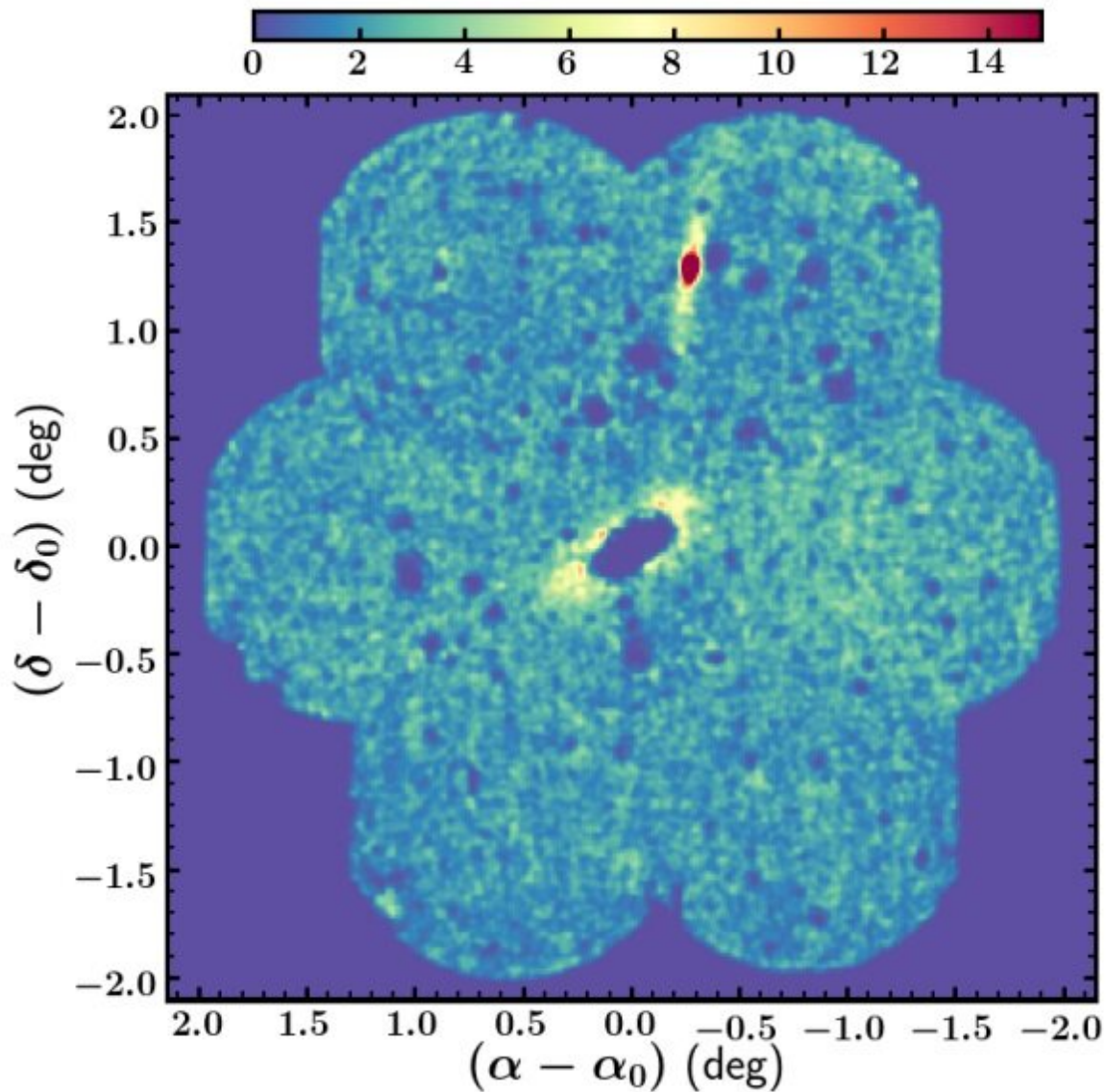


Tidal tails detected around dwarf galaxy DDO 44

June 25 2019, by Tomasz Nowakowski



Density map of candidate RGB stars at the distance and metallicity of DDO

44/NGC 2403. Bins are 0.750, and the image has been smoothed with a Gaussian kernel of 0.750 FWHM. The field is centered on NGC 2403 (the hole in the center is due to extreme crowding), and DDO 44 is to the north (and slightly west). Credit: Carlin et al., 2019.

By conducting deep, wide-area imaging survey of the galaxy NGC 2403 and its environment, including the dwarf satellite galaxy DDO 44, astronomers have detected tidal tails emanating from the dwarf. The finding, presented in a paper published June 19, could shed more light on the interactions between galaxies and their satellites.

In general, the so-called tidal tails are assumed to be the result of gravitational interactions between galaxies. For instance, when two galaxies orbit each other, [tidal forces](#) distort each galaxy, and these distorted regions are then ejected into intergalactic space, forming tidal tails.

Studying such features could be essential for improving our understanding about how galaxies interact with each other. Their observations have the potential even to disclose important information on galactic collisions and mergers.

Now, a team of [astronomers](#) led by Jeffrey Carlin of the Large Synoptic Survey Telescope (LSST) in Tucson, Arizona, reports the finding of tidal tails in DDO 44—a relatively massive dwarf spheroidal galaxy located some 9.65 million light years away. DDO 44 is assumed to be a [satellite](#) of NGC 2403, an intermediate spiral galaxy in the constellation Camelopardalis.

The researchers found the tidal tails from DDO 44 as part of a large-area imaging observational campaign (the Magellanic Analogs' Dwarf

Companions and Stellar Halos survey) around NGC 2403 aimed at searching its dwarf companions and the remnants of destroyed satellites.

"We report the discovery of a stellar tidal stream around the Local Volume dwarf spheroidal galaxy DDO 44, based on deep, resolved-star observations with Subaru+HSC," the astronomers wrote in the paper.

The newly detected tidal stream was measured to be about 163,000 light years long. The stream consists of two tidal tails stretching approximately 81,500 light years on either side of the main body of DDO 44. One tail is oriented toward the NGC 2403 galaxy.

Moreover, the researchers estimated the total luminosity of the DDO 44 progenitor (dwarf and streams combined), finding that this value is at least -13.4 . The mass of DDO 44 was calculated to be around 20 million [solar masses](#). The research confirmed that the dwarf is separated from its host by about 230,000 light years.

According to the paper, the results, especially the detected tidal tails and the estimated separation from NGC 2403, show that DDO 44 is an unusual object. The astronomers noted that while disruptions by hosts with masses comparable to that of NGC 2403 are not uncommon, the dwarf satellites are usually much closer to their host [galaxies](#) than observed for the DDO 44-NGC 2403 system.

"We find only about 0.1 percent of our mass-matched analog systems are disrupting with the type of large observed separation between NGC 2403 and DDO 44," the paper reads.

The astronomers concluded that the results suggest that DDO 44 only recently entered the halo of NGC 2403. They assume that the satellite is on a high-eccentricity orbit with a pericenter small enough to tidally strip both its stars and its gas reservoir.

More information: Jeffrey L. Carlin. Tidal destruction in a low mass galaxy environment: the discovery of tidal tails around DDO 44. arXiv:1906.08260v1 [astro-ph.GA]: arxiv.org/abs/1906.08260

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