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THE DEEP 1995 OPTICAL MINIMUM OF CH CYGNI AND A NEW EPISODE OF DUST CONDENSATION

CH Cyg (=HD 182917), formerly an MKK standard for the spectral type M6 III, has been the subject of intense study since the onset of an active phase in the 60es. At that time, emission lines and a highly variable hot blue continuum appeared in the optical spectra. CH Cyg is now recognized as a symbiotic star, composed of an M giant and a white dwarf. Reviews on the properties and nature of this binary have been presented, among others, by Kenyon (1986) and Mikolajewski *et al.* (1990, hereafter MMK90).

We have been monitoring CH Cyg in UBV and JHKLM bands since 1978. A detailed report on the measurements collected throughout 1995 has been presented by Munari *et al.* (1995, hereafter MYKT95). Their data for U and M bands are plotted in Figure 1.

The U lightcurve is dominated by the protracted active phase that started in 1977 and ended in 1987, the following minimum extending throughout 1988-1989, and the new bright phase that began in 1990. According to the numbering introduced by MMK90, the latter will be hereafter termed the 5^{th} *historically recorded outburst.* In July 1995 CH Cyg returned to the same U brightness of the 1988-1989 minimum and flickering activity disappeared as well.

In Figure 2 low resolution CCD spectra of CH Cyg for November 23, 1993 (when the star was approaching maximum U brightness) and July 27, 1995 are compared. The spectra have been obtained with the Boller & Chivens + CCD spectrograph attached to the 1.82 m telescope in Asiago. The resolution is 18 Å. Data reduction has been performed in a standard way with the IRAF software package and the calibration into absolute fluxes has been achieved with observations in open slit mode of CH Cyg and some standard stars from the list of Oke & Gunn (1983). The spectra in Figure 2 show that in the summer of 1995 the blue continuum from the hot component and circumstellar ionized gas has retraced. The TiO bands of the M giant dominate throughout the whole optical range. The intensity of emission lines has greatly diminished too.

Is the 5^{th} outburst now over ?

The faint U band brightness and the optical spectra seem to support this conclusion. However, the U lightcurve of the 5^{th} outburst shows several brightness drops superimposed onto the linear increase in magnitude culminated with the 1994 maximum brightness. On the contrary, the lightcurve of the 4^{th} outburst is much smoother. Therefore, it will be necessary to wait for additional observations extending to 1996 to firmly establish if (*a*) the present minimum in the activity of the hot component is simply another (even if very deep) drop and an immediate recover will follow, or (*b*) it is really the end of the outburst began in 1990.

