

# 8th RQC Seminar

## Superconducting qubits with nitride Josephson junctions

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**March 9, 2022** (Wed) **16:00~17:00** (JST)

This seminar will be recorded and made available for about 10 days after the event. The link to the recording will be notified later.

In this talk, I introduce our recent works on the development of all-nitride superconducting qubit on silicon substrate [1]. We have fabricated an all-nitride capacitively-shunted flux qubit coupled to a half-wavelength coplanar waveguide resonator by utilizing the growth technique of a full-epitaxial NbN/AlN/NbN tri-layer. Also, by employing a Si substrate instead of a conventional MgO substrate for epitaxial growth of NbN film, this nitride flux qubit has demonstrated a significant improvement in coherence times, such as  $T_1 = 16.3 \mu\text{s}$  and  $T_2 = 21.5 \mu\text{s}$ , which are more than an order of magnitude longer than those reported in the literature using MgO substrates [2]. These results are an important step towards constructing a new platform for superconducting quantum hardware.

[1] S. Kim *et al.*, [Communications Materials \*\*2\*\*, 98 \(2021\).](#)

[2] Y. Nakamura *et al.*, [Appl. Phys. Lett. \*\*99\*\*, 212502 \(2011\).](#)