

IAP Seminar Series

Progress toward entangling superconducting qubits with room temperature optical photons

Date: 11th Dec 2025 **Time:** 3:30PM **Venue:** SVN Auditorium

Abstract: Quantum transducers provide a pathway to link superconducting circuits to quantum networks that extend over large distances at ambient temperatures. Here, we present our progress toward entangling a superconducting qubit in a dilution refrigerator with a time-bin encoded optical qubit propagating through a room temperature telecom fiber. Starting from a transmon qubit coupled to a microwave resonator, we generate an itinerant time-bin encoded microwave qubit entangled with the transmon. We then route the microwave photon to an electro-optic transducer that upconverts it to the optical domain. To verify the entanglement fidelity, we plan to perform simultaneous measurements of the superconducting qubit and the optical qubit states, and show evidence of correlations in both longitudinal and transversal bases.

In this talk, I will present current experimental results, and discuss solutions for some of the problems faced. Our findings highlight the feasibility of using electro-optic conversion to interface superconducting qubits with photonic channels for quantum networking. If time permits, I will also talk about some other projects worked on by the group in the fields of quantum computation, with a focus on using fluxonia as low-hardware-overhead erasure qubits.

About the Speaker



**MR. SAMARTH
HAWALDAR**

GRADUATE STUDENT, INSTITUTE
OF SCIENCE AND TECHNOLOGY
AUSTRIA (ISTA).

Mr. Samarth Hawaldar is currently pursuing graduate studies in Institute of Science and Technology (IST), Klosterneuberg, Austria, working under the supervision of Prof. J M Fink. Samarth is working on quantum computation and quantum networks primarily, and is interested in both experimental and theoretical aspects of quantum information processing. Before moving to ISTA, Samarth obtained his BS and MS degrees from IISc in the Physics stream, and researched various aspects of superconducting circuits under the supervision of Prof. Baladitya Suri in the Quantum Technologies Lab at IAP, IISc.