GM SGR—NOW TWO DIFFERENT VARIABLES

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Abstract

W. J. Luyten reported the discovery of GM Sgr in 1927; in 1978, a finding chart of V. P. Goranskij placed the variable about 1 arc min north of Luyten's position. The authors find that Goranskij's variable is not identical with Luyten's. Goranskij's variable is now V4641 Sgr.

1. Introduction

GM Sgr was discovered by W. J. Luyten (1927) during his work on the Bruce Proper Motion Survey, on plates taken with the 0.6-m Bruce refractor at the Harvard College Observatory's southern station. He gave the position as (1900) R. A. $18^h 13^m 12^s$, Decl. -25° 27.9', but included no finding chart. Some years later, V. P. Goranskij (1978) published a finding chart for an eruptive variable that he had discovered at very nearly the published position of GM Sgr. We have reproduced this chart in Figure 1. Because of the close coincidence in the positions of the new variable with GM Sgr, the editors of the *General Catalogue of Variable Stars* (GCVS) (Kukarkin *et al.* 1969) assumed that the two reports referred to the same variable, and Goranskij's finding chart was referenced for GM Sgr in the next edition of the GCVS (Kholopov *et al.* 1985–1988). We have inverted the chart so that north is at the bottom, in order more easily to compare it with the sketch reproduced in Figure 2 (see next section). Goranskij gives the 1950 coordinates as $18^h 16^m 20^s$, -25° 24.7', or about 1 arc min north of Luyten's position. Luyten estimated the magnitude range of GM Sgr as 15.2 to fainter than 17 photographic. Goranskij's variable seems to be several magnitudes brighter.

The identification of Goranskij's star as a cataclysmic variable x-ray emitter in 1999 reintroduced the question of the proper identification of GM Sgr.

2. The Search

In May 1999 DBW, during a visit to the Harvard College Observatory plate stacks, looked for Luyten's original discovery plate pair, since normally Luyten's discoveries are well marked on the plates he used. In the case of GM Sgr, however, the plate pair was not easily identifiable. Some markings of the type Luyten made were found on a possible first epoch plate, A 2605, taken August 3, 1897, in Arequipa, Peru; GM Sgr itself was not marked.

DBW also noted that the star was listed in DH's manuscript data notebook on Harvard Variable Star Field 193. In her notebook, however, the star was not noted as recovered. In 1959 BLW, as a project under DH at the Maria Mitchell Observatory in Nantucket, MA, included GM Sgr with the stars whose magnitudes she estimated on Harvard plates. These estimates, showing variations, are included in a second DH data notebook, and are accompanied by a sketch showing the position of the variable. The origin of the sketch cannot be ascertained, but it clearly predates Goranskij's chart. The sketch is reproduced in Figure 2. A careful comparison of Figures 1 and 2 show that Goranskij's GM Sgr is the bright star below (north of) the BLW and Luyten GM Sgr.

With the sketch by BLW, DBW and MLH were able to locate the position of Luyten's variable on A2605, and compare the brightness with an (unfortunately clearly post-discovery) plate, A14207, taken on May 23/24, 1930. On the second plate, Luyten's star is much fainter. The early A plate is sufficiently good to identify Luyten's star on a *Digitized Sky Survey* (Space Telescope Science Institute 1993–95) chart, which is reproduced in Figure 3, where north is also at the bottom. The positions of Luyten's variable and Goranskij's variable are marked.

G. Williams, of the IAU Central Bureau for Astronomical Telegrams and the Harvard-Smithsonian Center for Astrophysics, measured a precise position for Luyten's star, given in *IAU Circular* 7277 (1999). Williams noted that this position is within 10 arc sec of the position originally given by Luyten.

It was the recommendation of the Central Bureau and the authors that E. Kazarovets and N. N. Samus, keepers of the *General Catalogue of Variable Stars*, allow Luyten's star to retain the designation GM Sgr. They agreed and Goranskij's star has now been assigned the name V4641 Sgr. This was announced in *IAU Circular* No. 7277 (Kazarovets and Samus 1999).

Subsequently, Kato and Uemura (1999) have published a finding chart for Luyten's GM Sgr.

3. Conclusion

We have shown that in all probability, the star GM Sgr as discovered by Luyten (1927) is not the same as the star identified as such by Goranskij (1978). Goranskij's star has now been assigned the designation V4641 Sgr.

