

# Extreme Universe

## The 16th COLLOQUIUM

May 24<sup>th</sup> (Wed.) ONLINE

TALK 16:00 - 17:00 (JST)

May 24<sup>th</sup> (Wed.) 7:00 - 8:00 am (GMT)

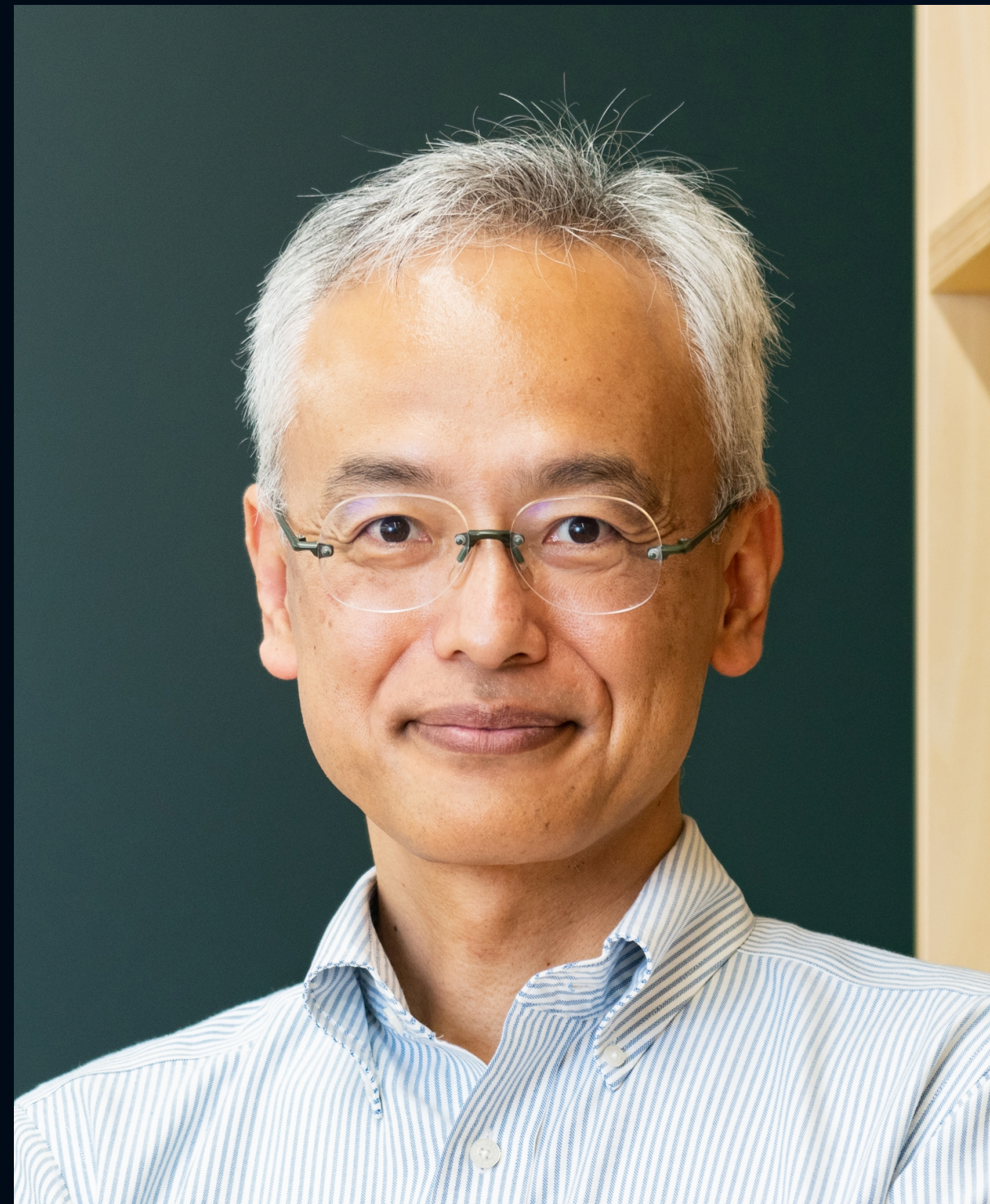
May 24<sup>th</sup> (Wed.) 0:00 - 1:00 am (PDT)

ONLINE COFFEE TIME

17:00 - 18:00 (JST)

Registration required (click [HERE](#))

Extreme Universe, JAPAN



Speaker

Prof. Yasunobu Nakamura

RIKEN & The University of Tokyo

Title

Superconducting circuits for quantum technologies

### Abstract

Interacting many-body systems are found at every level in the hierarchy of physics. Collective modes in such systems describe their elementary excitations, and the corresponding quasiparticles or 'quanta' often become constituent elements of a many-body system at the next level in the hierarchy. Superconducting circuits are many-body systems of interacting electrons designed and fabricated in the form of electrical circuits and are playing a major role in the development of modern quantum technologies based on quantum information science. Collective excitation modes in the circuits are used as highly coherent superconducting qubits. With strong nonlinearity due to the Josephson effect and large dipole moments that allow fast control and readout of the quantum states, they are considered one of the most promising platforms for implementing quantum information processors. In addition, the qubits are coupled to resonators and waveguides to exploit the properties of those bosonic modes, either localized or propagating, as a versatile tool for microwave quantum optics and quantum sensing. The auxiliary modes can also be replaced with other collective modes found in solid-state physics, e.g., acoustic and magnetic ones, to form hybrid quantum systems, expanding the realm of quantum technologies.

MEXT -KAKENHI- Grant-in-Aid for Transformative Research Areas (A)

The Natural Laws of Extreme Universe -A New Paradigm for Spacetime and Matter from Quantum Information-

Collaboration

2023