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Coherent Coupled Qubits for Next Generation Quantum Annealing

Existing quantum annealers rely on coupled superconducting flux qubits with short coherence times, limited primarily by the use of large persistent currents. Here, we investigate the available design space for next-generation quantum annealers, exploring the tradeoff between, coherence, coupling, and connectivity. In particular, by reducing the qubit persistent current we demonstrate a significant improvement in coupled qubit coherence. Furthermore, we discuss coupler chains and parallel couplers, the basic building blocks of a proposed high-connectivity, high-coherence architecture for quantum annealing.