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SPECTRAL INVESTIGATION OF NEW CANDIDATS TO LAMBDA BOOTIS TYPE STARS

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Abstract. We made detailed abundance analysis for ultimative test of membership of twenty λ Bootis type stars candidates. Atmosphere parameters, LTE abundances for ten elements (including C and O) and NLTE values for Na were determined. We are able to confirm or establish the membership for nine objects (HD23258, HD36726, HD40588, HD74911, HD84123, HD91130, HD106223, HD111604 and HD290799). Six stars (HD90821, HD98772, HD103483, HD108765, HD201184 and HD261904) can be definitely ruled out as being member of the λ Bootis group whereas no ambiguous decision can be drawn for another five stars (HD66684, HD105058, HD120500, HD141851 and HD294253). We also tryed to find apparent spectroscopic binaries which have two solar abundant components mimic one metal-weak star as proposed by Faraggiana and Bonifacio (1999).

1 Introduction

Group of λ Bootis type stars consists of Population I, metal poor (except C, N, O and S elements which have almost solar abundance), non-magnetic, late B to early F-type dwarfs. They fall into two classes with normal (NHL) and peculiar (PHL) hydrogen profiles with weak cores and broad but often shallow wings, have a weak λ4481 lines and high $v\ sin\ i$. Some of them have IR excesses and strong absorption features in IUE spectra. According to Venn and Lambert (1990) accretion theory, the chemical peculiarity of λ Bootis stars originates from the presence

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of a circumstellar shell (most likely a remnant of the star formation). Depleted gas from the circumstellar envelope consist of CNO and S elements is accreted by the star while elements with higher condensation temperature accumulate in the dust grains.

2 Observation and abundance analysis

In our previous work Paunzen et al. (1999) we determined accurate LTE abundances for 7 well established λ Bootis stars. We compared abundances of our candidates with two MK standard stars and abundance pattern from our previous paper. High resolution and high S/N CCD spectra have been obtained at four sites. The effective temperatures and surface gravities were estimated using the Strömgren photometric indices checked with additional calibrations in the Geneva system. We obtained LTE abundances and rotational velocities by using method of synthetic spectra, the atmosphere models of Kurucz and atomic data from the Vienna Atomic Lines Database (Kupka et al. 1999). For all the program stars we adopted V_t=2.5 km s^{-1}.

3 Conclusions

Future investigations should concentrate on establishing homogenity of the group of λ Bootis (candidates should show the most of common properties), clarification of the main physical processes responsible for its phenomenon by analysing of parameters (abundance pattern, behaviour in the infrared etc.), improving theory of λ Bootis forming by taking all observational results and evolutionary status of group's members into account. Precise IR spectroscopic and photometric observation of λ Bootis is nesessary for understanding the physico-chemical processes of accretion and diffusion in their circumstellar gas and dust discs and chemical anomalies on a surfaces, possible discovering of binaries among them.

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