**SSERVI Monthly Report**

**NESS/PI Burns - February, 2019**

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**Progress Report**

- **Research highlights:** University of Michigan graduate student Hegedus has made great progress on simulations of the Earth’s radiation belt as seen by radio arrays on the Moon. It turns out there are many ways to optimize the array that both make it easier to deploy and improve its sensitivity. Hegedus is also making good progress on a manuscript that shows simulations of lunar observations of the terrestrial radiation belt.


- **News:** (1) NASA selected 12 science and technology demonstration payloads to fly to the Moon, including a low-frequency radio spectrometer for the lunar surface to provide radio spectra from 10 kHz-10 MHz (or possibly 30 MHz) with 1-second resolution led by NESS Deputy MacDowall (see NASA press release). (2) SunRISE, led by NESS Co-I Kasper, was selected for an extended formulation study as announced on Feb. 25 by NASA within this press release. (3) Burns was interviewed by CPR on Jan. 9 and 22.

- **Meetings:** (a) Several NESS team members presented at the National Radio Science Meeting (January 9-12) at the University of Colorado Boulder: (1) Hegedus on “Using SUNRISE as a Pathfinder for Detecting Low Frequency Radio Emission from Extrasolar Planets with Space Based Radio Arrays”; (2) Anderson on “Monitoring Nearly 4000 Nearby Stellar Systems for Radio Exoplanets with the OVRO-LWA”; (3) Monsalve on “Strengthening the Cosmological Interpretation of the Edges Signal Through Instrumental Verification”; (4) Mahesh on “Spectral Index of the Diffuse Radio Background Between 50 and 100 MHz”; (5) Hallinan on “The Low Frequency Transient Sky”; (6) Rapetti on “Full Data Analysis Pipeline for Low Radio Frequency Measurements of the Dark Ages and Cosmic Dawn”; (7) Burns on "Dark Cosmology: Investigations of Dark Matter in the Dark Ages with the Space-Based Dark Ages Polarimeter Pathfinder (DAPPER)”; (8) Bordenave on “The Cosmic Twilight Polarimeter”; (9) Tauscher on “Confronting the Challenges of Global EoR Detection”.

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**Moment of Science:**

MacDowall is the PI of the recently selected lunar lander payload involving a radio receiver system to be placed on the lunar nearside. The instrument is a low-frequency radio spectrometer to provide radio spectra from 10 kHz - 10 MHz (or possibly 30 MHz) with 1-second resolution. These Radio wave Observations at the Lunar Surface of the photoElectron Sheath (ROLSES) will permit determination of the photoelectron sheath density from ~0-2 m above the lunar surface, using antennas at 1 m and 2 m above the surface (see figure). This is of scientific value and is also important to determine if there will be an effect on the antenna response of larger lunar radio observatories with antennas on the lunar farside.

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