DMR MRSEC Program

Nanowire Superinductance Fluxonium Qubit (IRG-3)

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A new class of superconducting qubits requires very high inductance with low parasitic capacitance. It is nearly impossible to achieve this using conventional magnetic inductance. However, using novel materials like NbTiN or granular aluminum, it is possible to generate high inductance through the intertial contribution of the electrons, called kinetic inductance. Here we have studied a fluxonium qubit made with a thin NbTiN wire serving as the inductor. Careful measurements of qubit relaxation indicate that the inductor can attain a quality factor of 40,000. This represents the first step towards building new types of superconducting qubits using novel materials.

1. T. Hazard *et al*, Phys. Rev. Lett., **122**, 010504 (2019)

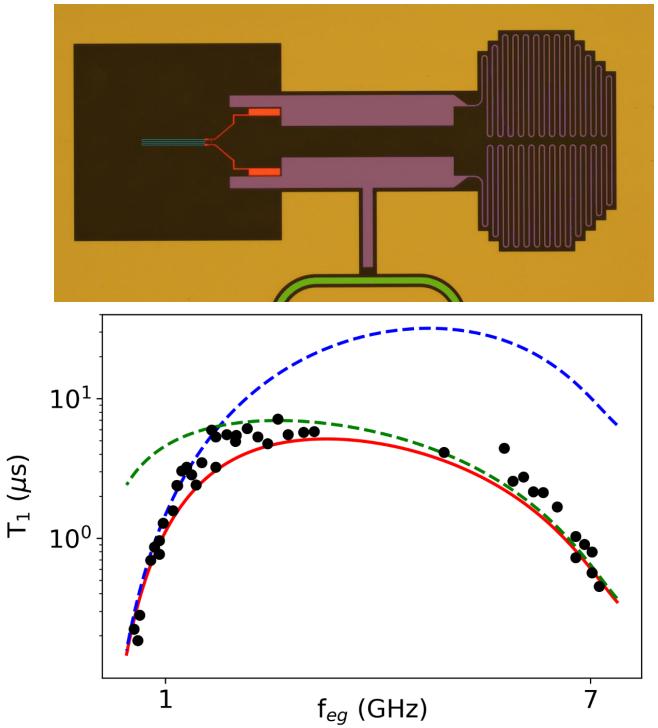

Figure 1. A high coherence qubit fabricated with a NbTiN nanowire super-inductor via kinetic inductance.

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