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UBV PHOTOMETRY OF CH CYGNI IN 1993: INCREASING ACTIVITY

During the recent years (since 1989), renewed activity on CH Cyg has been observed, including strong and variable blue continuum, broad and variable emission lines and rapid light variability (Leedjarv, 1990; Tomov and Mikolajewski, 1992, Kuczawska et al., 1992, Panov and Ivanova, 1992). The erratic activity has been interrupted by more quiet periods, but generally, the 1992-1993 observations show a trend of increasing activity (Leedjarv, 1993). In a recent paper Hinkle et al. (1993) proposed a triple-star model for CH Cyg, in which the symbiotic pair is in a 756 day period orbit. The long period orbit (14.5 yr) involves a third (unseen) star and probably has no implications to the CH Cyg activity (Hinkle et al., 1993). This is a major revision of previous orbit solutions, resolving a long-standing problem. Here we report our UBV photometry of CH Cyg, obtained in August-September, 1993 with the 60 cm telescope of the Bulgarian National Astronomical Observatory at Rozhen. We used a single channel, photon counting, computer controlled photometer. The integration was 10 sec and one observation (Comparison – CH Cyg – Comparison) is a mean of 4 consecutive integrations in each U, B, V filter. Mean nightly points were obtained from 3-4 individual observations and corrections were applied for dead-time, differential extinction and standard transformation. The UBV magnitudes are derived in respect to the comparison star HD 182691 (V=6.52, B−V=−0.08, U−B=−0.23) and they are shown in Table 1. From Table 1, it is apparent that the blue continuum became even stronger, compared to August, 1992 (Panov and Ivanova, 1992). The U mag was generally brighter than 8 during the observational period and our data are consistent with the photometry of Leedjarv (1993). The U−B index reached values near −0.90 and the visual mag began to increase, being in the range 7.7-8.1. On two nights, Aug 22 and Aug 23, 1993, we monitored CH Cyg for rapid light variations, which are shown in Figure 1 and Figure 2, respectively. (Integration was 1 sec). In the upper panel, the comparison star BD+49°2997 is shown for each night. Note that the observations in U, B, V filters are subsequent, with a time-delay of about 1-2 min between respective filters. The flickering is most pronounced in the U and B filters with amplitudes of 0.30 mag and 0.36 mag, respectively.

However, there is a clear flickering in the V filter also (amplitude: 0.14 mag). Kuczawska et al. (1992) reported flickering in all UBVRI-filters. The flickering is ascribed to mass transfer to the hot companion.

Leedjarv (1993) discussed the possibility that the 1993–increase of the visual brightness of CH Cyg is due to the rotation of the M star with a period of 770 days (Kuczawska et al., 1992). However, in their triple-star model, Hinkle et al. (1993) suggested that the 770 d photometric variations result from the heating of the M star by the hot companion.

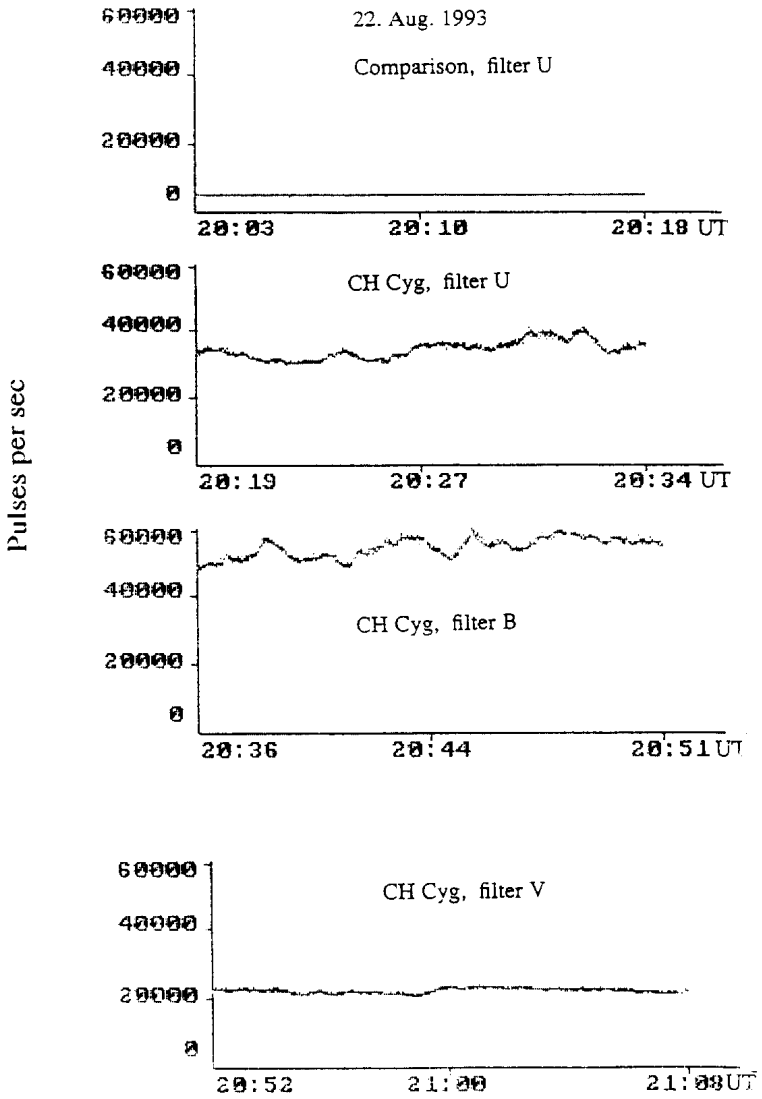
22. Aug. 1993
Comparison, filter U
60000
40000
20000
0
20:03
20:10
20:18 UT
CH Cyg, filter U
60000
40000
20000
0
20:19
20:27
20:34 UT
Pulses per sec
CH Cyg, filter B
60000
40000
20000
0
20:36
20:44
20:51 UT
CH Cyg, filter V
60000
40000
20000
0
20:52
21:00
21:08 UT

