



The Lunar Farside Transients and Technology Telescope (LFT3) Mission

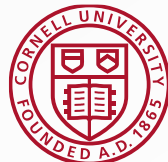
Jake D. Turner (he/him)

Cornell University and Carl Sagan Institute

Ad ASTRA Workshop: September 2, 2026

On behalf of the LFT3 mission team

DeBoer et al. 2026 (arXiv:2607.25762)



LFT3 Team

The Lunar Farside Transients and Technology Telescope (LFT3) Mission

David R. DeBoer, Charlie K. Ashe, Owen A. Johnson, Evan F. Keane, Andrew C. Lesh, Richard Lynch, Ella J. Marshall, Steve Prabu, Anže Slosar, Chenoa D. Tremblay, Jake D. Turner, Karl F. Warnick, Andrew P. V. Siemion, Jamie Drew, S. Pete Worden



Mission Overview

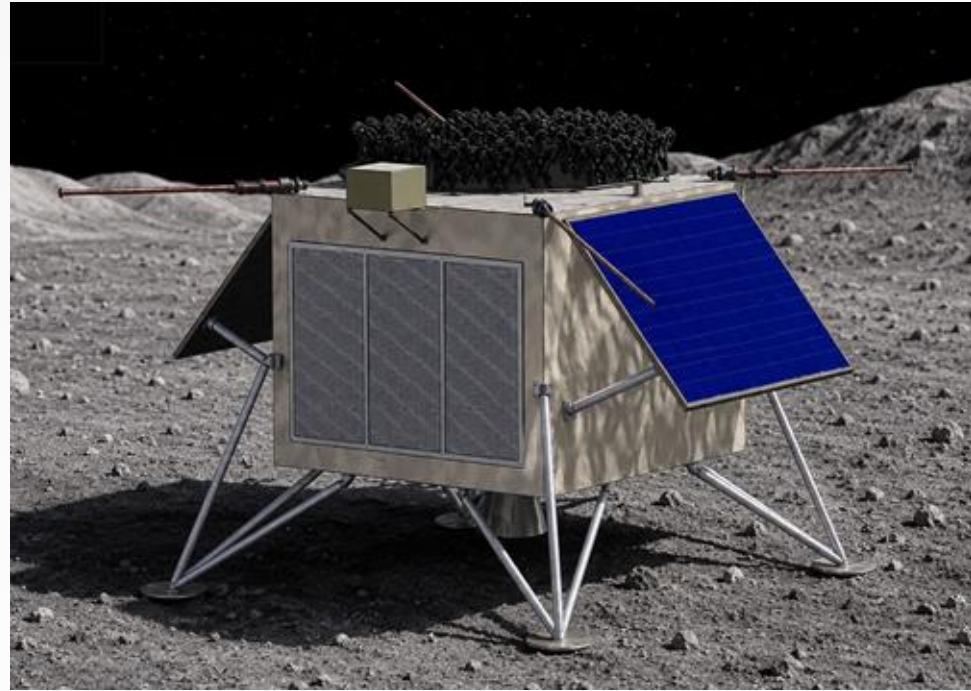
Conduct an RF-pristine broadband (0.1 – 2700 MHz) survey, establishing incumbent scientific use for lunar science.

Agnostic to CLPS lander & launch

- 100 kg payload
- 100 W (day) / 20 W (night)
- 100 GB/month
- ~100 \$M payload/lander costs

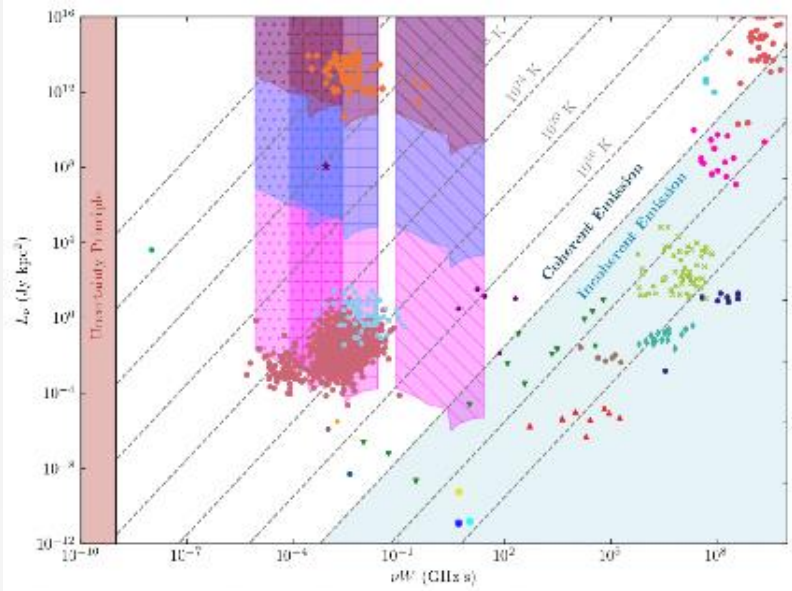
~2029 landing

Integrate with lander - EMI performance is the primary risk.

