

Abstract Submitted
for the APR13 Meeting of
The American Physical Society

The Dark Ages Radio Explorer (DARE): What were the first objects to light up the Universe and when did they do it?¹ JACK BURNS, University of Colorado Boulder, DARE TEAM — In the NRC Astrophysics Decadal Survey, Cosmic Dawn was singled out as one of the top astrophysics priorities. Specifically, the Decadal report asked “when and how did the first galaxies form out of cold clumps of hydrogen gas and start to shine—when was our cosmic dawn?” This is the science objective of DARE – to search for the first stars, galaxies, and black holes via their impact on the intergalactic medium as measured by the highly redshifted 21-cm hyperfine transition of neutral hydrogen (HI). DARE will probe redshifts of 11-35 with observed frequencies of 40-120 MHz. DARE will observe expected spectral features in the global signal of HI that correspond to stellar ignition, X-ray heating/ionization from the first accreting black holes, and the beginning of reionization. DARE will observe these spectral features with a biconical dipole antenna along with a receiver and digital spectrometer. We will place DARE in lunar orbit and take data only above the farside, a location known to be free of human-generated RFI and with a negligible ionosphere. The mission concept will be presented including initial results from an engineering prototype in western Australian which is designed to perform end-to-end validation of the instrument and our calibration techniques.

¹This work was supported by funding from the NASA Ames research Center and by JPL/Caltech.

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Date submitted: 25 Nov 2012

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