

CLAIMS

1. A device, comprising:
a readout resonator coupled to a qubit; and
a switch device formed across the readout resonator that shifts frequency of the readout resonator based on position of the switch device.
2. The device of claim 1, wherein the switch device comprises a radio frequency microelectromechanical system switch.
3. The device of any one of the preceding claims, wherein at a closed position the switch device causes at least one of a radio frequency short or a ground on the readout resonator that shifts at least one of the frequency of the readout resonator or a resonance condition of the readout resonator.
4. The device of any one of the preceding claims, wherein at a closed position the switch device converts the readout resonator from a first readout resonator having a first resonant wavelength of $\lambda/2$ to a second readout resonator having a second resonant wavelength of $\lambda/4$ or alters the resonance frequency.
5. The device of any one of the preceding claims, wherein at a closed position the switch device shifts the frequency of the readout resonator to isolate the qubit from one or more components external to the device, thereby facilitating at least one of improved coherence of the qubit, reduced dephasing of the qubit, or reduced Purcell loss of the device.
6. A device, comprising:
a bus resonator coupled to a plurality of qubits; and
a switch device formed across the bus resonator that shifts frequency of the bus resonator based on position of the switch device.
7. The device of claim 6, wherein the switch device comprises a radio frequency microelectromechanical system switch.

8. The device of any one of claims 6 to 7, wherein the switch device is formed across the bus resonator at a midpoint along the bus resonator.
9. The device of any one of claims 6 to 8, wherein at a closed position the switch device causes at least one of a radio frequency short or a ground on the bus resonator that shifts at least one of the frequency of the bus resonator or a resonance condition of the bus resonator.
10. The device of any one of claims 6 to 9, wherein at a closed position the switch device converts the bus resonator from a single bus resonator having a resonant wavelength of $\lambda/2$ to two bus resonators having resonant wavelengths of $\lambda/4$.
11. The device of any one of claims 6 to 10, wherein at a closed position the switch device shifts the frequency of the bus resonator to isolate a first qubit of the plurality of qubits from a second qubit of the plurality of qubits, thereby facilitating at least one of: improved coherence or reduced dephasing of at least one of the first qubit or the second qubit; or reduced Purcell loss of the device.
12. A method, comprising:
employing a switch device to shift frequency of a readout resonator coupled to a qubit based on position of the switch device, wherein the switch device is formed across the readout resonator.
13. The method of claim 12, further comprising:
moving the switch device to a closed position to cause at least one of a radio frequency short or a ground on the readout resonator that shifts at least one of the frequency of the readout resonator or a resonance condition of the readout resonator.
14. The method of any one of claims 12 to 13, further comprising:
moving the switch device to a closed position to convert the readout resonator from a first readout resonator having a first resonant wavelength of $\lambda/2$ to a second readout resonator having a second resonant wavelength of $\lambda/4$.

15. The method of any one of claims 12 to 14, further comprising:
moving the switch device to a closed position to isolate the qubit from one or more components external to a quantum device comprising the qubit.
16. The method of any one of claims 12 to 15, further comprising:
employing a second switch device to shift frequency of a bus resonator coupled to a plurality of qubits based on position of the second switch device, wherein the second switch device is formed across the bus resonator.
17. The method of claim 16, wherein the forming comprises:
forming the second switch device across the bus resonator at a midpoint along the bus resonator.
18. The method of any one of claims 16 to 17, further comprising:
moving the second switch device to a closed position to cause at least one of a radio frequency short or a ground on the bus resonator that shifts at least one of the frequency of the bus resonator or a resonance condition of the bus resonator.
19. The method of any one of claims 16 to 18, further comprising:
moving the second switch device to a closed position to convert the bus resonator from a single bus resonator having a resonant wavelength of $\lambda/2$ to two bus resonators having resonant wavelengths of $\lambda/4$.
20. The method of any one of claims 16 to 19, further comprising:
moving the second switch device to a closed position to isolate a first qubit of the plurality of qubits from a second qubit of the plurality of qubits.