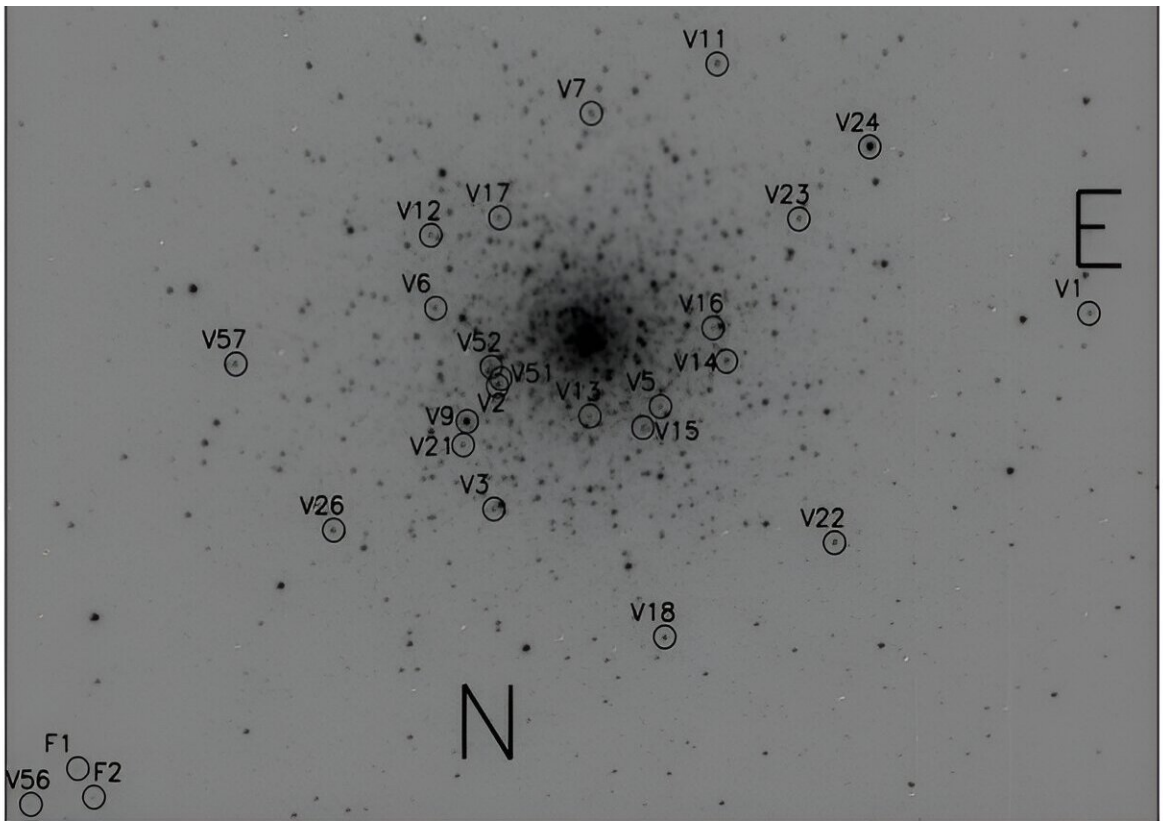
Research investigates variable star population of globular cluster NGC 1851

August 28 2024, by Tomasz Nowakowski



Identification chart of variable stars in the field of NGC 1851. Credit: Ferro et al., 2024.

Astronomers have performed photometric observations of a young globular cluster known as NGC 1851. The new observational campaign

provides more insights into the variable star population of this cluster and validates the membership of these variables. The findings were published August 20 on the pre-print server *arXiv*.

Detecting and studying variable stars could offer important hints into aspects of stellar structure and evolution. Investigation of variables could also be helpful for a better understanding of the distance scale of the universe.

Globular clusters (GCs) are collections of tightly bound stars orbiting galaxies. Astronomers perceive them as natural laboratories enabling studies on the evolution of stars and galaxies. In particular, globular clusters could help researchers to better understand the formation history and evolution of early-type galaxies, as the origin of GCs seems to be closely linked to periods of intense star formation.

NGC 1851 (also known as Caldwell 73) is a remarkably bright, massive GC located some 39,000 light years away from the Earth. The cluster is about 9.2 billion years old, has a metallicity at a level of -1.27 dex, and its mass is estimated to be 551,000 solar masses.

Previous observations of NGC 1851 have found that it contains 48 variable stars of the RR Lyrae type and that it may harbor four or five long period variables near the tip of the red giant branch (RGB).

Therefore, a team of astronomers led by Armando Arellano Ferro of the National Autonomous University of Mexico, decided to explore the population of variables in NGC 1851, hoping to complete the census of these objects in that GC. For this purpose, they employed the Astronomical Observatory of Córdoba in Argentina.

All in all, the observations conducted by Ferro's team found that of the 55 variables of NGC 1851 originally listed in previous variable stars

catalogs, eight have been found to be clearly field stars. Moreover, for six more variables, the membership cannot be confirmed due to the lack of proper motion or to blending with bright neighboring stars.

The observations detected three variables that had not been identified before. However, only one of them, designated V56, turned out to be a cluster member. The researchers classified this star as an SX Phoenicis variable.

Furthermore, the study confirmed the variability of two RR Lyrae of the RRab subtype and three long period variables, which were reported by previous Gaia satellite observations. Given that all five of them were validated as cluster members, they received designations V57–V61.

Based on the light curves of the identified RR Lyrae variables in NGC 1851, the researchers calculated that the metallicity of this cluster is approximately -1.35 dex and that the GC is located at a distance of 38,800 light years.

More information: A. Arellano Ferro et al, The variable stars population of the extended young globular cluster NGC 1851, *arXiv* (2024). DOI: 10.48550/arxiv.2408.11141

Citation: Research investigates variable star population of globular cluster NGC 1851 (2024, August 28) retrieved 28 August 2024 from https://phys.org/news/2024-08-variable-star-population-globular-cluster.html