

Characterisation of Upgraded Frequency Standard for the GMRT Observatory

An Active Hydrogen Maser (AHM) unit was recently installed and upgraded the frequency standard of the Giant Metrewave Radio Telescope (GMRT) observatory. The ultra-low phase noise and stability characteristics of this AHM have facilitated the observatory to carry out Very Long Baseline Interferometry (VLBI) observations. The outputs from the AHM are used as a precision frequency reference for the GMRT signal processing receiver chain particularly for synchronizing sampling clocks for the digitizers and as a reference to the computing cluster.

The AHM is housed in a room, specifically designed considering the environmental parameters such as ambient temperature, mechanical shock and vibrations, magnetic and RFI shielding. Continuous monitoring and remote logging of ambient room temperature, current requirement as well as other vital AHM parameters are being carried out using tools developed in-house. The software tools are also developed to record the phase data between the GPS disciplined Rubidium oscillator and AHM to compare and understand the stability parameters.

To understand the long term characteristics and behavior of the AHM, collaborative effort is initiated with ISTRAC-ISRO. Through this collaboration, the GMRT timescale system is built with the help of ISRO timescale instrumentation setup. GMRT timescale system had the AHM unit, GPS disciplined Rubidium oscillator and two free-running rubidium oscillators and common view GPS systems.

This presentation will explain the characteristic understood of the Maser Unit with the help of GMRT Timescale system giving the brief of present Phase noise, stability, drift characteristics of the AHM system. Also, the presentation will walk-through the future plan and collaboration with other Institutes within India for the performance evaluation of AHM.