A frequency domain multiplexing system to readout the TES bolometers on the LSPE/SWIPE experiment

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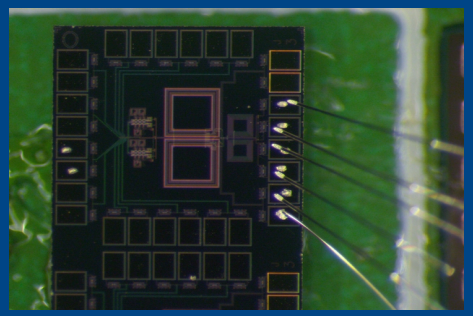

We present our design and experimental demonstration of a frequency domain multiplexing (FDM) system to readout the transition-edge sensor bolometers of the LSPE/SWIPE balloon-borne experiment, for measuring the B-mode polarization of the Cosmic Microwave Background (CMB) exploiting the reionization peak at $l < 10$, with the primary target of improving the tensor-to-scalar ration limit down to r = 0.03 at 99.7% CL. The FDM readout system has been devised consists of LC resonators composed of custom Nb superconducting inductors and SMD capacitors.
We describe the fabrication process and qualification tests of both cold and warm readout electronics. The cold section (0.3K - 1.6K) is composed of boomerang-shaped PCBs hosting the SQUIDs and the superconducting LC filters for the FDM channels. The warm section is based on a modular solution, with mezzanine plug-ins for DAC (comb generation), ADC (demodulation) and a SoC FPGA (Altera Cyclone V SoC) for data reduction.