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HD39917: A NEW, PROBABLY NON-ECLIPSING RS CVn-TYPE VARIABLE

In 1977 a four-colour uvby survey of the southern sky, designed to find F and early G stars belonging to the intermediate population II, was finished. Among many other object, HD 39917 ($7^m.6$, G0) was found to show photometric indications of low metallicity; cf. Olsen (1979), table 14, where it was tentatively predicted to be a G8 dwarf star with weak lines. It was consequently included in a spectroscopic programme by two of us (JA and BN) to determine the radial velocities of the presumed metal-poor stars identified in the photometric survey. These observations are made with the ESO 1.5 m telescope and coudé spectrograph on La Silla, Chile, at a dispersion of 20 Å/mm. Baked IIa-O emulsion is used, and one spectrogram (0.4 mm wide) is taken of each star.

The plate taken of HD39917 (F 6570, Oct.7 1978, HJD $2443789^d.8801$) showed the spectrum to be double-lined, with both double absorption lines and double emission components in the CaII H and K lines reaching almost to the continuum level. The two components show no gross difference in spectral type or rotation, the latter corresponding roughly to v sin i $\approx$ 50 km/s, but they are clearly of different brightness, the measured line ratios corresponding to a luminosity ratio of 0.7-0.8. The spectral type given by Houk (1978) is G8V, in approximate agreement with our spectrum, although we cannot make precise classification at this dispersion of a spectrum with rather diffuse double lines. The measured radial velocities are

V_1 = +16.2 ± 1.2 km/s (brighter comp.)
V_2 = -63.1 ± 4.5 km/s (fainter comp.)

The appearance of the spectrum seemed typical of RS CVn binaries in view of the dwarf classification and rather large

rotation, the latter implying a period of the order of a couple of days. It was therefore natural to search for the light variations and possible eclipses characteristic of RS CVn systems.

During 1979 additional uvby and β photometry was therefore obtained (by EHO). No eclipses were detected, but HD 39917 shows the intrinsic variations characteristic of RS CVn-type variables. The uvby photometry (standard system) is given in Table I with mean values and r.m.s. dispersions (one observation).

Table I

HJD 2440000+	V	b-y	m_1	c_1
$3226^d.54547$	$7^m.895$	$0^m.508$	$0^m.232$	$0^m.320$
3236.52057	7.895	0.516	0.234	0.304
3931.54434	7.969	0.511	0.236	0.303
3931.61838	7.963	0.519	0.234	0.316
3932.53845	7.869	0.520	0.236	0.326
3933.56253	7.910	0.513	0.242	0.299
3934.55934	7.883	0.509	0.256	0.282
3935.53944	7.856	0.511	0.244	0.300
3935.57493	7.854	0.510	0.243	0.305
3936.55226	7.962	0.512	0.244	0.301
3937.56892	7.856	0.508	0.259	0.296
3938.56645	7.924	0.509	0.246	0.312
3939.51807	7.895	0.507	0.249	0.309
3939.56293	7.886	0.510	0.241	0.317
3940.53901	7.847	0.515	0.237	0.319
3940.59465	7.869	0.509	0.252	0.291
3941.54215	7.942	0.525	0.222	0.338
3941.58864	7.950	0.523	0.229	0.310
4120.89730	7.811	0.514	0.236	0.311
4127.90271	7.855	0.516	0.225	0.328
4129.89667	7.879	0.515	0.217	0.308
4134.89047	7.867	0.519	0.223	0.297
Mean	7.893	0.514	0.238	0.309
Scatter	0.043	0.005	0.011	0.013

The corresponding over-all errors for the 3067 observations made with the same equipment in 1979 are $0^m.004$, $0^m.007$, and $0^m.007$ for b-y, m_1, and c_1, respectively. Thus, b-y shows no indication of variation, while the variations in the u and v bands are somewhat larger than in b and y. This is <u>not</u> due to a lower-than-average number of counted photons in u and v since a minimum of 40 000 photons was uniformly collected in u from all stars in the general programme.

Four β observations were made. The resulting value on the standard system is $2^m.559 \pm 0^m.010$ (r.m.s. scatter). Generally,

the r.m.s. error for 2626 β observations made in 1979 is $0^m.007$. We are tempted to suspect a slight change in the strength of H_β from March 1979, where β was $2^m.551 \pm 0^m.001$ (2 obs.) to October 1979, where β was $2^m.568 \pm 0^m.004$ (2 obs.).

The combined spectrographic and photometric evidence leave little doubt that HD 39917 is a RS CVn-type variable. No further work on this system is planned.

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