



Contribution ID: 53

Type: **not specified**

Results from observations with the SKA-low prototype station Aperture Array Verification System 2: the INAF contribution towards science commissioning

Tuesday, 28 November 2023 11:30 (20 minutes)

The Aperture Array Verification Systems (AAVSs) are full-size SKA-low prototype stations located at the Inyarrimanha Ilgari Bundara, also known as the CSIRO Murchison Radio-astronomy Observatory, site. Each of them is composed of 256 SKALA dual-polarization log-periodic antennas positioned within a circular area of ~ 40 m in diameter. These stations are designed to assess the SKA-low performance in preparation for its construction. The two most recent and currently operational AAVSs stations are composed of SKALA4.1 antennas, the reference design for SKA-low. In AAVS2 (late 2019-present), antennas are pseudo-randomly distributed, while AAVS3 (September 2023 - Feb 2024) has a different antenna configuration (Vogel layout) and is undergoing a test campaign. Over the next two years, six AAVS stations will be built to form the Array Assembly 0.5 (AA0.5), the first production prototype of the SKA-low telescope.

With this contribution, we will provide an overview of the results obtained over the past four years of activities, based on the analysis of data from AAVS2 observations at various frequencies across the SKA-low band (50-350 MHz). We will present all-sky images and discuss station calibratability, system stability and sensitivity. Furthermore, we will provide recent results that offer an initial validation of the SKA-low station's polarization response, through Intrinsic Cross Polarization maps derived from all-sky AAVS2 observations and their comparison with electromagnetic simulations.

These observational results are highly promising and represent a significant step towards the forthcoming low telescope construction and science.

The INAF observing group has developed strong technical and scientific expertise and will continue to be actively involved in AAVS3, AA0.5 and SKA-low commissioning plans within the next few years.

Research area

Other

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Session Classification: Plenary - SKA-related Technological Activities in Italy