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## Frequency Multiplexing of Cryogenic Sensors for the Ricochet Experiment

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Readout of low-intensity microwave signals over a wide bandwidth has become increasingly important for fundamental science. The high frequency allows high information transfer, which is ideal for multiplexing detectors and reducing low-frequency noise.

One specific experiment in need of frequency multiplexing is Ricochet. Ricochet aims to measure coherent neutrino scattering to search for new fundamental physics. It consists of superconducting crystals that function as bolometers and are read out using transition-edge sensors.

We designed, fabricated and characterised devices for frequency multiplexing in 6 and 18-channel configurations with Lincoln Laboratory. The signals inductively couple into RF SQUIDS that modulate the resonant frequency of aluminium resonators. These high-Q resonators connect to a single RF feedline, simplifying cabling and reducing heat loads. The low-frequency signals are recovered using SLAC Microresonator Radio Frequency (SMuRF) electronics for read-out of frequency-division-multiplexed cryogenic sensors.

### Early Career

Yes

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