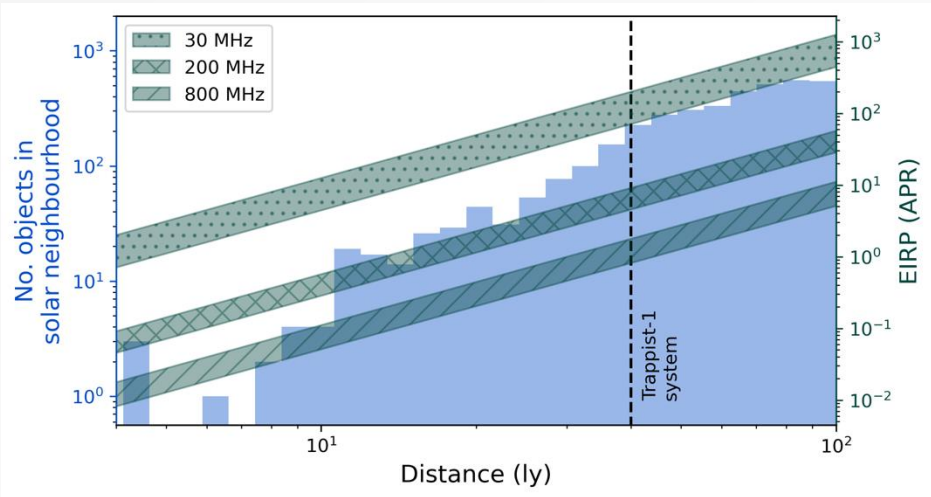


Science: Characterize the Pristine Radio Sky

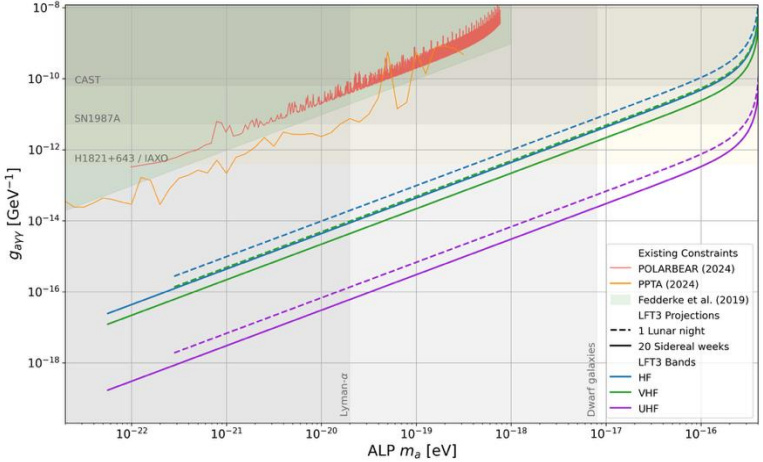
Low-DM FRB analogues & pulsar physics



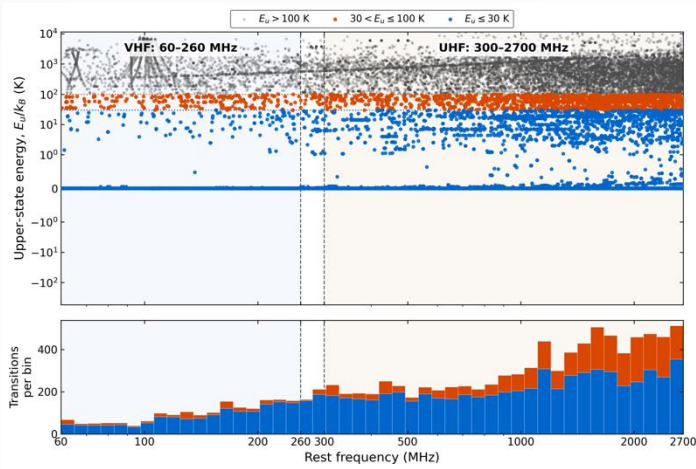
Technosignatures



Axion particle constraints

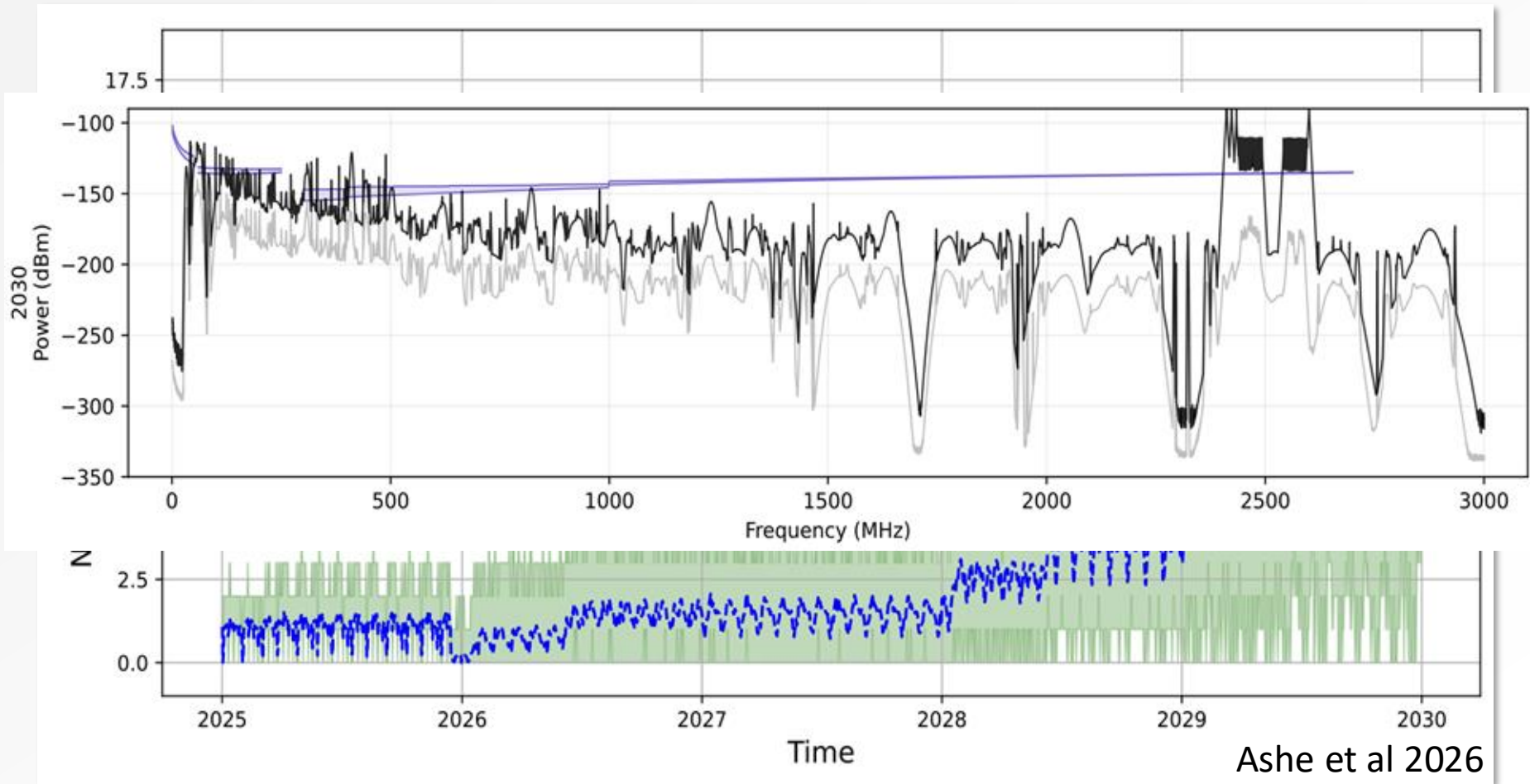


Astrochemistry

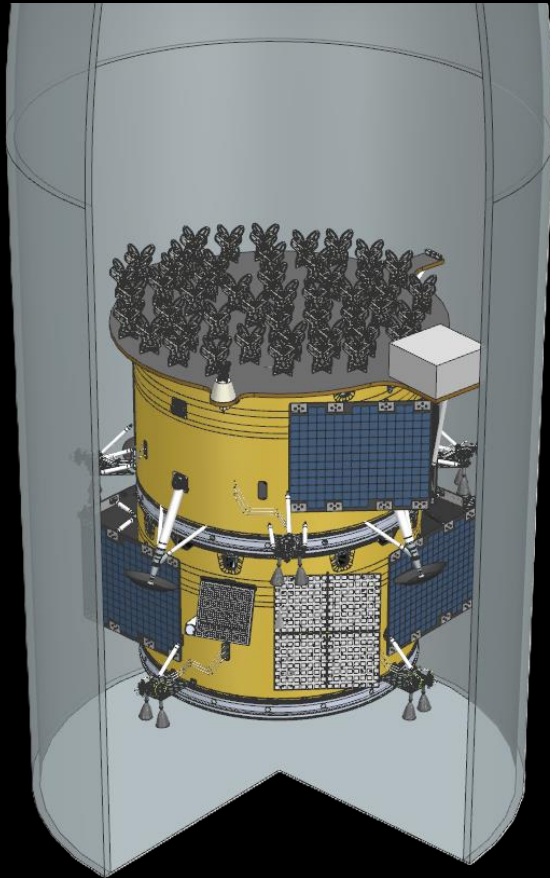


The Urgency

Future missions will begin to encroach on the RF-pristine state of the lunar Farside (Ashe et al. 2026)



