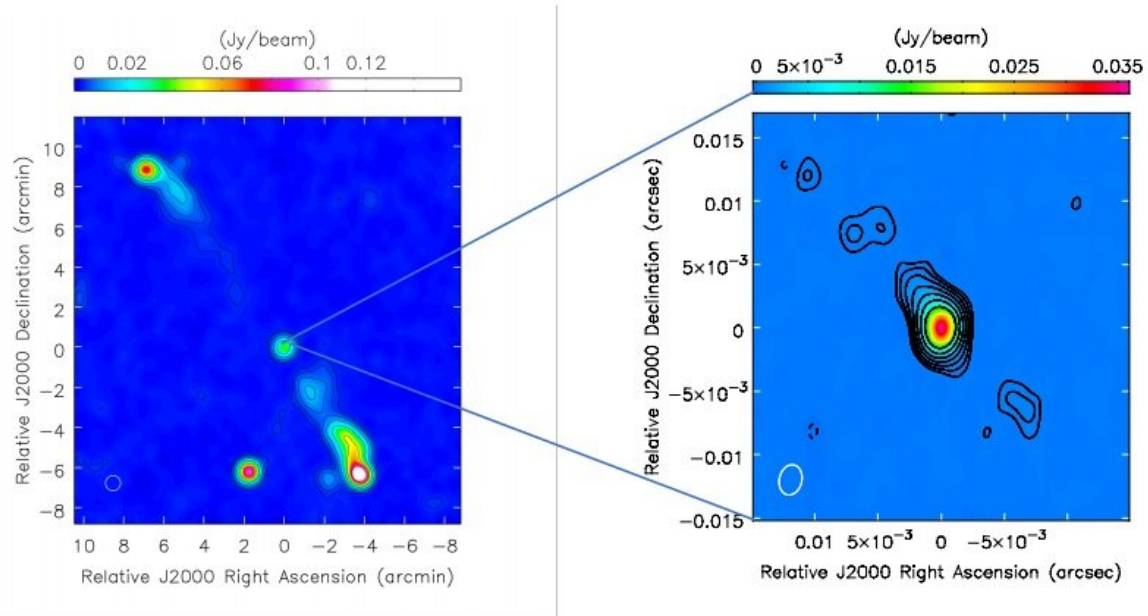


Mrk 1498 hosts a young and obscured AGN, study finds

August 26 2019, by Tomasz Nowakowski



(Left) NVSS image of Mrk1498, at 1.4 GHz. Contours are 3σ multiples (-1, 1, 2, 4, 8, 16, 32, 64). The RMS is 0.5 mJy/beam, while the beam (45×45 arcsec) is plotted in the lower-left corner, and (right) zooming image of the nucleus with VLBA at 4.8 GHz from archival data. Contours are 3σ multiples (-1, 1, 2, 4, 8, 16, 32, 64). The RMS is 0.06 mJy/beam, while the beam (2.41×1.78 mas) is plotted in the lower-left corner. Not at scale. Credit: Hernandez-Garcia et al., 2019.

An international team of astronomers has found that the giant radio

galaxy (GRG) Mrk 1498 has a more complex nuclear structure than previously thought. By analyzing multi-wavelength observations of Mrk 1498, a young and obscured active galactic nucleus (AGN) has been identified in the center of this galaxy. The study is detailed in a paper published August 16 on arXiv.org.

GRGs are [radio galaxies](#) with an overall projected linear length on megaparsec scales. They are rare objects grown in low-density environments. GRGs are important for astronomers to study the formation and the evolution of radio sources.

An AGN is a compact region at the center of a galaxy, more luminous than the surrounding galaxy light. Such regions are very energetic due either to the presence of a black hole, or to star formation activity at the core of the galaxy.

At a redshift of approximately 0.055, Mrk 1498 (also known WN 1626+5153 or Swift J1628.1+5145) is a GRG with [emission](#) line regions extending outward up to a distance of about 23,000 light years. Its nucleus is at the center of two giant radio lobes with a projected linear size of around 3.6 million [light years](#).

Previous observations of Mrk 1498 have suggested that the galaxy could be photo-ionized by an AGN that has faded away or is still active but heavily absorbed. In order to verify these two scenarios, a team of astronomers led by Lorena Hernandez-Garcia of the University of Valparaíso, in Chile, more closely observed the available observational data regarding the nucleus of Mrk 1498. The dataset includes observations at radio, mid-infrared, optical and X-ray frequencies.

"In this work, we have used multiwavelength data at radio, mid-infrared, optical, ultraviolet and X-ray frequencies to study the innermost parts of the galaxy Mrk 1498," the astronomers wrote in the paper.

According to the study, the results suggest that Mrk 1498 has a heavily absorbed nucleus, which has recently restarted its nuclear activity. In particular, the research found that Mrk 1498 has a complex nuclear structure with a young radio source surrounded by a strong X-ray nuclear absorption. The observations show that the galaxy's mid-[infrared spectrum](#) is dominated by the torus emission. Moreover, a circum-nuclear extended emission was detected, assumed to be most likely due to star formation or outflowing material.

"The radio spectrum of its core is fitted by a log-parabola model with a peak at 4.9 GHz, indicative of a young radio phase, implying the reactivation of the nuclear activity. (...) Data at mid-infrared frequencies shows the typical shape of an AGN dominated by the torus emission. (...) It shows extended emission in the [OIII] emission line, which does not seem to be related to photo-ionization from the AGN, but could be either explained by [star formation](#) or outflowing material," the researchers explained.

Therefore, the results allowed the researchers to exclude the possibility that Mrk 1498 hosts a fading AGN. They believe the data clearly shows that this galaxy has an obscured but active AGN in its center. This suggests that Mrk 1498 could be a result of a merging event or secular processes, such as a minor interaction, which could be responsible for the reactivation of nuclear activity.

More information: A young and obscured AGN embedded in the giant radio galaxy Mrk 1498, arXiv:1908.06080 [astro-ph.GA] arxiv.org/abs/1908.06080

L Hernández-García et al. A young and obscured AGN embedded in the giant radio galaxy Mrk 1498, *Monthly Notices of the Royal Astronomical Society* (2019). [DOI: 10.1093/mnras/stz2265](https://doi.org/10.1093/mnras/stz2265)

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