Study sheds more light on the properties of open cluster IC 1434

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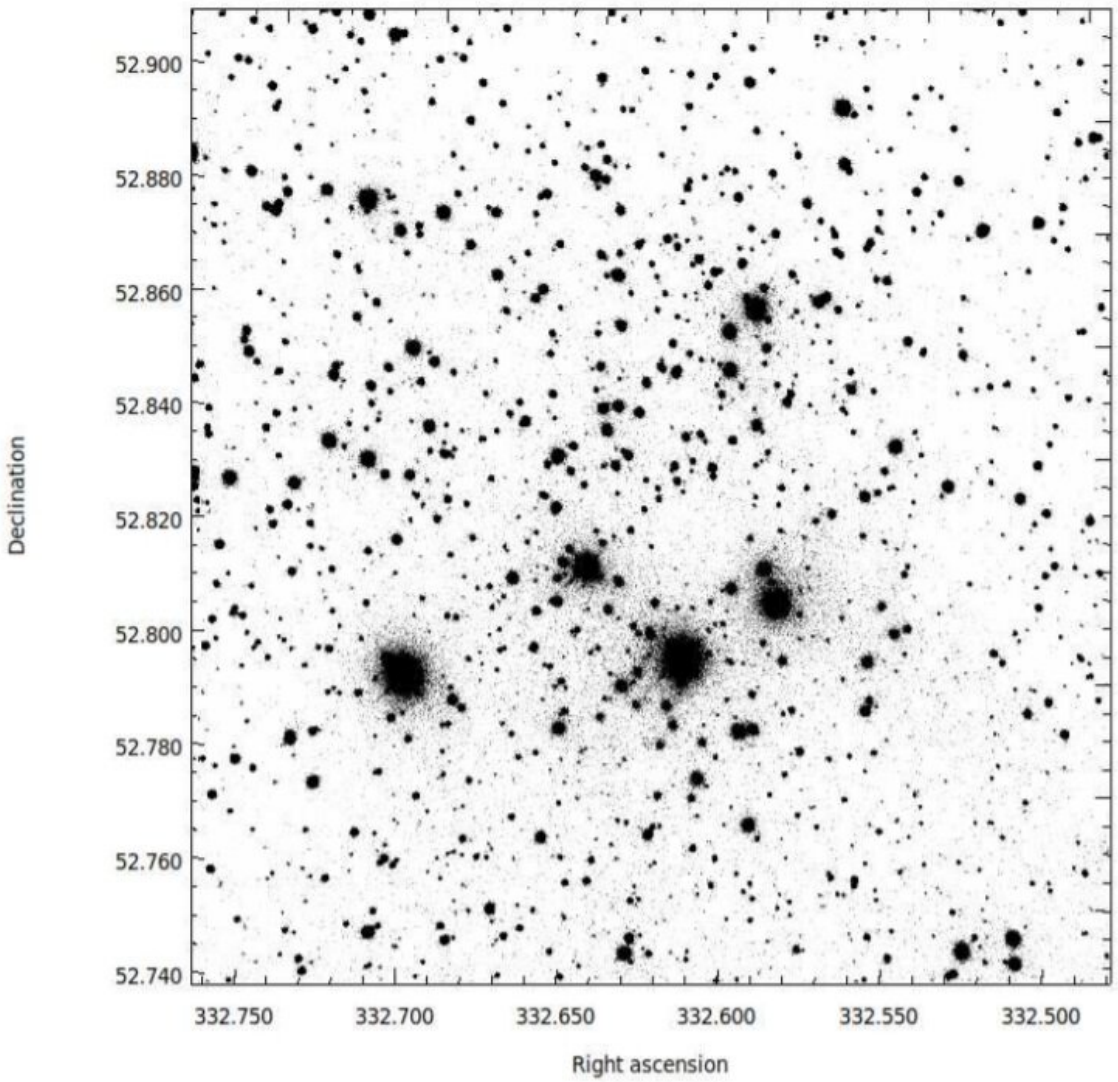

Finding chart of the stars in the field of IC 1434. Credit: Hendy et al., 2021.

Astronomers have performed a detailed photometric and kinematical study of an open cluster known as IC 1434. Results of the research provide essential information regarding the properties of this stellar grouping. The study was detailed in a paper published June 10 on the arXiv pre-print server.

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 9,900 light years away from the Earth, IC 1434 is an intermediate age OC (about 320 million years old) with an interstellar reddening of 0.66. Given that this cluster has been poorly studied in the past, a team of astronomers led by Yasser Hendy of the National Research Institute of Astronomy and Geophysics (NRIAG) in Cairo, Egypt, conducted photometric observations of IC 1434 using the 74-inch Kottamia astronomical observatory (KAO) of NRIAG. The study was complemented by data from the American Association of Variable Star Observers (AAVSO) Photometric All-Sky Survey (APASS) and from ESA's Gaia satellite.

"Our main goal is to accomplish a deep and precise analysis of an intermediate-age open cluster IC 1434 using CCD V RI, APASS, and Gaia DR2 data," the researchers wrote in the paper.

The team managed to estimate the membership probabilities of stars towards the region of IC 1434 and has found 238 members with a membership probability higher than 60 percent. Afterward, those probable members were used to derive the fundamental parameters of

the cluster.

The mean proper motions of IC 1434 were calculated to be −3.89 and −3.34 mas/year in both the right ascension and declination directions, respectively. Based on the radial density profile, the cluster radii was found to be approximately 7.6 arcmins. The obtained values are in accordance with previous studies.

According to the paper, IC 1434 is older and located farther away than previously thought. The study found that the cluster's age is about 631 million years, while its distance is estimated to be some 10,400 light years. The researchers noted that obtained value of the distance is much precise than previous calculations because it is based on good quality optical data along with the high precision Gaia DR2 astrometry.

The interstellar reddening of IC 1434 was measured to be approximately 0.34 mag. Additionally, the density contrast parameter for IC 1434 was calculated to be between 7 and 23. This means that IC 1434 is most likely a relatively sparse cluster.

More information: Study of an intermediate age open cluster IC 1434 using ground-based imaging and Gaia DR2 astrometry, arXiv:2106.07496 [astro-ph.SR] arxiv.org/abs/2106.07496

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