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Iron-peak elements Sc, V, Mn, Cu, and Zn in Galactic bulge globular clusters

Globular clusters are tracers of the history of star formation and chemical enrichment in the early Galaxy. Their abundance pattern can help understanding their chemical enrichment processes. In particular, the iron-peak elements have been relatively little studied so far in the Galactic bulge.
Methods. The main aim of this work is to verify the strength of abundances of iron-peak elements for chemical tagging in view of identifying different stellar populations. Besides, the nucleosynthesis processes that build these elements are complex, therefore observational data can help constraining theoretical models, as well as give suggestions as to the kinds of supernovae that enriched the gas before these stars formed.
The abundances of iron-peak elements are derived for the sample clusters, and compared with bulge field, and thick disk stars. We derived abundances of the iron-peak elements Sc, V, Mn, Cu, and Zn in individual stars of five bulge globular clusters (NGC 6528, NGC 6553, NGC 6522, NGC 6558, HP 1), and of the reference thick disk/or inner halo cluster 47 Tucanae (NGC 104). High resolution spectra were obtained with the UVES spectrograph at the Very Large Telescope over the years. Conclusions. The sample globular clusters studied span metallicities in the range -1.2<~[Fe/H]<~0.0. V and Sc appear to vary in lockstep with Fe, indicating that they are produced in the same supernovae as Fe. We find that Mn is deficient in metal-poor stars, confirming that it is underproduced in massive stars; Mn-over-Fe steadily increases at the higher metallicities due to a metallicity-dependent enrichment by supernovae of type Ia. Cu behaves as a secondary element, indicating its production in a weak-s process in massive stars. Zn has an alpha-like behaviour at low metallicities, which can be explained in terms of nucleosynthesis in hypernovae. At the metal-rich end, Zn decreases with increasing metallicity, similarly to the alpha-elements.

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