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LIGHT ELEMENTS OF GG Vel

The variability of GG Vel = BV 1201 = HD 79459 = SAO 220955 = CoD-42^o5065 = CPD-42^o3467 was discovered by Strohmeier and Patterson (1967) on Sky Patrol plates taken from Mt. John Observatory. They published a list of times of minimum light, gave the first light elements, an Algol-like variability, a weak secondary minimum and an amplitude of 0.45 mag. These elements were also listed by Strohmeier and Knigge (1969).

This variable was named by Kukarkin et al. (1972) and mentioned in a report of the Rosemary Hill Observatory as part of a VRI photoelectric photometry observing program (see Bull. Am. Astr. Soc. Vol. 10, pg 107, 1978).

In this note I present six photoelectric times of minimum light for each pass-band in the UBV system and the derived light elements.

Observations were made between 1979 and 1980 from CTIO* in Chile, and from Bosque Alegre (Córdoba) and El Leoncito (San Juan) Observatories, both in Argentina, with apertures of 40, 152, and 76 cm, respectively. Individual minima are listed in Table I with the standard deviation given in parenthesis. They were determined from the light curve on each pass-band. The color average of these minima are listed in Table II (standard deviations in parenthesis) together with the photographic minima given by Strohmeier and Patterson (1967).

Table I

Individual times of minima

HJD 2440000+		
V	E	U
3899.8150(13)	3899.8180(06)	3899.8161(12)
3902.7628(06)	3902.7610(13)	3902.7623(08)
3908.6737(10)	3908.6721(17)	3908.6744(11)
3973.5714(12)	3973.5706(11)	3973.5725(07)
4302.5533(09)	4302.5513(23)	4302.5533(13)
4306.9765(08)	4306.9798(07)	4306.9778(09)

Table II

Minima of GG Vel

Meth.	HJD 2440000+	w	E	(O-C)	(O-C)'	(O-C)''
Pg	38379.542	1	-2000	-0.0154		-0.014
Pg	38382.545	1	-1998	0.0371		0.039
Pg	38385.543	1	-1996	0.0847		0.087
Pg	38441.399	1	-1958	-0.1175		-0.116
Pg	38490.272	1	-1925	0.0734		0.075
Pg	38841.292	1	-1687	-0.0080		-0.007
Pg	38844.293	1	-1685	0.0425		0.044
Pg	38869.233	1	-1668	-0.0962		-0.095
Pg	38872.227	1	-1666	-0.0526		-0.052
Pg	39118.543	1	-1499	-0.0977		-0.097
Pg	39198.313	1	-1445	0.0107		0.011
Pg	39201.311	1	-1443	0.0582		0.059
Pg	39232.237	1	-1422	0.0047		0.005
Pg	39235.230	1	-1420	0.0473		0.048
Pg	39862.101	1	- 995	-0.0485		-0.049
Pg	39907.964	1	- 964	0.0828		0.082
UBV	43899.8164(15)	1	1742	0.0007	0.0023	
UBV	43902.7620(09)	3	1744	-0.0041	-0.0026	
UBV	43908.6734(12)	2	1748	0.0064	0.0079	
UBV	43973.5715(10)	3	1792	-0.0050	-0.0041	
UBV	44302.5526(12)	2	2015	0.0029	0.0008	
UBV	44306.9780(17)	1	2018	0.0027	0.0005	

A least squares solution for the 16 photographic minima give the following linear light elements:

$$\begin{aligned} \text{Min I} = \text{HJD } 2438379.^{\text{d}}556 + 1.^{\text{d}}475218 \text{ E}' \\ \pm 0.026 \quad \pm 0.000047 \text{ m.e.} \quad (1) \end{aligned}$$

while for the present 6 photoelectric minima the light elements are:

$$\begin{aligned} \text{Min I} = \text{HJD } 2443973.^{\text{d}}5756 + 1.^{\text{d}}475230 \text{ E}'' \\ \pm 0.0014 \quad \pm 0.000012 \text{ m.e.} \quad (2) \end{aligned}$$

These results show the period to be constant within the errors. Finally, a least squares linear fit was performed with all the minima giving the following elements:

$$\begin{aligned} \text{Min I} = \text{HJD } 2441329.^{\text{d}}98944 + 1.^{\text{d}}4752160 \text{ E} \\ \pm 0.0096 \quad \pm 0.0000056 \text{ m.e.} \end{aligned}$$

which comprise about 4000 cycles of the "history" of this system.

The cycles E and the residuals (O-C) from the latter ephemeris are listed in columns 4 and 5 of Table II, while (O-C)' and (O-C)'' from (1) and (2) are in columns 6 and 7.

The light curve is not completely observed yet. The present observations show partial eclipses, a primary minimum of amplitude 0.5 mag and no evidence of a secondary eclipse.

GG Vel has a visual companion ($\Delta\alpha=0$, $\Delta\delta=6''$) of magnitude $V=11.2$. The effect of the light of this star on the combined light of the components at maxima is about 0.01 mag. Therefore, one component of the system would be a faint star with a luminosity beyond the accuracy of photoelectric magnitudes, only detected due to a pronounced reflection effect as seen in the observations.

On the other hand, if the period were twice that considered above, then the system would be composed by two similar stars in temperature and luminosity. This is also supported by the observations because the colors are almost constant during the whole period and the amplitudes of all measured minima are of the same order. Then also the orbit would be circular, as shown by the behaviour of the residuals (O-C) of odd cycles.

A spectrographic study of GG Vel could decide between the two possibilities. Observations of this system are planned in the next season.

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