

Constraining HERA's chromatic instrument response through antenna feed positioning

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ABSTRACT

Minimizing the leakage of spectrally-smooth foregrounds outside the 'wedge' is important to detecting the redshifted hydrogen 21-cm line from the epoch of reionization. One source of enhanced leakage is the inherent chromaticity of the Hydrogen Epoch of Reionization (HERA) array. We report on efforts to characterize and control additional instrument chromaticity due to variation in the positions of feeds from their nominal positions in the HERA array. Using simple tools, an apparatus was developed for positioning the feeds over each of the hundreds of HERA antennas with centimeter or better accuracy. We demonstrate that positioning feeds makes the autocorrelation functions more uniform across antennas. We also present results of how feeds move from their fiducial position as a function of time, which informs how often the feeds need to be repositioned to control excess instrument chromaticity.