

Indian astronomers investigate open cluster NGC 1027

April 19 2023, by Tomasz Nowakowski



R/B-band color composite image of NGC 1027 from the Second Digitized Sky Survey (DSS2). Credit: DSS2

By analyzing the data from the 104-cm Sampurnanand Telescope (ST)

and ESA's Gaia satellite, astronomers from India have inspected a Galactic open cluster known as NGC 1027. Results of the study, published April 12 on the *arXiv* pre-print server, shed more light on the properties of this cluster.

Open clusters (OCs), formed from the same giant molecular cloud, are groups of stars loosely gravitationally bound to each other. So far, more than 1,000 of them have been discovered in the Milky Way, and scientists are still looking for more, hoping to find a variety of these stellar groupings. Expanding the list of known galactic [open clusters](#) and studying them in detail could be crucial for improving our understanding of the formation and evolution of our galaxy.

Located some 3,300 light years away in the eastern part of the Cassiopeia constellation, NGC 1027 (also known as Melotte 16 or Collinder 30) is an intermediate-age OC discovered by William Herschel in 1787. The cluster is estimated to be 355 million years old and its reddening was found to be at a level of 0.36 mag.

A team of astronomers led by Aparna Tripathi of the Deen Dayal Upadhyaya Gorakhpur University in Gorakhpur, India, decided to perform a photometric and kinematic study of NGC 1027 in order to get more insights into its structural and fundamental parameters. For this purpose they analyzed the available data collected by ST and Gaia.

"We present the photometric and kinematic study of the intermediate-age open cluster NGC 1027 using UBV RIC data taken with the 1.04m Sampunanand telescope and Gaia EDR3 [Early Data Release 3] data," the researchers wrote in the paper.

The study found that NGC 1027 has a radius of about 8.64 light years and that its center is approximately 2 arcminutes away from the center reported by previous observations. The mean proper motion for the

cluster was measured to be -0.84 and 2.04 mas/year, in right ascension and declination, respectively.

The [astronomers](#) conducted a membership analysis of NGC 1027 and identified 217 member stars (with membership probability higher than 70%) in the cluster region. They noted that the distribution of proper motion of the stars in the cluster region shows a clear separation between the cluster members and field stars.

The researchers found that NGC 1027 has an age of some 130 million years, therefore, the cluster is younger than previously thought. The distance to NGC 1027 was measured to be about 3,700 [light years](#) and the cluster's reddening was found to be 0.36—in good agreement with previous estimates.

The study conducted by Tripathi's team also found that relatively massive stars are dominantly distributed in the inner regions of NGC 1027. The authors of the paper concluded that this suggests mass segregation, and they assume that the cluster is under the influence of external tidal interactions.

More information: Aparna Tripathi et al, Photometric and Kinematic study of the open cluster NGC 1027, *arXiv* (2023). [DOI: 10.48550/arxiv.2304.05762](#)

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