Astronomers investigate open cluster NGC 6530

January 9 2019, by Tomasz Nowakowski

The Lagoon Nebula and NGC 6530 (on the right). Credit: Wikimedia Commons / Rbruels.

Italian astronomers have investigated the young open cluster NGC 6530 by conducting a statistical study of its global properties. The research, which provides important insights on the cluster membership, was

presented in a paper published December 29 on the arXiv pre-print repository.

Open clusters, formed from the same giant molecular cloud, are groups of up to few thousand stars loosely gravitationally bound to each other. Given that stars in open clusters have similar ages, chemical compositions, and distances from the Earth, they serve as excellent laboratories for studies of formation of stars and stellar evolution.

Discovered in the 17th century, NGC 6530 (also known as OCL 19, or ESO 521-SC21) is a young open cluster of a few million years old within the Lagoon Nebula. The cluster is known for its complex morphology and star-formation history.

NGC 6530 contains low-mass stars in their pre-main sequence, which makes them bright X-ray sources due to their active coronae. This allowed researchers to identify a large population of around 2,500 candidate cluster members down to subsolar masses. However, this cluster member list is still incomplete, since each of the methods used in previous studies suffers from some bias.

So a team of astronomers led by Francesco Damiani of Italian National Institute for Astrophysics (INAF) in Palermo, Italy, decided to assemble a highly comprehensive list of candidate members of NGC 6530. Using various methods, the researchers managed to expand the list of candidate cluster members to more than 3,500 stars.

"By combining various techniques for member selection complementary to each other, we have assembled a list of 3,675 candidate NGC 6530 members down to approximately 0.3 solar masses," the astronomers wrote in the paper.

The techniques employed by Damiani's team to determine the cluster

membership include X-ray data, hydrogen-alpha emission, near-infrared and ultraviolet excess from photometric surveys and near-infrared catalogs, as well as astrometry provided by ESA's Gaia satellite. They also used their own method for photometric selection of M-type pre-main-sequence cluster members.

The researchers say that out of the 3,675 candidates, only 711 fulfill more than one membership criterion. However, they estimate that more than 2,700 are genuine NGC 6530 members. "The total net number of NGC 6530 members estimated with all our methods becomes therefore of 2,728 stars, down to 0.2–0.4 solar masses, the exact limit being dependent on individual stellar ages and extinction," the paper reads.

In addition to assembling the list of NGC 6530 members, the astronomers found that the distance to this cluster is about 4,300 light years. They also confirmed the cluster's complex morphology, noting that it has a core containing the bulk of members, and secondary concentrations of members in known regions, as well as anonymous, small groups.

More information: A wide-area photometric and astrometric (Gaia DR2) study of the young cluster NGC 6530. arxiv.org/abs/1812.11402

Citation: Astronomers investigate open cluster NGC 6530 (2019, January 9) retrieved 28 April 2024 from https://phys.org/news/2019-01-astronomers-cluster-ngc.html