

The Gaia-ESO Survey Mg-Al anti-correlation in iDR4 globular clusters

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Abstract

We use Gaia-ESO (GES) Survey iDR4 data to explore the Mg-Al anti-correlation in globular clusters that were observed as calibrators, as a demonstration of the quality of Gaia-ESO Survey data and analysis. The results compare well with the available literature, within 0.1 dex or less, after a small (compared to the internal spreads) offset between the UVES and GIRAFFE data of 0.10-0.15 dex was taken into account. In particular, for the first time we present data for NGC 5927, which is one of the most metal-rich globular clusters studied in the literature so far with $[Fe/H] = -0.39 \pm 0.04$ dex; this cluster was included to connect with the open cluster regime in the Gaia-ESO Survey internal calibration. The extent and shape of the Mg-Al anti-correlation provide strong constraints on the multiple population phenomenon in globular clusters. In particular, we studied the dependency of the Mg-Al anti-correlation extension with metallicity, present-day mass, and age of the clusters, using GES data in combination with a large set of homogenized literature measurements. We find a dependency with both metallicity and mass, which is evident when fitting for the two parameters simultaneously, but we do not find significant dependency with age. We confirm that the Mg-Al anti-correlation is not seen in all clusters, but disappears for the less massive or most metal-rich clusters. We also use our data set to see whether a normal anti-correlation would explain the low $[Mg/\alpha]$ observed in some extragalactic globular clusters, but find that none of the clusters in our sample can reproduce it; a more extreme chemical composition, such as that of NGC 2419, would be required. We conclude that GES iDR4 data already meet the requirements set by the main survey goals and can be used to study globular clusters in detail, even if the analysis procedures were not specifically designed for them.

Keywords

Surveys, Stars abundances, Globular clusters general, Globular clusters individual NGC 5927