
# Probing atomic diffusion in the globular cluster NGC6397 using VLT/FLAMES-UVES data

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## Abstract

Atomic diffusion represents a physical process that operates inside stars, where atoms can be brought to the surface (radiative acceleration) or sink to the core (gravitational settling). It has been theorized for over a century, and later incorporated into solar and other stellar models. This process is expected to show larger effects in warm, metal-poor stars due to their thinner convective envelopes, and was first confirmed observationally in the globular cluster NGC 6397. Our work is a reanalysis of high-resolution VLT/FLAMES-UVES spectra of NGC 6397, in order to test the developing abundance determination software webSME, and to search for abundance signatures of atomic diffusion in elements not previously studied in this context. The data consists of 18 stars in different evolutionary stages, from the turn-off point (TOP) to the red giant branch (RGB). The elements Fe and Ba were re-analyzed in this framework and showed good agreement with literature results. The other elements investigated (Na, Mn, and Ni) are present in theoretical models but had not been analyzed before in this context. For Na and Mn, we did not find diffusion trends, due to severe blending of the spectral lines and a lack of suitable lines for measurement. For Ni, however, we found a clear abundance trend with a variation of ~ 0.2 dex from the TOP to the RGB stars, in both LTE and NLTE, that agrees very well with theoretical predictions. We also performed a re-analysis using a hotter temperature scale, which confirmed the consistency of our results. Therefore, this work presents the first evidence of an atomic diffusion trend for nickel in the globular cluster NGC 6397, confirming a theoretical prediction in an element not previously analyzed in this context.