

SEMINARS ON TECHNOLOGICAL ADVANCES AND INNOVATION

BACKEND SIGNAL PROCESSING FOR GMRT



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An array telescope like the Giant Metrewave Radio Telescope (GMRT) requires real-time signal processing to combine the signals received at the antennas to produce the interferometer and beam outputs. The continuous frequency coverage of the upgraded GMRT (uGMRT) antennas (from 130 MHz to 1500 MHz) along with an increased observation bandwidth of upto 400 Mhz from 30 antennas, adds challenges to achieve real-time processing power and data interconnect requirements at GMRT Backend.

The Backend processing of the uGMRT receiver is located at the Central Electronics Building where Radio Frequency (RF) signals from antennas are brought through Analog Optical Fiber links. The signals are down-converted to lower frequencies and digitised. All signal processing is carried out in digital domain on a hybrid platform of FPGA+CPU/GPU systems. The processing cluster can handle a maximum of 32 antennas, dual polarisation with 400 MHz bandwidth (max) in real time generating interferometry and beam outputs based on the science requirements. The backend receiver also incorporates additional features like narrow band spectral line modes, VLBI mode, real-time RFI cancellation scheme, Walsh based cross talk reduction etc. The design and architecture of this system, including the novel features and capabilities will be presented along with sample results that validate its performance in conjunction with the entire receiver chain of the upgraded GMRT. We will also briefly discuss, recent developments and other projects handled at Backend lab.

Feb

19

2026

TIFRH Auditorium 16:00 Hrs

Tea/Coffee 15:45 Hrs