



Science Traceability Matrix

Science Goal

Technosignatures

Conduct unambiguous search (RFI free) for techno signatures in frequencies bands not possible on Earth

Science Goal

Transients

Study transients (pulsars, FRBs, flare stars, etc) in the low-frequencies otherwise not possible from Earth

Science Goal

Spectral lines

Perform spectral measurements of the sky, unhindered by RFI and ionosphere

Science Goal

Environment observations

Spectral study of the lunar environment

Measurement Requirement

- Conduct SETI observations in pristine radio environments free from RFI
- Conduct narrowband radio scans to isolate artificial signals from astrophysical sources
- Target low- and mid-band frequencies blocked on Earth to probe unexplored SETI parameter space

Measurement Requirement

- Study the low frequency pulsar emission (originating close to the surface of the pulsar)
- Measure diurnal systematics in PTA data via continuous monitoring of the Vela pulsar
- Observe low-frequency FRBs to better understand its progenitors and the intervening baryons
- Search for unknown populations of low-DM transients
- Perform polarimetric studies of flare stars, solar burst, hot jupiters, and other sources of emission within the solar system.

Measurement Requirement

- Conduct RFI-free H1 observations of extragalactic sources, enabling detection of 21-cm emission otherwise marked by terrestrial interference
- Map the diffuse cold neutral medium in the Milky Way using radio recombination lines at low frequencies
- Measure hydrogen recombination lines from the early Universe in RFI-free environment to probe ionisation history of the Universe

Measurement Requirement

- Quantify and characterise the Lunar RF environment

LFT3 Instrument

- 3 dual-pol antennas for frequencies 1-50 MHz, 50-100 MHz, and 600-1800 MHz
- a dual-pol multi-beam phased array for observations at 300-900 MHz

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Observation Strategy

- high time and frequency resolution observations
- processed on-board for "hits"
- "on"- "off" multi-beam strategies used to build confidence on "hits"
- SETICORE used real time on beam-formed targets

Observation Strategy

- high time and frequency resolution polarimetric observations
- VLBI with Earth based stations for micro-arc second resolution observations

Observation Strategy

- make time averaged spectra of targets, using the onboard radio telescope appropriate for the frequency
- for H1 recombination lines from the Early Universe, make time averaged spectra when the Sun and Galaxy are below the horizon

Observation Strategy

- make regular time averaged spectral of the lunar RF environment over the entire frequency band of operation

Data Products

- dynamic spectra and time-stamped voltages of "hits" are saved on-board
- de-dispersed and time-averaged power spectra is sent to Earth

Data Products

- raw voltages stored on board
- high time and freq resolution dynamic spectra in IQUV sent to Earth

Data Products

- time averaged stokes I spectral of targets sent to Earth

Data Products

- time averaged stokes I spectrum of the Moon sent to Earth