
Starquakes shake up the theory of stellar evolution



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Australian astronomers studying stars' internal upheavals have opened a new fault line in theories about the universe's formation.

Researchers monitoring “starquakes” — the stellar equivalent of earthquakes — have found a startling symmetry in dozens of swollen stars known as red giants.

The findings, published this morning in the journal *Nature Astronomy*, open a new mystery around the formation of clusters of stars from swirling clouds of molecules and gas.

Co-author Dennis Stello, an astrophysicist with the University of NSW, said these gas clouds rotated on their own internal axes. Astronomers had assumed the initial spin orientation would become “scrambled” by the colossal turbulence generated when they coalesced into families of stars.

The study, which gauged the spin of 48 red giant stars in two clusters within our galaxy, found that 70 per cent were aligned with each other — suggesting most of the stars had retained the original “imprint” of the rotation of the gas clouds from billions of years earlier when they had formed.

Dr Stello said this meant the amount of energy driving the rotation of gas clouds was far higher than had been supposed: “Our understanding of how stars form is not as we thought, so we have to rethink it.”

He said the findings would spawn a hypothesis when the theoreticians had “scratched their heads hard enough”.

The study gauged stars' spin by measuring the “natural oscillations” created by internal bubbles of boiling gas striking the surface from within. “It creates lots of small starquakes that make the entire star ring like a big gong,” Dr Stello said.

This sound is far below the audible range, with a wavelength that can last from minutes to days. “Even a blue whale wouldn't be able to hear it,” he said.

While scientists cannot access these sound waves directly, the team inferred them by measuring tiny fluctuations in the stars' brightness, analysing four years of observations from NASA's Kepler space observatory.

Dr Stello conducted the study while at the University of Sydney. The research was led by Dr Stello's former PhD student, Enrico Corsaro, who is now at the Observatorio Astrofisico di Catania in Sicily.

The results reveal little about the formation of our own solar system because scientists are unsure which cluster it belongs to. Dr Stello said the sun, like most stars, had broken away from its original cluster to “drift around” as a loner.

He said astronomers were sifting through the galaxy looking for stars of similar age and chemical composition, suggesting they had been born together, but still had not identified the

sun's "twins".

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