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GM SAGITTARII: STRANGE LIGHT CHANGES IN A BINARY SYSTEM

GM Sgr (HV 4048) was discovered by Luyten (1927) and classified as a long period variable star with the range 15.2-(17^m. No chart was published. The co-ordinates (converted to the equinox 1950.0) were $18^h16^m17^s$ $-25^o26'.8$.

In June 1978 Goranskij (1978) discovered the outburst of a star in the same sky region. Its peak brightness was about two magnitudes over the mean quiet level. Evident rapid variations were seen in the quiet state at 14^m.2 B. The star was classified as a possible nova-like variable. The accurate position of this star is $18^h16^m16^s.2$ $-25^o25'43"$, 1950.0.

Dr. P.N.Kholopov, the late chief editor of GCVS, identified Goranskij's star with GM Sgr in spite of principle difference in descriptions and classifications. Note that the variability ranges of these stars did not overlap. This identification must be verified with old photographic observations or tested immediately in the discovery Bruce proper motion plate.

Present investigation was carried out on the base of 345 Moscow collection plates obtained with the Crimean 40-cm astrograph in J.D.2437109-47741. No other strong outbursts were found. The eye estimates of the star in June 1978 outburst are the following.

J.D.2443659.505	B=14.35	43672.463	B=13.70
668.460	12.4	686.395	13.86
669.474	13.20	692.427	14.33

The total range of variability is 12.4-15.3 B.

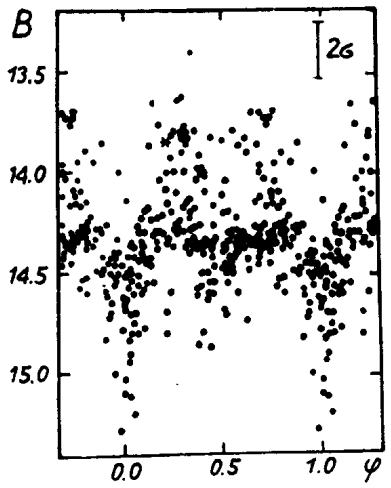

Figure 1. The light curve of GM Sgr. Phases are computed with the formula $C = 2447707.454 + 0^d.7365483 \cdot E$

The observations of GM Sgr were also tested for periodicity. The computer program was a realization of the well known Lafler-Kinman method in S.Yu.Shugarov's modification without phase sizing procedure. ϑ statistics shows a set of very shallow dips, the amplitude of periodic component in the light curves being less than $0^m.5$ with the total amplitude of the rapid variability of $1^m.9$. The possible periods found between 0.05 and 500 days are given in the Table.

Frequency	Single wave		Double wave	
cycle/day	period (days)	ϑ	period (days)	ϑ
1.7127	0.5838874	1.32	1.1677828	1.40
2.7151	0.3682688	1.37	0.7365483 *	1.20
3.7181	0.2689528	1.40	0.5379031	1.58
4.7209	0.2111825	1.50	0.4236508	1.31
5.7209	0.1747990	1.46	not found	

Here we faced the known problem of day aliasing. This southern object may be observed from Crimea only during a few

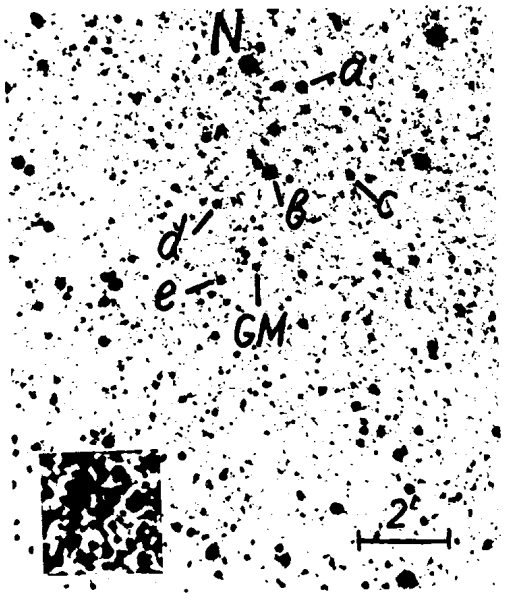

Figure 2. Visual chart of GM Sgr. Lower left is a 2'x2' fragment of the blue Palomar Sky Survey chart. Image of GM Sgr is in the center. Photographic magnitudes of comparison stars are the following: b=12.90, c=13.71, d=14.48, e=15.43.

hours in a night. A final choice of the orbital period can be made by monitoring at southern observatories.

The best period marked with an asterisk gives the lowest dispersion light curve shown in Figure 1. Zero phase is at J.D.hel. 2447707.454 (Min I). Other double wave curves resemble this one. The double wave periods are more preferable than the single ones because the alternate minima have nonequal depth.

The light curve shows pronounced changes of the light level. The depth of the primary minimum varies from $0^m.2$ to $1^m.0$. The deepest eclipses below $15^m.0$ were observed twice in August 1971 and in July 1989.

The finding chart in visual light is given in Figure 2. The star is located in a very dense star field but outstands from neighbour stars with intense blue colour. Its image of 16^m (!) in

the blue Palomar Sky Survey plate is blended with several faint companions (see a square fragment of plate in the left lower corner of Figure 2, the image of GM Sgr is in the center of the fragment). The accurate measurement reject assumption that one of companions is responsible for June 1978 outburst.

A single photoelectric observation of GM Sgr relatively to the star 'a' was obtained at the 1-m reflector of Mt.Sanglock observatory of Tadjik Academy of Sciences. The star 'a' was later calibrated through Alcaino's (1981) photoelectric standard in M 26. The photoelectric measurement is plotted with an asterisk in Figure 1. These are the magnitudes and colours of the variable and the comparison star.

	Date	V	B-V	U-B
GM Sgr	2446708.108	13.48	0.37	0.26
a	47681.5	11.62	0.20	0.08

Apparently GM Sgr does not have ultraviolet excess, and its classification as a nova-like variable is wrong. With given UBV colours the object remains an early A type star having a small colour excess $E(B-V)_{\sim}0^{m}.3$.

It seems that the star may be an interesting object for further investigations including multiwavelength and spectral observations, monitoring and archival search.

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