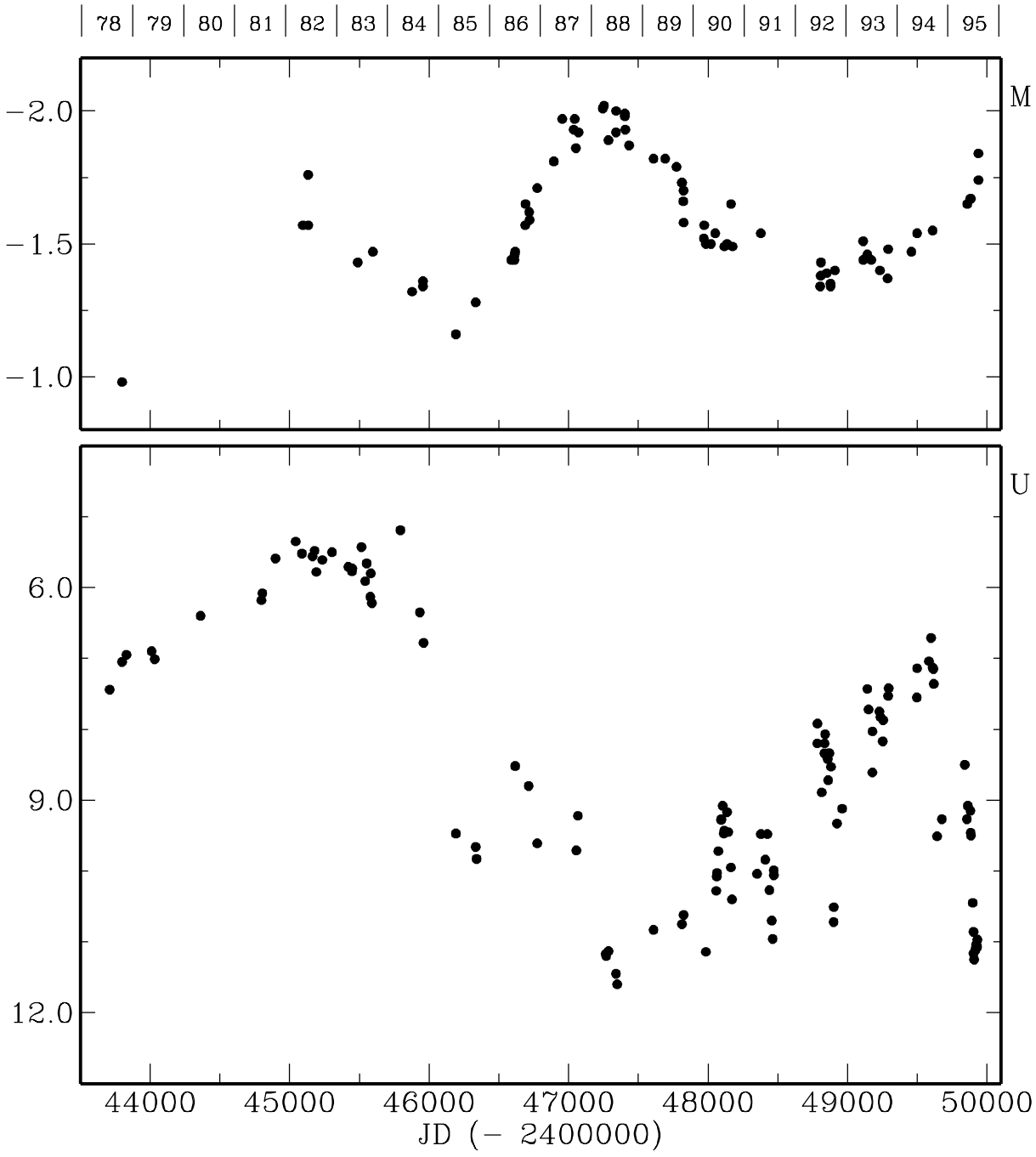

Figure 1. U and M band lightcurves of CH Cyg over years 1978 to 1995.

