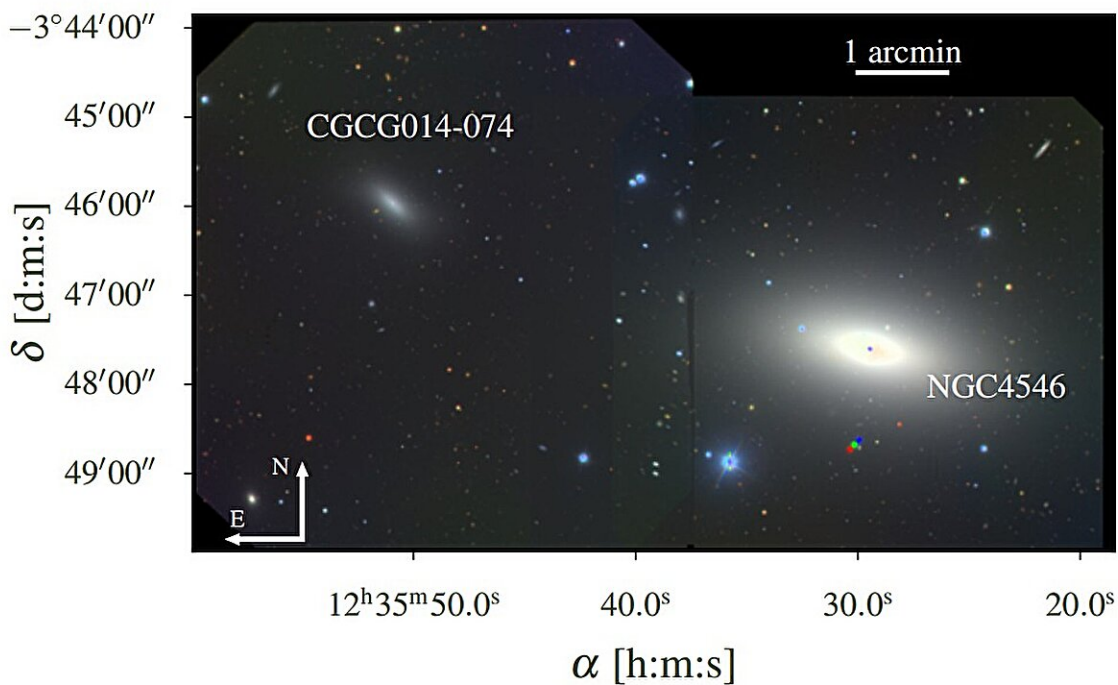


Spectrophotometric study explores an early-type dwarf galaxy

September 11 2024, by Tomasz Nowakowski



Mosaic of GEMINI-GMOS images showing the position in the sky of the dwarf galaxy CGCG014-074 and the S0 galaxy NGC 4546. Credit: Guevara et al., 2024.

Using the Gemini Observatory, Argentinian astronomers have conducted comprehensive photometric and spectroscopic observations of an early-

type dwarf galaxy known as CGCG014-074. Results of the observational campaign, [published](#) September 3 in the *Monthly Notices of the Royal Astronomical Society*, shed more light on the properties and evolution of this galaxy.

In general, dwarf [galaxies](#) are low-luminosity and low-mass stellar systems, usually containing a few billion stars. From this group, early-type dwarf galaxies stand out as the dominant galaxy type within the local universe.

CGCG014-074 is an early-type dwarf lenticular galaxy, located in the vicinity of NGC 4546—a massive lenticular galaxy at a distance of about 46 million [light years](#) away. Besides heliocentric velocity at a level of 998 km/s, not much is known about the properties of CGCG014-074 as the galaxy remains completely unexplored.

That is why a team of astronomers led by Natalia Guevara of the National University of La Plata in Argentina has employed Gemini Multi-Object Spectrographs (GMOS) at the Gemini South telescope in Chile, in order to perform a comprehensive spectrophotometric study of CGCG014-074.

"This paper presents the photometric and spectroscopic analysis of the early-type dwarf galaxy CGCG014-074. The observations were obtained with the GMOS South instrument of the Gemini Observatory. The photometric data were obtained using the broadband filters z' , y' , r' and i' , while the [spectroscopic observations](#) were made in the long-slit mode of the same instrument," the researchers wrote.

The observations found that CGCG014-074 exhibits distinct features, including a rotating inner disk, an extended stellar formation with the cessation of activity about two billion years ago, and boxy isophotes towards its outer regions. The study detected no evidence of a

kinematically decoupled core, nor any traces of a major merger.

According to the paper, CGCG014-074 has a total stellar mass of 330 million [solar masses](#) and total dynamical mass of 800 million solar masses. These results are in good agreement with values obtained for other early-type dwarf galaxies.

The collected data indicate that CGCG014-074 has an old and metal-poor nucleus—with an age of about 9.3 billion years and metallicity of -0.84 dex. In contrast, its stellar disk is younger (about 4.4 billion years old) and has a higher metallicity (approximately -0.40 dex).

The authors of the paper conclude that CGCG014-074 underwent a prolonged period of stellar formation from its beginning until about two billion years ago when its [star formation](#) ceased and it reached 100% of its stellar mass. Therefore, based on the new study, they perceive CGCG014-074 as a probable building block galaxy that has evolved passively throughout its history.

More information: Natalia Guevara et al., Understanding the origin of early-type dwarfs: The spectrophotometric study of CGCG014-074, *Monthly Notices of the Royal Astronomical Society* (2024). [DOI: 10.1093/mnras/stae2063](#). On *arXiv*: [DOI: 10.48550/arxiv.2409.02768](#)

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Citation: Spectrophotometric study explores an early-type dwarf galaxy (2024, September 11) retrieved 11 September 2024 from <https://phys.org/news/2024-09-spectrophotometric-explores-early-dwarf-galaxy.html>

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