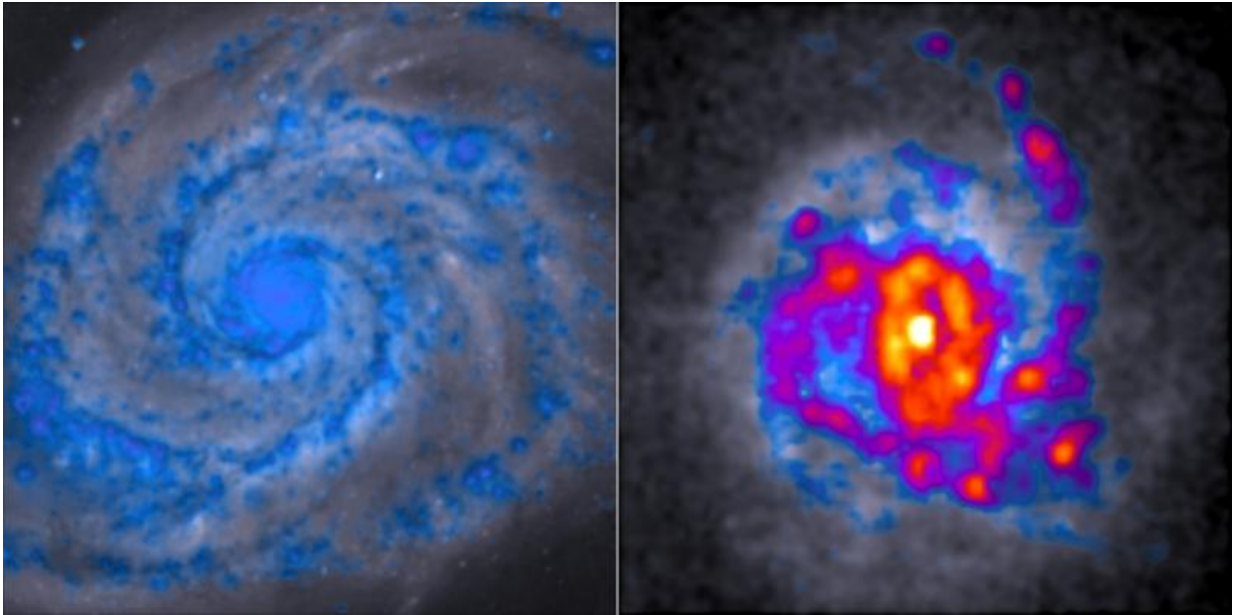


A new spin on star-forming galaxies

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Spiral Galaxy V Clumpy Galaxy. Credit: International Centre for Radio Astronomy Research

Australian researchers have discovered why some galaxies are "clumpy" rather than spiral in shape—and it appears low spin is to blame.

The finding challenges an earlier theory that high levels of gas cause clumpy galaxies and sheds light on the conditions that brought about the birth of most of the stars in the Universe.

Lead author Dr Danail Obreschkow, from The University of Western

Australia node of the International Centre for Radio Astronomy Research (ICRAR), said that ten billion years ago the Universe was full of clumpy galaxies but these developed into more regular objects as they evolved.

He said the majority of stars in the sky today, including our five billion-year-old Sun, were probably born inside these clumpy formations.

"The clumpy galaxies produce stars at phenomenal rates," Dr Obreschkow said.

"A new star pops up about once a week, whereas spiral galaxies like our Milky Way only form about one new star a year."

The research team—a collaboration between ICRAR and Swinburne University of Technology—focused on a few rare galaxies, known as the DYNAMO galaxies.

They still look clumpy even though they're seen "only" 500 million years in the past.

Dr Obreschkow said looking at galaxies 500 million years ago was like looking at a passport photo taken a year ago.

"We see that galaxy the way it probably looks now... something could have happened to it but it's very unlikely," he said.

"The galaxies that are 10 billion light years away, that's comparable to a picture from when you were three or four years old, that's very different."

The team used the Keck and Gemini observatories in Hawaii to measure the spin of the galaxies, along with millimetre and radio telescopes to

measure the amount of gas they contained.

Dr Obreschkow said the DYNAMO galaxies had a low spin and this was the dominant cause of their clumpiness, rather than their high gas content as previously thought.

"While the Milky Way appears to have a lot of spin, the galaxies we studied here have a low spin, about three times lower," he said.

Swinburne University astronomer Professor Karl Glazebrook, co-author and leader of the survey team, said the finding was exciting because the first observation that galaxies rotate was made exactly 100 years ago.

"Today we are still revealing the important role that the spin of the initial cloud of gas plays in galaxy formation," he said.

"This novel result suggests that spin is fundamental to explaining why early galaxies are gas-rich and lumpy while modern [galaxies](#) display beautiful symmetric patterns."

More information: Danail Obreschkow, Karl Glazebrook, Robert Bassett, David B. Fisher, Roberto G. Abraham, Emily Wisnioski, Andrew W. Green, Peter J. McGreigo, Ivana Damjanov, Attila Popping, Inger Jorgensen; Low Angular Momentum in Clumpy, Turbulent Disk Galaxies; *The Astrophysical Journal* arxiv.org/pdf/1508.04768v2.pdf

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