

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 2610

Konkoly Observatory
Budapest
19 October 1984
HU ISSN 0374 - 0676

RECENT CHANGES IN THE SPECTRUM OF CH CYG

Spectroscopic observations of CH Cyg have been carried out by many astronomers and are widely discussed in papers since the 1977 outburst. The reason for that is that the star shows the longest period of its high activity with characteristic increase in brightness and with appearance of spectral features like those in symbiotic stars.

In December, 1979 regular observations of CH Cyg were started using the coude spectrograph of the 2 m telescope at the National Astronomical Observatory (NAO) of the Bulgarian Academy of Sciences. The observations cover the spectral range from 3500 Å to 9000 Å with dispersion 4 and 9 Å/mm in the blue and 18 Å/mm in the red and infrared region. Some of the results have been published already (Luud et al., 1982 and Tomov and Luud, 1984).

Recently, however, the star has shown significant changes in its radiation. From the end of July till the middle of August 1984 its brightness decreased. It was $V = 6^m.58$, $B-V = +0^m.45$ and $U-B = -0^m.94$ on August 1, and $V = 6^m.82$, $B-V = +0^m.48$ and $U-B = -0^m.98$ on August 14, 1984 (Luud, 1984).

Comparing the spectra obtained at NAO considerable changes can be seen after July, 1984. The intensity of the superimposed blue continuum has been strongly decreased. This follows from the fact that the TiO molecular bands (4584 Å, 4626 Å, 4667 Å, 4762 Å), practically invisible in the older spectra, are clearly present and increasing in intensity on the plates of August and September 1984. The strongest absorption line in the M6 III star, viz. the Ca I 4227 Å, is filled up by the hot continuum and shows only a deep and narrow shell-component, which is clearly visible now (central depth is about 0.6 on September 30).

Strong changes in the line spectrum of CH Cyg are also seen. The Balmer series is represented by clearly visible profiles up to H_{18} , being very wide and expanded to about 2000 km/s for H_{δ} and 2500 km/s for H_{β} . In Figure 1

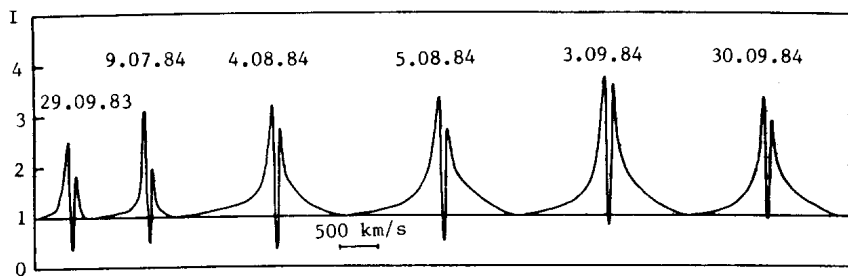


Figure 1

some earlier and recent profiles of H_{α} are compared.

Lines of He I (3820 A, 4026 A, 4471 A, 4713 A, 5876 A) are present now with increasing intensity and significant width. The Fe II emissions are strong and have one component. The absorption components of Fe II, which were from time to time ones of the strongest features in the spectrum of the star in the last years, completely disappeared.

The forbidden lines have appeared increasing both in number and intensity. In addition to the [FeII] lines, [O I], [Ni II], [Cu II], [S II] are also present. It is interesting to point out the appearance of the lines [Ne III 1] 3869 A and [O III 2] 4363 A on September 3, the intensity of which were strengthened on September 30.

On the other side, the absorption spectrum is characterized by the increased intensity of the neutral metals, approaching to the M6 III spectrum. In addition to the mentioned lack of Fe II absorptions, a very strong weakening of Ti II lines occurs, especially longward 3647 A. On the contrary, Fe I absorption lines are steadily strengthening. The Sc II, Sr II, V II, Cr I, Mn I, Mg I are strongly developed, too. The Ca II H and K lines show few components with different intensity. The Na I doublet lines have inverse P Cyg profiles.

The facts mentioned above, the decreasing brightness of the star and the intensification of the features characteristic of an M6 III spectrum suggest that the active phase of CH Cyg started in 1977 is probably over.

T. TOMOV

Department of Astronomy with
National Astronomical Observatory
Bulgarian Academy Sciences.

References:

- Luud, L., 1984, private communication.
Luud, L., Tomov, T., Vennik, Y., Panov, K., 1982, Soviet Astr. Letters, 8.No. 8
Tomov, T., Luud, L., 1984, Astrofizika, 20. No.1