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SPECTRAL ANALYSIS OF A AND F DWARF MEMBERS OF THE OPEN CLUSTER M6: PRELIMINARY RESULTS

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Abstract. We present the first abundance analysis of CD-32 13109 (NGC 6405 47), member of the M6 open cluster. The photospheric abundances of 14 chemical elements were determined by comparing synthetic spectra and observed spectra of the star. Findings show that this star should be an Am star.

Keywords: stars: abundances, stars: chemically peculiar, open clusters and associations: individual: M6

1 Introduction

M6 (=NGC 6405, age = 100×10^6 yrs) is an open cluster located about 500 pc away in the constellation Scorpio. The first photometric study of M6 including numbering system was performed by Rohlfs et al. (1959). In order to constrain physical processes such as radiative-gravitional settling and/or turbulence diffusion, previous abundance analysis of stars in open clusters have been performed by several authors, e.g. Varenne & Monier (1999), Monier (2005), Gebran et al. (2008), Gebran & Monier (2008). We have started to analyse the spectra of A and F type dwarf members of M6. We present detailed abundance determination of the star CD-32 13109 (NGC 6405 47) whose lines are sharp.

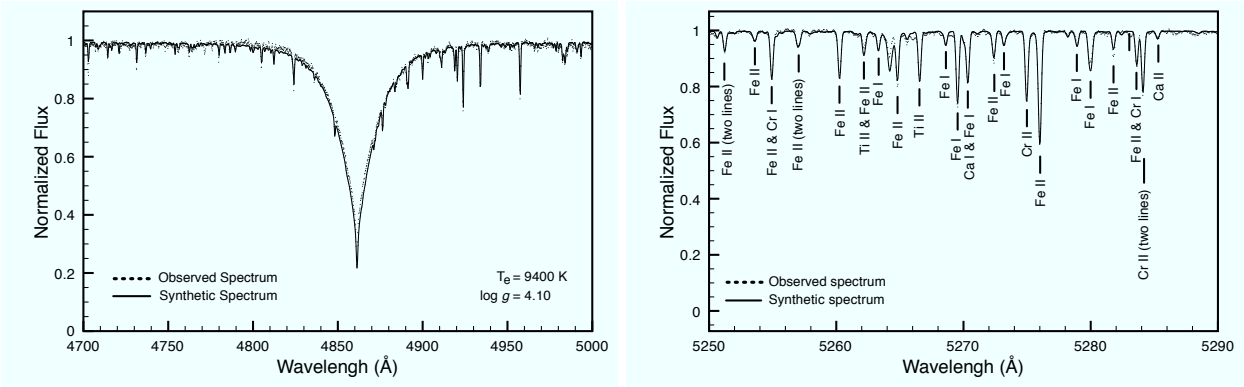

Fig. 1. Left: Comparison of the observed and the synthetic H_β profiles **Right**: Comparison of the observed and synthetic spectrum between 5250 Å and 5290 Å for [Fe/H] = 0.28 dex

2 Observations

The program stars have been observed using the FLAMES/GIRAFFE spectrograph with the MEDUSA fibers, mounted at UT2 (Kueyen), the 8 meter class VLT telescope in May and June, 2007. The spectral regions cover three wavelengh intervals: 4500 - 5100 Å, 5140 - 5350 Å and 5590 - 5840 Å at resolving powers of about 7500, 25900, 24200, respectively.

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3 Atmospheric Parameters

Initial atmospheric parameters of 42 stars were derived from Geneva seven-color photometry measurements (WEBDA) using the CALIB code described in Kunzli et al. (1997). A reddening E(B2-V1) value of 0.13 ± 0.01 was adopted. In order to check the effective temperature and surface gravity derived from photometry, we compared the observed H_β profile of CD-32 13109 with synthetic models calculated with SYNSPEC48 (Hubeny & Lanz 1992). Finally, we adopted the values of T_e = 9400 K and log g = 4.10 for the star (Fig. 1, left).

4 Abundance Determinations

In order to obtain rotational broadened synthetic spectrum, the rotational velocity of 6.5 km s^{-1} is derived from the Fe II 5254.959 Å line. The photospheric abundances of 14 chemical elements of CD-32 13109 were derived by synthesizing unblended or weakly blended lines using SYNSPEC48 with ATLAS9 model atmospheres (Kurucz 1979). A sample of high resolution region is shown in Fig. 1, right. The comparison of the synthetic (solar) and the observed spectrum clearly establishes a Sc deficiency (Fig. 2, left).

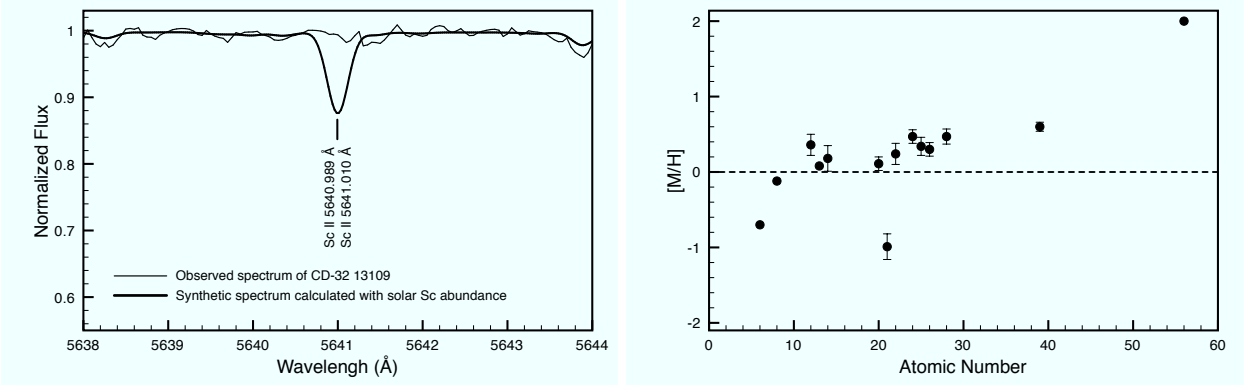

Fig. 2. Left: The difference between the observed spectrum and synthetic spectrum calculated for a solar Sc abundance **Right**: The derived atmospheric elemental abundances with respect to solar for CD-32 13109

5 Results

For CD-32 13109, the derived abundances (Fig. 2, right) for Mg and heavier atoms are greater than solar except for Sc which is very underabundant (-1.00 dex). We found striking overabundances (higher than 0.4 dex) for Cr, Ni, Y, and probably for Ba with respect to solar. Altogether these findings strongly suggest that this star is an Am star. The ongoing analysis of the other member stars will allow us to address the chemical heterogeneity (star to star variations) of A stars in this open young cluster.

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