

# SQUID based frequency multiplexing readout and commercial fabrication for superconducting sensors

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Transition edge sensors (TES) are work horses of physics experiments. In pursuit for more sensitivity, experiments such as Cosmic Microwave Background (CMB) polarimetry experiments and neutrino-less double beta decay experiments are increasing number of sensors. As TES operate at sub-Kelvin temperature, highly multiplexed, low-noise and low power dissipation multiplex readout technique is a key for successful operation. CMB experiments have been implementing frequency multiplexing (fmux) readout scheme. The current deployed fmux system readout up to 68 TES bolometers per single SQUID amplifier.

I will describe on-going development to improve fmux system for future experiments that goes beyond CMB experiments. We have designed and fabricated custom SQUID amplifier with STAR Cryoelectronics that has low input impedance, low power dissipation and high transimpedance. Using this amplifier, we are exploring new fmux readout configuration to further lower readout noise contribution, increase multiplexing factor and simply sub-Kelvin integration. We have been testing readout system while coupling them to TES bolometers fabricated by HYPRES, a commercial foundry. I will describe how these development will enable future CMB experiment and possibly neutrino-less double beta decay experiment and light Dark Matter experiments.

I will also share experience with commercial foundry to fabricate superconducting devices as these maybe attractive way to develop devices for future QIS devices.

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