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INVERSE P Cyg PROFILE OF $H\alpha$ IN THE SPECTRUM OF THE RED
GIANT HD 139216 = τ^4 Ser

The star HD 139216 = τ^4 Ser is an irregular variable of spectral class M 5 III with a light change of $m_{pg}=7^m.5-8^m.5$ according to Kukarkin et al. (1970). In 1977 Sato et al. (1978) found an unusually wide absorption $H\beta$ line and an inverse P Cyg profile of the $H\alpha$ line in the spectrum of τ^4 Ser. It is interesting that earlier Jennings and Dyck (1972) did not notice any emission feature in the $H\alpha$ line.

With the purpose of expressing possible further profile changes of the $H\alpha$ line in the τ^4 Ser spectrum, in 1979 we obtained a series of spectrograms in the region around $H\alpha$ with a dispersion of 20 Å/mm. The spectra were obtained in the Cassegrain focus of the 125-cm reflector of the Crimean Station of the Sternberg Astronomical Institute with the help of a grating spectrograph with an image tube. Ten spectrograms of the standard star HD 134943 of the spectral class M4III were also obtained. The dates of the observations and the number of the spectrograms for the variable and the standard star are:

Date of observation	τ^4 Ser	HD 134943
31.III-1.IV.1979	8	~
5-6.IV.1979	8	4
26-27.VI.1979	5	2
27-28.VI.1979	2	2
28-29.VI.1979	3	2

All of these 26 spectrograms of τ^4 Ser, analogically to the results obtained in 1977 by Sato et al. (1978), show an inverse P Cyg profile of the $H\alpha$ line with faint emission and absorption components. Noticeable significant changes in the intensity of the emission-absorption components during our observations

were not established.

For qualitative measurements the spectrograms of the standard star HD 134943 and the best quality spectrograms of the variable star τ^4 Ser were registered in density with the help of the microdensitometer "Youce-Loeble" of the National Astronomical Observatory of Bulgaria (Rojen). From the microdensitometer registrations we obtained the wavelengths for the maximum and minimum of the reverse P Cyg profile. In all measurements, corrections have been made for the terrestrial orbital motion. With the help of the absorption $H\alpha$ line in the spectrum of the standard HD 134943 a radial velocity of $V_r = -46 \pm 1$ km/sec was obtained. In the catalogue by Wilson (1953) the radial velocity of the standard is $V_r = -34.7 \pm 1.2$ km/sec, from where we derived the correction $\Delta V_r = +11$ km/sec in order to reduce our measurements to Wilson's system. For the $H\alpha$ line in the τ^4 Ser variable spectrum in Wilson's system we obtained $V_r = -205 \pm 9$ km/sec for the emission component and $V_r = +6 \pm 4$ km/sec for the absorption component of the inverse P Cyg profile.

The radial velocity of the absorption component coincides practically with the one defined by Sato et al. (1978). As to the emission component our measurements present a significantly greater negative radial velocity in comparison with the one defined by these authors ($\Delta V \approx 80$ km/sec).

Probably, a certain part of this difference may be explained by the different methods of elaboration of the spectrograms, but in its larger part, it seems, that there is a real change of the emission component radial velocity during the time. This conclusion conforms to the fact that the previous observations made by Jennings and Dyck (1972) did not show the presence of $H\alpha$ emission in the τ^4 Ser spectrum.

The τ^4 Ser star is an interesting peculiar object. The investigation of its physical nature requires a more thorough photometric and spectroscopic study.

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References:

- Jennings, M.C., and Dyck, H.M., 1972 *Astrophys. J.*, **177**, 427
Kukarkin, B.V., et al., 1970, *Gen. Cat. Var. Stars*, Moscow
Sato, K., et al., 1978, *Publ. Astron. Soc. Japan*, **30**, 557
Wilson, R.E., 1953, *Gen. Cat. Stellar Radial Velocities*, Washington D.C.