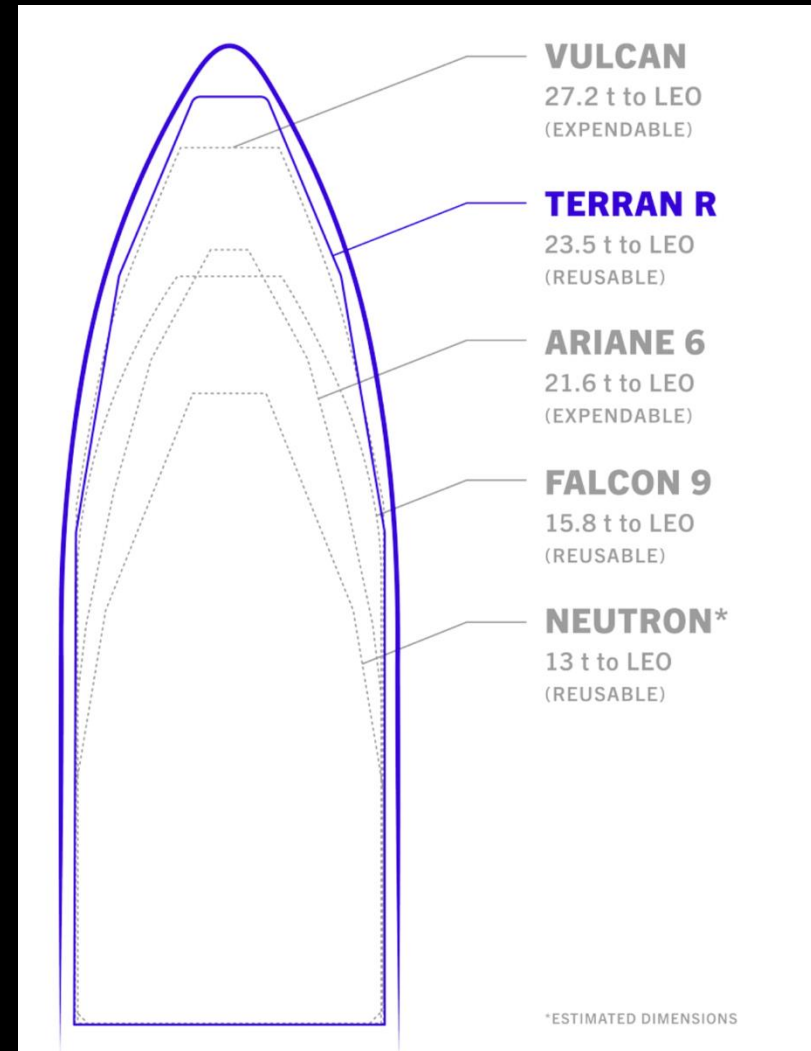
Launch Vehicle



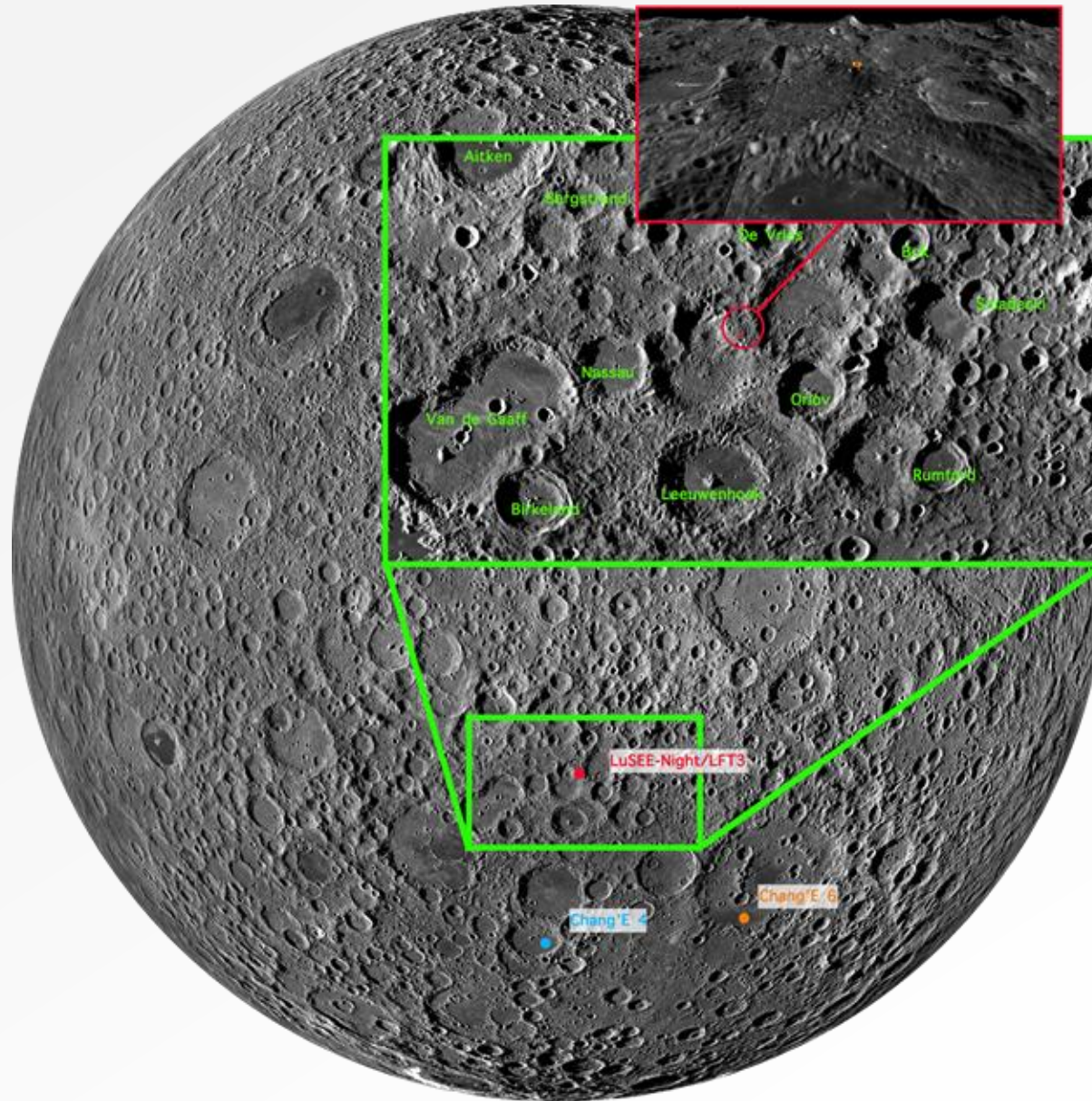
Falcon 9



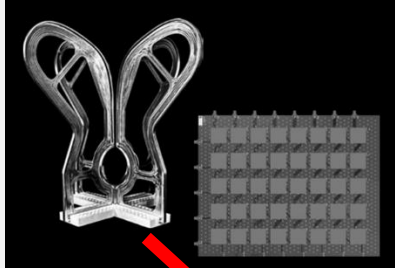
Eclipse



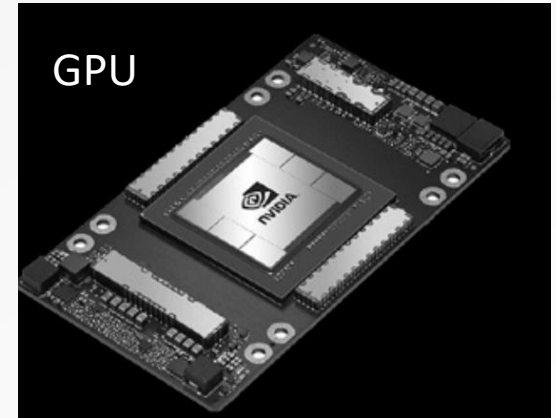
The Location



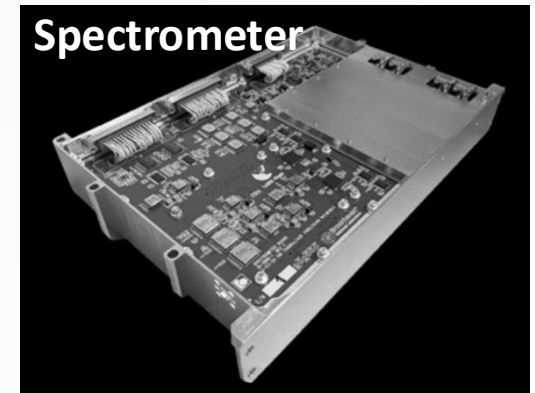
The LFT3 Payload



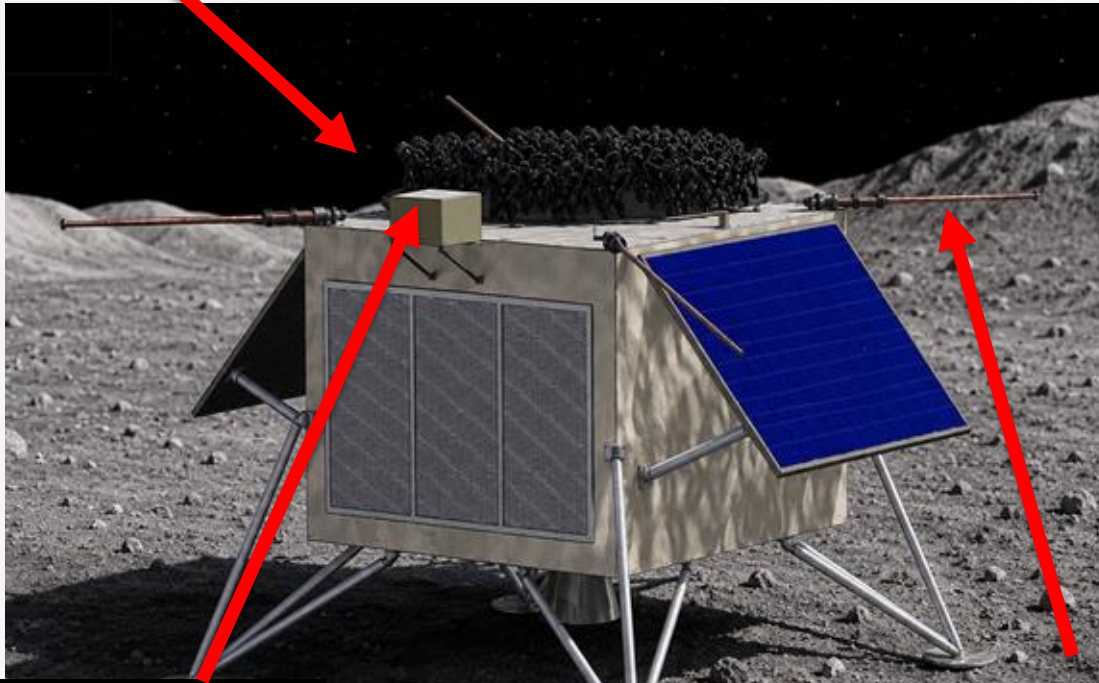
48 VHF antennas:
300 MHz – 2.7 GHz
Beamformer



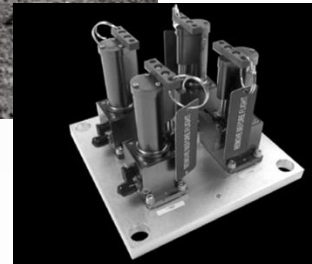
GPU



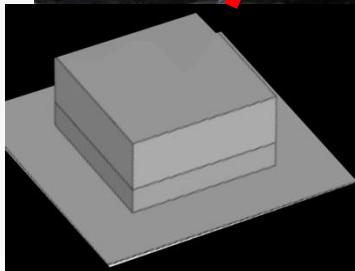
Spectrometer



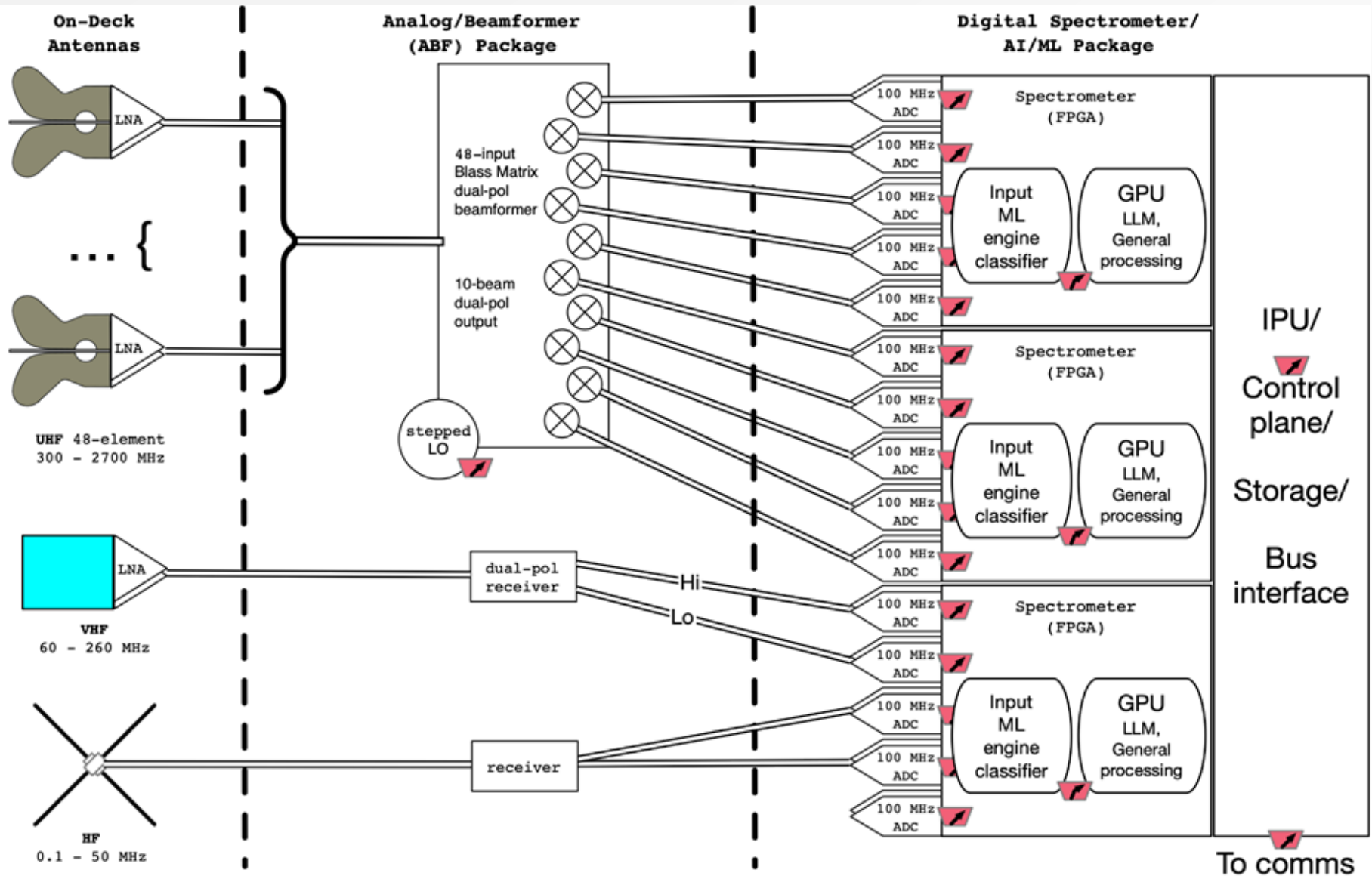
HF antenna:
0.1 MHz – 50 MHz
(Same as LuSEE-Night)



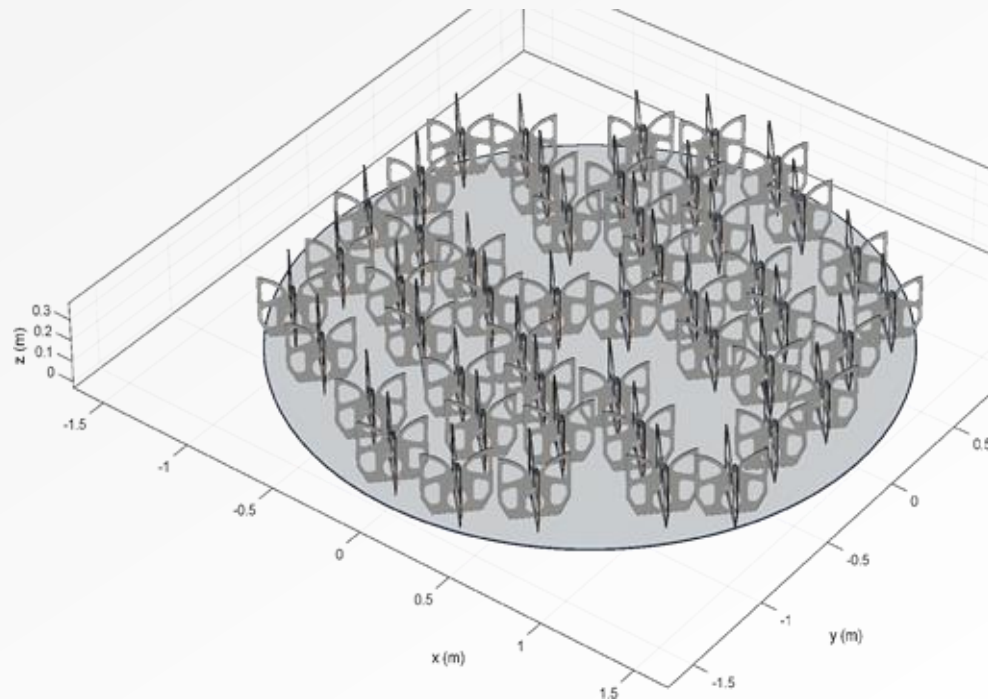
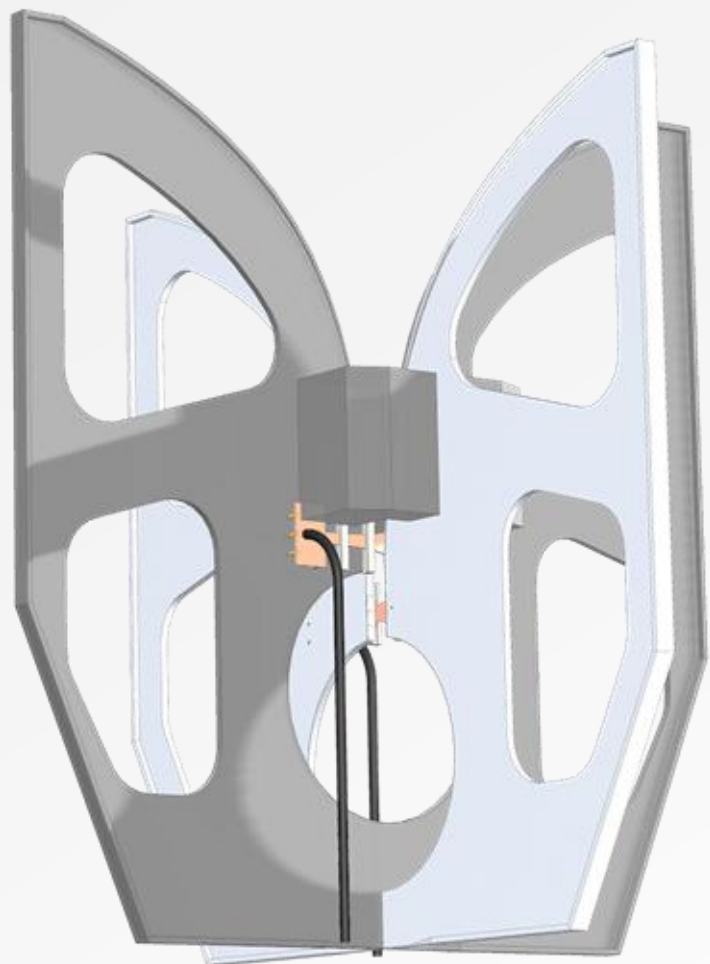
VHF antenna:
60 MHz – 260 MHz



