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BINGO Telescope: An Overview

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The BINGO instrument is being constructed with the goal to be the first radio telescope to detect Baryonic Acoustic Oscillations (BAO) in the radio frequency band (˜ 1 GHz) using the 21 cm hyperfine transition of the neutral hydrogen using an observation technique known as intensity mapping (IM). However, the 21 cm signal is a few orders of magnitude weaker than the emission from other astrophysical processes in the same frequency band. This difference in signal magnitude demanded that the instrumental requirements contemplated a very clean beam profile, low sidelobes levels, and a rejection of cross-polarization better than 99%. In recent works of the collaboration, we showed that the optical design meets these requirements, with a focal arrangement composed of 28 feed horns. The mechanical design allows the vertical displacement of the horns for better sky sampling. We are currently using the foreground extraction packages GNILC, GMCA, and FastICA, to accurately recover the 21 cm signal from simulated sky maps with white noise. Additional steps on this matter contemplates the inclusion of radio frequency interference (RFI) contamination and 1/f noise.

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