



Graduate School Event

Thesis Defense: Interfacing superconducting qubits with optical photons

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Fink Group

Host: Matthew Kwan

In this thesis, I investigate superconducting quantum circuits as a platform for both fundamental tests of quantum mechanics and scalable quantum information processing. Superconducting qubits are engineered electrical circuits that exhibit discrete, atom-like energy levels. Unlike natural atoms, their spectra can be designed and fabricated, enabling flexible control at the cost of device-to-device variability. These systems operate below 100 mK to suppress thermal noise at their characteristic microwave frequencies (~10 GHz). In contrast, optical photons (~193 THz) are robust against room-temperature thermal noise and are ideal carriers of quantum information over long distances. Bridging these frequency regimes is therefore essential for connecting superconducting quantum processors to optical quantum networks. To address this challenge, we develop electro-optic transducers. These devices convert single photons between the microwave and the optical domain. I demonstrate two proof-of-principle experiments: all-optical readout of a superconducting qubit state and upconversion of single microwave photons to optical frequencies. These results establish a pathway toward integrating superconducting qubits with large-scale quantum communication networks.

Tuesday, March 3, 2026 02:00pm - 03:00pm

Sunstone Bldg / Ground floor / Big Seminar Room B (I23.EG.102)



This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station. Please find a schedule of the ISTA Shuttle on our webpage: <https://ista.ac.at/en/campus/how-to-get-here/> The ISTA Shuttle bus is marked ISTA Shuttle (#142) and has the Institute Logo printed on the side.