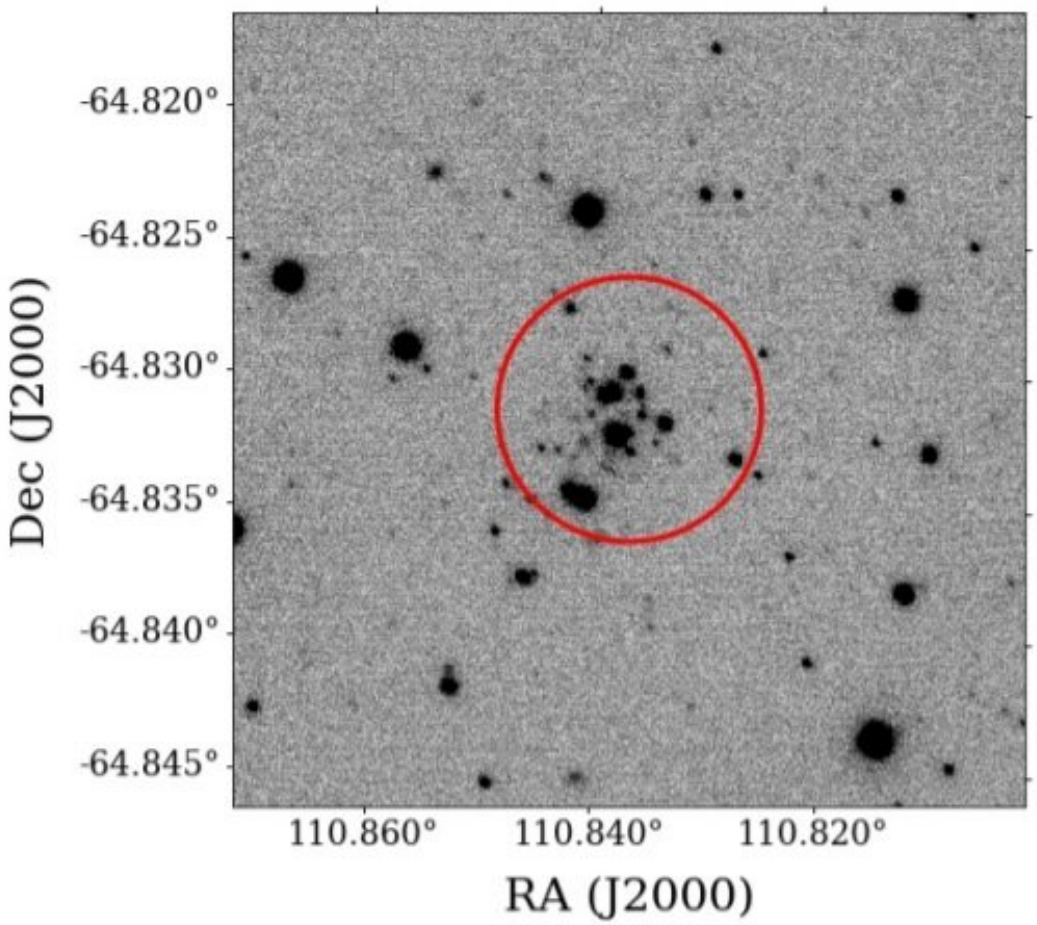
Italian astronomers discover new star cluster

July 29 2021, by Tomasz Nowakowski



G−band sky image of 1.5' × 1.5' in size centered on YMCA-1. Credit: Gatto et al., 2021.

Astronomers from Italy report the detection of a new star cluster as part of the YMCA (Yes, Magellanic Clouds Again) survey. The newly discovered stellar grouping, designated YMCA-1, may be an old and remote star cluster of our Milky Way galaxy. The finding is detailed in a paper published July 21 on the arXiv pre-print repository.

Star clusters are groups of stars sharing common origin and gravitationally bound for some length of time. They are important for astronomers as they can help study and model stellar evolution processes. In general, star clusters are divided into two broad categories: open clusters and globular clusters.

YMCA is an optical survey carried out with the 2.6-m VLT survey telescope (VST), aimed at exploring the outskirts of the Large and the Small Magellanic Cloud (LMC and SMC). One of the goals of YMCA is searching for unknown stellar systems, such as star clusters in the periphery of the LMC and SMC. So far, the survey has found about 80 clusters in the LMC and its surroundings.

Now, a team of astronomers led by Massimiliano Gatto of the University of Naples Federico II in Italy, reports the finding of a new star cluster from the YMCA data. The new cluster, which received designation YMCA-1, was identified during a search for small scale overdensities in the photometric data of the YMCA survey.

YMCA-1 was first spotted as an uncatalogued stellar system placed about 13 degrees to the East of the center of LMC. This stellar overdensity has a significance of 12.2 sigma over the local background and is easily visible as an agglomerate of stars.

The data allowed the team to obtain fundamental parameters of YMCA-1. It was found that the cluster is about 12.6 billion years old and is metal-poor—with a metallicity at a level of -2.0. The system is located

some 342,000 light years away from the center of our galaxy and its half-light radius is estimated to be approximately 15.6 light years.

According to the researchers, the results suggest that YMCA-1 may be an old and remote star cluster of the Milky Way galaxy. If this hypothesis is true it would mean that it has rather unusual properties compared to other star clusters at similar galactocentric distances.

"If this scenario could be confirmed, then the cluster would be significantly fainter and more compact than most of the known star clusters residing in the extreme outskirts of the Galactic halo, but quite similar to Laevens 3. (...) YMCA-1 could be one of the faintest star clusters ever discovered hitherto and definitely the most compact beyond 50 kpc [from the Galactic center]," the authors of the paper explained.

However, follow-up deep photometric observations are required to confirm the nature of YMCA-1 and to reliably estimate its distance.

More information: YMCA-1: a new remote star cluster of the Milky Way?, arXiv:2107.10312 [astro-ph.GA] arxiv.org/abs/2107.10312

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