

Conference: 14th International Workshop on Low Temperature Detectors
Location: Heidelberg, Germany
Dates: July 30 – August 6, 2011

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Abstract:

μ -Spec - A High Performance Ultra-Compact Photon Counting Spectrometer for Space Submillimeter Astronomy

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We have designed and are testing elements of a fully integrated submillimeter spectrometer based on superconducting microstrip technology. The instrument can offer resolving power $R \sim 1500$, and its high frequency cutoff is set by the gap of available high performance superconductors. All functions of the spectrometer are integrated - light is coupled to the microstrip circuit with a planar antenna, the spectral discrimination is achieved using a synthetic grating, orders are separated using planar filter, and detected using photon counting MKID detector.

This spectrometer promises to revolutionize submillimeter spectroscopy from space. It replaces instruments with the scale of 1 m with a spectrometer on a 10 cm Si wafer. The reduction in mass and volume promises a much higher performance system within available resource in a space mission.

We will describe the system design and the performance of the components that have been fabricated and tested.