

Radiation from atomic hydrogen helps understand star formation

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Astrophysicists have gained new insights into the formation of stars by tracking and measuring radiation of atomic hydrogen from a group of star-forming galaxies that are moving away from us¹.

The measurements, made with the help of the upgraded Giant Metrewave Radio Telescope in Pune, India, could help better understand the evolution of the universe, which has been expanding since its fiery birth.

The expanding universe stretches light waves, making the wavelength longer, hence redder. This phenomenon is called cosmological redshift. Atomic hydrogen, which fuels star formation through the formation of molecular hydrogen gas, has been detected from galaxies up to a redshift of 0.4.

To detect atomic hydrogen in star-forming galaxies with higher redshifts, scientists from the Tata Institute of Fundamental Research in Pune and the Raman Research Institute in Bengaluru, both in India, conducted a search for atomic hydrogen emissions from 7,653 star-forming galaxies at different redshifts.

The researchers found that the average total mass of atomic hydrogen was comparable to — and possibly larger than — the average mass of stars, providing plenty of fuel for star formation. However, they found that the mass of atomic hydrogen observed could fuel star formation for only 1–2 billion years more.

This suggests that infall of atomic hydrogen gas on to galaxies at an average redshift of one may have been insufficient to sustain high star-formation rates, the researchers say.

References

1. Chowdhury, A. *et al.* H I 21-centimetre emission from an ensemble of galaxies at an average redshift of one. *Nature*. (2020) doi: [10.1038/s41586-020-2794-7](https://doi.org/10.1038/s41586-020-2794-7)