2020 Measurements of the Sky Brightness Temperature with EDGES

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In this talk I will present and discuss the analysis of sky observations done in 2020 by the Experiment to Detect the Global EoR Signature (EDGES). The 2020 observations were coducted from the Murchison Radioastronomy Observatory in Western Australia with the objective to verify the absorption feature in the radio spectrum reported by EDGES in 2018. The new measurements were done with antennas modified with respect to those introduced in 2018, in order to explore the possibility of antenna artifacts producing the absorption feature. Two new antennas were used: (1) a Low-Band antenna model similar to the original ones, but rotated 45 degrees relative to the 30m x 30m ground plane; and (b) a Mid-Band antenna, smaller than the Low-Band models.

After introducing the new antennas and measurements, my talk will focus on discussing the Mid-Band data and analysis. The talk will describe the measurements, their calibration, the excision of radio-frequency interference, the reduction, and the modeling. I will show how an absorption feature similar to the one reported in 2018 is a justified addition to the model for the 2020 data after accounting for the contributions from the foregrounds. I will present comparisons between models using the Bayesian evidence as a metric to support our conclusions. I will show how the Bayesian analysis enables us to identify, from among the cases tested, the optimum number of foreground and absorption signal parameters, as well as their best-fit values and uncertainties. I will finally show how data cuts and simulations strongly suggest that the absorption feature is not produced by the instrument but is instead intrinsic to the sky.