

COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS

Number 5334

Konkoly Observatory
Budapest
6 November 2002

HU ISSN 0374 – 0676

**ASTROMETRIC AUTHENTICATION OF RX J2309.8+2135
AS A NEARBY DWARF NOVA CANDIDATE**

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RX J2309.8+2135 = 1RXS J230949.6+213523 is an X-ray source discovered through the ROSAT all-sky survey (Voges et al. 1999). Wei et al. (1999) reported its optical identification and provided a classification as a cataclysmic variable (CV) without further specification. Schwope et al. (2000) tentatively classified this object as a symbiotic binary based on the presence of a strong M-type stellar component. Most recently, however, Schwope et al. (2002) reported a refined classification as a CV based on the complete absence of high ionization lines and the line ratios (He I and Balmer lines) unlike those of symbiotic stars. Schwope et al. (2002) further proposed the spectral type of M3. Assuming that the secondary star is a Roche-lobe filling M3 dwarf star, Schwope et al. (2002) suggested an extremely small distance of ~ 30 pc. This implication is surprising since this would break the nearest record of CVs (the best established example being WZ Sge: 45 pc, J. Thorstensen, cited in Steeghs et al. (2001)). We therefore reexamined this possibility.

We have examined the available astrometric catalogs (Table 1), and detected a large proper motion of $2''.8$ in 40.1 yr. This value has been confirmed by a direct comparison of DSS 1 and 2 plate scans. The detected proper motion corresponds to $0''.069 \pm 0''.012$ yr⁻¹. This value is comparable to nearby dwarf novae with large proper motions (WZ Sge: $0''.078 \pm 0''.007$ yr⁻¹, Kraft and Luyten 1965; GW Lib: $0''.066 \pm 0''.012$ yr⁻¹, Thorstensen et al. 2002; V893 Sco: $0''.067 \pm 0''.015$ yr⁻¹, Thorstensen 1999; 1RXS J232953.9+062814: $0''.056 \pm 0''.005$ yr⁻¹, Uemura et al. 2001, Kimeswenger et al. 2002). This large proper motion makes the object likely a nearby object. Assuming an upper limit transverse velocity of 100 km s⁻¹, the upper limit of the distance becomes ~ 300 pc, which is consistent with independent distance determinations of CVs with similar proper motions (Thorstensen et al. 2002). The upper limit of M_V of the secondary thus becomes +8.5, which safely excludes the possibility of a symbiotic binary with a giant secondary. This indication is consistent with the suggested luminosity classification based on the CaH absorption at 6382 Å (Schwope et al. 2002). The present astrometry thus authenticates RX J2309.8+2135 as a nearby dwarf nova candidate. Even at a reasonable distance of ~ 100 pc, the outburst maxima of RX J2309.8+2135 would reach $V \sim 9^m$. At the suggested distance of ~ 30 pc, the maxima would reach even $V \sim 7^m$ (Warner 1986). These values indicate that RX J2309.8+2135 is a candidate for the brightest dwarf novae in the entire sky.

Table 1. Astrometry of RX J2309.8+2135.

| Source | R. A. (J2000.0) | Decl. | Epoch |
|-----------|---|--------------|----------|
| USNO A2.0 | 23 ^h 09 ^m 49 ^s .27 | +21°35'20"0 | 1951.613 |
| GSC 2.2.1 | 23 ^h 09 ^m 49 ^s .17 | +21°35'17".7 | 1991.754 |

However, the observed properties of RX J2309.8+2135 is rather unusual for a typical dwarf nova. The spectral type of M3 usually indicates an orbital period longer than 2–3 hr. Although CVs with such periods usually have relatively high mass-transfer rates (Warner 1995), the weak contribution of a disk continuum in the published spectra of RX J2309.8+2135 suggests the contrary. The lack of outburst detection between 2002 January and October (VSNET observations) seems to support a low mass-transfer rate. We know another secondary-dominated system with a low mass-transfer rate, CW 1045+525 (Tappert et al. 2001). These objects may represent a hitherto unidentified class of long-period CVs with the lowest mass-transfer rates, or these system may be undergoing excursions to long-lasting low states as in VY Scl-type stars (Warner 1995). The rather narrow appearance of emission lines in the published spectra resembles those of low states in VY Scl-type stars (Robinson et al. 1981), although a nearly pole-on view of a dwarf nova is also consistent with the observation. Since the orbital period of RX J2309.8+2135 has not yet been established, there also remains a possibility of an object with an anomalously hot, bright, evolved secondary (Uemura et al. 2002). The object is a very good candidate for future detailed photometric and radial velocity studies.

We are grateful to Pavol A. Dubovsky and Timo Kinnunen who reported observations to VSNET. This work is partly supported by a grant-in aid [13640239 (TK), 14740131 (HY)] from the Japanese Ministry of Education, Culture, Sports, Science and Technology.

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