The Payload



UHF Design



Modified HERA feed (Fagnoni et al 2021)
Jonas Flygare, Caltech

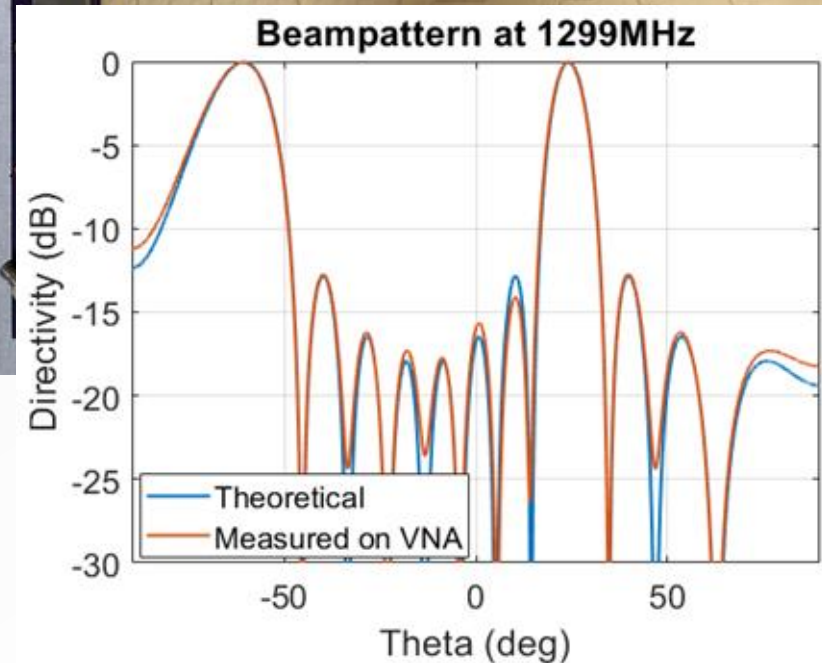
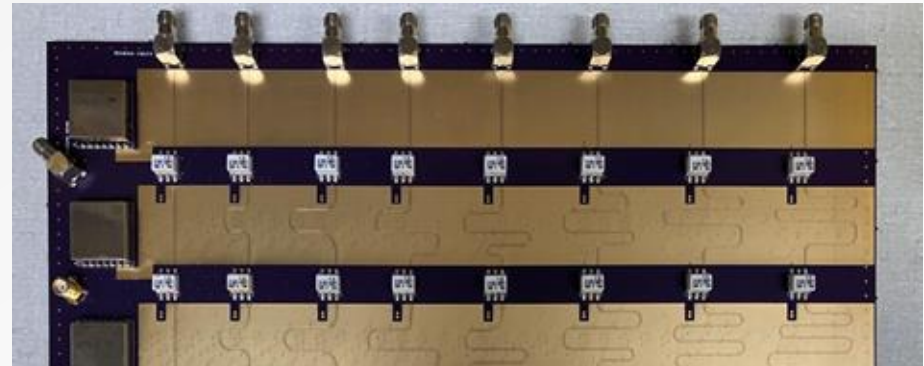
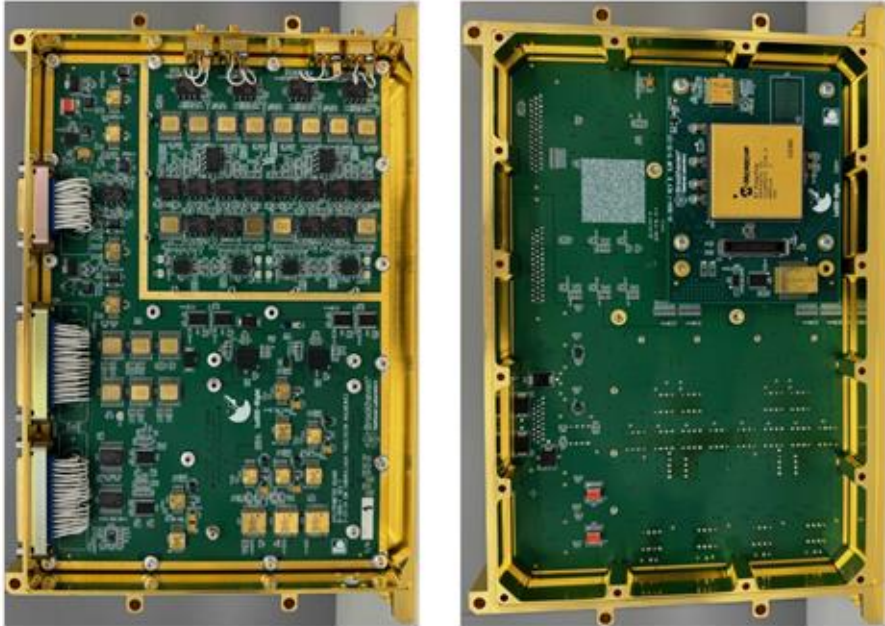
RADIO ASTRONOMY
SYSTEMS **BYU**



Hardware is being built!

Fabricated beamformer board

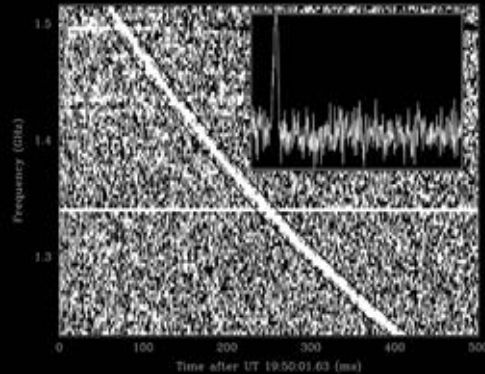
Spectrometer



Data Products

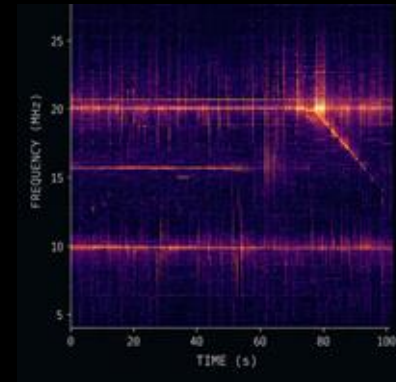
Triggered events

Baseband data (2 GB/s)

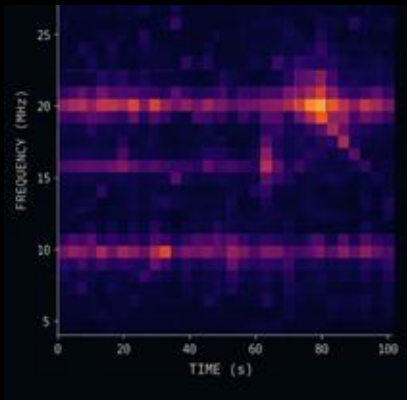


Tunable by Observer

High resolution dynamic spectra (0.0004- 0.02 GB/s)



Sky complete spectra (0.0004 GB/s)

