

Researchers explore open cluster NGC 2506 with AstroSat

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Open cluster NGC 2506. Credit: StudentAstronomyGroupUoC

Using the AstroSat spacecraft, Indian astronomers have investigated an open cluster known as NGC 2506. The study identified more than 2,000 member stars of this cluster and provided more insights into its properties. The findings were published in *Monthly Notices of the Royal Astronomical Society* on 29 August.

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.

At a distance of some 12,700 [light years](#), NGC 2506 (also known as Caldwell 54) is a mildly elongated, intermediate-age OC. Although many studies of this cluster have been conducted so far, still not much is known about its stellar content. Previous observations have suggested that NGC 2506 exhibits mass segregation, with the lower mass member stars being more likely to be in the outer parts of the cluster.

In order to shed more light on the stellar populations of NGC 2506, a team of astronomers led by Anju Panthi of the Birla Institute of Technology and Science in Pilani, India, performed multi-wavelength observations of this cluster, mainly using the UltraViolet Imaging Telescope (UVIT) onboard AstroSat.

"We studied an intermediate-age open cluster NGC 2506 using the AstroSat/UVIT data and other archival data," the researchers wrote.

All in all, the study identified 2,175 cluster members of NGC 2506 using a machine learning based algorithm. Among them, nine blue straggler stars (BSS), three yellow straggler stars (YSS) and three red clump (RC) stars were detected.

Furthermore, the astronomers discovered hot companions to three BSS, two YSS and three RC stars and estimated their fundamental properties. They found that these objects are [white dwarfs](#) with masses from 0.2 to 0.8 [solar masses](#) and effective temperatures between 13,250 and 31,000 K.

When it comes to the effective temperatures of BSS stars in NGC 2506, the results show that they vary from 7,750 to 9,750 K, which is consistent with the age of the cluster—about 2 billion years. The temperatures of YSS stars are between 6,500 and 6,750 K, while the temperatures of RC stars were found to be 5,000–5,250 K.

According to the researchers, the results suggest that the [mass transfer](#) in a binary system mechanism is likely to be responsible for the formation of at least 40% BSS and YSS systems in NGC 2506. However, they do not exclude a merger in triple system with close inner binary scenario.

More information: Anju Panthi et al, UOCS –VIII. UV Study of the open cluster NGC 2506 using ASTROSAT, *Monthly Notices of the Royal Astronomical Society* (2022). [DOI: 10.1093/mnras/stac2421](https://doi.org/10.1093/mnras/stac2421)

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