

SPECTROSCOPIC STUDIES OF 89 HER AND HD 161796

Sunetra Giridhar
Indian Institute of Astrophysics
Bangalore 560034, India
A.A.Ferro and L.E.Parrao
National University of Mexico
Dept. of Astronomy, Mexico City

ABSTRACT. We have studied the spectra of UU Her stars 89 Her and HD 161796 in the red spectral region. The atmospheric parameters are derived using model atmospheres and spectrum synthesis. LiI line at 6707.8 Å is identified and measured in 89 Her leading to $\log(\text{Li}/\text{H}) = 2.3$. The variation of the H α line profile for these stars is also discussed.

INTRODUCTION

89 Her and HD 161796 are members of a group of semi-regular variables that are seen at large galactic latitudes. General behaviour of these stars is summarized by Sasselov (1984). Infrared excess has been reported for these two stars by Parthasarathy and Pottasch (1986). We felt the need for detailed spectroscopic investigation of these objects; our preliminary results are reported here.

OBSERVATIONS

The high resolution spectra covering a spectral range 5600–7000 Å were taken by one of us (AAF) at DDO using 1.88 m reflector during 1981. Spectroscopic reductions were done at IIA, Bangalore, using RESPECT software (cf Prabhu et al. 1987).

RESULTS AND DISCUSSION

The spectra of these objects resemble those of F type supergiants with strong FeII and SiII lines. The most interesting feature in the spectrum of 89 Her is LiI line at 6707.8 Å. Figure 1 shows the spectral region around LiI line. Figures 2 and 3 show H α line profile variation for HD 161796 and 89 Her. P Cygni nature of the profile is obvious in the case of 89 Her with emission component seen in longer wavelength wing of the line suggesting a scattering envelope. Also the deep absorption core indicating a large optical depth might have been caused by extended atmosphere or circumstellar shell. HD161796 does not display emission component but a sharp

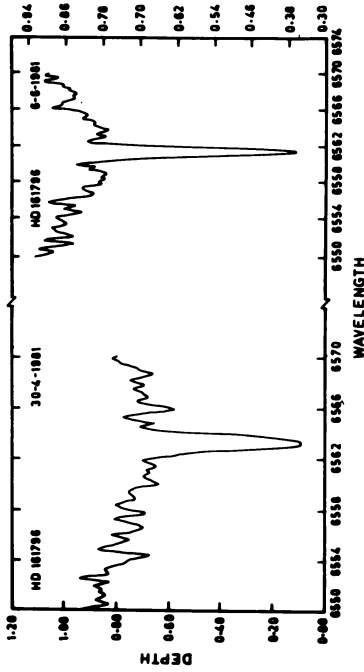


Fig. 1: The spectrum of 89 Her around Li I line.

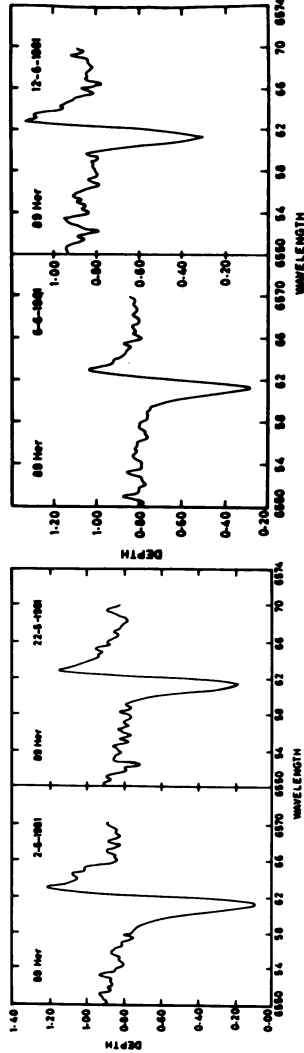


Fig. 2: The H α line profile variation for HD 161796.

Fig. 3: The H α line profile variation for 89 Her.

narrow absorption superposed on a broad absorption suggests a shell structure.

Our spectroscopic method of deriving atmospheric parameters is described in detail elsewhere (Giridhar 1984). We derive $T_{\text{eff}} = 6000 \text{ K}$, $\log g = 0.5$ and $V_t = 4.5 \text{ km s}^{-1}$ for 89 Her and $T_{\text{eff}} = 5600 \text{ K}$, $\log g = 1.5$ $V_t = 4.0 \text{ km s}^{-1}$ for HD 161796. It was easier to measure equivalent width of LiI line in the spectrum of 89 Her because the neighbouring lines FeI 6707.441 and VI 6708.1 are very weak in such low gravity stars. In the case of HD 161796, due to relatively lower temperature and higher gravities the LiI line is hopelessly blended making equivalent width measurement impossible.

TABLE 1. DERIVED ABUNDANCES FOR DIFFERENT ELEMENTS

Element	No. of lines used	89 Her	HD 161796
Li/H	1	2.3	
Al/H	2	6.8	6.6
Si/H	4	7.57 ± 0.16	7.4 ± 0.2
S/H	2	7.12	7.3
Ca/H	4	6.2 ± 0.18	6.1 ± 0.25
Fe/H	26	7.57 ± 0.15	7.48 ± 0.16

As is obvious from the table 1 we find almost solar abundance for Si, S, Ca and Fe. Al shows marked overabundances in 89 Her but a marginal one for HD 161796.

It would be of interest to derive Li abundances for other members of UU Her stars and also to look for a correlation between Li/H and $^{12}\text{C}/^{13}\text{C}$ to understand the evolutionary status of these objects.

REFERENCES

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DISCUSSION

GRATTON The abundance of Al seems quite high. May you comment?

GIRIDHAR The derived abundance is indeed quite high. But the present estimate is based on only two lines. It would be nicer including more number of lines to improve the accuracy of abundance estimates.