High-fidelity gates and readout for superconducting quantum processors

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Quantum computing demands an unprecedentedly high level of precision in the control and readout of quantum states encoding quantum information in a large Hilbert space. Therefore, in parallel with the pursuit of scalability, persistent efforts have been made to improve control and readout fidelities of qubits. We are developing two-dimensionally integrated superconducting qubit arrays for quantum computing. This talk introduces our approaches toward fast multiplexed qubit readout [1] and fast two-qubit gates using a tunable coupler between fixed-frequency qubits [2]. The fidelities above 99.9% are within reach, and the targets are raised.

References

- [1] P. A. Spring et al., arXiv:2409.04967.
- [2] R. Li et al., Phys. Rev. X 14, 041050 (2024).