

India looks for 1st signals emitted by stars, galaxies

B'luru Team Hopes To Detect Soon

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Bengaluru: Nearly 14 billion years since the formation of the universe, astrophysicists and astronomers are still hunting for signals from the first stars and galaxies that hold answers to many questions from the "dark ages" – the period immediately after the Big Bang.

A team of Indian astrophysicists and researchers using a 100% indigenous radio telescope and instruments says the first round of data collected has given it the confidence of detecting such signals in the near future.

The 12-member team from the Raman Research Institute (RRI), Bengaluru – Ravi Subrahmanyam; N Udaya Shankar; Saurabh Singh; Mayuri S Rao; Srivani KS; BS Girish; A Raghunathan; Somashekar R; Divya J; S Nivedita; Jishnu T and Magendran S – completed its first round of observations from a location 300 metres higher than Hanle, in Ladakh this November.

The location in Ladakh, 4,800m from the sea level, is the highest night sky observation point in the world for such an experiment

The project, named SARAS (Shaped Antenna measurement of the background Radio Spectrum), has a system that consists of an antenna connected with analog and digital receivers to take the data from sky and record it for further analysis. The design and testing took two years.

The team's aim is to detect the signal emitted from the time when the first stars and galaxies formed. Scientists say the signal, popularly referred to as the 21-cm



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HELP FROM ISRAEL

Once compressed and deciphered, the signal data will be shared with Prof Rennan Barkana, head of the department of astrophysics, Tel Aviv University, considered among the best theorists in the field.

"While the effort is indigenous, we will share information with him to understand our findings better," a senior professor at RRI said.



The RRI team in Ladakh

10-NATION TELESCOPE

When individual attempts to detect the signal failed, world scientists came together to start the 10-nation telescope project – the Square Kilometre Array (SKA) – which is expected to conclude in 2024. When commissioned, SKA will be the world's largest and most sensitive radio telescope. India became a permanent member of the project in October 2015.

signal, holds many secrets.

Detecting the signal would enable scientists to understand this nebulous period in the formation of cosmos. However, given that the signal was emitted when the universe was only 250-550 million years old – its present age is 13.7 billion years – it is extremely weak.

"The frequency range one needs to look for the signal is between 40 MHz and 200 MHz. Contaminations can be a million times stronger than the signal. Hence, it comes as no surprise that after more than a decade of international efforts, the signal has not yet been detected," RRI's Sau-

rabh Singh told STOI.

The instrument has to be modelled meticulously to detect the signal. "We have built instruments that are capable of making such a high accuracy measurement," Singh said, adding that in the process, the team has evolved novel techniques for minimizing instrument contributions.

"After acquiring data for four nights in the Ladakh region, we are analysing it. The primary results are encouraging and we are achieving amazing levels in sensitivity. This has boosted our confidence that detection of the signal may not be too far," he said.