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Space Telescope Science Institute 1993–95, *Digitized Sky Survey*, Baltimore.
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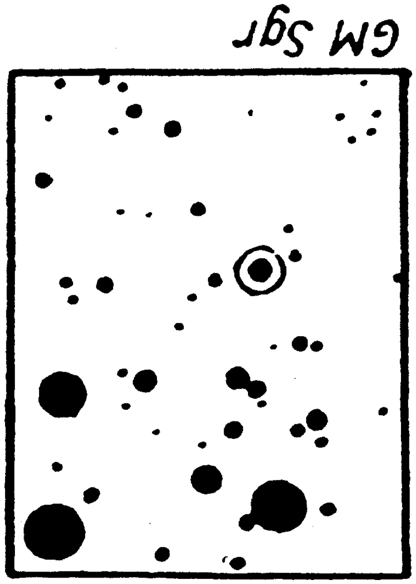

Figure 1. Finding chart for Goranskij's (1978) star, inverted for comparison with Figure 2, with a 2 arc min field. South is up and west to the left.

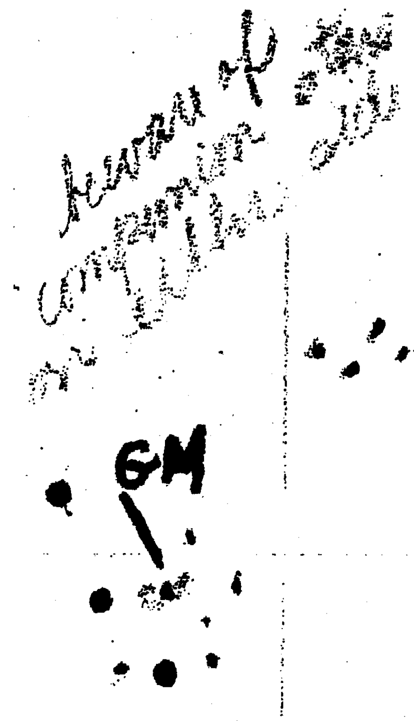

Figure 2. Sketch of the position of Luyten's variable from BLW's measures in DH manuscript notebook No. XII, stored at the Harvard College Observatory. South is up and west to the left. The handwriting (BLW's) says "beware of companion star on either side."

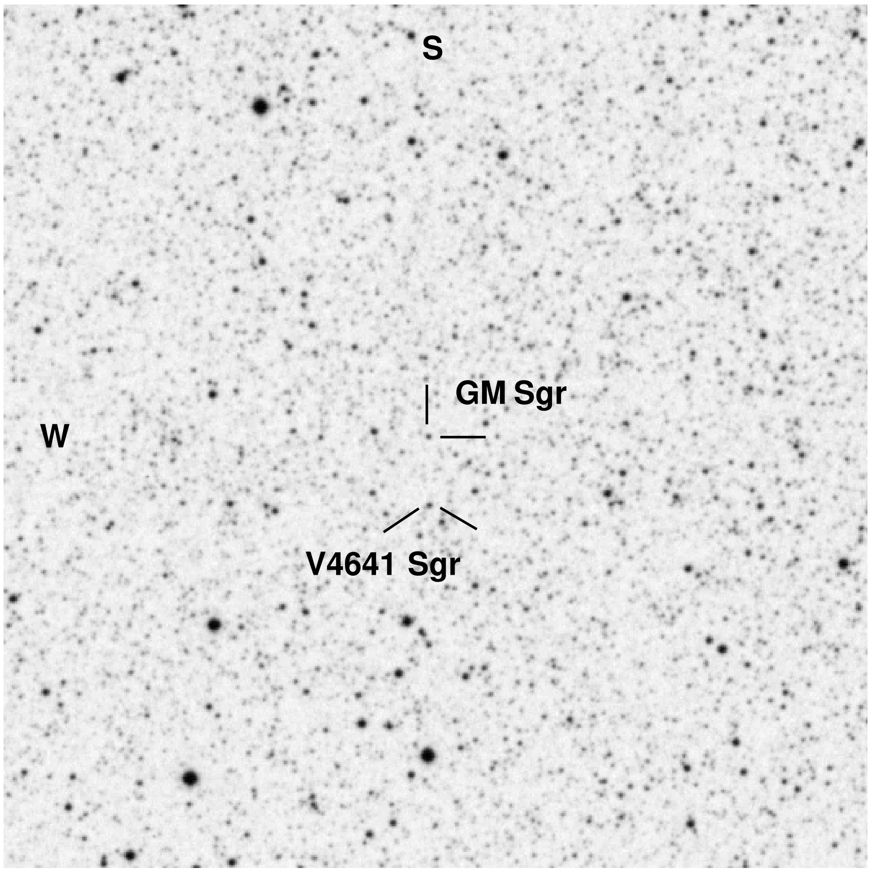

Figure 3. Chart of the area of GM Sgr, identifying Luyten's variable (GM Sgr) and Goranskij's variable, V4641 Sgr. The chart, centered on (2000) R. A. 18^{h} 19^{m} 22^{s}, Decl. -25° 25.6', is from the *Digitized Sky Survey* (produced at the Space Telescope Science Institute under U.S. Government Grant NAG W-2166). The field is 15 x 15 arc min, with south up and west to the left.