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CH Cygni in 1992: the strongest activity after the large outburst in 1977-1986

CH Cyg is a symbiotic binary consisting of an M giant semiregular variable and a white dwarf probably possessing strong magnetic field (Mikolajewski et al. 1990). Since 1989, the star has shown some episodes of erratic activity (e.g. Mikolajewski et al. 1990; Leedjarv 1990; Bode et al. 1991; Tomov and Mikolajewski 1992). In particular, two transitory (~ 1-2 months) maxima of *UBV* color indices related to reappearance of the hot

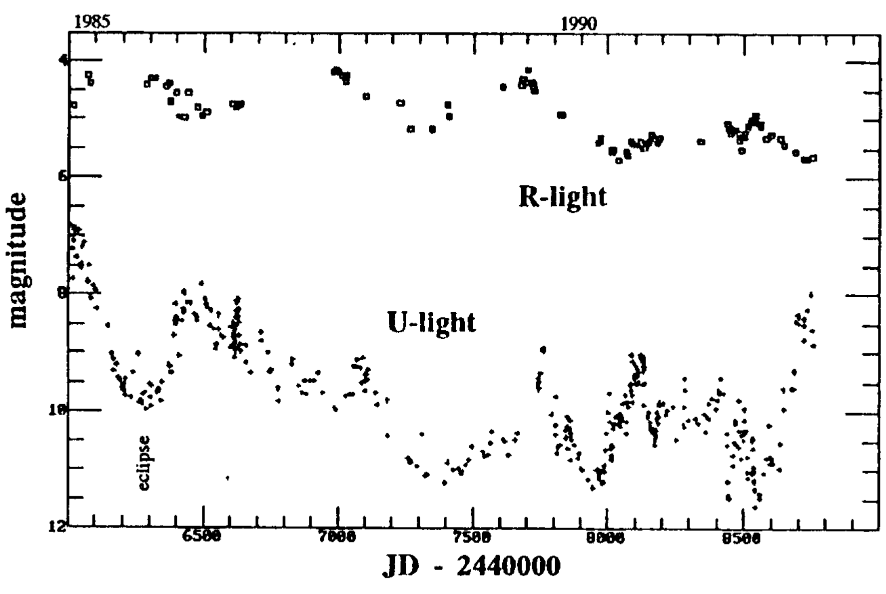

Figure 1. The *UR* light curves of CH Cyg during 1985-1992, mostly based on data obtained at Tartu, Toruń and Byurakan Observatories (Tomov et al. 1992, in preparation).

continuum were observed in 1989, and two more pronounced events happened in 1990–1991 (Fig. 1). The periods of increased brightness were also accompanied by flickering activity and remarkable changes in the emission line spectrum.

In the beginning of 1992, the hot continuum started to grow up again. In March-April 1992, the *U* magnitude was about $8^m.5$, which means that the hot continuum was as strong as that observed in 1986, shortly before the end of the 1977-1986 outburst (Fig. 1). At the same time, the cool giant was close to minimum of its 770^d variability as indicated by low *RI* magnitudes ($R \approx 5^m.6$; $I \approx 3^m.2$), and spectral type between M7 and M8 derived from the VO absorption (Bode et al. 1991). Mikołajewski, Mikołajewska and Khudyakova (1992) have recently suggested that this variability can be due to rotation of the giant's photosphere covered with a large dark spot. Although the hot component brightness is comparable to that observed in 1986, the very low brightness of the M giant causes the spectrum in the *UB* range to be dominated by the hot component. In fact, even the most prominent spectral features of the M giant (e.g. CaI 4227Å and TiO bands) are practically fully veiled by the hot continuum (Fig.2), and the flickering variability characteristic of the hot source is visible in *U* band (Fig. 3) and even in *BV* bands.

The optical spectra taken in 1992 were characterized by very bright HI Balmer lines, strong He I and relatively weak [Fe II] and Fe II emission lines (e.g. comparing with 1986, when the overall intensity of the hot spectrum was comparable), as well as the presence of forbidden [O III], [Ne III] and [S II] lines. Ca II "H" and "K" emission lines with core absorptions were stronger than anytime before. It was surprising that H_8 had similar profile, with blue-shifted absorption component of increasing strength. Unfortunately, we do not have any idea about the origin of this strange H_8 profile. All remaining HI Balmer lines had single component profiles without any trace of absorptions. Between January and April 1992, intensities of the Balmer emission lines and continuum as well as of the other permitted lines have been growing up, while the forbidden line fluxes have been slightly decreasing or constant (Fig. 2).

