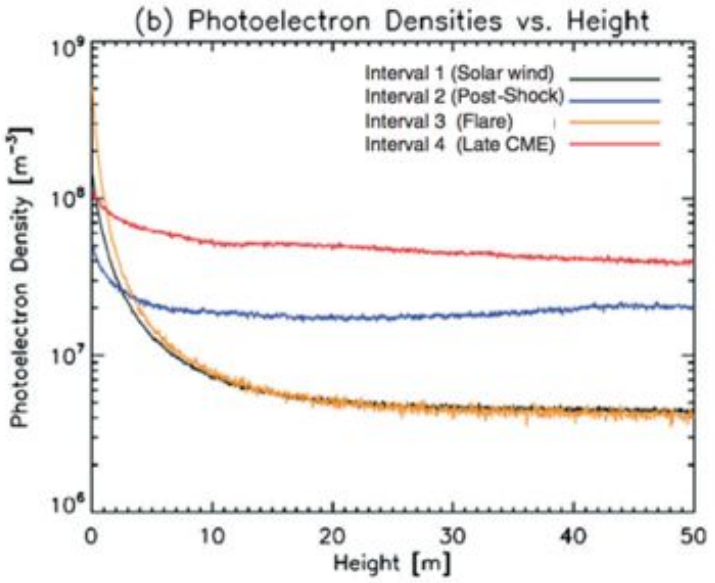
SSERVI Monthly Report
NESS/PI Burns - February, 2019

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.
- **Papers:** (1) **Monsalve**, Fialkov, **Bowman**, Rogers, Mozdzen, Cohen, Barkana, **Mahesh**, "Results from EDGES High-Band: III. New Constraints on Parameters of the Early Universe", arXiv: 1901.10943. (2) **Burns**, Bale, **Bassett**, **Bowman**, **Bradley**, Fialkov, **Furlanetto**, Hecht, Klein-Wolt, Lonsdale, **MacDowall, Mirocha**, Munoz, **Nhan**, **Pober**, **Rapetti**, Rogers, **Tauscher,** "Dark Cosmology: Investigating Dark Matter & Exotic Physics in the Dark Ages using the Redshifted 21-cm Global Spectrum", Science whitepaper submitted to the Astro2020 Decadal Survey, arXiv:1902.06147.
- **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".
- **Meetings (contd.):** (10) **Anderson** on "A Simultaneous Search for Prompt Radio Emission Associated with GRBs Using the OVRO-LWA". (b) Presentations by NESS members at the International Space Science Institute Beijing Forum (23-25 January): (1) **Kasper** on "SunRISE"; (2) **Burns** (remotely) on "Dark Cosmology: Investigations of Dark Matter with the Dark Ages Polarimeter PathfindER (DAPPER)"; (3) **Hallinan** on "Solar Physics"; (4) **Falcke** on "Future missions discussion"; (5) **Koopmans** on "Calibration and LOFAR"; (6) **Monsalve** on "EDGES"; (7) **Klein-Wolt** on "CE-4 NCLE".
- **Missions:** (1) **SunRISE:** selected for a seven-month, $100,000 extended formulation study. (2) **DAPPER:** due to the shutdown the concept study deadline was postponed to May 28. A first internal review is tentatively planned to be conducted at Ames on March 14 and a Red Team for the week of April 15.

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.

3/05/2019