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The HiRMES Focal Plane Array

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The High Resolution Mid-Infrared Spectrometer (HiRMES) instrument will fly onboard the National Aeronautics and Space Administration's (NASA) airborne Stratospheric Observatory for Infrared Astronomy (SOFIA) in 2021. It will provide astronomers with a unique observing window (25–122 μm) for exploring the evolution of protoplanetary disks into young solar systems. The instrument's focal plane comprises two independent arrays of transition-edge sensor (TES) bolometers: a low-light 8×16 array for high-resolution spectroscopy, and a higher saturation power 16×64 detector array for both spectroscopy and imaging. Both arrays feature special close spacing that provides nearly continuous coverage over one axis.

Though both pixels are designed around superconducting Mo/Au bilayer on suspended single-crystal silicon membranes, leg geometry and transition temperature have been tuned separately to suit the different optical loads. We have tested both types and expect photon-noise limited performance out of both. The unique environment of this instrument places demands on the size and weight of the detector package, as well as its mechanical and thermal properties. These constraints drove distinct solutions in readout architecture, mounting, and materials. We present detector characterization results and discuss the packaging of an airborne kilopixel array.

Less than 5 years of experience since completion of Ph.D

N

Student (Ph.D., M.Sc. or B.Sc.)

N

Primary authors: Dr KUTYREV, Alexander (University of Maryland College Park/NASA GSFC); BROWN, Ari (NASA Goddard Space Flight Center); FIXSEN, Dale; Dr WOLLACK, Edward J. (NASA GSFC); Mr SHARP, Elmer (NASA GSFC); COLAZO PETIT, Felipe A. (NASA GSFC); HAYS-WEHLE, James (NASA / UMBC); Dr ROSTEM, Karwan (University of Maryland Baltimore); Dr GREENHOUSE, Matthew (NASA Goddard Space Flight Center)

Presenter: HAYS-WEHLE, James (NASA / UMBC)

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