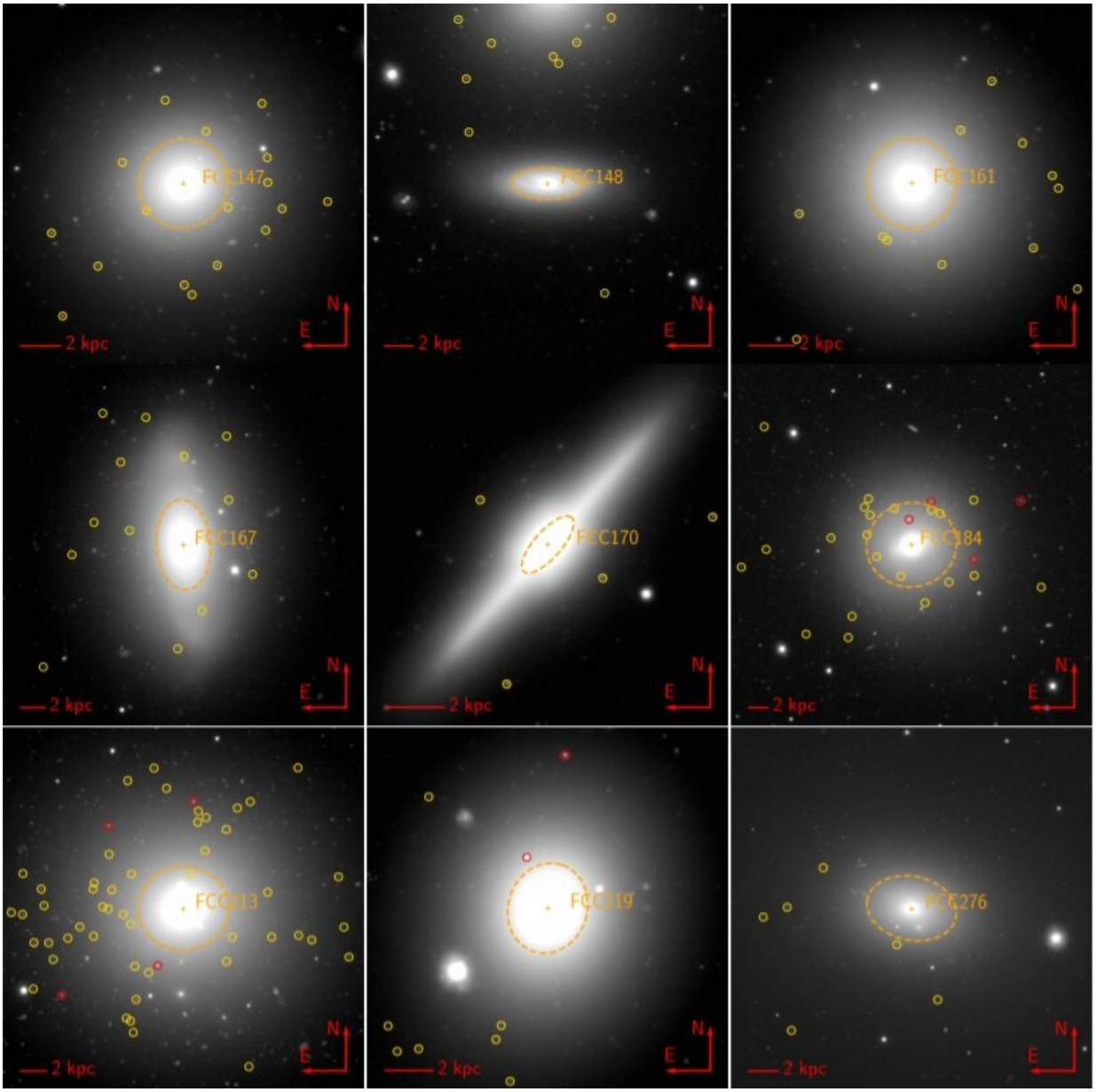
Dozens of ultra-compact dwarf galaxies detected

April 8 2021, by Tomasz Nowakowski



UCD/GCs around the brightest galaxies in the Fornax cluster. Credit: Saifollahi et al., 2021.

Astronomers from the University of Groningen and elsewhere have identified 44 new ultra-compact dwarf galaxies (UCDs). The newly found objects most likely belong to the Fornax Cluster. The discovery is reported in a paper published March 31 on the arXiv pre-print server.

UCDs are very compact galaxies with high stellar populations, containing about 100 million stars. They display masses, colors and metallicities between those of globular clusters and early-type dwarf galaxies. These ultra-compact stellar systems could provide important insights on the formation and evolution of galaxies in the universe.

Located some 65 million light years away from the Earth, the Fornax Cluster is the second-richest cluster of galaxies nearby. Due to its relatively close proximity, it is a valuable source of information about galaxy clusters in general. Previous observations of Fornax Cluster have detected 61 member UCDs in total.

Now, a group of astronomers led by Teymoor Saifollahi of the University of Groningen, the Netherlands, reports the finding of dozens of new potential UCDs that may be associated with the Fornax Cluster. By analyzing the data from the Fornax Deep Survey (FDS), Vista Hemisphere Survey (VHS) and archival datasets from the Visible and Infrared Survey Telescope for Astronomy (VISTA), they identified 44 candidate UCDs in the outskirts of this cluster.

"With the deep optical images of the Fornax Deep Survey, combined with public near-infrared data, we revisit the UCD population of the Fornax cluster and search for UCD candidates, for the first time,

systematically, out to the virial radius of the galaxy cluster," the researchers wrote in the paper.

The team initially selected 220 UCD candidates, and from this broad sample, they chose 44 that have a higher probability of being real UCDs. Almost all of the newly detected UCD candidates are located outside the core of the Fornax Cluster (more than 1,170 light years away from the cluster's center).

According to the paper, almost half of the newfound ultra-compact dwarf galaxies in the outskirts of the Fornax Cluster appear to be intra-cluster UCDs, further away than 650,000 light years from any galaxy in this cluster brighter than -18 mag. The astronomers noted that this group of UCDs may be formed in low-density environments and represent in-falling UCD populations into the cluster.

The study also identified two over-densities of UCDs outside the core of the Fornax Cluster in the northern and western sides, which appear to overlap the enhancements in the densities of dwarf galaxies in this cluster. This finding suggests that the population of UCDs follow the dwarf galaxies in the Fornax Cluster and may form in low-density, pre-processed group environments, what challenges our current models of UCD formation.

The authors of the paper added that follow-up spectroscopy and radial velocity studies are required in order to confirm the membership of the new UCD candidates. Such measurements would also shed more light on the origin of these UCDs.

More information: Ultra-compact dwarfs beyond the centre of the Fornax galaxy cluster: Hints of UCD formation in low-density environments, arXiv:2104.00004 [astro-ph.GA] arxiv.org/abs/2104.00004

Citation: Dozens of ultra-compact dwarf galaxies detected (2021, April 8) retrieved 19 September 2024 from https://phys.org/news/2021-04-dozens-ultra-compact-dwarf-galaxies.html