

POLITECNICO DI MILANO



## **Multi-channel Microwave Radiometer**

*Description: A multi-channel microwave radiometer with channels at 72.5 GHz and 82.5 GHz, plus a minimum of two K-band channels at nominally 23.8 and 31.4 GHz. The lower frequency channels should be chosen to provide integrated water vapor and liquid water path amounts. All frequency channels shall share a common receive antenna. The radiometer should be a stand-alone system for automated use under nearly all environmental conditions. The radiometer shall have a hydrophobic radome and blower/ heater system to blow away water and snow and prevent the formation of dew on the radome. The instrument shall have operating software that allows local and remote operation, storage and manipulation of data. The instrument shall have internal retrieval algorithms that calculate the integrated liquid water vapor and liquid water path amounts, and provide the retrieval data and raw data output (Levels 0,1,2). The instrument shall have full programmable steerability, including an azimuth positioner that allows 0 to 360 degree rotation as well as internal elevation scanning, with custom definable scans, including "sun-switching". The instrument shall have external meteorological detectors and GPS clock.*

*Radiometer Calibration: The radiometer shall have absolute calibration modes that include a sky tipping calibration mode and an external mode that uses an external cold (liquid nitrogen) target and an internal ambient load. The liquid nitrogen target and mounting mechanism shall be included. The radiometer shall have internal auto-calibration systems that include noise sources that provide noise switching, gain calibration and Dicke switches that provide system noise temperature calibration.*

*Other Multi-channel Radiometer Specifications:*

*Center Frequencies: 72.5 GHz +/- 0.1 GHz, 82.5 GHz +/- 0.1 GHz.*

*Bandwidth: 72.5 and 82.5 GHz: < 2 GHz bandwidth (-3dB FWHM); 23.8 and 31.4 GHz: < 300 MHz*

*Beam Width (FWHP) 72.5 and 82.5 GHz: less than 1.6 degrees. 23 and 31 GHz: less than 4 Degrees.*

*Sidelobe level: 72.5 and 82.5 GHz: less than -40 dBc. K-band: less than -30 dBc*

*Radiometric Resolution: < 0.2K rms at 1 sec integration time.*

Politecnico di Milano  
Department of Electronics, Information and Bioengineering

Via Ponzio 34/5  
20133 Milan  
Tel. +390223993400  
Fax +390223993587  
www.deib.polimi.it  
VAT No.: 04376620151  
Tax code: 80057930150



*Brightness temperature accuracy: < 0.5 K*

*Radiometric range: 0-800 K*

*System stability: < 1.0 K.*

*Receiver and antenna thermal stabilization: < 0.02 K*

*Sampling rate/ temporal resolution: equal to integration time (plus time to change elevation/azimuth)*

*LWP accuracy: +/- 25 g/m<sup>2</sup>*

*IWV accuracy: +/- 0.3 Kg/m<sup>2</sup>*

*Automatic rain detections system with rain flag and rain rate.*

*Elevation scan: scan steps less than or equal to 0.15 degrees, resolution less than 0.15 degrees.*

*Azimuth scan: scan steps less than or equal to 0.1 degrees, resolution less than 0.1 degrees.*

*Pointing Speed: > 40 degrees per second.*

*Azimuth alignment by software (sun-tracking plus GPS): provides measure of the azimuth pointing error to the resolution of the azimuth positioner.*

*Sun-Switching mode: Control software that dynamically tracks the sun and automatically calculates "spot-on" pointing to the sun center, within the resolution of the azimuth and elevation scans, and a user defined offset pointing from the Sun center.*

*External meteorological sensors: barometric pressure, humidity, temperature, rain-rate, which are time-stamped and recorded.*

*Operating temperature range: -40C to +45C*

