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V 1068 CYGNI - A LONG-PERIOD RS CVn STAR?

On the long-period eclipsing binary V 1068 Cygni (= BD +41°4100) there was published a report in this Bulletin by D. Hoffleit (1). More recent investigations of this star were made by R. Diethelm (2) and by B. Fuhrmann (3).

First photoelectric UBV observations of the object were obtained by the author with the Sonneberg 60 cm telescope II and the Piszkéstető (Hungary) 50 cm telescope in the years 1979 to 1981 (see Table I). The comparison star BD +41°4108 was linked to BD +42°4081 with magnitudes from (4). The magnitudes found for BD +41°4108 are: V = $9^m.49$, B-V = $+1^m.07$, U-B = $+0^m.76$. Figure 1 shows the mean light curves (outside eclipse) for the separate years computed with the elements given by B. Fuhrmann (3). There is an indication of a migrating

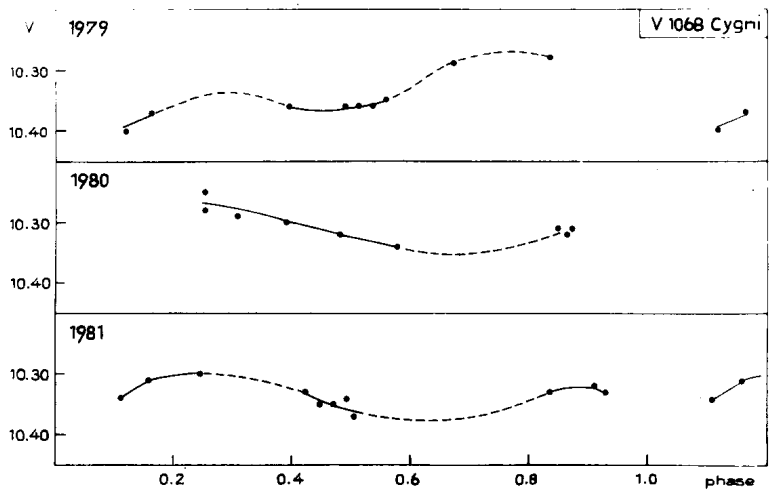

Figure 1

wavelike distortion as it occurs in RS CVn type stars. With respect to the period of 42.7 days the system would then be a member of the long-period RS CVn group.

Table I

year	J.D.hel. 2444000+	V	B-V	U-B	phase	
1979	136.397	10.29	+1.14	-	.6729	
	143.352	10.28	+1.19	-	.8358	
	155.380	10.40	+1.12	+0.80:	.1176	x
	157.328	10.37	+1.14	+0.78:	.1633	x
	167.328	10.36	+1.14	+0.75	.3976	x
	171.274	10.36	+1.14	+0.76:	.4900	x
	172.275	10.36	+1.12	+0.78	.5135	x
	173.301	10.36	+1.12	+0.68	.5375	x
	174.253	10.35	+1.08	+0.80:	.5598	x
1980	374.526	10.25	+1.21	+0.89	.2521	
	485.379	10.31	+1.15	+0.68	.8493	
	486.376	10.31	+1.18	+0.65	.8727	
	490.326	10.57	+1.44	+1.03:	.9652	
	491.397	10.55	+1.49	+1.03	.9903	
	508.460	10.30:	+1.16:	+0.66:	.3901	x
	512.302	10.32	+1.15	+0.77	.4801	x
	516.504	10.34	+1.15	+0.69	.5786	x
	545.280	10.28	+1.17	-	.2528	
	571.344	10.32	+1.17	+0.74	.8634	
	575.313	10.46	+1.36	+0.96	.9564	
	577.308	10.58	+1.43	+1.00	.0032	
	590.297	10.29	+1.17	+0.69	.3075	
1981	769.473	10.37	+1.16	+0.66	.5055	
	783.545	10.33	+1.16	+0.71	.8352	
	787.545	10.33	+1.14	+0.64	.9289	
	829.422	10.32	+1.17	+0.69	.9101	
	851.340	10.33	+1.13	+0.74	.4236	
	852.329	10.35	+1.13	+0.71	.4468	
	853.335	10.35	+1.15	+0.72	.4703	
	854.305	10.34	+1.16	+0.69	.4931	
	886.393	10.30	+1.17	+0.71	.2449	
	923.229	10.34	+1.16	+0.76	.1079	
	925.342	10.31	+1.19	+0.72	.1574	

: uncertain values
x observed at Piszkéstető

Moreover P. Notni kindly took image tube spectra at the Tautenburg 2 m telescope with a dispersion of 140 Å/mm on 1980 April 15 (24.5 days past minimum) and 1980 December 3 (in minimum phase). The first spectrum is composite and indicates

a spectral class B5 to A5 + G8 II-III in accordance with (1). The second spectrum also seems to be composite, but the Balmer lines of the hotter component are clearly weeker. Unfortunately the spectra do not reach the CaII lines H and K, so it is impossible to decide on the presence of emission in those lines, which would be an important criterion of RS CVn stars and related objects. Further spectroscopic investigation is desirable. Emission in other lines could not be found.

If we assume that the hotter component of the system has physical properties of a normal main sequence star and that the colour excess ratio E_{U-B}/E_{B-V} for hotter component attains the normal value of 0.7, then the observed minimum depths in the three colours, $\Delta V = 0\overset{m}{.}30$, $\Delta B = 0\overset{m}{.}58$, $\Delta U = 0\overset{m}{.}93$, are well to reproduce by a B9.5 V component ($M_V = 0\overset{m}{.}7$) and a G8 II-III component ($M_V = -0\overset{m}{.}3$). In this case the hotter component is eclipsed in the centre of the minimum phase about 85%. From the colour excess $E_{B-V} = 0\overset{m}{.}62$ follows $A_V = 3.E_{B-V} = 1\overset{m}{.}9$. The maximum apparent brightness of the hotter component alone is, after the computed model, $V_{max} = 11\overset{m}{.}65$. This amounts to a distance to the system of 650 pc.

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