μ- Spec: A High Performance Compact Spectrometer for Submillimeter Astronomy

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We describe the μ-Spec, an extremely compact high performance spectrometer for the submillimeter and millimeter spectral ranges. We have designed a fully integrated submillimeter spectrometer based on superconducting microstrip technology and fabricated its critical elements. Using low loss transmission lines, we can produce a fully integrated high resolution submillimeter spectrometer on a single four inch Si wafer. A resolution of 500 can readily be achieved with standard fabrication tolerance, higher with phase trimming. All functions of the spectrometer are integrated - light is coupled to the microstrip circuit with a planar antenna, the spectra discrimination is achieved using a synthetic grating, orders are separated using a built-in planar filter, and the light is detected using photon counting Microwave Kinetic Inductance Detectors (MKID). We will discus the design principle of the instrument, describe its technical advantages, and report the progress on the development of the instrument.