Figure 1

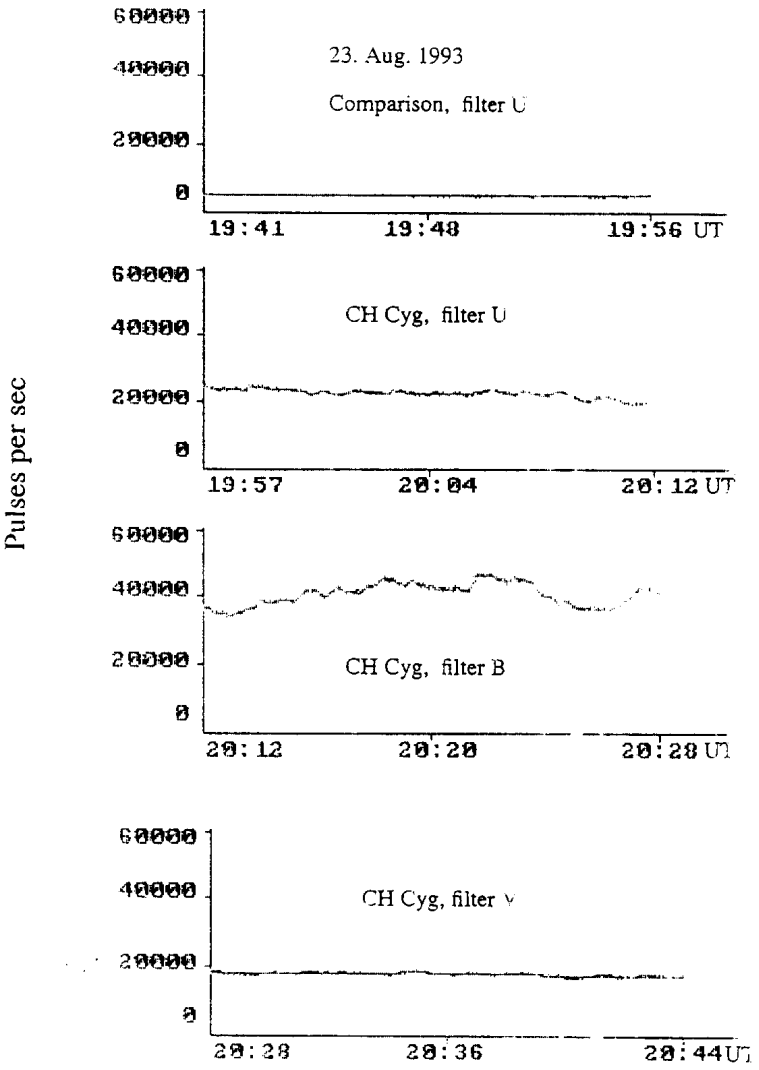
60000
40000
20000
0
23. Aug. 1993
Comparison, filter U
19:41
19:48
19:56 UT
60000
40000
20000
0
CH Cyg, filter U
19:57
20:04
20:12 UT
60000
40000
20000
0
CH Cyg, filter B
20:12
20:20
20:28 UT
60000
40000
20000
0
CH Cyg, filter V
20:28
20:36
20:44UT
Pulses per sec

Figure 2

Table 1. UBV photometry of CH Cygni

JD 2400000+	V	B	U	B-V	U-B
49212.361	7.69	8.43	7.58	0.74	-0.85
49220.372	7.91	8.75	7.87	0.84	-0.88
49221.335	7.85	8.61	7.74	0.76	-0.87
49221.468	7.83	8.61	7.77	0.78	-0.84
49222.324	7.85	8.55	7.62	0.70	-0.93
49222.498	7.70	8.37	7.44	0.67	-0.93
49223.309	7.93	8.83	7.93	0.90	-0.90
49224.313	8.06	8.97	8.07	0.91	-0.90
49224.493	8.01	9.00	8.19	0.99	-0.81
49225.305	7.83	8.60	7.73	0.77	-0.87
49233.322	8.01	8.77	7.82	0.76	-0.95
49233.470	7.97	8.68	7.76	0.71	-0.92
49234.334	7.91	8.66	7.79	0.75	-0.87
49235.303	8.03	8.82	7.97	0.79	-0.85

Indeed, the two periods (770 d photometric and 756 d orbital) are very close. Fom our observations, it looks that the brightening of CH Cyg in the visual band results from the hot continuum, which already veils the M star in all UBV filters. The flickering is an indication of the presence of that continuum. From previous extended outburst of CH Cyg it is well known, that the hot continuum appears first at short wavelengths. With the progress of the outburst, the veiling continuum gets stronger and spreads to longer wavelengths. If so, the veiling in the V band in 1993 shows further increase of the CH Cyg activity.

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References.

Hinkle, K. H., Fekel, F. C., Johnson, D. S., and Scharlach, W. G., 1993, *Astron. J.*, **105**, 1074
Kuczawska, E., Mikolajewski, M., Kirejczyk, K., 1992, *Inf. Bull. Var. Stars*, No. 3806
Leedjarv, L., 1990, *Inf. Bull. Var. Stars*, No. 3474
Leedjarv, L., 1993, *Inf. Bull. Var. Stars*, No. 3951
Panov, K. P., Ivanova, M. S., 1992, *Inf. Bull. Var. Stars*, No. 3817
Tomov, T., Mikolajewski, M., 1992, *Inf. Bull. Var. Stars*, No. 3721