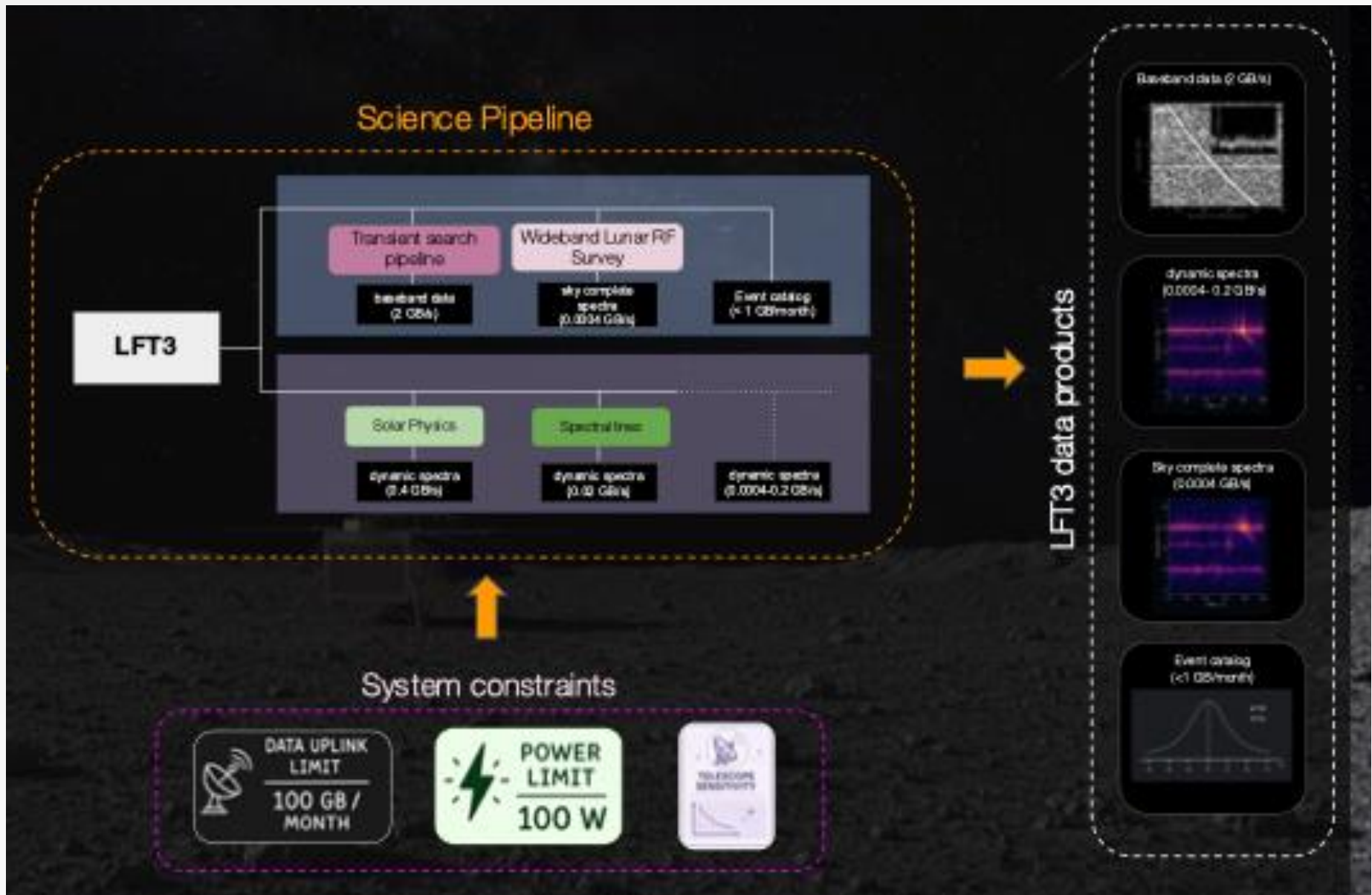


Entire mission

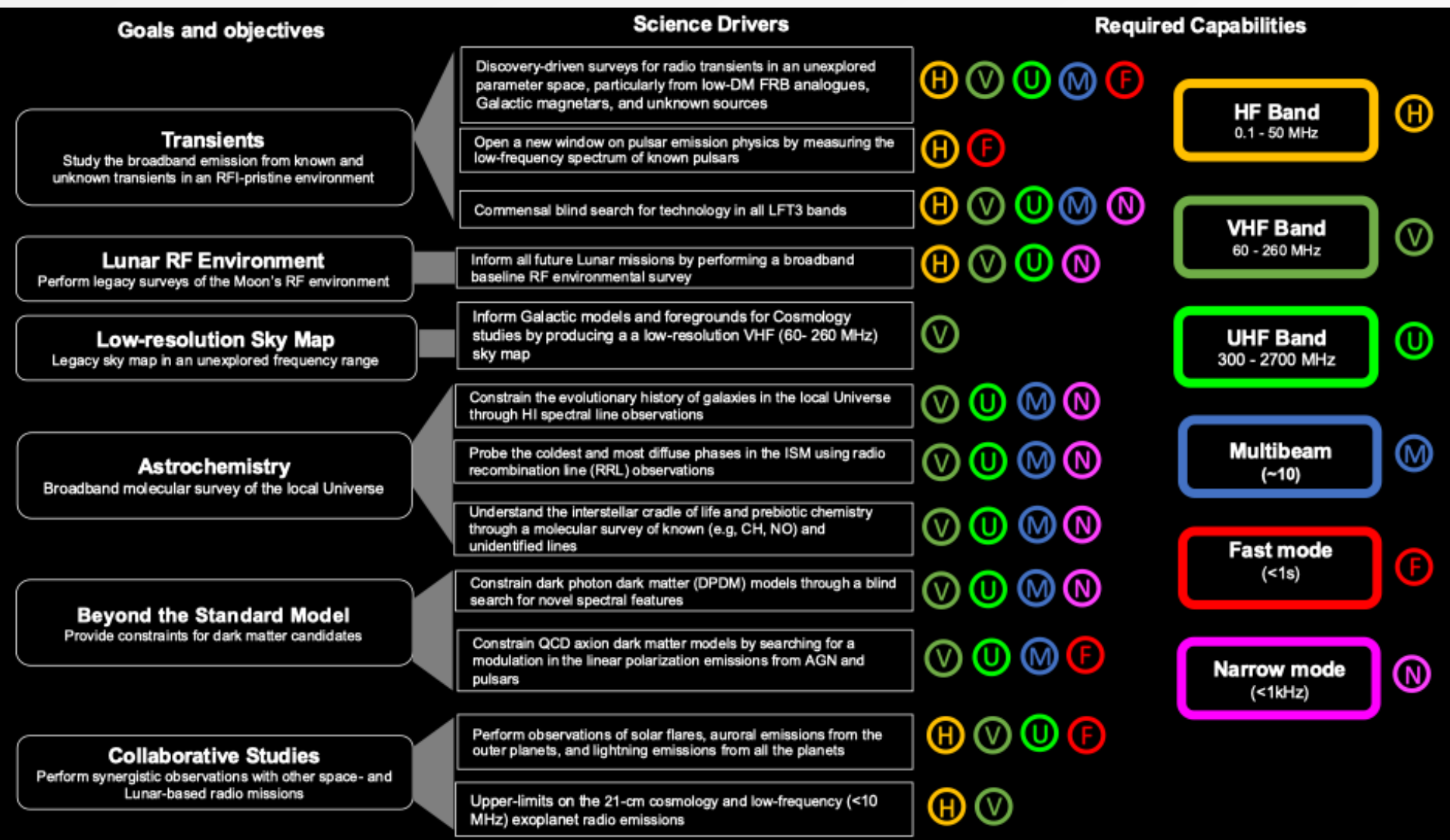
Event catalog (<1 GB/month)



