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The optical behaviour of the old nova RR Pictoris in 1985/86

We present spectroscopic and photometric observations of the old nova RR Pic obtained in Febr. 1985 and March 1986 at the ESO Observatory La Silla/Chile. Spectroscopy was performed at the 1.5 m telescope equipped with the Boller & Chivens spectrograph and the IDS whereas the 50 cm telescope with the standard single-channel photometer was used for UBVRI photometry. In total 55 spectra and 923 UBVRI measurements were collected. Tables 1 and 2 give details of the observations.

The spectra cover the wavelength region $\lambda\lambda$ 4500 - 6900 Å (114 Å/mm) and $\lambda\lambda$ 3700 - 7200 Å (172 Å/mm) and have a resolution of about 7 Å and 10 Å respectively. The most pronounced features are the emission lines of HeII λ 4686 Å and H α . Radial velocities of these lines were determined and folded with the photometric period given by Vogt (1975). Fig.1 shows the resulting radial velocity curve for the HeII line which indicates $K \approx 120$ km/s and $\gamma \approx -30$ km/s. Similar values were also derived from the H α measurements. Wyckoff and Wehinger (1977) found the same amplitude and phasing but a different systemic velocity (+40 km/s) from their HeII radial velocity curve. Both lines show a variable asymmetry through the orbital cycle: H α even exhibits a double-peaked structure with a tendency for the blue component to be stronger than the red one around phase 0.1 - 0.2 and vice versa around phase 0.7 (Fig.2). Onset and duration of this behaviour is, however, not strictly the same for each orbital cycle. The equivalent widths of both lines show a pronounced maximum near phase 0.5 - 0.6 and are then stronger by about a factor of 1.5 than around phase zero.

Warner (1986) noticed a disappearance of the strong double-humped shape of the light curve of RR Pic during the years 1972 - 1984 which seemed to be gradually replaced by the second of two minima as the dominant recurrent feature. Haefner and Metz (HM, 1982) recognized these minima as stable features in their light curves obtained in 1980. To elucidate the general behaviour of the present photometric data we examined average light curves covering several orbital cycles. A periodogram analysis revealed no change of Vogt's (1975) period of 0.1450255d. Therefore, the measurements of 1985 and 1986 were superimposed according to his elements respectively. Fig.3 presents a few of the resulting light curves. The characteristic 'W'-shape (HM) is still present though less pronounced in the 1986 data. The first minimum gradually disappears for longer wavelengths due to the growing extent of the principal maximum. The position of this minimum appears now to be shifted from phase ~ 0.43 (1980) to phase ~ 0.52 whereas the second minimum is still at the same position.

Table 1. Spectroscopy of RR Pic

Date	Start (UT)	Duration	Integr. Time (m)	No. of spect.	Disp. (Å/mm)
26 Feb 1985	0 ^h 40 ^m	5 ^h 31 ^m	16	17	114
27 Feb 1985	0 ^h 31 ^m	5 ^h 31 ^m	16	18	114
28 Feb 1985	4 ^h 52 ^m	1 ^h 22 ^m	12	6	172
13 Mar 1986	1 ^h 04 ^m	4 ^h 35 ^m	16	14	114

Table 2. Photometry of RR Pic

Date	Start (UT)	Duration	No. of UBVR sets
18 Feb 1985	1 ^h 57 ^m	4 ^h 41 ^m	63
19 Feb 1985	1 ^h 16 ^m	5 ^h 21 ^m	77
21 Feb 1985	1 ^h 07 ^m	5 ^h 16 ^m	90
22 Feb 1985	1 ^h 02 ^m	5 ^h 31 ^m	103
24 Feb 1985	1 ^h 05 ^m	5 ^h 13 ^m	98
25 Feb 1985	0 ^h 59 ^m	5 ^h 31 ^m	109
13 Mar 1986	2 ^h 01 ^m	3 ^h 17 ^m	76
15 Mar 1986	0 ^h 27 ^m	4 ^h 49 ^m	115
17 Mar 1986	0 ^h 51 ^m	4 ^h 09 ^m	99
20 Mar 1986	0 ^h 39 ^m	4 ^h 05 ^m	93

