EARLY UNIVERSE

Star power

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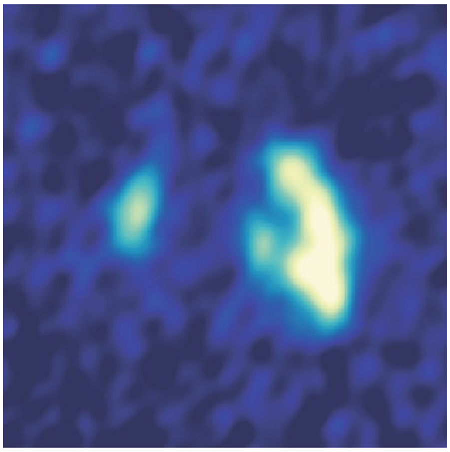

Credit: Macmillan Publishers Ltd

Going back in time to study the nascent massive structures appearing shortly after the Big Bang is not possible, but far-infrared telescopes such as the Atacama Large Millimeter/submillimeter Array (ALMA) can detect light from such distant epochs. And indeed, Daniel Marrone and co-workers have obtained high-resolution images of two "extremely luminous" galaxies at redshift 6.900 (or 780 million years after the Big Bang). Detections of such objects are rare, and these two prove to be particularly exceptional as well, with unprecedented luminosities.

Their extended far-infrared emission suggests that the two sources are powered by star formation, with enormous rates of 540 solar masses per year for the smaller mass SPT0311-58 E (pictured, left) and 2,900 solar masses per year for the larger SPT0311-58 W (pictured, right). Moreover, the larger galaxy contains dust and gas of 440 billion solar masses and 4 billion solar masses, respectively. These quantities make it the most massive known object above redshift 6, and an ideal test of the prevailing cosmological model. Whether through a calculation involving the dust or gas masses, or the baryon fraction, the estimated dark matter halo is in the range of hundreds of billions of solar masses. Compared to other high-redshift massive galaxies, the halo mass of SPT0311-58 sets the record, although it is still within the bounds of the current cosmological model.

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