A Millimeter/Submillimeter Microwave Kinetic Inductance Detector Camera for Multicolor Mapping

Jason Glenn\textsuperscript{1}, Peter K. Day\textsuperscript{2}, Sunil Golwala\textsuperscript{3}, Shwetank Kumar\textsuperscript{3}, Henry G. LeDuc\textsuperscript{2}, Benjamin A. Mazin\textsuperscript{2}, Hien T. Nguyen\textsuperscript{2}, James Schlaerth\textsuperscript{1}, Anastasios Vayonakis\textsuperscript{3}, & Jonas Zmuidzinas\textsuperscript{2,3}

Microwave Kinetic Inductance Detectors (MKIDs) are sensitive, superconducting, Cooper-pair-breaking detectors. They lend themselves to elegant multiplexed readout using HEMT amplifiers and software-defined radio technology. Recently 16-pixel, two-color, antenna-coupled MKID arrays have been tested in the laboratory, demonstrating readiness for large-scale focal plane arrays for astrophysics. Additionally, MKID noise has been reduced to the BLIP level for 750 μm to 1.3 mm observations from Mauna Kea. Hence, we are building a four-band (750 μm, 850 μm, 1.1 mm, and 1.3 mm) MKID camera to make observations, first from the Caltech Submillimeter Observatory, and later from the Cornell-Caltech Atacama Telescope. The MKID camera will utilize an array of 600, four-color, antenna-coupled MKIDs, for a total of 2,400 channels, yielding a high survey mapping speed. We will report on a conceptual design for this camera and laboratory results from a small-scale demonstration camera\textsuperscript{4}. A successful demonstration of large-scale MKID arrays will provide an alternative technology to transition-edge sensors (TESs) for SOFIA, the Beyond Einstein Cosmic Microwave Background Polarization Probe (CMBPol), and SAFIR.

\textsuperscript{1}Center for Astrophysics and Space Astronomy, University of Colorado, 389-UCB, Boulder, CO 80309 (contact author: jglenn@casa.colorado.edu)
\textsuperscript{2}Jet Propulsion Lab, 4800 Oak Grove Drive, Pasadena, CA 91109
\textsuperscript{3}George W. Downs Laboratory of Physics, MC 320-47, California Institute of Technology, Pasadena, CA 91125
\textsuperscript{4}This work is funded, in part, by a NASA APRA grant and a grant from the Moore Foundation.