IQST

IQST Seminar by Prof. Yasunobu Nakamura

Time: Monday, 16 February 2026, 16:15- 17:30
Location: Pfaffenwaldring 57, Room 2.136

Titel:
High-fidelity control and readout of superconducting qubits

Abstract:

Solid-state quantum computing technology has recently made significant progress towards quantum error correction and fault-tolerant quantum computing. Despite various decoherence mechanisms existing in the solid-state environment as well as the variations in device fabrications, logical error suppression with quantum error correction has been demonstrated in several experiments [1]. To make it scalable by reducing the logical error rate and the associated overhead in the architecture drastically, it demands higher-fidelity control and measurement of qubits in large-scale integrated circuits. We are developing technologies for superconducting quantum computing platforms aiming at scalable, fast, and high-fidelity operations. Our efforts include 2D integration of transmon qubits, fast (<100 ns), high-fidelity (>99.9%) frequency-multiplexed qubit readout [2], fast (<50 ns), high-fidelity (>99.9%) two-qubit gates with a tunable double-transmon coupler [3,4], all-microwave CZ gate with a fixed-frequency transmon coupler [5], and broadband low-noise Josephson traveling-wave parametric amplifiers [6].

[1] Google Quantum AI, Nature 638, 920 (2025).
[2] P.A. Spring et al., PRX Quantum 6, 020345 (2025).
[3] R. Li et al., Phys. Rev. X 14, 041050 (2024).
[4] R. Li et al., Phys. Rev. Appl. 23, 064069 (2025).
[5] S. Shirai et al. arXiv:2511.01260.
[6] C.W.S. Chang et al., Phys. Rev. Appl. 24, 044081 (2025).