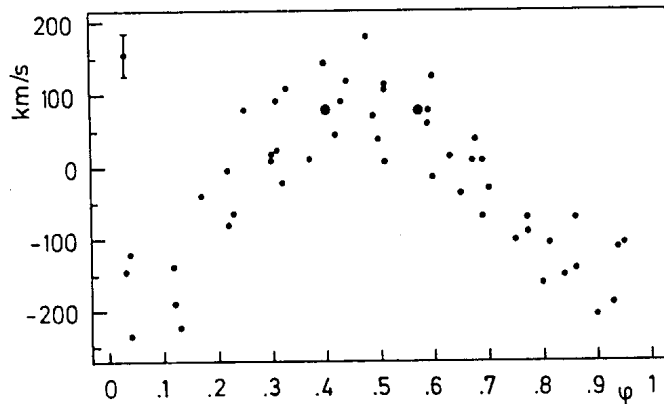


Fig.1 Radial velocity curve of RR Pic based on the HeII $\lambda 4686$ line. Phases are computed using Vogt's (1975) elements. Upper left: Estimated error of a single measurement.

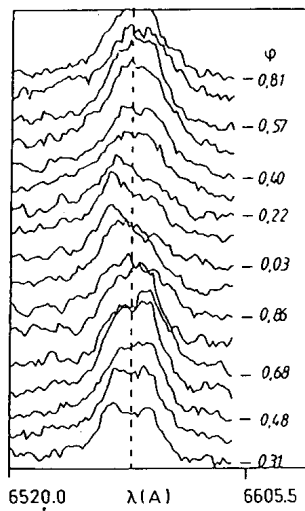


Fig.2 Profile changes of H α for the run of Febr. 26, 1985. Phases are indicated to the right.

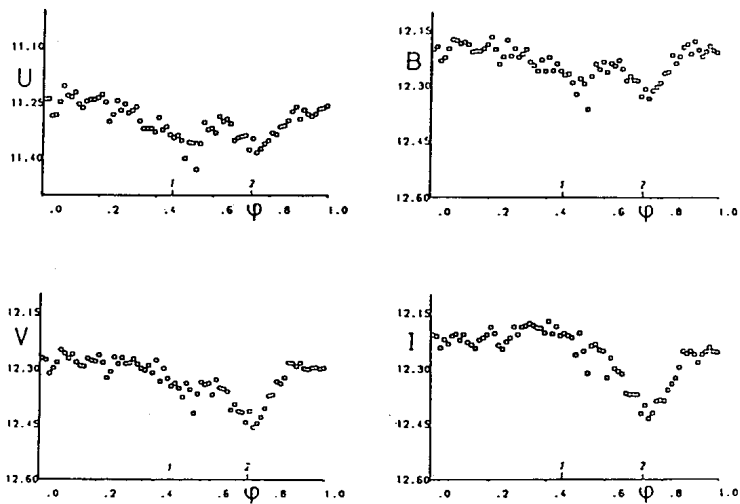


Fig.3 Average light curves (1985) of RR Pic (75 bins per period). The position of the first (1) and second (2) minimum according to HM are indicated. For further explanation see text.

Our new measurements confirm the phase relation between radial velocity curve and light curve given by HM which led to an unusual interpretation with respect to the energy distribution within the accretion disc of RR Pic. Since the system is barely detectable in the infrared (Feast and Glass,1974) the wavelength dependent changes in the light curve can hardly be ascribed to the influence of the secondary. This behaviour as well as the shift of the first minimum is rather due to the energy distribution in the disc and its gradual variation. At the same time the overall brightness has remained at an almost constant value around $V \approx 12.25$ since ~ 1980 .

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REFERENCES:

- Feast, M.W., Glass, I.S.: 1974, *Mon. Not. R. astr. S.* **167**, 81
Haefner, R., Metz, K.: 1982, *Astron. Astrophys.* **109**, 171
Vogt, N.: 1975, *Astron. Astrophys.* **41**, 15
Warner, B.: 1986, *Mon. Not. R. astr. S.* **219**, 751
Wyckoff, S., Wehinger, P.A.: 1977, *IAU Coll. No. 42*, p.81