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DISPATCH · FAST RADIO BURSTS · 2 MIN

Fast radio burst traced to a galaxy seen three billion years after the Big Bang

Radio and near-infrared observations place FRB 20240304B in a low-mass, clumpy star-forming galaxy at redshift 2.148, and its scattered signal implies some bursts escape current surveys.

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Photo: Spacex

Fast radio bursts are flashes of radio waves that last only milliseconds and come from beyond our own galaxy. What causes them is still debated, but astronomers value them for another reason: on its way to Earth, each burst passes through electrically charged gas, or plasma, and magnetic fields. That journey leaves marks on the signal's frequency and polarisation, the orientation in which its radio waves oscillate. A burst from far away therefore carries information about the material along its route.

In a 2026 paper in Science, a team including Manisha Caleb, Themiya Nanayakkara, B. W. Stappers and Karl Glazebrook reports one such burst, catalogued as FRB 20240304B. The collaboration includes researchers affiliated with the ARC Centre of Excellence for Gravitational Wave Discovery in Australia, the Netherlands Institute for Radio Astronomy and the Pontificia Universidad Católica de Valparaíso in Chile.

The work combines two kinds of observation. Radio data captured the burst itself. Follow-up observations in near-infrared light, just beyond what the eye can see, were then used to identify the host galaxy, the galaxy in which the burst originated. Pinning a burst to a specific galaxy matters because it fixes the distance, and with it the length of the path the signal travelled.

According to the authors, the host is a low-mass, clumpy galaxy that is actively forming stars. They measure its redshift, a stretching of light to longer wavelengths that grows with distance in an expanding universe, at 2.148 ± 0.0013. That corresponds to a time 3 billion years after the Big Bang. The researchers place the burst in the era when the universe as a whole was forming stars at its peak rate, and say that its signal probes ionised gas over approximately 80% of cosmic history.

The burst's second notable feature is that its emission was highly scattered. Scattering happens when radio waves are deflected by turbulent plasma on their way to the observer, which spreads the pulse out and makes it harder to spot. The authors argue that this implies there is a population of fast radio bursts that current surveys do not detect.

The study rests on a single event, and the abstract does not say where along the line of sight most of the scattering arose, nor how large the hidden population might be.

PAPER	*A fast radio burst at redshift 2, three billion years after the Big Bang*
AUTHORS	Manisha Caleb, Themiya Nanayakkara, B. W. Stappers, Inés Pastor-Marazuela, Ilya S. Khrykin, Karl Glazebrook et al.
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