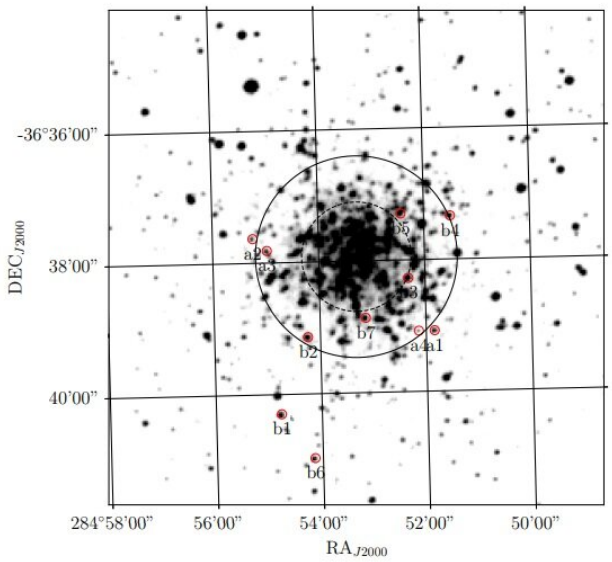
Astronomers conduct chemical investigation of globular cluster NGC 6723

1 July 2019, by Tomasz Nowakowski



Finding chart for the analyzed stars, which are indicated by red circles. The dashed and full line black cirles represent the core and half-light radius, respectively (Harris 1996, 2010 edition). Image from the ESO Digitized Sky Survey.

By analyzing high-resolution spectra for 11 red giant branch (RGB) stars, astronomers have conducted a chemical investigation of the globular cluster NGC 6723. Results of the study, presented in a paper published June 24 on arXiv.org, offer more insights on the chemical enrichment of NGC 6723 and could be important to better understand chemical composition of globular clusters in general.

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. Given that GCs are relatively rare, as there are just over 200 such clusters so far identified in the Milky Way, the hunt for new objects of this type and studying them is essential in order to improve our understanding of our home galaxy.

However, many known GCs still remain poorly studied, especially with regard to heavier elements. This is the case with NGC 6723—a GC about 12.5 billion years old located some 28,400 light years away in the constellation Sagittarius. Although this cluster has been studied photometrically in the past, its history of spectroscopic observations is unsatisfactory, leaving many uncertainties regarding its chemical composition.

A team of astronomers led by Juliana Crestani of the Federal University of Rio Grande do Sul, Brazil, decided to change that. They have performed a detailed spectral analysis of NGC 6723 using high-resolution spectra for 11 RGB stars collected with the Magellan Inamori Kyocera Echelle (MIKE) instrument on one of the twin 6.5 Magellan telescopes, and with the Fibre-fed, Extended Range, Echelle Spectrograph (FEROS) at the MPG/ESO 2.2-meter telescope. This allowed them to investigate abundances of a variety of species, including light, alpha, iron-peak and neutron-capture elements in the selected sample of stars.

"In the present work, we have obtained abundance estimates for variety of chemical species with a sample of 11 RGB stars," the astronomers wrote in the paper.

The research found a mean metallicity at a level of about ?0.93, with a star-to-star spread of around 0.05 dex. The typical alpha enrichment was measured at approximately 0.39, which follows the trend of metal-poor and metal-intermediate globular clusters.

The astronomers noted that the same trend was observed also for light metals, iron-peak, s/r-process elements and for the anticorrelation: Na-O and Mg-Al. The findings seem to suggest that the chemical enrichment of NGC 6723 is typical for

metal-intermediate GCs.

"The current findings further support the evidence that the chemical enrichment of NGC 6723 is more in line with metal-intermediate GCs and their lower metallicity counterparts, and it does not bring forward the prodrome of the metal-rich regime," the researchers concluded.

They added that the results put NGC 6723 right at the edge between the low and high metallicity regimes that correlate strongly with horizontal-branch morphology.

More information: Juliana Crestani, et al. Chemical abundances in the metal-intermediate GC NGC 6723. arXiv:1906.09824v1 [astro-ph.SR]: arxiv.org/abs/1906.09824

APA citation: Astronomers conduct chemical investigation of globular cluster NGC 6723 (2019, July 1) retrieved 28 November 2020 from https://phys.org/news/2019-07-astronomers-chemical-globular-cluster-ngc.html