

A Brief Overview of Activities at the Raman Research Institute

Agaram Raghunathan, Udaya Shankar N.

Raman Research Institute, C.V. Raman Avenue, Sadashivanagar, Bangalore – 560 080, India
uday@rri.res.in, raghu@rri.res.in

In this presentation I will give a brief overview of the on-going activities at Raman Research Institute (RRI). The present focus at RRI is on aperture arrays for low frequency radio astronomy.

Appreciating the fact that SKA design will use the aperture array technology up to 1.4GHz, RRI has initiated design studies related to aperture phase array technology. The talk will describe the present status of the design of wide band antenna elements, LNAs, digital receivers with 2 GHz digitizers and a verification program centered on a 144 tile system. Based on these developments, we propose to build a compact aperture array; A Low Frequency All Sky Transient Telescope, with a 10% collecting area of SKA dedicated to studying transients. We are targeting the frequency range 0.1 to 1 GHz. This is an order of magnitude larger than the collecting area of SKA pathfinders / demonstrators which are in different phases at present.

RRI is now a partner institution in Murchison Wide-field Array (MWA), an SKA demonstrator covering the frequency range 80-300 MHz. The MWA will consist of 8000 dual-polarization dipole antennas optimized for the subset of 32 tiles are now in hand, with construction activities of the full array ramping up. The MWA receiver system consists of two parts, a front-end which is a small analog & mixed-signal board and apurely digital back end. The talk will describe in detail the challenges faced and results obtained at RRI in collaboration with other partner institutions, during the implementation of coarse spectral filtering, decimation to a selected 30.72 MHz subset, and aggregation of signals for fiber transport to the central processing facility.

The talk will also touch upon an ongoing experiment at RRI to detect the monopole component of the 21cm signal from EoR, the design and construction of a 3 m sub-millimetrewave telescope using a novel and an economical optical concept, GBT-RRI multi-band receiver, and a Thomson X-Ray polarimeter for a small satellite mission.