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# A Novel Configuration of LPDAs for Low-Frequency Observations of Pulsars at Gauribidanur

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Randomly distributed array configurations adapted for the Square Kilometre Array Low-Frequency Telescope (SKA1-Low). However, for a small array operating between 130-350 MHz of SKA1-Low bands at the Gauribidanur observatory, a tightly spaced configuration is investigated to study candidate pulsars and to develop novel calibration techniques for use in the future SKA observations. Log-periodic antennas are arranged with a tilt and in a checkerboard layout to avoid grating and reduce sidelobes across a wide band. Array configurations are simulated and optimized using the CST software.

We have customized a single polarised log-periodic antenna (LPDA) having a half-power beamwidth [HPBW] of ~90$^o$ and 8 dBi directivity arranged in orthogonal pairs to form a dual polarized primary element for our array. The combined voltages from the pairs form an electrical center at the baseline center for each of the polarisations. Thus, our primary element gets a field of view of ~60$^o$ with an elevated gain of ~11 dBi across 130 MHz to 350 MHz.

In addition, we have also configured 16 primary elements as an array in a checkerboard layout. We have simulated the full array layout and studied the main lobe and side-lobe performances across the full band. The checkerboard layout gets a main lobe gain of up to 22 dB with high sidelobe suppression across the wide band: 130 MHz to 350 MHz. We have commissioned all 16 primary elements made out of 64 LPDAs. A newly built RF signal-chain is integrated to a part of the array and operational with an existing digital backend in the observatory and test observations have begun.

A novel checkerboard array with 16 primary elements was designed and optimized to achieve a high main lobe gain of 22 dB and a high side-lobe suppression across a 130 MHz to 350 MHz band. We have commissioned all 16 primary elements from 64 LPDAs in the observatory. A newly built RF signal chain is integrated and operational with an existing digital backend in the observatory. A 24x7 routine transit observation has begun, which detects many radio sources from the observations. A versatile voltage recording and processing pipeline has been developed for pulsar observations and is being tested.

A 24-x7 routine transit observation has begun, which detects many radio sources from the observations. A versatile transient voltage buffer recording and processing pipeline has been developed for pulsar observation, and we have started testing it on strong pulsar sources. In the future, after achieving the primary goals, the array being constructed will be released as an educational training platform for low-frequency observation, particularly tuned to the upcoming SKA1-Low-frequency band. This talk will outline the key aspects of the features of the commissioned array, sensitivity achieved, sky coverage plans, initial results from the observations and array expansion strategies for the future.

1. Arul Pandian B, RRI Inhouse talk 2024.
2. Arul Pandian B, QR-10 RRI internal report, 2024.
3. Arul Pandian, et al., A RADIO ARRAY FOR PULSAR POLARIMETRIC STUDIES (On preparation)