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To: EDGES group

From: Alan E.E. Rogers

Subject: EDGES-3 performance tests made in the screen room at Haystack Observatory

The EDGES-3 receiver calibration and performance tests are described in memo 382 using the "antenna simulator" described in memo 199. More details of the test using the antenna simulator are now provided along with how to access the data so tests can be made using the new 21-cm analysis pipeline.

The sources of data are:

s1p data for ant amb hot open short loads from 2021_288_21 using reads1p1 acq data from amb hot open short from 2021/2021_261 using acqplot7amoon acq data from antenna simulator from 2021_289,290,291,293,294 using acqplot7amoon

path correction for LNA s11 uses corresv s11.csv -cablen 4.46 -cabdiel -1.04 -cabloss -89.5

calibration SOL values rs = 49.962 ps = 33temperatures ambient 303.0K hot 391.9K

Figure 1 shows the plots from the calibration using edges3 c-code to solve for the noise noise waves.

Figure 2 shows the calibrated spectrum from the antenna simulator as in the thick line of the top left plot in figure 1 but over a reduced frequency range of 50 to 120 MHz along with the residuals after the removal of a 6-term polynomial.

Figure 3 shows the grid search using 6-terms for the 21-cm spectrum with tau=7 on the left plot and after adding the 2018 21-cm spectrum on the plot on the right. The longav c-code is used for the feature search.

Figure 4 shows the results with 5-terms and with a reduced frequency range of 58 to 115 MHz.

The data is available on the enterprise computer at ASU in the following directories:

/data5/edges/data/EDGES3_HaystackAntennaSim/vnachk for s1p data /data5/edges/data/EDGES3_HaystackAntennaSim/vnachk/2021 for the acq data

and some c-shell test scripts including the script used to make the plots in the figures of this memo are in aeer/scripts. The c-coded functions in the script (dosearcht) used are:

reads1p1, acqplot7amoon, corrcsv, edges3 and longav.



Figure 1. Plots of the calibrated s11, spectra, and noise waves results







Figure 3. Plots of the residuals with 6-polynomial terms removed without and with added 21-cm signal



Figure 4. Plots of the residuals with 5-polynomial terms removed without and with added 21-cm signal