Discovery of a pulsating star that hosts a giant planet

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Recently published in an article of the *Astronomy & Astrophysics* journal, a group of Spanish researchers from the Institute of Space Sciences (IEEC-CSIC) at Universitat Autonoma de Barcelona has discovered, for the first time, a delta Scuti pulsating star that hosts a hot giant transiting planet. The study was carried out by the PhD student, Enrique Herrero, the researcher Dr. Juan Carlos Morales, the exoplanet expert, Dr. Ignasi Ribas, and the amateur astronomer, Mr. Ramón Naves.

WASP-33 (also known as HD15082) is hotter, more massive than the Sun (1.5 Msun) and is located at a distance of 378 light years away, in the constellation of Andromeda. It has the peculiarity of being a star that pulsates radially, like a balloon that inflates and deflates continuously, and non-radially, like the tides in Earth's oceans caused by the presence of the moon, which deforms the bodies of water between the poles and the equator.

This star hosts a giant planet, WASP-33b, that was detected in 2006 through the transiting method. The planet's mass is four times the mass of Jupiter and it orbits the star at such a high speed that it only takes 1.2 days to complete its orbit. This very short orbital period indicates its extreme proximity to the star, 0.02 astronomical units (AU) when Mercury, the closest planet to the Sun, is at 0.39 AU. This planet is quite particular because it has a retrograde orbit and, evenmore, its orbit is quite inclined in angle respect to the star's equator.

The study also suggests that the star's pulsations could be caused by the

presence of the giant planet, something never seen before in any other planetary system. A small periodic signal, visible in the overall signal during the transit of the planet, called the attention of the researchers and through a thorough study, the pulsating modes of the star were determined and their possible relationship with the planet.

Apart from being a pioneering study in the field, it is noteworthy to mention that the observations have been obtained from professional and amateur observatories. For the first time in its recent activity history, the Montsec Astronomical Observatory (OAdM) has provided most of the observations used for this research. In addition, the amateur astronomer R. Naves, from the Montcabrer Observatory, has provided excellent data, revealing the great importance of Professional-Amateur collaborations in this field.

Therefore, the WASP-33 system represents a landmark in the world of exoplanets since it may provide vital information on pulsations modes that occur in stars, the effects of tides between stars and planets and the dynamical evolution of planetary systems.

More information: 1 UA= 149.597.870 km

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