

Superconducting qubits with nitride Josephson junctions

Dr. **Sunmi Kim**

National Institute of Information and Communications
Technology (NICT)



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).