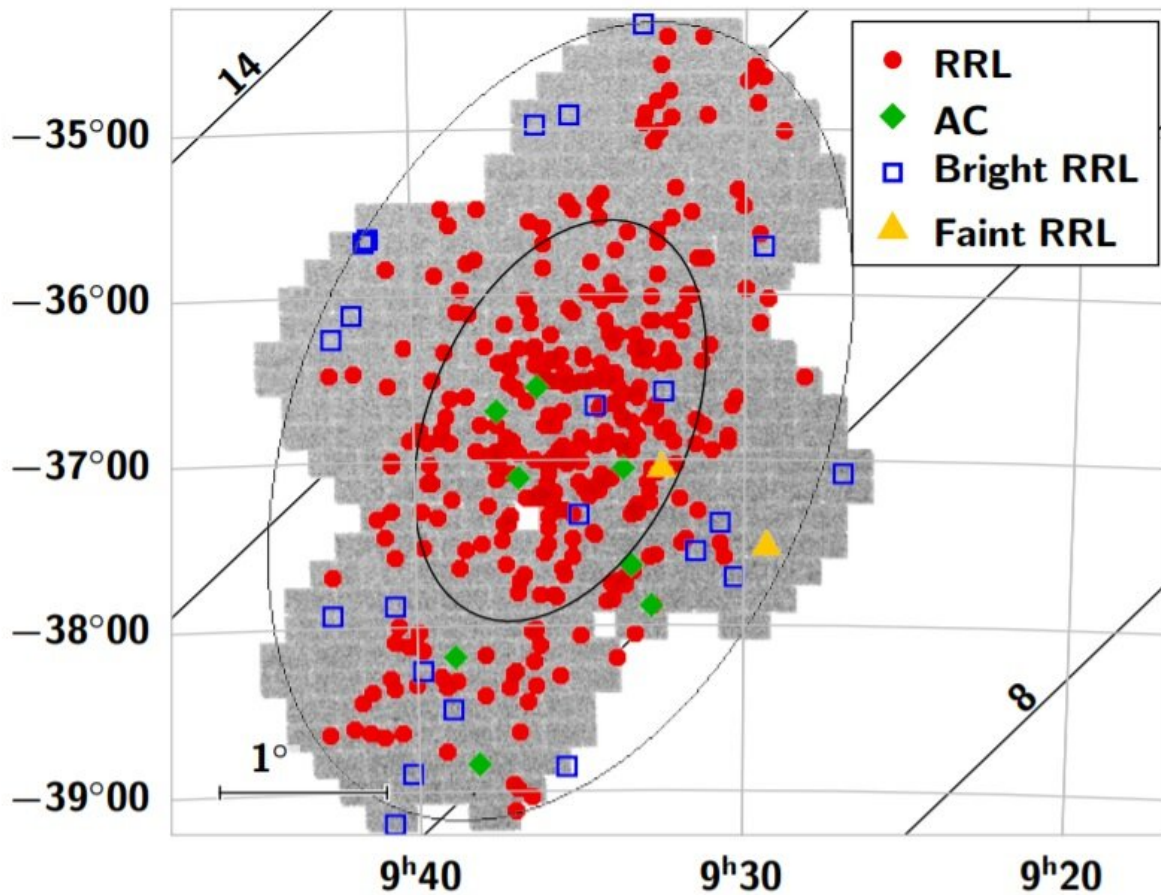


Hundreds of new pulsating variable stars detected

December 23 2021, by Tomasz Nowakowski



Spatial coverage of DECam observations of Ant 2 in equatorial coordinates. Credit: Vivas et al., 2021.

Using the Cerro Tololo Inter-American Observatory (CTIO),

astronomers have detected more than 300 pulsating variable stars by observing the Milky Way's satellite galaxy Antlia 2 (or Ant 2 for short). The finding, reported in a paper published December 15 on arXiv.org, could improve our understanding of this galaxy and its surroundings.

Variable [stars](#) could offer important hints into aspects of stellar structure and evolution. They could be also helpful for better understanding of the distance scale of the universe. In particular, the so-called RR Lyrae (RRL) variables are a powerful tool for studying the morphology, metallicity and age of [galaxies](#), especially those with low surface brightness. In general, RRLs are pulsating horizontal branch stars of spectral class A or F, with a mass of around half the sun's.

At a distance of about 422,000 light years, Ant 2 is a low-surface-brightness dwarf satellite galaxy of the Milky Way. It has a half-light radius of 9,450 light years and is some 100 times more diffuse than any known ultra diffuse galaxy (UDG).

The discovery of Ant 2 was triggered by the identification of a group of three RRL stars from the Gaia DR2 catalog. Subsequent observations of this galaxy showed that these RRL stars were not actually part of Ant 2 since they were located in front of it. One study suggested that the identified RRLs were the near side of a cloud of debris material that originated from Ant 2 during its disruption by the tidal forces of the Milky Way.

In order to confirm this scenario, a complete survey of RRL stars in Ant 2 and its neighborhood is required. So a team of astronomers led by CTIO's Katherina Vivas has carried out a search for RRL stars and other variables, either in Ant 2 or its line of sight using the DECam on the Victor M. Blanco 4-meter telescope at CTIO.

"We present a variability survey of 12 sq. deg. around the Ant 2 satellite

galaxy, which revealed a large population of RRL stars," the researchers wrote in the paper.

In result, they identified 350 pulsating [variable stars](#), including 318 RRLs and eight anomalous Cepheids. The majority of the RRLs (193) were classified as RRab variables (RRLs displaying steep rises in brightness), while 104 as RRc (with shorter periods and more sinusoidal variation), and 21 turned out to be double mode pulsators (RRd).

The astronomers consider the detected RRLs as a very pure sample of Ant 2 members given that virtually no contamination by Milky Way's RRL stars is expected at a similar distance. The results suggest that the distance to Ant 2 is approximately 404,500 [light years](#), therefore smaller than previously thought.

Furthermore, the study allowed the researchers to confirm that Ant 2 is indeed a very large galaxy and likely extends beyond their observed area. They assume that there are more RRL stars awaiting discovery outside the observed area. The results also indicate that Ant 2 is disrupting as the spatial distribution of the RRL stars reveals an elongation, which is approximately aligned with the reflex corrected proper motions of the galaxy. The authors of the paper suppose that the RRL stars they are observing were torn apart from the main body of Ant 2 during the last pericenter passage that took place most likely 800 million years ago.

More information: Kathy Vivas et al, Variable Stars in the giant satellite galaxy Antlia 2. arXiv:2112.08467v1 [astro-ph.GA], arxiv.org/abs/2112.08467

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