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SPECTROSCOPY OF VW Hyi

Spectroscopic observations of VW Hyi during quiescence are presented in this study. The spectroscopic data were obtained between 1985 December 5, UT= 06^h45^m - 08^h18^m (10 spectra) and December 6, UT = 06^h32^m - 08^h23^m (13 spectra) with the Image Dissector Scanner (IDS) in the ESO 1.52 meter telescope equipped with the Boller-Chivens Cassegrain Spectrograph (Haefner and Schoembs 1987). Table I gives the journal of observations and radial velocity measurements.

Table I

HJD 2446400+	Hα v_r (km/s)	Hβ v_r (km/s)	Hγ v_r (km/s)
5.786	-81	76	-275
5.794	-74	2	42
5.801	-32	157	314
5.808	-72	-67	-68
5.816	-122	23	63
5.822	-128	50	-156
5.829	-101	140	77
5.836	-56	91	44
5.842	-72	167	195
5.849	-87	104	-36
6.775	-118	32	-18
6.782	-162	-45	-202
6.788	-120	-45	-307
6.795	-178	213	362
6.801	-12	179	343
6.807	-42	197	-224
6.814	11	213	85
6.820	-55	102	232
6.827	-60	22	-22
6.833	-69	157	256
6.840	-70	129	317
6.846	-74	37	-203
6.852	-115	-160	-129

The wavelength range λλ 3760 - 7180 was covered, with a dispersion of 172 A/mm. The exposure time was about 10 minutes on the first night and 8 minutes on the second night for each spectrum. The reduction was carried out

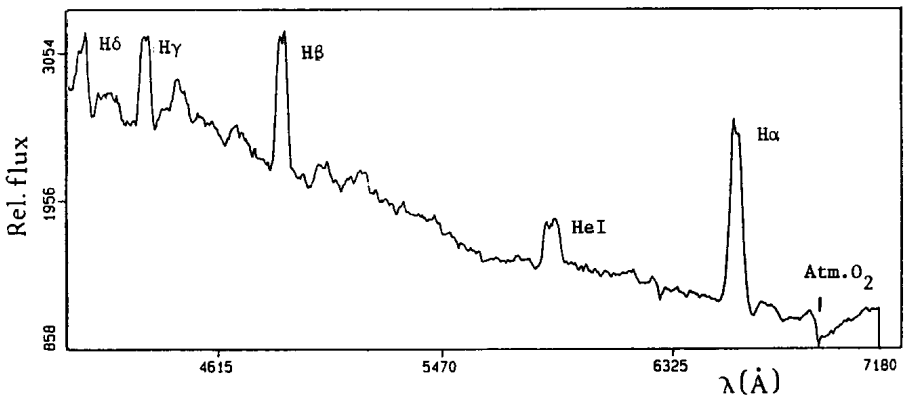

Figure 1

with the standard IHAP software in the ESO Headquarters in Garching. The wavelength calibration of the spectra was obtained from the helium-argon lamp (HEAR) exposure before and after the observations every night. No drift in these HEAR spectra was found. The probable wavelength errors were tested by the radial velocity variations of OI λ5017 , OI λ6100 A and beginning wavelength of the atmospheric oxigen band λ6878 A. The probable pixel-defects of the IDS were tested especially around the Hα emission lines. The calibration of this part of the spectra was repeated using a large number of calibration lines. There was not found any pixel defect. Absolute flux calibration was deduced from observations of the white dwarf standard star Feige 15. The reduction procedure was repeated at least two times.

The spectra were obtained at quiescence and, all spectra are dominated by Hα, HeI λ5876, Hβ, Hγ, Hδ emission lines. Since the sensibility of IDS is not enough for short wavelengths, the blue sides of the spectra are too noisy. The sum spectrum is given in Figure 1.

The Hα , Hβ , and Hγ Balmer emission lines were used for the determination of the radial velocity curves. The emission lines were fitted by a Gaussian profile (double Gaussian profile for Hα lines, single Gaussian profile for the relatively weak Hβ and Hγ lines).

Figure 2 shows the radial velocity curves of VW Hyi. The symbols refer to different observing nights: open circles to JD 2446405, and the dots to JD 2446406. The solid line is the fitted sine curve.

