Progress Report

- **New Research:** (1) At UCLA, Furlanetto, Mirocha, and graduate student Richard Mebane submitted a paper describing a new semi-analytic model of the first generations of stars and galaxies. The model will form the foundation for predictions of the 21-cm radio signal we hope to observe from the Moon; (2) The Cosmic Twilight Polarimeter (CTP, see September report) engineering prototype has been deployed and preliminary observations are currently being conducted in search for the periodic projection-induced polarization from the foreground spectrum.


- **Meetings:** (1) MacDowall and Kasper attended the Parker Solar Probe/Solar Orbiter SWG (JHU APL) on Oct 2-6; (2) MacDowall presented on low frequency radio arrays from the lunar surface at LEAG (Columbia, MD) on Oct 11-12, and attended the Back to the Moon workshop on Oct 12-13 (Columbia, MD) and the Van Allen Probes SWG (JHU APL) on Oct 25-27; (3) Bowman presented results from EDGES at IAU333 on Oct 2.

- **Outreach:** Fiske planetarium, Sommers-Bausch Observatory and NESS at U. Colorado celebrated the International Observe the Moon Night on Oct 28. This event presented the full planetary dome show Back to the Moon for Good followed by Q&A, and afterwards a visit to the observatory for a live viewing of the Moon.

- **Student Mentoring:** Graduate student Nivedita Mahesh from ASU produced simulations of the EDGES antenna beam that include perturbations in the field of view that mimic potential obstacles seen by a real antenna. These simulations are part of a study to quantify the effect of obstacles in the field of view on measurements of the global redshifted 21-cm line.

- **Visits/collaborations:** On Oct 19-20, the NESS team at CU hosted a visitor from UC Berkeley, graduate student Nicholas Kern, who gave a seminar talk and participated in discussions where he contributed his expertise on estimation of cosmological parameters from low-frequency measurements; On Oct 26, the CU team hosted chief exploration scientist for NASA HEOMD, Ben Bussey, whom our NESS team is working with to help plan a workshop on Science from the Deep Space Gateway.

Upcoming Events

- Burns will visit Puebla, Mexico to receive a Honorary Doctorate from the National Institute of Astrophysics, Optics & Electronics and give an invited talk entitled “Our Future in Space: Humans, Robots & Telescopes Exploring Together” on Nov 8.

- Fong will visit CU on Dec 12 for collaborative discussions about the work on telerobotics and its synergy with virtual reality for lunar exploration being currently developed at CU.

- MacDowall will represent NESS telerobotics at the Space Assembly & Servicing Workshop (GSFC) on Nov 1-3; MacDowall will also present on radio astronomy including NESS activities at the Jean-Louis Steinberg Memorial Conference (Meudon, France) on Nov 6-10.

Moment of Science

Virtual rover and lunar surface as seen from a virtual reality head-mounted display. This experimental framework allows for 3rd and 1st person rover teleoperation for user studies, user training, and rapid prototyping of user interfaces and rover designs — all without the need of physical hardware. This is research by CU graduate student Michael Walker & NESS Collaborator Dan Szafir.