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Closed-Loop Optimization for High-Fidelity Quantum Gate Calibration

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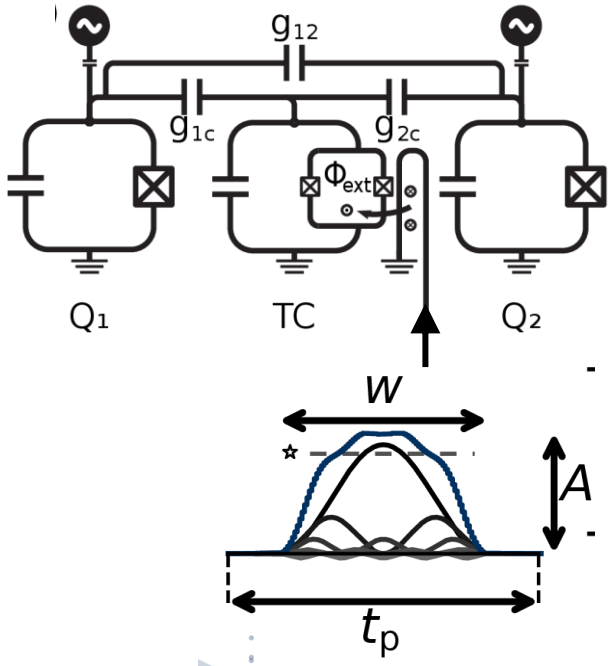

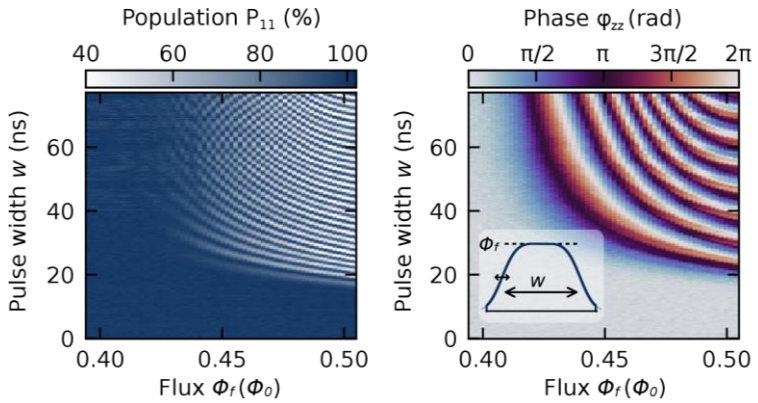

- **Robust calibration** of controlled-Z gate.
- Minimize **leakage and phase errors** via advanced pulse shaping.
- **Strongly correlated parameters** of control pulse trajectory.
- **Mitigate hardware model mismatches** by performing closed-loop optimization directly on superconducting qubit hardware.
- Achieving high-fidelity CZ gates with **> 99.9% fidelity** using compact parametrizations (e.g., 64 ns Fourier-series pulse with 7 parameters)

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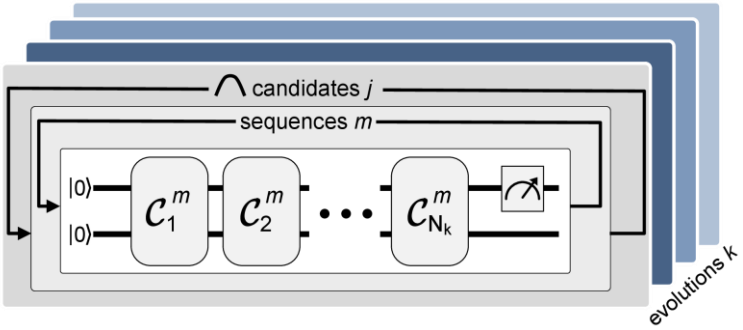
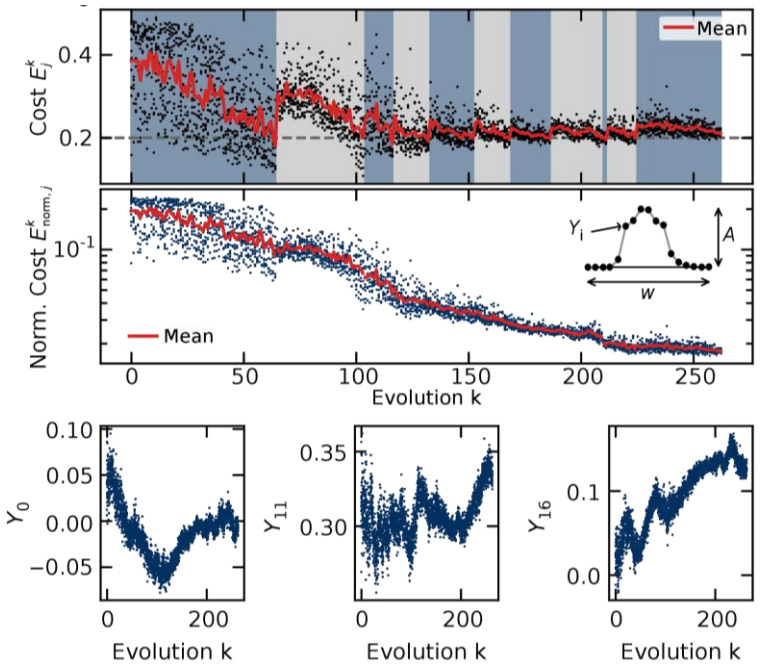
CMA-ES Optimization
Efficiently calibrates multi-parameter pulse shapes directly on quantum hardware. (Other optimizers available)

ORBIT Randomized Benchmarking
Randomized Clifford sequences with fixed depth, provide universal and realistic cost function.

Adaptive sensitivity of Cost Function
Maintains high sensitivity across fidelity regimes during optimization by dynamically tuning RB gate-error-sensitivity via adaptation of Clifford sequence depth.

Performance optimized for **WMIQC** and **LabOneQ.**





Phys. Rev. Applied **24**, 024048 (2025)