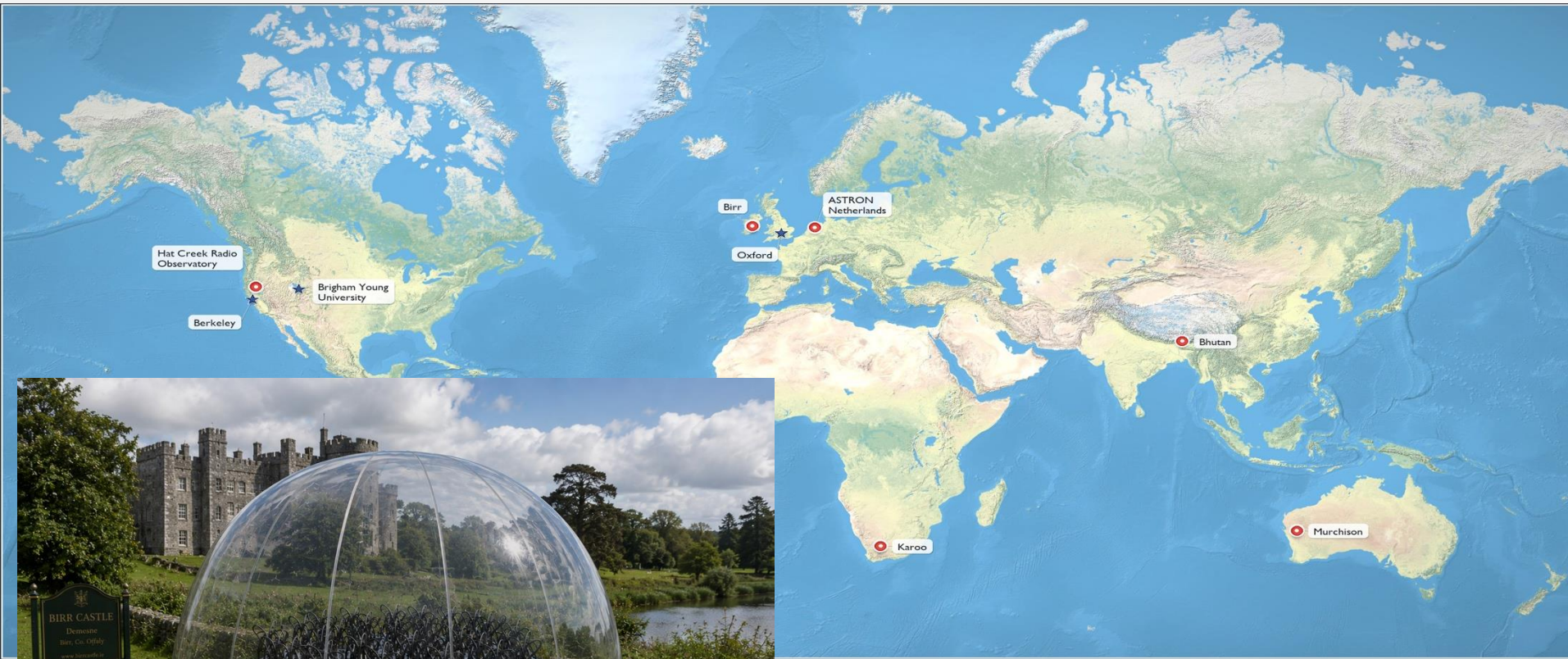
Concept of Operations



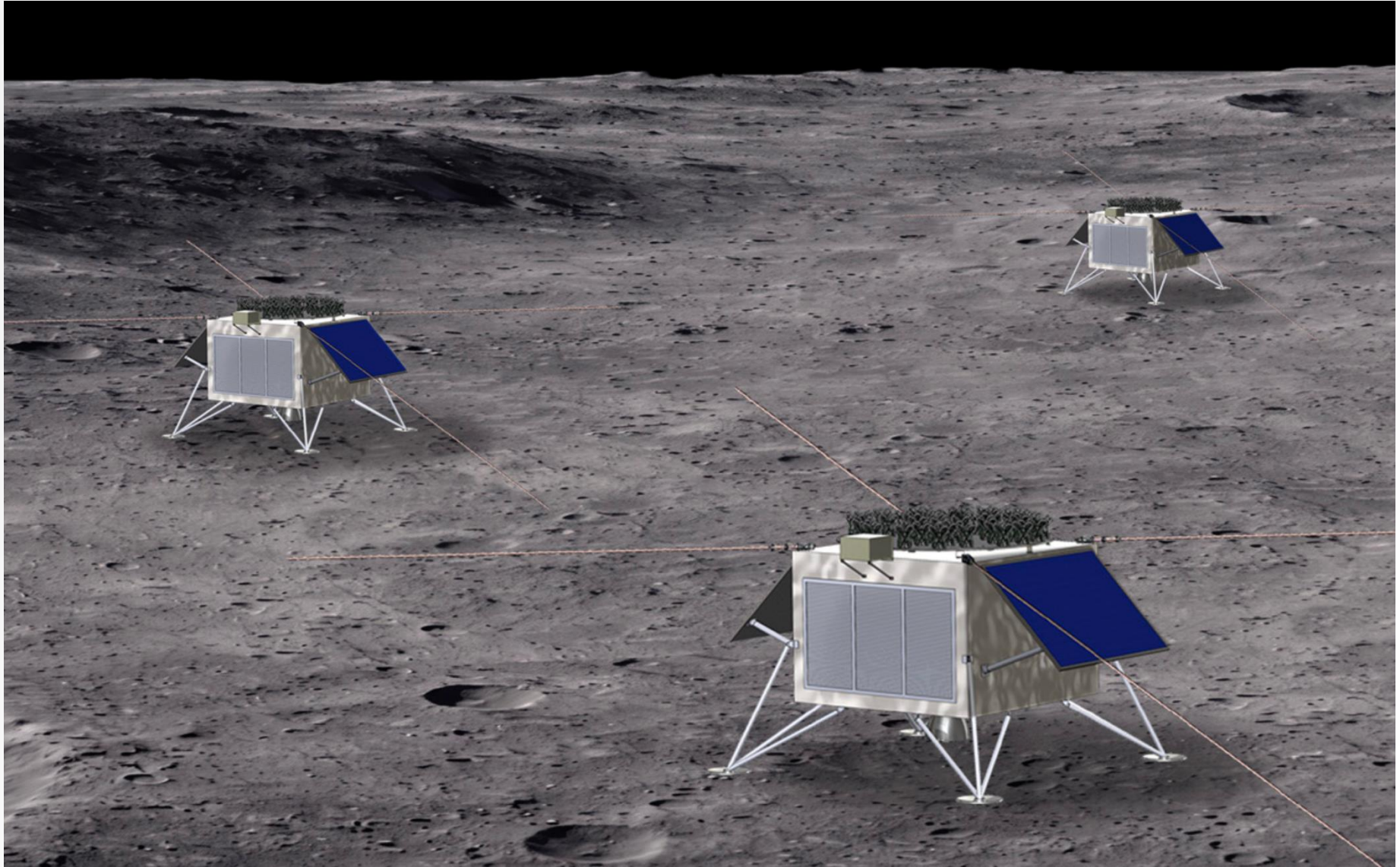
Science Traceability Matrix



LFT3Earth



Future: Array?



Summary

- Conduct an RF-pristine broadband (0.1 – 2700 MHz) survey
- Robust science case: Low-DM FRB analogues, pulsar emission physics, axion particle constraints, astrochemistry, technosignatures, and more
- LFT3 will establish a lasting legacy for future lunar and radio astronomy missions

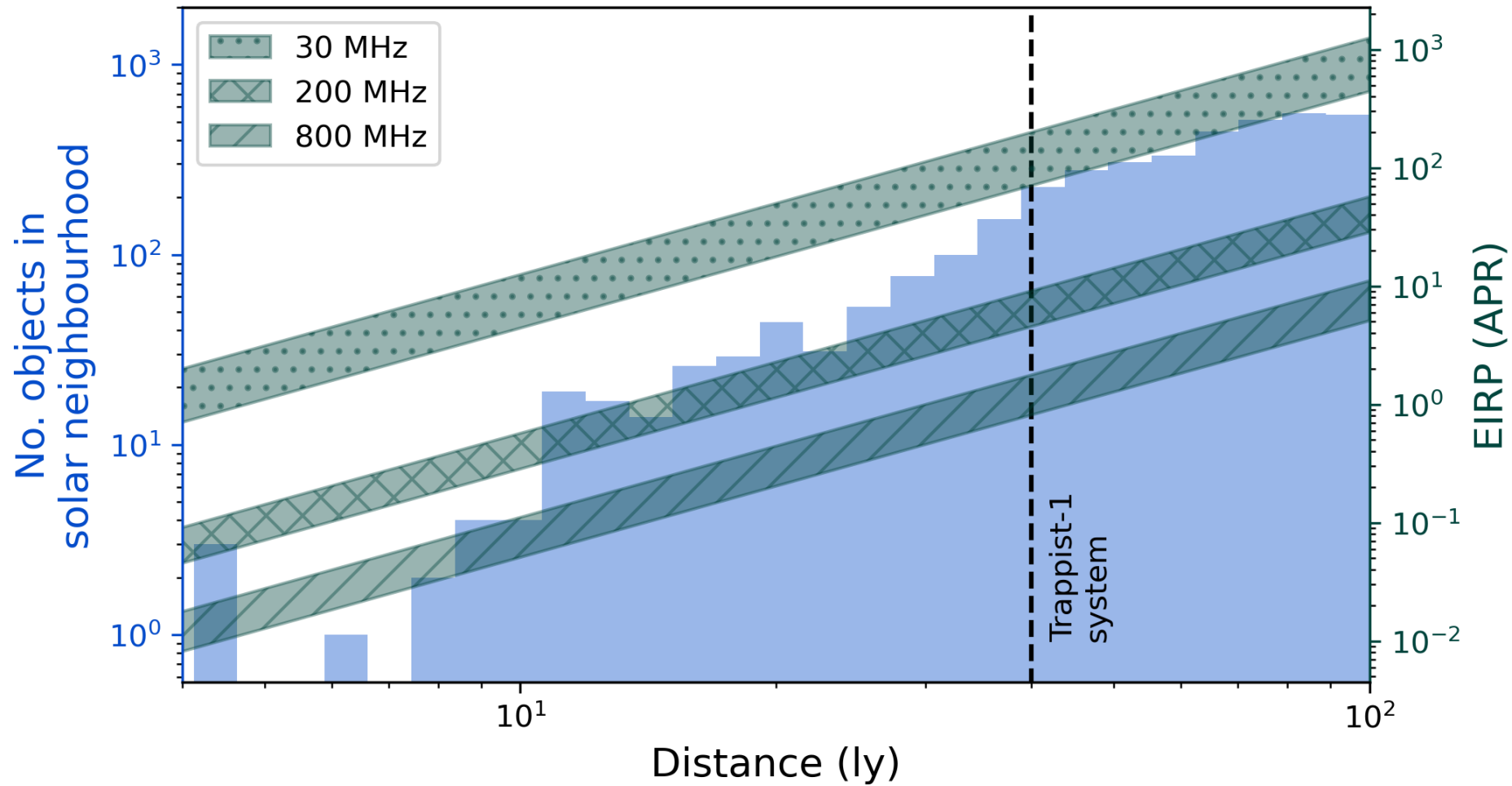
DeBoer+ 2026 (arXiv:2607.25762); lft3.space

Thanks!

