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PHOTOMETRIC AND POLARIMETRIC VARIATIONS OF THE SYMBIOTIC STAR CI CYGNI

After the outburst in June 1971 (Lowder, 1971) the star CI Cygni exhibited a transformation in the optical range. The lines of high excitation disappeared together with a weakening of TiO bands. In December 1971 a P Cygni profile for HI, HeI predominated. In November 1975 near the minimum (V=11.05) emission lines of high excitation and TiO bands reappeared. Numerous spectra were taken by Audouze et al. (1981) when the star (V=8.6) exhibited an F type spectrum.

Photometric and polarimetric observations were made at the Observatoire de Haute-Provence in October 1975 and July 1976 with the polarimeter II of Martel (Chevreton et al. 1977) attached to the 193 cm Cassegrain telescope. The results are given in Table I.

The broad-band filters accounted are U (λ 3200 - 3900 Å), B (λ 3800 - 4700 Å), V (λ 5000 - 5900 Å). An E.M.I. type 9789 QA tube with an S11 photocathode was utilized. All the observations were obtained with a diaphragm of angular aperture 14 arcsec. The instrumental polarization was determined from the observations of standard stars in the Hiltner catalogue. The most significant variations in the polarization of CI Cygni were observed after the minimum (V = 9.4). The position of the vibration plane does not change notably during the polarization variations contrary to R Aquarii. Fig.1 shows the dependence of the polarization rate with λ^{-1} quite typical of linear polarization. Szkody et al. (1982) have obtained U : 0.70%, B : 0.50%, V : 0.30% for the ratio of linear polarization of CI Cygni in January 1977 between two minima (V = 9.9) and show that the source of the polarization is explained by Rayleigh scattering.

The strong polarization discovered in July 1976 cannot be attributed entirely to Rayleigh scattering of nebular emission lines.

The maximum polarization found in the blue region might come from the absorption resonance line λ 4227 Å.

The drop in polarization in the V band is certainly due to the strong TiO bands (Aspin et al., 1985).

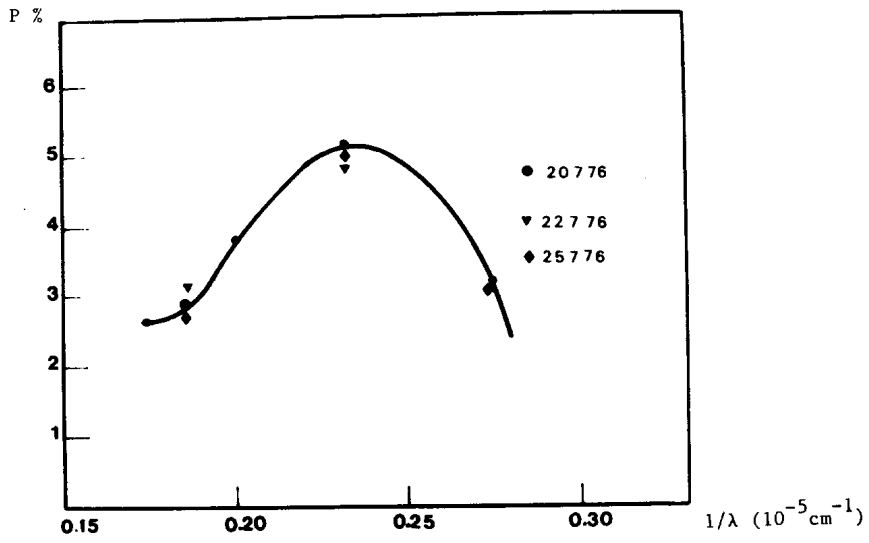

Figure 1

Degree of polarization as a function of the wavelength

Table I

Photometric and polarimetric data for CI Cygni

J.D.	V	V P±ΔP	V θ±Δθ	B	B P±ΔP	B θ±Δθ	U P±ΔP	U θ±Δθ
2442 714	11.05	2.73 ±0.15	114°.7 ± 0.8					
2442 980	9.40	2.82 ±0.19	100°.0 ± 1°.0	10.18	5.22 ±0.14	104°.4 ± 0°.3	3.05 ±0.17	104°.8 ± 0°.8
2442 982	9.41	3.17 ±0.09	104°.3 ± 0°.4	10.23	4.84 ±0.48	106°.9 ± 1°.4		
2442 985	9.43	2.86 ±0.12	103°.6 ± 0°.6	10.24	4.88 ±0.13	108°.6 ± 0°.4	3.06 ±0.19	105°.0 ± 0°.9

The existence of correlations between the polarization and other parameters should help to explain the nature of symbiotic stars.

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