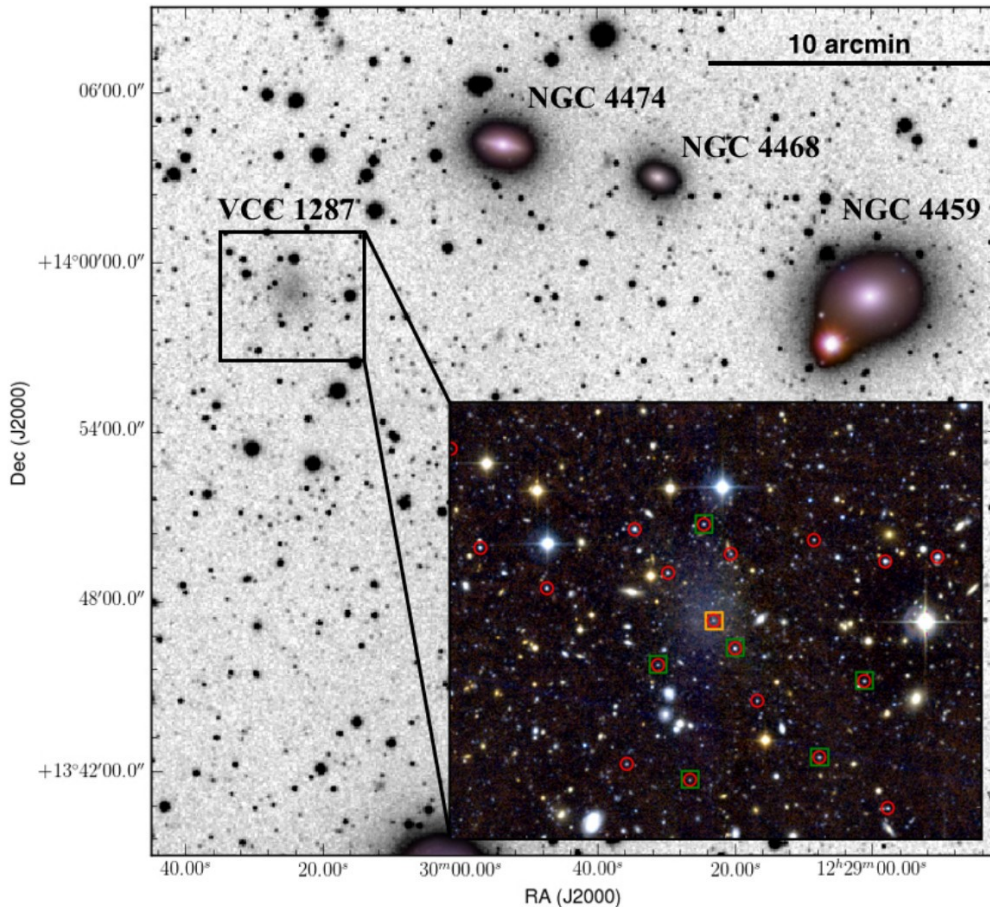


The dark side of the diffuse galaxies

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A region of the Virgo cluster of galaxies containing the ultra-diffuse galaxy VCC 1287. The main image is 500 thousand light years across, uses a negative image for contrast, and was obtained with a 10-centimetre diameter amateur telescope in Switzerland (Antares Observatory). The zoom-in colour-composite image of VCC 1287 is from the 4-metre Canada-France- Hawai'i telescope. The coloured symbols show globular star clusters targeted for orbital speed measurements with the 10-metre Gran Telescopio CANARIAS (GTC). Credit: IAC

A team of International astronomers, led by members of the Instituto de Astrofísica de Canarias, has measured for the first time the mass of an ultra-diffuse galaxy using the Gran Telescopio CANARIAS (GTC).

Galaxies, in all forms including spirals, ellipticals, giants and dwarfs, have been widely studied over the past century. To the surprise of the scientific community last year, a new type of galaxy was discovered, residing in a galactic megalopolis known as the Coma Cluster, some 300 million light years away from Earth. Even though they are very numerous, these ultradiffuse [galaxies](#) have gone unnoticed until now because they are very faint. Their stars are spread over a very large area, which makes it particularly difficult to distinguish them from the sky background.

"These galaxies are particularly interesting, given that the violent environment in which they are situated would have destroyed them long ago, were they not protected by a large amount of dark matter," says Michael Beasley, the first author of the article published in the journal *Astrophysical Journal Letters*. "To test this fascinating idea was possible after identifying an ultradiffuse galaxy near enough to study in detail."

This galaxy, VCC 1287, is situated in the Virgo Cluster, some 50 million light years away, and it is surrounded by a swarm of globular clusters, which are key to studying its dark matter content. "Globular clusters, made up of hundreds of thousands of stars, orbit within the gravitational field of the ultradiffuse galaxy," says Aaron Romanowsky of San José State University (U.S.) one of the authors of the article. "The heavier the galaxy, the more rapidly its globular clusters move, so they can be used as a cosmic balance."

Using the Gran Telescopio CANARIAS (GTC) the team found that

these [globular clusters](#) move at high velocity, pulled by a surprisingly strong [gravitational field](#). "Even though dark matter is present in other galaxies, this is an exceptional case," concludes Beasley. "For each kilogramme of ordinary material, VCC 1287 contains 3 tonnes of dark matter. So we can say that ultradiffuse galaxies are essentially composed of [dark matter](#), with very few stars." The scientists say this conclusion poses another question: "How is it possible for galaxies so diffuse and dark to exist?"

More information: Michael A. Beasley et al, AN OVERMASSIVE DARK HALO AROUND AN ULTRA-DIFFUSE GALAXY IN THE VIRGO CLUSTER, *The Astrophysical Journal* (2016). [DOI: 10.3847/2041-8205/819/2/L20](#)

Provided by Instituto de Astrofísica de Canarias (IAC)

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