Finanziato dall'Unione europea NextGenerationEU | Ministero dell'Università e della Ricerca | Italiadomani

Consiglio Nazionale delle Ricerche

INO Istituto Nazionale di Ottica

PNRR Project – Task 1420.1 | Project: EMM – Earth Moon Mars

Lunar Earth Temperature Observatory (LETO) – Payload for spectroscopic measurements from lunar infrastructure

Overview

LETO-FTS is a Fourier transform spectrometer developed at TRL4 to measure, in the medium and far infrared, the spectrum of radiation emitted by the entire disk of the Earth visible from the future lunar base.

Technical specifications

- Spectral range: **100-1600 cm^{-1} (6 – 100 µm)**
- Maximum spectral resolution: **0.5 cm^{-1}**
- Field Of View: **2.3°**
- Absolute Radiometric Accuracy: **0.1 K**
- Acquisition time: **1-2 min**
- Remote control: **LabVIEW interface**

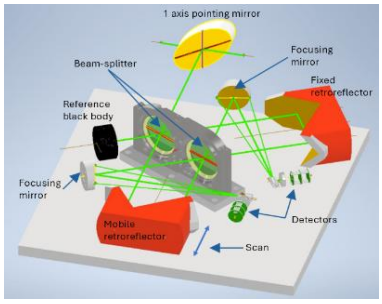
Applications planned by the Moon base

- Continuous monitoring of the outgoing long-wave spectral flux of the entire Earth's disk observable from the Moon
- Monitoring of the Earth's brightness temperature in various infrared spectral regions
- Analysis of climate trends through the study of the relationships between the various spectral components of the outgoing flux and the geophysical parameters subjected to change
- Development of accurate climatologies to improve observational constraints in climate prediction models

Laboratory applications to support the development of the Lunar infrastructure

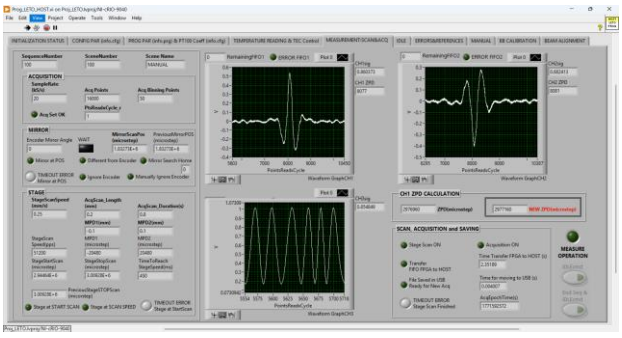
- Use of LETO-FTS as a baseline for future developments at higher TRL
- Laboratory verification of the main instrumental specifications
- Characterization measurements of lunar dust in the FIR band

Instrument images



Functional diagram of the Mach-Zehnder interferometer with dual input-output

LETO laboratory prototype



LabVIEW control interface