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A NEW SHELL STAR : HD 50845

The star HD 50845 (KO) = BD $-1^{\circ}1447$ = SAO 133883 ($\alpha_{1950}=6^{h}52^{m}16^{s}.57$, $\delta_{1950}=-1^{\circ}13'05''.3$, $m_v=8.2$) was observed by us with the 1.50 m-coudé spectrograph of the Cerro Tololo Interamerican Observatory, in Chile, on February 18 and 19, 1984 (UT). The material obtained - which was rather weak - is listed in Table I. The plates were calibrated by means of a spot sensitometer.

Table I

Spectrograms of HD 50845

Date (UT)# JD (2,445,000+)	Exposure Time (minutes)	Emulsion (Kodak)	Dispersion* (A mm^{-1})
748.633	177	IIIa-F	18.6/37.2
748.738	99	098-04	18.6/37.2
749.665	289	IIa-0+098-04	9.0/18.0

\# Mid-exposure
* second order blue (3900-5000 A)/first order red (5700-7000 A)

The striking feature on our spectra of HD 50845 is that Hα displays a complex structure (see Fig. 1): a broad, shallow absorption line with superimposed incipient emission cut into by a strong, deep, sharp absorption core.

If we compare our spectra of HD 50845 with the reproductions of stellar spectra published in An Atlas of Representative Stellar Spectra (Yamashita et al. 1977), we find that the former resembles that of a KO Ib object. The strongest lines correspond to Fe I, Ca II and Na I - which are sharp - and to H. The lines of Ca II display the deepest cores.

The radial velocity values that we have derived from our material are given in Table II. The mean square errors have been estimated in around $\pm$ 4 km s^{-1}.

The line profiles of most of the spectral lines, the radial velocity behavior and the fact that the Fe I lines arising from metastable levels are the most conspicuous ones, suggest that the spectrum of HD 50845, at least in the region represented on our plates, is that of a shell. In consequence,

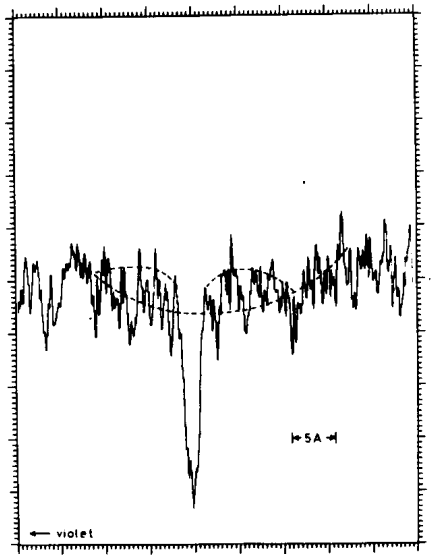

Figure 1: The Hα profile in the spectrum of HD 50845. We have schematically drawn the broad absorption and the incipient emission that appear to be present.

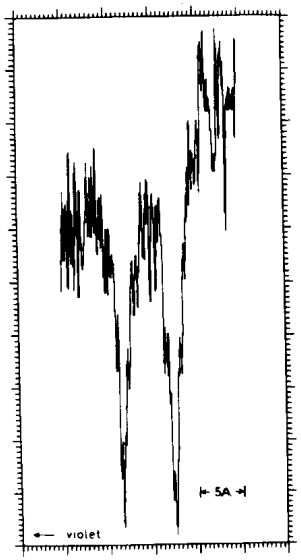

Figure 2: The Ca II-K and H lines in the spectrum of HD 50845. Each profile suggests the presence of a broad absorption component in addition to the sharp core.

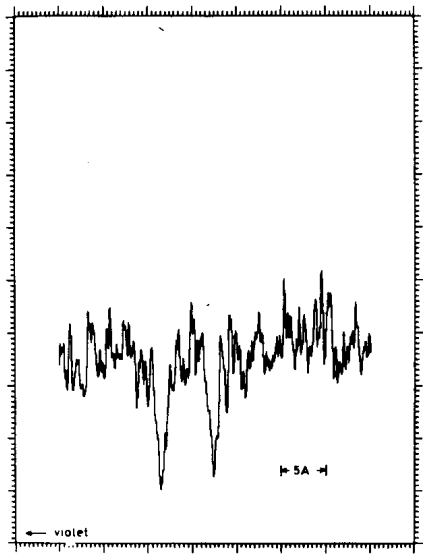

Figure 3: The Na I-D lines in the spectrum of HD 50845.

the KO spectral classification assigned to the object does not correspond to a star, it merely describes, in a rough way, the physical characteristics of the shell around HD 50845.

Table II

Radial Velocities of HD 50845

Element/Feature	Radial Velocity ($km\ s^{-1}$)	
Hα sharp core	+10.4	
Hγ sharp core	+ 7.9	
Fe I	+10.4	average of 8 values
Na I	+ 3.9	
Ca II	-10.1	

The stellar spectrum appears to be represented by the broad Hα absorption, which seems to be red-displaced by approximately 1 A with respect to the laboratory position. There is also some indication of a broad stellar component at Ca II (see Fig.2). It seems ,therefore, in order to conclude that the stellar object is probably on the main sequence or quite close to it; as for its spectral type, it ought to be earlier than KO.

Figure 3 illustrates the Na I-D lines.

An attempt will be made to secure better exposed spectra of HD 50845 to improve our knowledge of the object.

We are indebted to the Director and staff of the Cerro Tololo Interamerican Observatory for their hospitality and efficient help that permitted us to secure the observations reported here. We are also indebted to the Centre de Données Stellaires, Strasbourg, for informing us of the lack of previous spectroscopic studies of the star. Mrs.Margarita Trotz kindly prepared the illustrations.

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Reference :
Yamashita,Y., Nariai,K., and Norimoto,Y. 1977, An Atlas of Representative Stellar Spectra (U. of Tokyo Press).