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research highlights

STAR FORMATION

A dusty gem

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Although we understand how stars form in nearby galaxies, the extreme conditions found in their high-redshift counterparts may lead to different modes of star formation. Raoul Cañameras and colleagues exploit the resolving power and sensitivity of ALMA and the gravitational magnification caused by a massive foreground galaxy at redshift ~1.5 to probe scales of tens of parsecs in a starbursting galaxy at redshift ~3, nicknamed the Ruby.

The submillimetre emission reveals that the galaxy is forming up to 4,000 solar masses of stars per year per square kiloparsec. The kinematics of the gas further imply gas surface densities of $\sim 10^{10}\, M_{\odot}\ \mathrm{kpc}^{-2}$ — far higher than any local galaxy. These properties indicate that the galaxy is undergoing a critical starburst phase, its star formation essentially self-regulated through the injection of energy from stellar winds and supernovae explosions.

Interestingly, Cañameras *et al.* find that the galaxy has a star-formation efficiency of 1–10%, consistent with local star-forming galaxies. Moreover, the galaxy falls right on the expected relation for marginally gravitationally stable molecular clouds, akin to molecular clouds observed in the Milky Way. These findings underline that the star-formation law, as seen in our Galaxy, appears to be universal even in the most extreme conditions of this dusty ruby.

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