spin Zero

Some Novel Approaches at QUP for Experimental Particle Cosmology

Prof. Masashi Hazumi

Director,
International Center for Quantum-field Measurement Systems for Studies of the Universe and Particles (QUP),
High Energy Accelerator Research Organization (KEK)

2024 **5/28** Tuesday (JST)
13:30 - 15:00

Okochi Hall ^{Bldg. C32} & via Zoom
at RIKEN Wako Campus Zoom Registration →



Particle cosmology is a discipline seeking a fundamental understanding of the Universe based on particle physics. Five mysteries drive our research today: cosmic inflation, baryon asymmetry, neutrino properties, dark matter, and dark energy.

Resolving any of the five mysteries will revolutionize our picture of the Universe. Numerous interesting theoretical hypotheses have been proposed to this end. Many require new scalar quantum fields, such as inflatons, axions, supersymmetric particles, etc. They are, in a sense, an attempt to expand the role of the vacuum. Since we have not found such spin-zero fields yet, we shall invent new eyes to make an experimental or observational breakthrough.

The International Center for Quantum-field Measurement Systems for Studies of the Universe and Particles (QUP) was established in December 2021 at KEK under the WPI program of MEXT and JSPS. With its tagline of "bring new eyes to humanity," one of the primary missions of QUP is inventing and developing such new eyes for particle cosmology. In this seminar, after briefly introducing QUP, I focus on research topics I have contributed, including the LiteBIRD satellite to study inflatons and light scalar quantum field searches with novel methods using quantum sensing techniques.

