

PRESS RELEASE

Haumea, the most peculiar of Pluto companions, has a ring around it

The trans-neptunian belt contains four dwarf planets, among which Haumea stands out for its extremely elongated shape and rapid rotation

A stellar occultation revealed the main physical characteristics of this heretofore poorly known body - among which the most surprising presence of a ring

Granada, xx xx 2017. At the ends of the Solar System, beyond the orbit of Neptune, there is a belt of objects composed of ice and rocks, among which four dwarf planets stand out: Pluto, Eris, Makemake and Haumea. The latter is the least well known of the four and was recently the target of an international observation campaign which was able to establish its main physical characteristics. The study, led by astronomers from the Institute of Astrophysics of Andalusia and published in *Nature*, reveals the presence of a ring around the dwarf planet.

Trans-neptunian objects are difficult to study because of their small size, their low brightness, and the enormous distances that separate us from them. A very efficient but complex method lies in the study of stellar occultations, or the passing of these objects in front of a star (like a small eclipse). It allows astronomers to determine the main physical characteristics of an object (size, shape, and density) and has been successfully applied to dwarf planets Pluto, Eris and Makemake.

"We predicted that Haumea would pass in front of a star on the 21st of January 2017, and twelve telescopes from ten different European observatories could detect on the phenomenon," says José Luis Ortiz, researcher at the Institute of Astrophysics of Andalusia (IAA-CSIC) in charge of the study. "This deployment of technical means allowed us to reconstruct with a very high precision the shape and size of dwarf planet Haumea, and discover to our surprise that it is considerably bigger and less reflecting than was previously believed. It is also much less dense than previously thought, which answered questions that had been pending about the object."

Haumea is an interesting object: it revolves around the Sun along an elliptic orbit which takes it 285 years to complete (it presently lies fifty times further from the Sun than the Earth), and it takes 3.9 hours to rotate around its axis, much less than any other body measuring more than a hundred kilometers long in the entire Solar System. This rotational speed causes it to flatten out, giving it an ellipsoid shape similar to a rugby ball. The

recently published data reveal that Haumea measures 2.320 kilometers along its largest axis – almost the same as Pluto – but lacks the global atmosphere that Pluto has.

FIRST TRANS-NEPTUNIAN OBJECT WITH A RING

"One of the most interesting and unexpected findings was the discovery of a ring around Haumea. Until a few years ago we only knew of the existence of rings around the giant planets; then, recently, our team discovered that two small bodies situated between Jupiter and Neptune, belonging to a group called centaurs, have dense rings around them, which came as a big surprise. Now we have discovered that bodies even farther away than the centaurs, bigger and with very different general characteristics, can also have rings," says Pablo Santos-Sanz, another member of the IAA-CSIC team.

According to the data obtained from the stellar occultation, the ring lies on the equatorial plane of the dwarf planet, just like its biggest satellite, Hi'iaka, and it displays a 3:1 resonance with respect to the rotation of Haumea, which means that the frozen particles which compose the ring rotate three times slower around the planet than it rotates around its own axis.

"There are different possible explanations for the formation of the ring; it may have originated in a collision with another object, or in the dispersal of surface material due to the planet's high rotational speed," says Ortiz (IAA-CSIC). It is the first time a ring has been discovered around a trans-neptunian object, and it shows that the presence of rings could be much more common than was previously thought, in our Solar System as well as in other planetary systems.

REFERENCES

J. L. Ortiz et al. "The size, shape, density and ring of the dwarf planet Haumea from a stellar occultation". *Nature*, (2017) DOI: [10.1038/nature24051](https://doi.org/10.1038/nature24051)

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MULTIMEDIA CONTENT:

IMAGES

Artistic rendering of Haumea with correct proportions of main body and ring. The ring is 2287 kilometers from the center of the main body and it is darker than the surface of the dwarf planet.