

# Probing Early Universe using the uGMRT, and SKA

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The detection of the redshifted 21-cm signal of neutral hydrogen is a promising probe to study physical processes in the early universe, from the Cosmic Dawn (CD) to the Epoch of Reionization (EoR). This quest has been extremely hard at low radio frequencies due to severely bright foregrounds, ionospheric corruption, radio frequency interference (RFI), and instrumental systematics.

Here, we will present some recent uGMRT observations of the ELAIS-N1 field within the band-2 (120–250 MHz). This corresponds to the redshift range of 4.7–10.8. A significant feat is achieved with substantial 32-hour observations and an operational bandwidth of approximately 100 MHz. The resultant image reached an RMS noise level of 236 Jy/beam, the deepest image so far in this band of uGMRT. We will present glimpses of the data analysis and the final constraints obtained on the cosmic HI signal from the Cosmic Dawn and EoR. We have developed an end-to-end pipeline to study how systematics affects the extraction of the redshifted HI 21cm signal from future SKA-1 Low observations. In order to probe the Dark Ages, we rely on observations made from space in the absence of Earth's ionosphere and free from the RFI. One such location is the far side of the moon. Here, we present a concept mission that will offer sensitive measurements for frequencies below 20 MHz to 300 kHz. This frequency band will probe the redshifted 21 cm cosmological signal from the early universe from around 0.38 to 400 million years after the Big Bang.

## keywords

Radio Cosmology, Deep Field, High Dynamic Range Imaging, Direction Dependent Calibration

## In-person or online?

in-person

## Career level

Mid-Senior

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