

## **A Compact 670-GHz Polarimetric Radiometer for CubeSat Cloud Ice Observations**

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The design and performance of a compact polarimetric radiometer operating at 670 GHz is presented. The module will be integrated into a CubeSat form factor for atmospheric research with a DRO, scanning antenna, calibration target, and other electronics. Submillimeter radiometry provides cloud ice measurements that are not adequately sampled with microwave and infrared sensors, but are needed for better understanding of cloud precipitation processes in severe weather systems. Polarimetric measurements provide information about cloud microphysics, particle size, and shape.

The 1.5" x 1.5" x 0.75" RF module contains a waveguide orthomode transducer (OMT) followed by a complete dual-channel downconverter with 600-700 GHz low noise amplifiers followed by a Schottky mixer. The complete local oscillator active multiplier chain and first stage of IF amplification for each channel is also integrated in the block. The CubeSat mission scenario calls for measurement of three Stokes parameters. A separate IF module with post-amplifiers, filters, splitters, phase compensation, analog correlation, detectors, and video amplifiers required for extraction of these parameters is being developed. The RF module has been fully assembled and is currently in final testing. Preliminary measurements show polarization isolation >20dB. Expected single-sideband noise temperature is approximately 5000K for each channel, giving a NEDT of ~0.5K for a 10ms integration. Total DC power consumption for the RF module is approximately 6W. Complete system performance will be presented at the Conference, as well as further information on the CubeSat integration and proposed mission.

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