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**Multiple Resonators as a Multi-Channel Bus for Coupling Josephson Junction Qubits** ZECHARIAH THRAILKILL, JOSEPH LAMBERT, ROBERTO RAMOS, Drexel University — Josephson junction-based qubits have been shown to be promising components for a future quantum computer. A network of these superconducting qubits will require quantum information to be stored in and transferred among them. Resonators made of superconducting metal strips are useful elements for this purpose because they have long coherence times and can dispersively couple qubits. We explore the use of multiple resonators with different resonant frequencies to couple qubits. We find that an array of resonators with different frequencies can be individually addressed to store and retrieve information, while coupling qubits dispersively. We show that a control qubit can be used to effectively isolate an active qubit from an array of resonators so that it can function within the same frequency range used by the resonators.

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