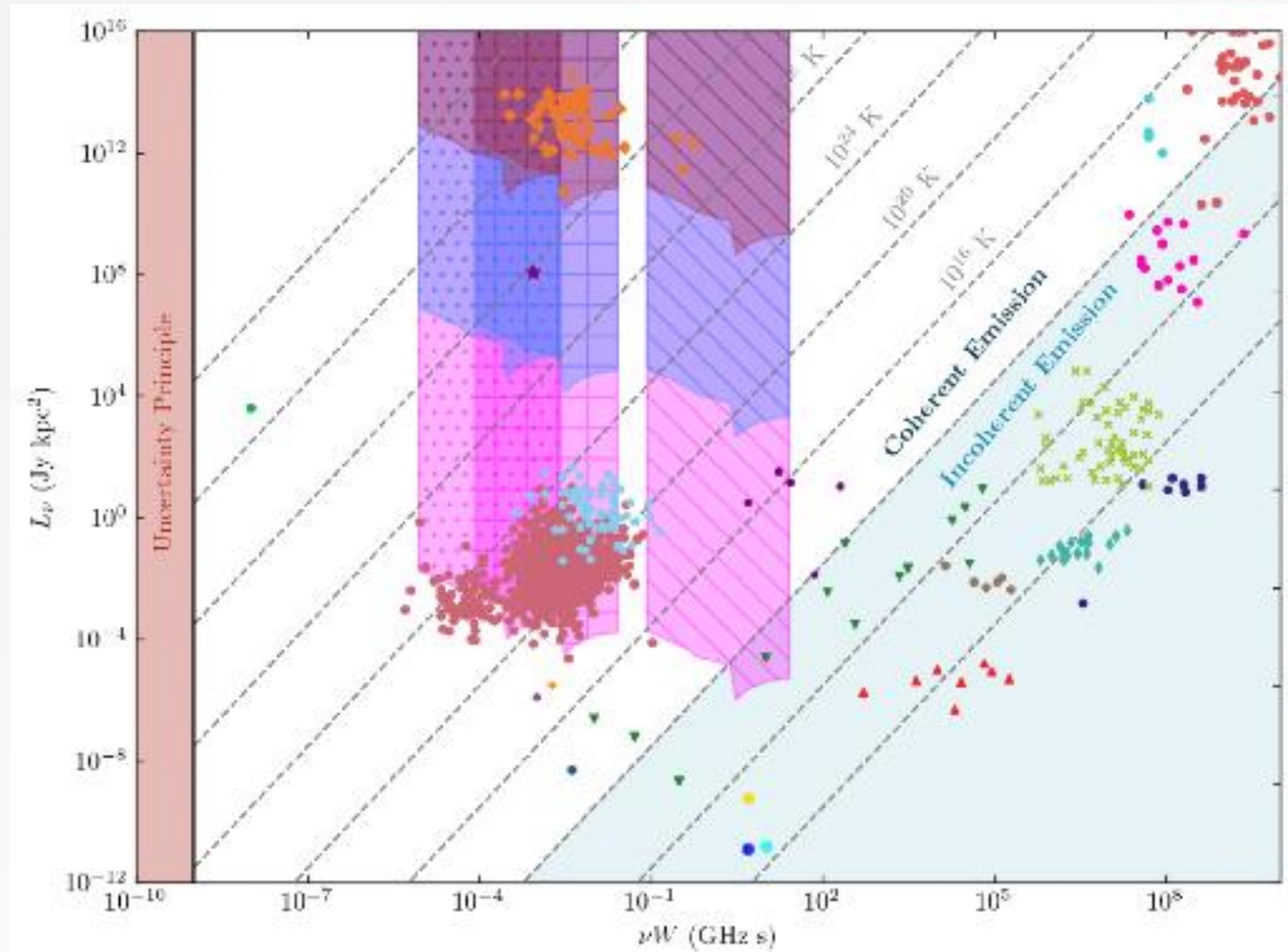
jaketurner@cornell.edu

Extra Slides

Technosignatures

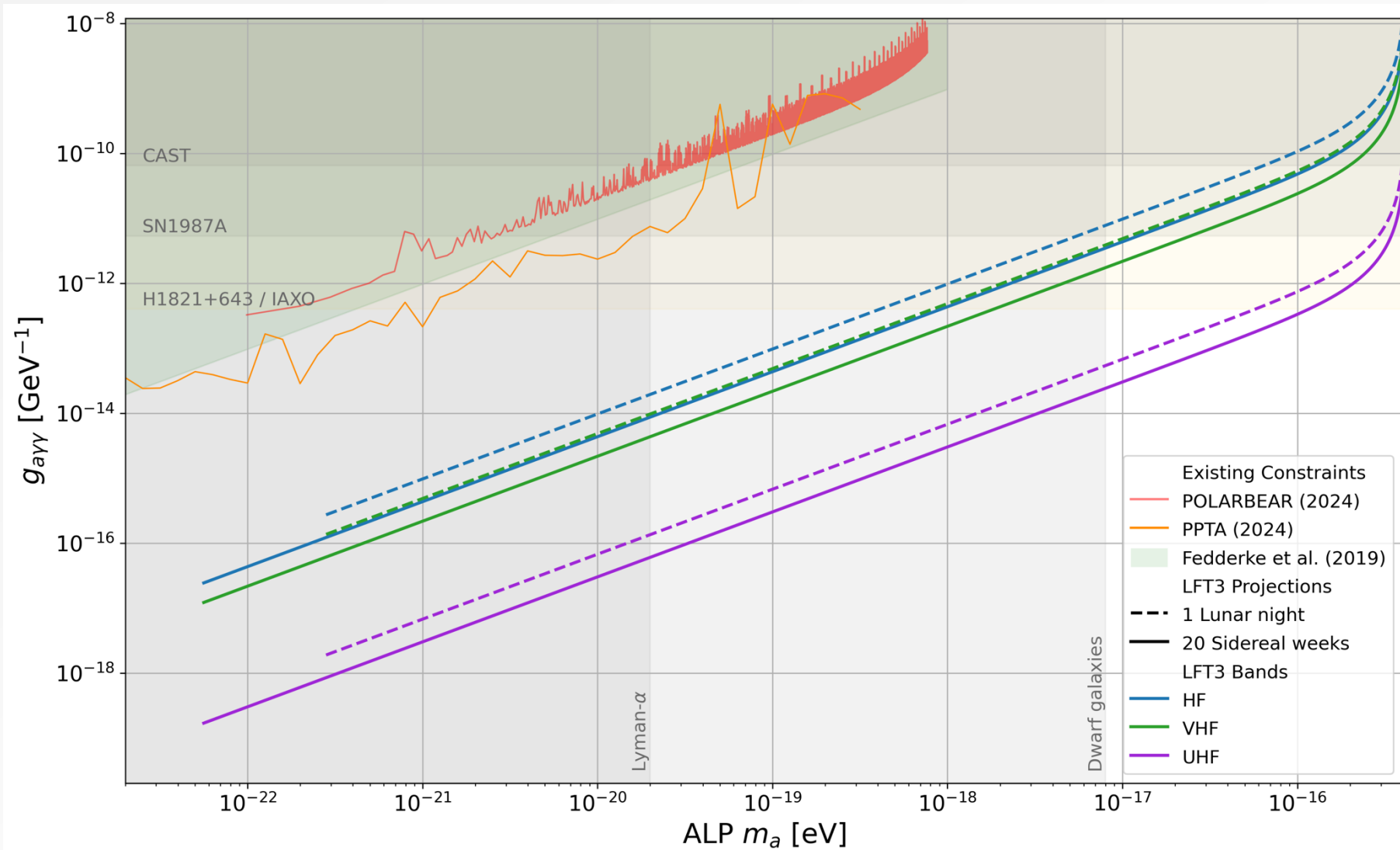


Transients

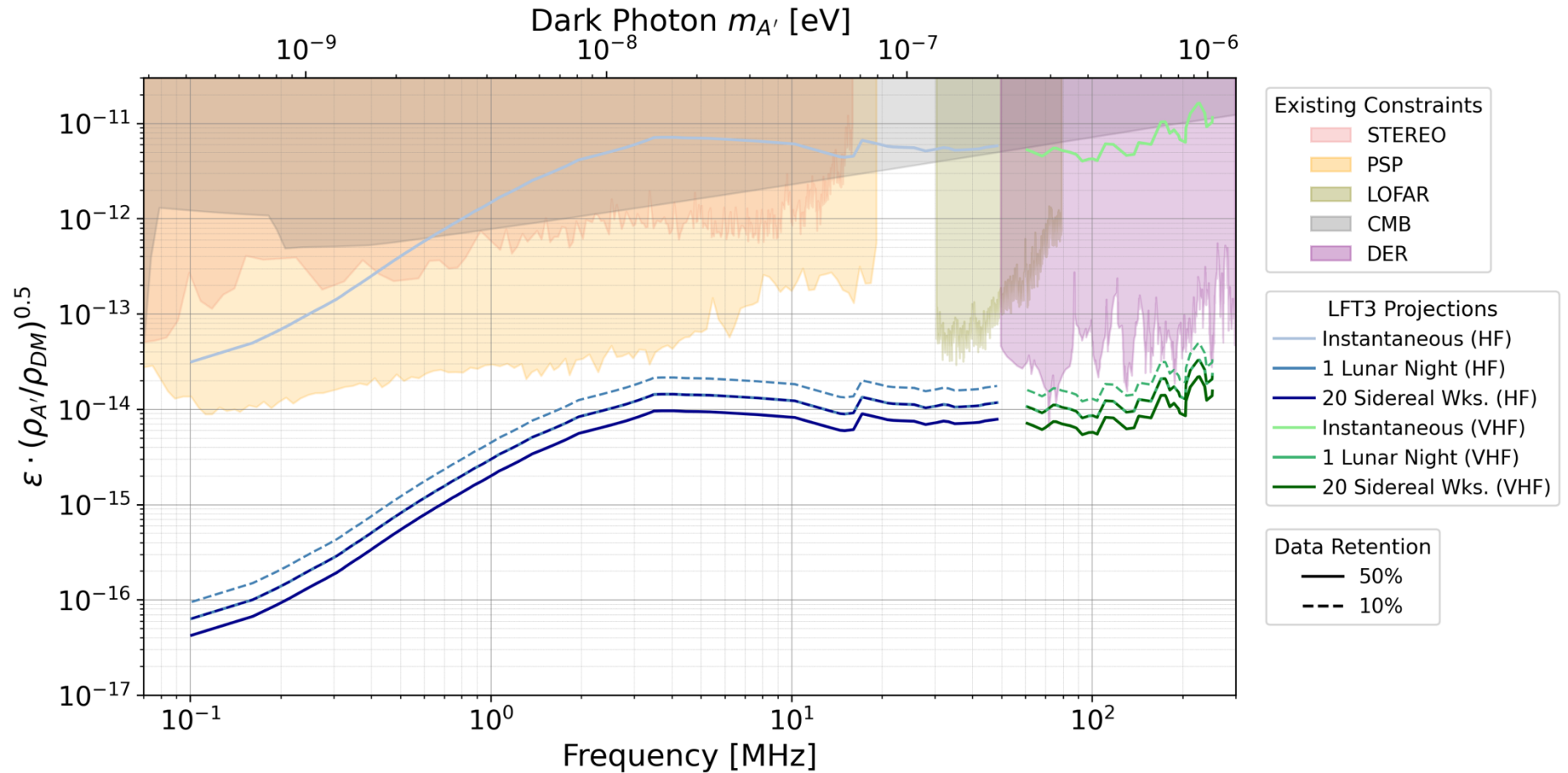


New parameter space: Low-DM FRB analogues

Axions

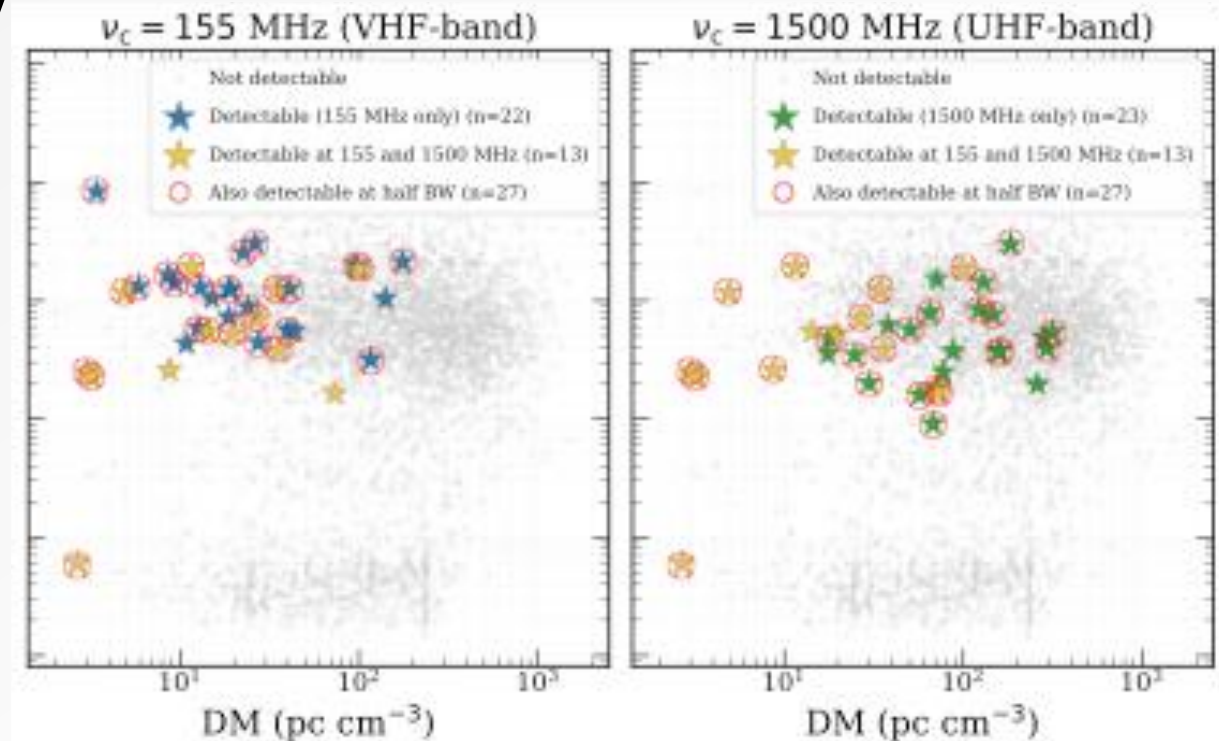
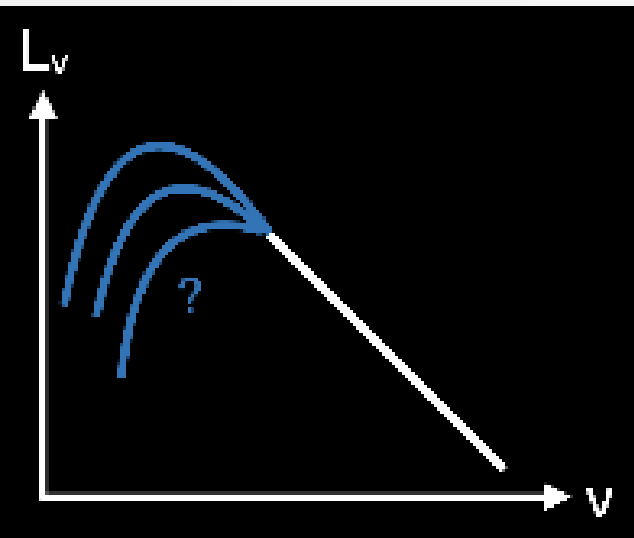


