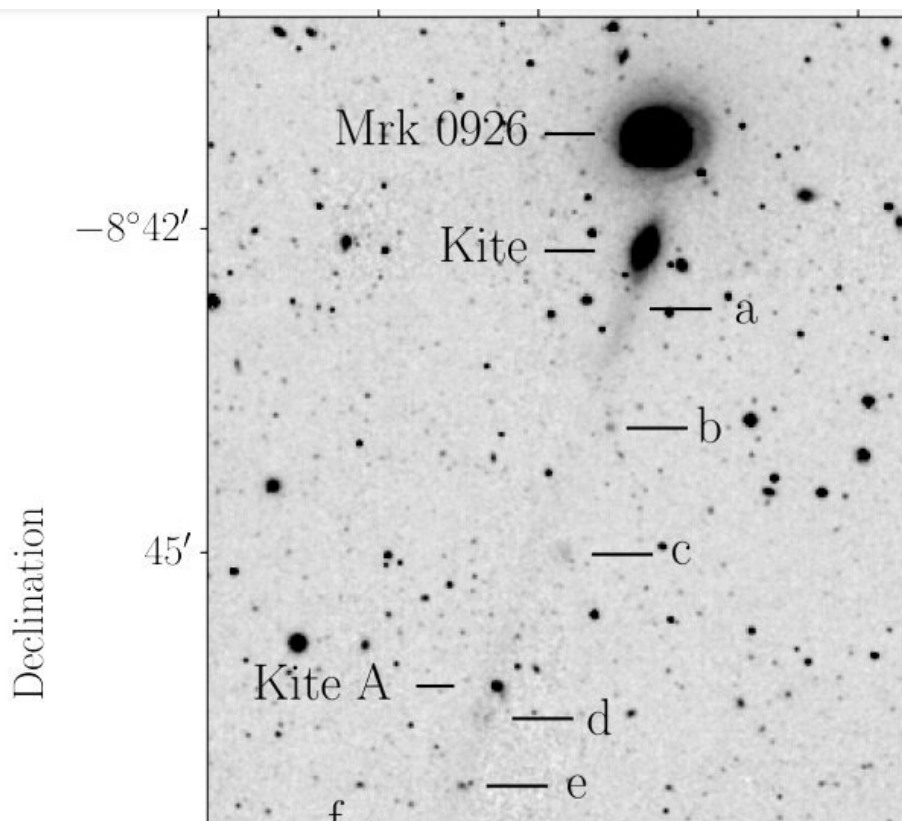


Astronomers detect unusual galaxy system with a long, highly collimated tail of gas and stars

May 11 2023, by Tomasz Nowakowski



The Kite galaxy and its companion, Mrk 0926. Features along the tail are labelled a–j as shown. The candidate disrupted galaxy, Kite A, is also labelled. Image obtained from the Legacy Survey public archive and is in the r -band. Bar at bottom right shows the length of 1 arcmin or the equivalent physical length at the distance of the Kite, 54 kpc. Credit: Zaritsky et al, 2023

An international team of astronomers reports the discovery of a new enigmatic galaxy system as part of the DESI Legacy Imaging Surveys. The newfound system consists of a pair of galaxies and an extended highly collimated tail of gas and stars. The finding was reported May 2 on the *arXiv* pre-print server.

Galactic tails may be a signature of a process or event acting to transform galaxies. Therefore, the discovery and study of these features could help us better understand how galaxies form and evolve.

Now, a group of astronomers led by Dennis Zaritsky of the University of Arizona in Tucson, Arizona, has discovered a new extraordinary galactic tail with a variety of interesting features. The tail is associated with a binary galaxy system.

First, the researchers serendipitously detected a new edge-on S0/a galaxy that received designation PGC 1000273, during a search for low surface brightness (LSB) galaxies. Due to its morphology, PGC 1000273 was dubbed the "Kite" galaxy and the observations found that it is located some 610 million [light years](#) away.

Furthermore, a [companion galaxy](#) to Kite was identified about 186,000 light years away from it. The companion, designated PGC 070409, or Mrk 0926, is an active galaxy with an [active galactic nucleus](#) (AGN) at its center. The Kite-Mrk 0926 was found to have a long galactic tail consisting of gas and stars, which also hosts a small galaxy dubbed "Kite A," which does not show evidence for ongoing star formation.

"We present the discovery of an extraordinary tail emanating from what we have dubbed the Kite galaxy," the researchers wrote in the paper.

The tail was found to have a projected length of about 1,240 light years and has a length to width ratio of 40. The images show that all of the

identified knots of emission along the tail scatter in position angle by less than 3 degrees.

Therefore, the length, narrowness, and linearity of the newfound tail make it an unusual example of a galactic tail. The Kite's tail is the longest optical galactic tail so far detected. The only even longer galactic structures are some radio-detected, head-tail systems that can reach lengths greater than 2,000 light years.

What makes the Kite's tail extraordinary is that it is sufficiently gas-rich to support star formation along its length even though it originates from an S0/a galaxy, which is expected to be gas-poor. Moreover, the tail lies in a low-density galactic environment with no cluster or group nearby but is in a close binary galaxy system where both [galaxies](#) are known to host AGNs.

Trying to explain the origin of the detected extended tail, the authors of the paper concluded that the most plausible scenario is the one in which a three-body encounter between the Kite, Mrk 0926, and Kite A resulted in the rapid ejection of the smallest galaxy.

"We propose that the tail resulted from a three-body interaction from which the lowest-mass galaxy was ejected at high velocity.... The resulting hyperbolic orbit explains the linearity of the debris field and the tail's narrowness," the researchers concluded.

More information: Dennis Zaritsky et al, An Enigmatic 380 kpc Long Linear Collimated Galactic Tail, *arXiv* (2023). [DOI: 10.48550/arxiv.2305.01335](https://doi.org/10.48550/arxiv.2305.01335)

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