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H ALPHA VARIATIONS AND THE NEAR INFRARED SPECTRUM OF CI CYGNI

Since its 1975 outburst, the remarkable symbiotic star CI Cyg was gradually fading from the 9th magnitude to the present V=10.8. Eclipses were recorded in 1975 and 1980 when the visual magnitude of the star attained the minimum of about V=11.2 (Belyakina 1981, Mattei 1981).

This star was included in a program of coordinated ultraviolet (IUE) and optical observations to study the spectral variation during different activity phases. The results of the UV observations were discussed by Viotti et al. (1980) and Baratta et al. (1982). The behaviour of the emission lines of different ions may suggest a complex and extended structure of the emission envelope surrounding the eclipsed hot component (see also Michalitsianos et al. 1982).

Since July 1978, objective prism plates were secured at the Schmidt telescope of Campo Imperatore of the Roma Astronomical Observatory to follow its activity in the optical region. Large spectral variations were recorded both in the emission lines and in the blue continuum. Figure 1 shows the behaviour of Hα during July 1978 to July 1981. It is evident from the figure that the line intensity has gradually decreased by a factor of about two in three years, following the long term luminosity decline of the star. A minimum was displayed during the 1980 eclipse with a mean central depth of about 40 per cent. The line was still weak in July 1980 during egress of eclipse (see the light curve in the insert of Figure 1), a result that was also found by Gevorkian (1981) with a narrowband photometry centered on Hα. However, the IUE observations made during June 1979 to August 1980 showed that the Balmer continuum decreased by a factor 2.5 during eclipse (Baratta et al. 1982). Also the eclipse fading of the other Balmer lines was of about the same amplitude (cf. Mikolajewska and Mikolajewski 1982). The smaller eclipse variation

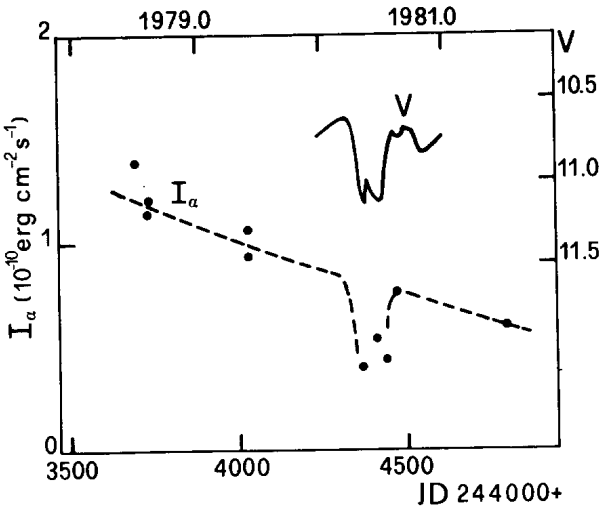

Figure 1. Intensity variation of Hα in CI Cyg during 1978-1981. The 1980 eclipse is shown in the insert.

of Hα should be due to the fact that the emission line originates from a more extended region around the hot component than that of the UV Balmer comtinuum.

To understand the nature of this star it would be of particular importance to determine the physical properties of the cool spectral component which dominates longwards of about 5000 A. Several strong TiO absorption bands are present in our spectra, and their relative strength suggests a spectral type of about M6, slightly cooler than the previous classification of Merrill (1944) and Boyarchuk (1969). It is interesting to note that during the present phase the visual - near infrared spectrum of CI Cyg closely resembles that of the symbiotic star Z And whose cool spectral type is M6.5 (Altamore et al. 1981). In addition, according to the infrared photometry of Eiroa et al. (1982), the two stars display nearly the same IR energy distribution. This seems to indicate a similar behaviour of S-type symbiotic stars during minimum activity.

We have measured the monochromatic magnitude of CI Cyg near 8000-8800 A for the same period of the Hα observations and found a mean value of m(8400 A)= 7.4 ± 0.2. Since the dispersion of the data should be mostly ascribed to errors of measurement, we may conclude that at present there is no evidence of variation larger than ± 0.2 magnitudes for the cool stellar component in the near infrared, during a period of time when the star underwent large

luminosity variations in the visual. It may also be noted that the infrared magnitudes of CI Cyg of Eiroa et al. in July 1981 during a phase of low activity of the star, are close to those given by Swings and Allen (1972) obtained in August 1971 when the star was bright in the visual ($V \simeq 9.4$).

All those results seem to suggest that the cool component of CI Cyg is not variable. On the opposite, large IR variation has been detected in some of the D-type symbiotic stars; it would therefore be important to investigate whether the S-type symbiotic stars like CI Cyg have, on the contrary, stable cool components. A continuous photometric monitoring of these stars in the infrared is urgently needed to verify this point which is important for any modelling of the symbiotic stars.

G.B. BARATTA, P.A. MENGOLI
Osservatorio Astronomico, Roma

R. VIOTTI
Istituto Astrofisica Spaziale, CNR, Frascati

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