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Microwave SQUID multiplexing for high-speed applications

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The Microwave SQUID Multiplexer combines dissipationless rf-SQUIDs and superconducting microwave resonators, encoding the signal from each input channels in its own microwave tone, summing many tones onto a common output channel. Its principal advantage over existing multiplexing technologies is the large (~4 GHz) available output bandwidth. This bandwidth allows the multiplexed readout of large numbers of conventional detectors, but also of faster detectors than could be usefully multiplexed before.

For high-bandwidth applications such as the HOLMES neutrino mass experiment and x-ray beamline science we present a new microwave SQUID multiplexer design. This device targets an effective per-pixel sampling rate of 1 MHz and a multiplexing factor of 256 pixels per cryogenic amplifier, far exceeding existing technologies and enabling new measurements. We will discuss the performance of this device and our work with the room-temperature demultiplexing electronics to utilize its full per-pixel bandwidth capacity.

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