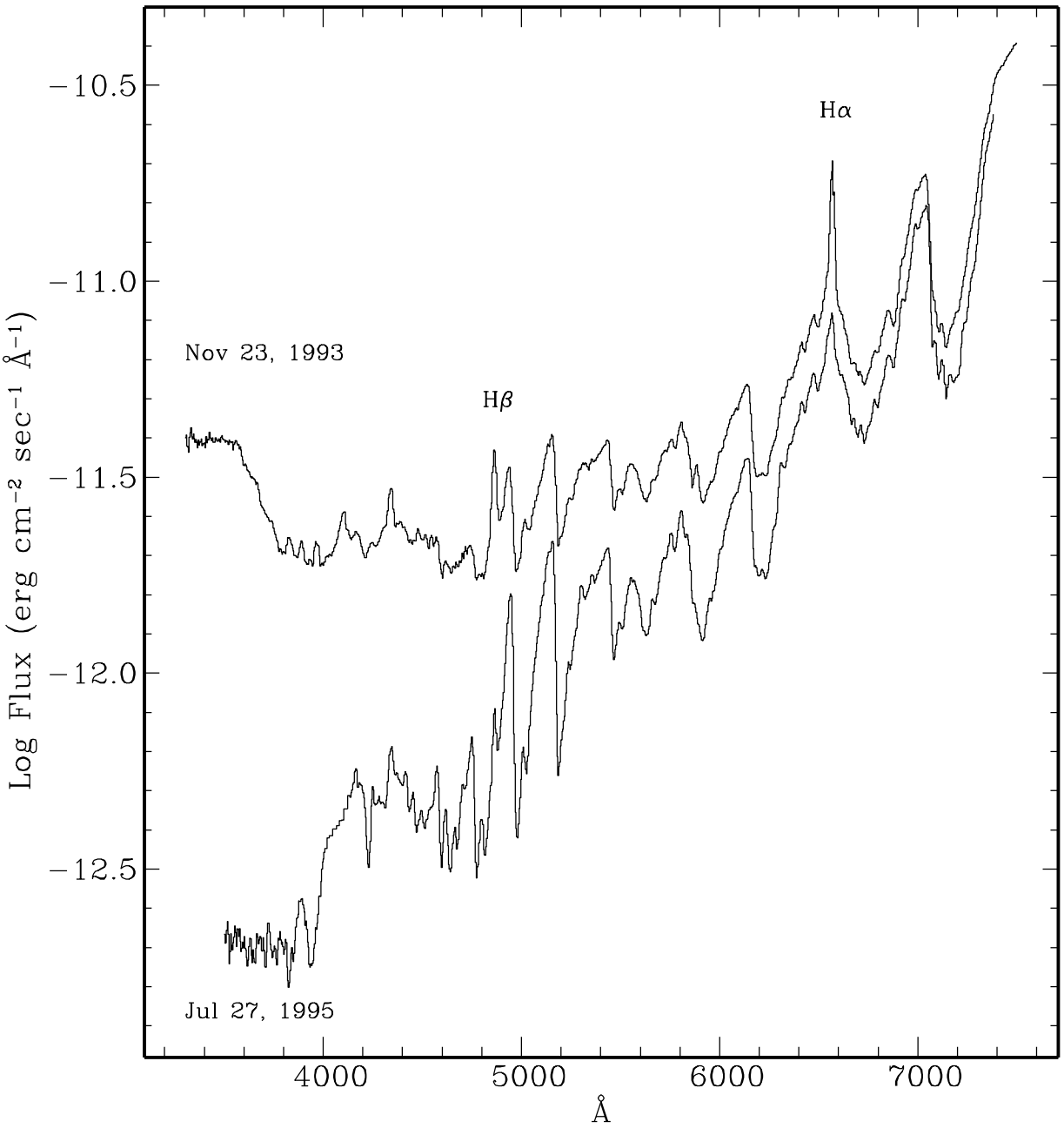

Figure 2. Absolute spectrophotometry of CH Cyg.

The M band lightcurve presented in Figure 1 traces the emission of the dust around the M giant, as demonstrated by MYKT95. A dust condensation episode took place in 1986. After the peak reached in 1988, the dust formation rate dropped far below the dilution rate in the surrounding medium and the M brightness decreased toward the 1992 minimum. A similar cycle took place in the years 1978-85. Figure 1 shows that in 1993 a new dust condensation cycle started. Dust condensation in the wind of the M giant is still in full progress at the time of writing.

The two previous dust condensation cycles lasted $\sim$7 years each. It is therefore important to extend the infrared observations of CH Cyg to coming years to monitor the present dust condensation event and to check if these cycles are periodic. Such a periodicity would have profound implications for the modelling of CH Cyg, its circumstellar environment and in particular for the evolutionary status of its cool giant.

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References:

Kenyon, S.J., 1986, *The Symbiotic Stars*, Cambridge Univ. Press
Mikolajewski, M., Mikolajewska, J. & Khudyakova, T.N., 1990, *A&A*, **235**, 219
Munari, U., Yudin, B.F., Kolotilov, E.A. & Tomov, T.V., 1995, *A&A*, submitted
Oke, J.B. & Gunn, J.E., 1983, *ApJ*, **266**, 713