Quantum computing with Schr'odinger cat states

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Résumé

Superconducting qubits are one of the most promising platforms to implement quantum technologies. Quantum processors of tens of qubits are now available, and exciting applications with these intermediate size systems are in perspective. However, many algorithms, including all those with a proved quantum speed-up, require extremely low error rates. This will most likely require quantum error correction (QEC). Unfortunately, current QEC architectures require daunting overheads in physical qubits and control electronics. The goal of this research is to reduce this overhead, and our approach is based on two key ideas. First, we use high Q resonators to redundantly encode quantum information. Second, we engineer non-linear dissipation to protect and manipulate this information.

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