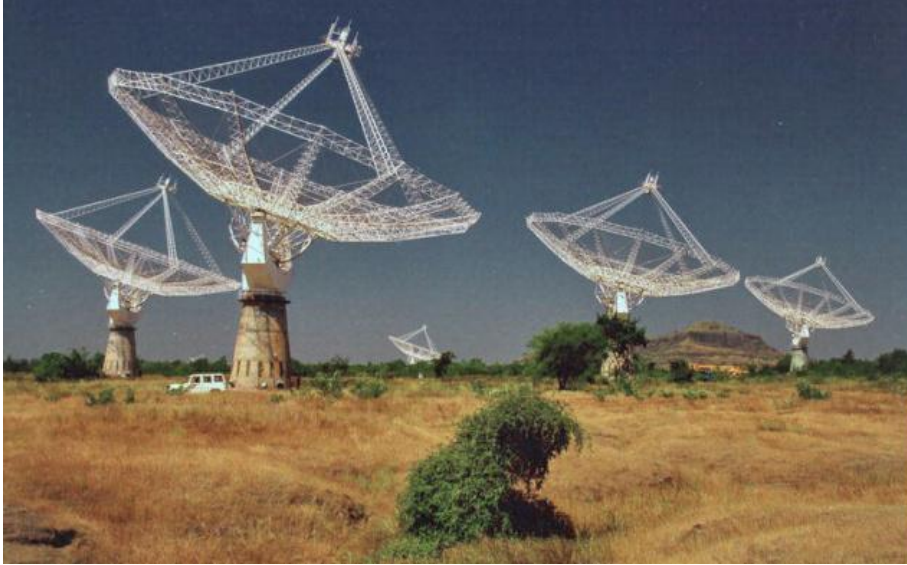


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BENGALURU, May 31, 2016

## Small galaxies, big potential

• Staff Reporter



Studying the stars: The research team scanned a portion of the universe using the Giant Metrewave Radio Telescope.— Photo: By Special Arrangement

*A finding contradicts popular view that majority of the hydrogen was contained in massive star-forming galaxies*

Insights into the history of the universe, now roughly 13 billion years old, using an indigenously developed interferometer – also the largest in the world— Indian astronomers have reached the stars, and the science behind their formation. Their findings proved that small galaxies had big potential.

A three-member team comprising Nissim Kanekar from the National Centre for Radio Astrophysics, Tata Institute of Fundamental Research, Pune, and Shiv Sethi and K. S. Dwarakanath from the Raman Research Institute, Bengaluru, scanned a portion of the universe using the Giant Metrewave Radio Telescope (GMRT). They analysed the signal emitted from neutral hydrogen, the fuel for stars, to derive insights into the composition of galaxies in the distant past.

Their research was aimed at filling the gap in knowledge of how hydrogen gas in galaxies, which is the fuel for star formation and accounts for about three-fourths of the universe by mass, evolves as the universe ages. They used the GMRT (a radio interferometer, which is a collection of 30 antennas each spread over a distance of 25 km near Pune) for their observations. The GMRT measurements showed that about nine billion years ago, the majority of the hydrogen was not contained in massive star-forming galaxies. The researchers used the GMRT data to estimate the cosmological mass density in neutral gas in massive star-forming galaxies of the universe when it was four billion years old. This was found to be significantly lower than the cosmological mass density of hydrogen in all galaxies of the universe at the same period, implying that most of the hydrogen is in smaller galaxies.

“We know galaxies evolve by the formation and death of stars. Our finding provides important evidence on the past of such a process. We normally expect large star forming galaxies to contain most of the neutral hydrogen. There is fair evidence to support this thesis in the present universe. However, our finding is contrary to this widely held notion,” Prof. Dwarakanath and Prof. Sethi told *The Hindu* .