Spectral Index of the Diffuse Radio Background Between 50 and 100 MHz

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We report absolutely calibrated measurements of diffuse radio emission between 50 and 100 MHz collected with two implementations of the Experiment to Detect the Global EoR Signature (EDGES) low-band system. EDGES employs a wide beam zenith-pointing dipole antenna centred on a declination of -26.7º. We measure the sky brightness temperature as a function of frequency averaged over the EDGES beam from 244 nights of data acquired between 14 September 2016 to 27 August 2017. We derive the spectral index, β, as a function of local sidereal time (LST) using nighttime data and a two parameter fitting equation, to find -2.59 > β > -2.54 +/- 0.012 between 0 and 12 h LST, ignoring ionospheric effects. When the Galactic Centre is in the sky, the spectral index flattens, reaching β = -2.46 +/- 0.012 at 17.7 h. The measurements are stable throughout the observations with night-to-night reproducibility of $\sigma_\beta <$ 0.004 except for an LST range of 7 h to 12 h where the amount of data collected was low. Including systematic uncertainty, the overall uncertainty of β is 0.012 across all LST bins. We compare our measurements with various global sky models and find that the closest match is with the Guzman-Haslam (GH) sky maps, similar to the results found with the EDGES high-band instrument for 90-190 MHz. Three parameter fitting was also evaluated with the result that the spectral index becomes more negative by ~ 0.02 with -0.11 < γ < -0.04, and the agreement with the GH sky maps improves to within +/- 0.02. Including nighttime ionospheric absorption causes β to become more negative by 0.008 > Δ_β > 0.016 depending upon LST.