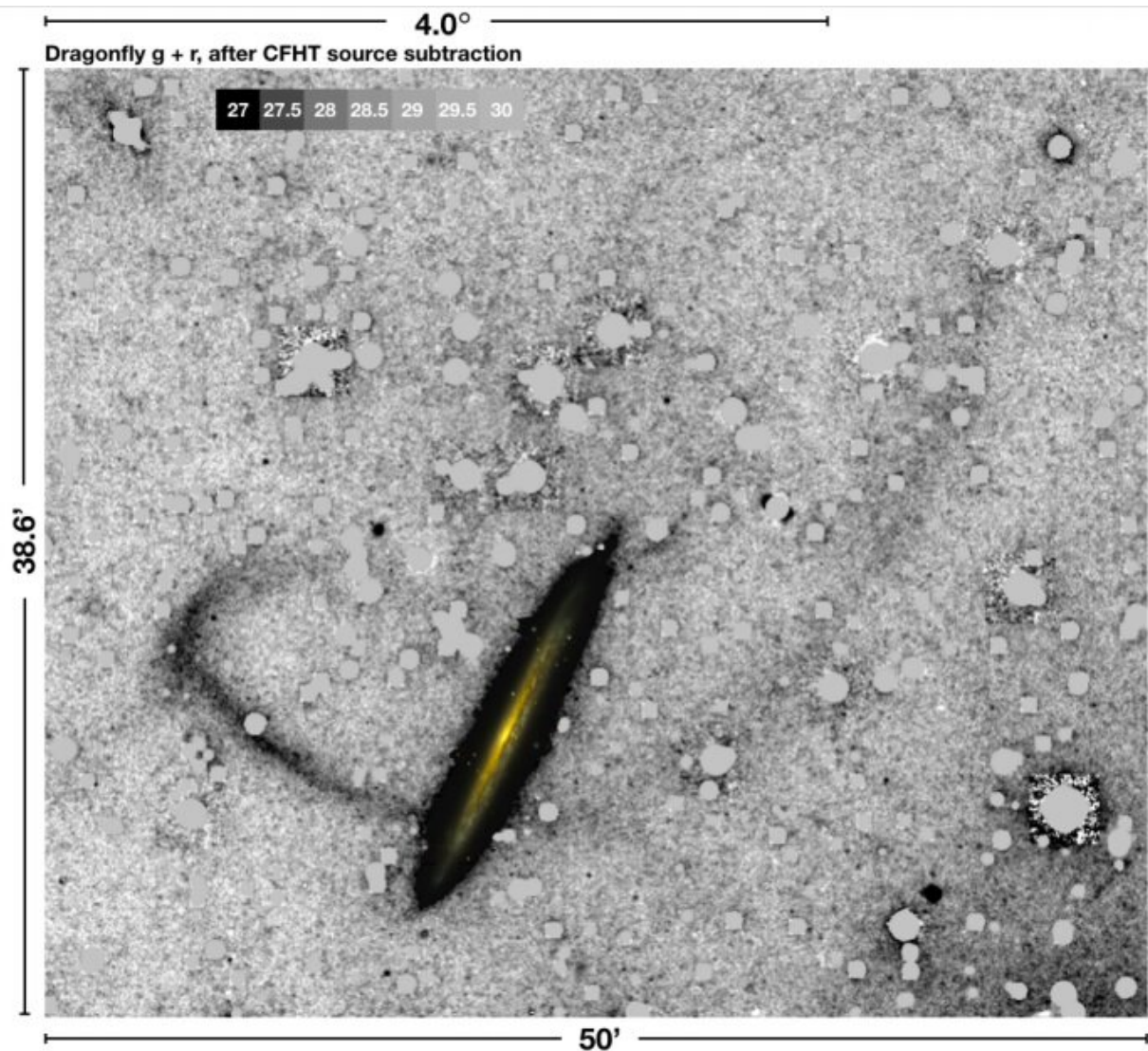


Stellar stream of galaxy NGC 5907 has a morphology different than previously thought

July 2 2019, by Tomasz Nowakowski



Dragonfly imaging of the NGC 5907 field, with North up and East to the left.
Credit: van Dokkum et al., 2019.

Using Dragonfly Telephoto Array, astronomers have revisited the spiral galaxy NGC 5907 and provided more insights into the morphology of its stellar stream. The new observations indicate that this feature has a qualitatively different morphology than when it was observed about a decade ago. The new findings are reported in a paper published June 26 on arXiv.org.

Stellar streams are remnants of dwarf [galaxies](#) or globular clusters that once orbited a galaxy but have been disrupted and stretched out along their orbits by tidal forces of their hosts. So far, more than 40 stellar streams have been identified in the Milky Way, just a few in the Andromeda galaxy, and about 10 outside the Local Group.

For astronomers, stellar stream could provide [important information](#) on the frequency of the accretion of small objects onto larger ones. Given that their morphologies reflect their orbits, they could serve as probes of the gravitational potential. Moreover, they could be also used as a tool to constrain the mass and structure of dark matter halos.

One of the best-known stellar streams outside the Milky Way galaxy is the one associated with NGC 5907, a spiral galaxy located some 55.4 million [light years](#) away, with a stellar mass of around 80 billion solar masses. The stream was detected in 1998 when sections of a loop around the disk of NGC 5907 were identified. Further observations of this feature, conducted 10 years later, showed that the stream exhibits not one but two complete loops, enveloping the galaxy in a giant corkscrew-like structure.

Now, new observations performed by a group of astronomers led by Pieter van Dokkum of Yale University, delivered more detailed images of NGC 5907's stellar stream. The [new data](#), collected by the Dragonfly Telephoto Array, indicate that the morphology of this feature is different than that in the study published a decade ago.

"Here, we report on new low-surface-brightness imaging of NGC 5907 over a wide field as part of an imaging campaign of nearby galaxies with the Dragonfly Telephoto Array," the astronomers wrote in the paper.

In general, the study found that NGC 5907 is a relatively straightforward system composed of the remnant of a progenitor galaxy, a leading tail and a long, faint trailing tail. The astronomers said that the stellar stream of this galaxy is similar to the Sagittarius stream around the Milky Way in terms of its spatial extent and stellar mass.

However, the most puzzling aspect of the study is that it has not confirmed the presence of the second loop in NGC 5907's stellar stream. The researchers noted that the leading tail in the image obtained by the Dragonfly Telephoto Array falls in between the two loops identified in the observations conducted in 2008.

Furthermore, by comparing the new images with these acquired ten years ago the extent of the Western stream was found to be greater. Additionally, the stream was found to have more substructure and brightness variations, and the ratio of the apparent width of the stream to the apparent width of the disk of the galaxy turned out to be much smaller.

Trying to find a possible explanation of such discrepancies in the data, the authors of the study point out to the image processing procedures that were applied to the data as the images collected in 2008 were processed by an amateur [astronomer](#).

"Amateurs have played an important role in this field as they convincingly demonstrated the power of small telescopes for low surface brightness imaging. However, the methods that are used by the amateur community typically do not allow for [quantitative analysis](#), as their image processing is generally optimized for aesthetic qualities rather than preserving the linearity and noise properties of the data," the researchers concluded.

More information: Pieter van Dokkum, et al. Dragonfly imaging of the galaxy NGC5907: a revised view of the iconic stellar stream. arXiv:1906.11260v1 [astro-ph.GA]: arxiv.org/abs/1906.11260

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