Axions

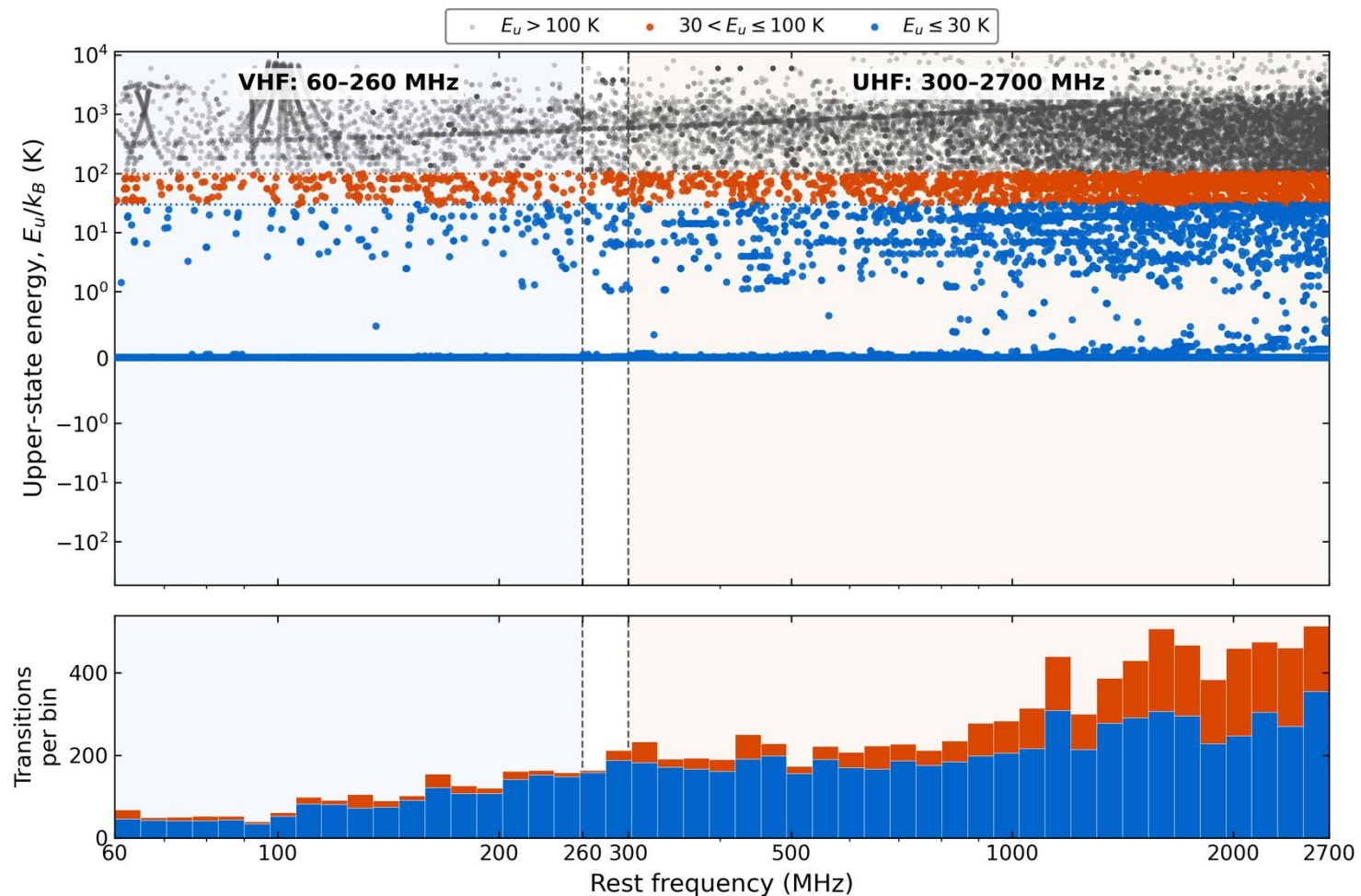


Pulsar Physics

Search for low-frequency
turnoffs



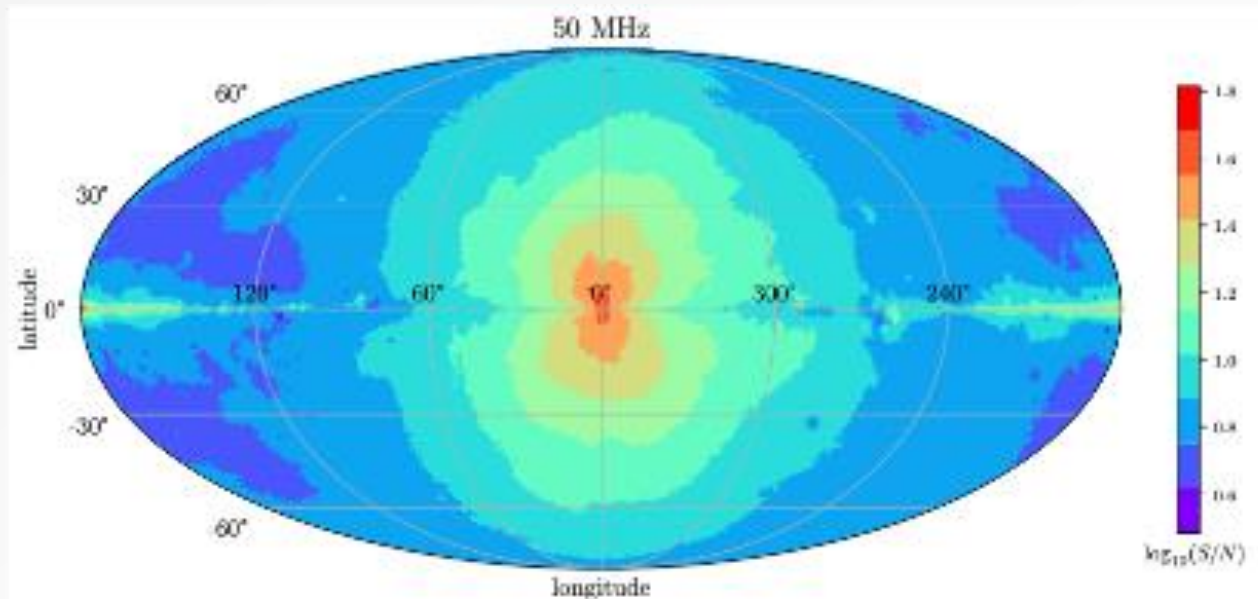
Astrochemistry



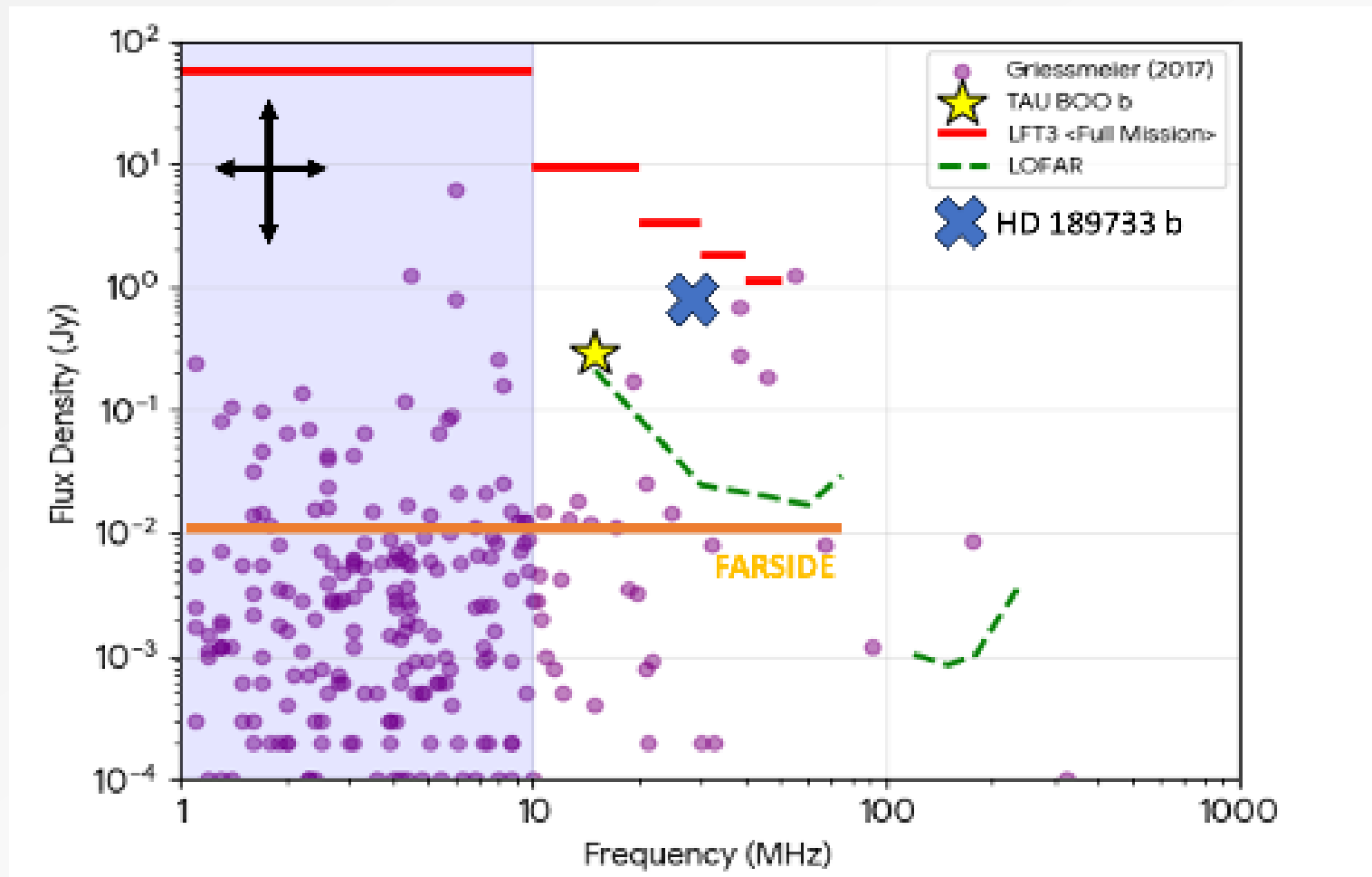
LFT3 will use the unique radio-quiet environment of the lunar farside to conduct the first systematic, broad-frequency survey of low-frequency atomic and molecular transitions, including spectral regions inaccessible or severely compromised from Earth.

Low-res VHF Sky-map

Produce a low-res VHF (60-260 MHz) sky map to inform Galactic models and foregrounds for cosmology studies



Exoplanets



Upper-limits in the unexplored low-frequency spectrum (<10 MHz) →
informative for FARSIDE