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Progress towards a small-scale quantum annealer I: Architecture
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— A quantum annealer holds promise for improving solutions to hard optimization problems using quantum enhancement. Constructing a quantum annealer, however, stands as an outstanding challenge. It requires an architecture delicately balanced between connectivity, coherence and controls. Here, we report our recent progress on building a small-scale quantum annealer and we discuss the key features of our proposed architecture. Composed of fluxmon qubits and tunable couplers, our architecture allows for ultra-strong qubit-qubit coupling with reduced control crosstalks. This opens up the possibility of constructing complex graphs with high connectivity degrees. We conclude by discussing how 3-D circuit integration can be used to further improve device performance.

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