COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1918

Konkoly Observatory
Budapest
1981 February 3
HU ISSN 0374-0676

HONDA'S VARIABLE IN CYGNUS: A NEW LONG PERIOD VARIABLE

Following Honda's discovery of a probable nova in Cygnus on 198o November 29 (Honda, 198o), a spectroscopic program was initiated at the Kavalur Observatory. The spectra reveal that this star is not a nova but a long period variable of type M4e.

The spectrograms were obtained between 198o December 8 and 1981 January 5. An image tube spectrograph was used at the Cassegrain focus of the 102cm reflector at the Kavalur Observatory. Most of the spectra were recorded at a low dispersion of $400 A mm^{-1}$ since a spectroscopic programme on the recent supernovae in NGC 6946 and 1316 was in progress (Prabhu, 1981). However, one spectrogram was obtained at a higher dispersion of $65 A\ mm^{-1}$ on 1981 January 4.61 UT to facilitate detailed analysis. This spectrogram covers the wavelength region of 4200A-6200A while the lower dispersion spectrograms cover 4200A-8400A.

Even as the first spectrum was recorded, the prominent molecular bands and the sharp emission lines of hydrogen showed this star to be a red variable and not a nova. Subsequent observations at higher dispersion allow us to classify the spectrum. A density plot of this spectrogram in the region of 4800A-6200A appears in the figure. The plot is digitally averaged over ten sampling intervals of 8 μm each. The narrow emission line of H_β and the absorption bands of TiO have been labelled in the figure. The identifications have been made following Merrill (1940), Merrill, Deutsch and Keenan (1962) and Keenan and McNeil (1976).

The prominence of TiO bands and the absence of ZrO bands show that this variable has a spectral type of M. The 5736A band of VO_1 a characteristic of stars later than M6, is not visible in the spectrum. The TiO α System at 5759A (0,2) and 5810A (1,3) are clearly visible and hence the spectrum cannot be of type earlier than M3. The strengths of the above bands and also the

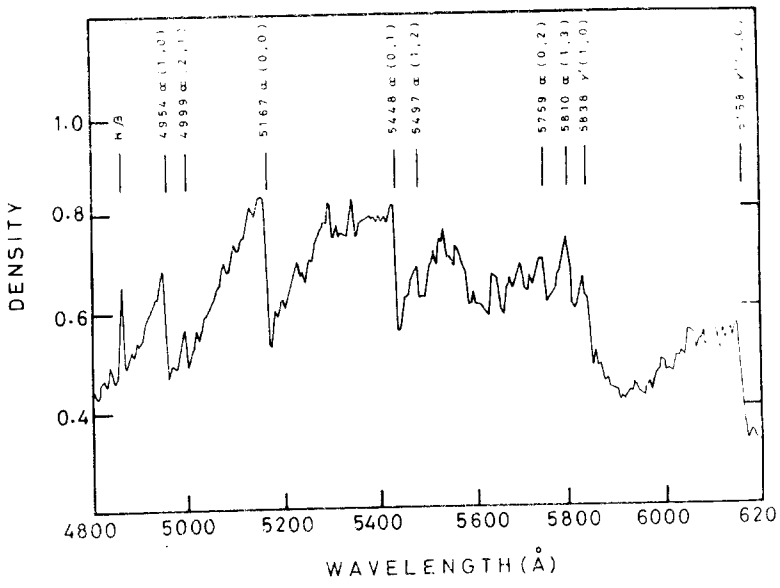
bands at 5448A (0,1) and 5497A (1,2) belonging to the same system indicate a spectral type of M4.

Though the region between H_β to H_γ has a lower exposure on our spectrogram, a few more features could definitely be identified by us as also the Balmer emission lines seen in our spectrograms appear in Tables I and II.

Table I

Emission Lines

6563A	H_α
4861A	H_β
4303A	H_γ
4101A	H_δ



Spectrum of the variable in the region 4800A-6200A on Jan. 4.61 UT

Table II

Absorption Bands of TiO

5167 α(0,0)	5448 α(0,1)	5759 α(0,2)	5810 α(1,3)
4955 α(1,0)	4999 α(2,1)	5497 α(1,2)	
4761 α(2,0)	4804 α(3,1)		
4584 α(3,0)			
6158 γ'(0,0)	5838 γ'(1,0)		
7054 γ(0,0)	7589 γ(0,2)	8206 γ(0,3)	
6651 γ(1,0)	7125 γ(1,2)		

The identifications between 6200A and 8400A have been made on the low dispersion spectrograms. The sharpness of the emission lines of H_β and H_γ indicates that the variable was already in its post-maximum phase.

Waagen (1980) finds from the Harvard photographic plates that this object has varied in brightness from a mag >14 to mag ~ 10 between 1938 and 1951. Continuous photoelectric observations of this variable are necessary in order to ascertain its period and the range of light variations.

T.P.PRABHU
M.V.MEKKADEN
Indian Institute of
Astrophysics
Bangalore 560034
India

References:

Honda, M., 198o, I.A.U. Circular No.3546
Keenan, P.C., McNeil, R.C., 1976, An Atlas of Spectra of the Cooler Stars: Types G,K,M,S, and C The Ohio State University Press.
Merrill, P.W., 1940, Spectra of Long Period Variable Stars, University of Chicago Press.
Merrill, P.W.,Deutsch, A.J., Keenan, P.C., 1962, Astrophys.J. 136, 21
Prabhu, T.P., 1981, in press
Waagen, E., 198o, I.A.U. Circular No. 3553.