The Prototype HyspIRI Thermal Infrared Radiometer (PHyTIR)

William R. Johnson, Simon J. Hook (P.I.), Marc C. Foote, Bruno M. Jau and Bjorn T. Eng

The technology for the HyspIRI-TIR instrument is mature, but further work is needed to reduce risk. In particular, the proposed design requires a high sensitivity and high throughput focal plane array (FPA) coupled with a scanning mechanism which has stringent pointing knowledge. The scanning approach, and the high sensitivity and high throughput FPA, are required to meet the revisit time (5 days), the high spatial resolution (60m), and the number of spectral channels (8) specified by the Decadal Survey and the HyspIRI Science Study Group for the mission. The next step is to reduce the risk associated with the scanning mechanism and the FPA with the development of a laboratory prototype termed the Prototype HyspIRI Thermal Infrared Radiometer (PHyTIR).

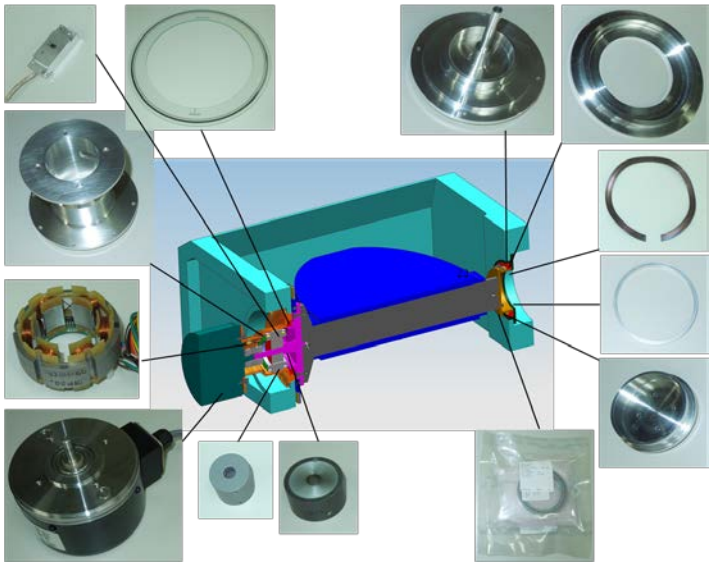
PHyTIR will demonstrate that:

1. The detectors and readouts meet all signal-to-noise and speed specifications.

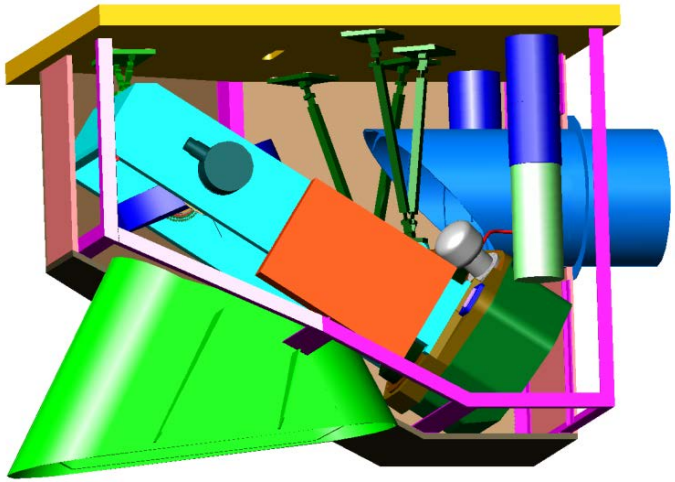
2. The scan mirror, together with the structural stability, meets the pointing knowledge requirements.

3. The long-wavelength channels do not saturate below 480 K.

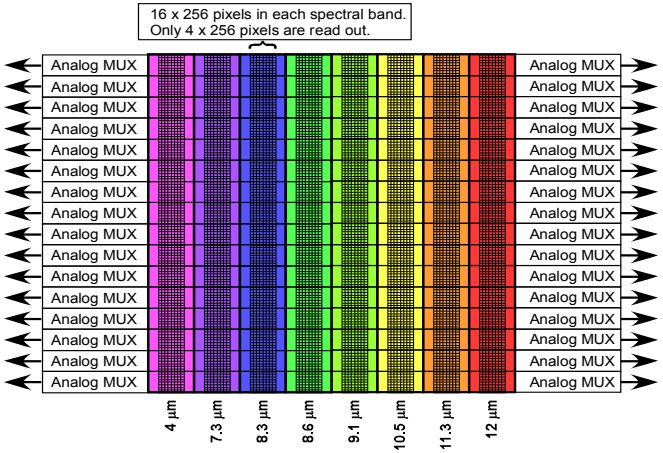
4. The cold shielding allows the use of ambient temperature optics on the HyspIRI-TIR instrument without impacting instrument performance.



Much of the scan assembly is already in-house.



Overall laboratory prototype is approximately 1m x 0.7m x 0.7m in volume, uses 200W nominal power (due to extra cryocooler – not on HyspIRI) and weighs 60Kg.



PHyTIR uses previously developed HyspIRI-TIR readout integrated circuit (ROIC).
32 parallel output at ≥ 10 MHz allow 32 µs frame times.