The phases refer to the elements: HJD (max) = $2440128.0222+0^{d}.0742711 \cdot E$ (Vogt, 1974). The radial velocity amplitudes of Hα, Hβ and Hγ are

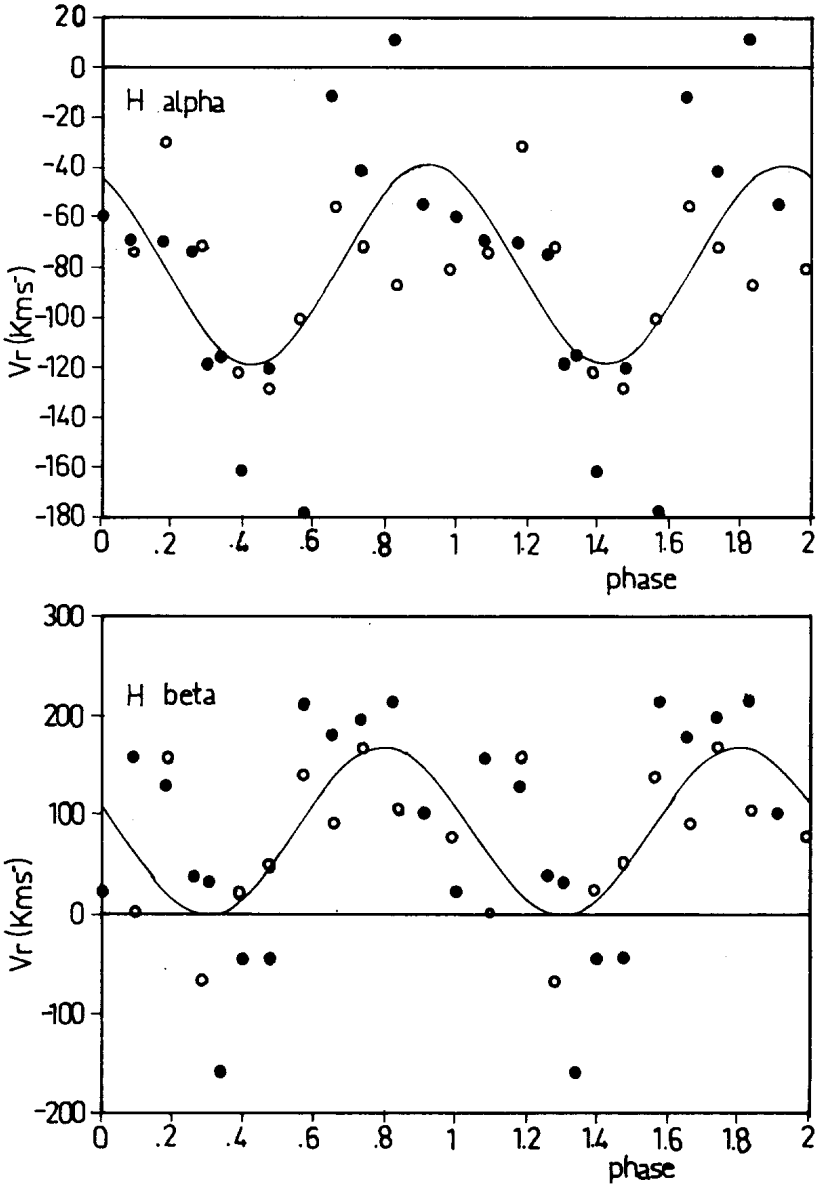

Figure 2

39 ± 11 km/s, 85 ± 23 km/s, 113 ± 59 km/s. The systemic velocities are -78.9 ± 8 km/s, 83.3 ± 17 km/s, 62.6 ± 24 km/s for these lines respectively. The earth velocity factor, -5 km/s, is not included in the radial velocities. In the earlier study of Schoembs and Vogt (1981) the semi-amplitude of the Hα line was obtained as 78 ± 14 km/s, and the systemic velocity was zero. Their observations were obtained at quiescence and during the late decline from an outburst. These observations are insufficient to account for the differences in radial velocity curves, because such differences might occur from time to time. A search for similar cases was carried out in other cataclysmic variables. In the UX UMa star PHL 227 Haefner and Schoembs (1987) found the values of K_1 and γ velocities from Hα and Hβ lines as follows: $K_{1\alpha}$ = 124 ± 20 km/s, $K_{1\beta}$ = 87 ± 15 km/s, γ_α = 43 ± 13 km/s, and γ_β = -58 ± 10 km/s, respectively. In V2051 Oph (Watts et al., 1986) the values of K_1 from the Hβ and Hγ lines are consistent with each other yielding the mean result K_1 = 111 ± 12 km/s ($K_{1\beta}$ = 108 ± 14 km/s, $K_{1\gamma}$ = 116 ± 23 km/s). The γ systemic velocities are significantly different by 90 km/s (γ_β = -55 ± 9 km/s , γ_γ = 35 ± 15 km/s). In RW Tri Kaitchuck et al. (1983) found a difference 115 km/s between the γ for the redshifted component of the Hβ and Hγ lines.

More spectroscopic observations with high dispersion are needed in order to understand these differences in the radial velocity curves and semi-amplitudes of VW Hyi.

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