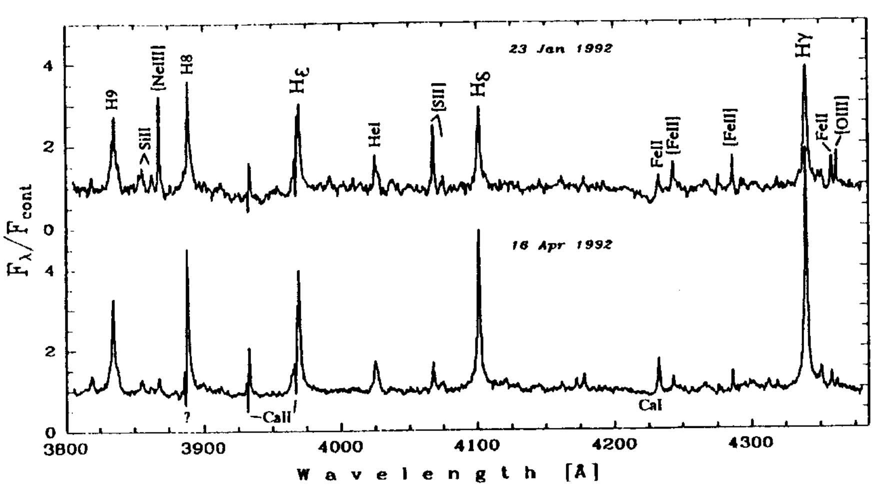

Figure 2. Coude-spectra (0.35Å) of CH Cyg obtained at Rozhen Observatory.

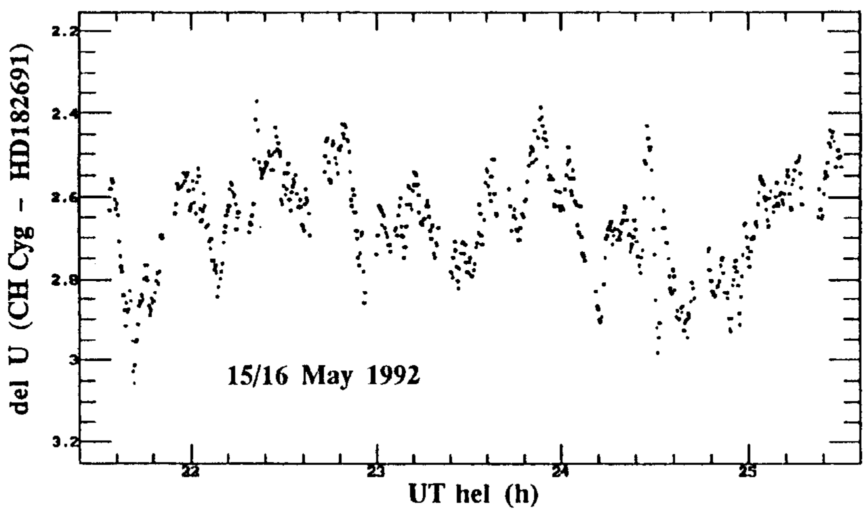

Figure 3. Flickering in *U* light, observed with two-channel photometer and 60cm telescope at Mt.Suhora Observatory. Rapid fluctuations with an amplitude of 30 ÷ 50% and a timescale of minutes are clearly visible.

The erratic activity of the hot component in 1989–1992 was unrelated to the M giant behavior. In particular, the 1989 summer episode coincided with maximum brightness of the giant, while the present one occurred during its minimum. This activity rather results from highly unstable physical conditions near the white dwarf. After the jet ejection in 1984, the accretion complex around the magnetic white dwarf was practically disrupted (Mikołajewski, Mikołajewska and Khudyakova 1990). At present, matter accreted from the giant's wind falls directly onto magnetosphere, causing the observed phenomena. In fact, strong HI Balmer emission, presence of nebular [O III] and [Ne III] emission, and especially the profiles of prominent Ca II "H" and "K" emissions, indicate strong outflow of matter, which can be due to propeller interaction of the rapidly rotating magnetic white dwarf with the giant's wind (see Mikołajewski et al. 1990 for details of the model).

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