Contribution ID: **28** Type: **not specified**

UAV-based Antenna Measurements for the Bridging Project of SKA1-LOW

Wednesday 23 October 2019 15:30 (20 minutes)

The Square Kilometer Array (SKA) is one of the most promising radio telescopes for the next decades. Its low-frequency instrument will consist of a sparse random array of dual-polarized log-periodic antennas operating from 50 to 350 MHz. The LOW Bridging project aims at implementing an SKA1-LOW station architecture called AAVS1.5 at the Murchison Radio Observatory, close to the current AAVS1 installation (previous prototype). Questions and risks associated with station calibration have been addressed from the directions of both electromagnetic simulations, tests and measurements. In order to verify and test the log-periodic based station against a trusted benchmark, and as a risk mitigation strategy, the Murchison Widefield Array (MWA) bowtie dipole antenna has been deployed and tested in parallel in the so-called EDA2 array. The heritage of CNR and INAF on UAV-based antenna measurements of low-frequency radio telescopes has been exploited to validate the electromagnetic analyses of the three deployed antenna arrays, AAVS1.5 composed of 48 aluminum SKALA4.1 antennas, EDA2 composed of 48 MWA dipoles, and AAVS1 station composed of 256 steel SKALA2 antennas. The collaboration with Curtin Institute of Radio Astronomy (CIRA) has been crucial for the success of the experiments.

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