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ON THE SUPERCYCLE OF SX LMi

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SX LMi is an SU UMa-type dwarf nova, which was originally discovered as a faint blue star in the north Galactic pole region (Iriarte and Chavira 1957; Sanduleak and Pesch 1984). The nature of the object was finally revealed by the secure detection of superhumps during its outburst in 1994 December (Nogami et al. 1997).

Nogami et al. (1997) argued that SX LMi has a relatively peculiar character based on their extensive research on relations between outburst amplitudes and supercycle lengths of known SU UMa stars. Their most important conclusion is that SX LMi has a relatively small superoutburst amplitude ($\sim 3\overset{\mathrm{m}}{.}8$) while the suggested supercycle has a fairly normal value of 250 d. SX LMi was thus proposed as a candidate for the missing link between ER UMa stars (for a review, see Kato et al. 1999) and the usual SU UMa-type dwarf novae. Other suggested candidates include HS Vir (Kato et al. 1998), NY Ser (Nogami et al. 1998), CI UMa (Nogami and Kato 1997) and V503 Cyg (Harvey et al. 1995). However, none of these objects show perfectly intermediate outburst characteristics between ER UMa stars and usual SU UMa-type dwarf novae, as discussed in Kato et al. (2000). SX LMi and CI UMa were listed in Kato et al. (2000) as objects having less regular superoutbursts. SX LMi was also discussed by Nogami et al. (1997) as having a possibly anomalous disk viscosity parameter. Since the historical superoutbursts of SX LMi (also cited in Nogami et al. (1997)) looked to have occurred less regularly, a more comprehensive search for superoutbursts is indispensable to reveal the nature of the object, and to test the arguments presented by Nogami et al. (1997) and Kato et al. (2000).

Observations reported to VSNET (http://www.kusastro.kyoto-u.ac.jp/vsnet/) were analyzed, which almost completely covered the object since 1995 November, except solar conjunction periods. These visual observations were done using V-magnitude calibrated comparison stars, and their errors are an order of 0.2–0.3 mag, which will not affect the following discussion. Figure 1 shows the overall light curve from VSNET observations. Arrows represent upper limits, but upper limits brighter than 14.5 mag are omitted from this figure in order to avoid confusion. The light curve clearly shows relatively regular occurrence of bright outbursts reaching 13.0–13.5 mag. These outbursts might be naturally considered as superoutbursts based on their duration and brightness, but we have tried to adopt more secure identifications based on superhump detection. Recent CCD observations by Iwamatsu et al. (2001, in preparation) has confirmed that the 2001 January long outburst is a genuine superoutburst. Together with past observations described in Nogami et al. (1997), we can now safely identify long and bright outbursts as superoutbursts.

Table 1: Superoutbursts of SX LMi

JD start	peak magnitude	duration (d)
2450238	13.2	> 2
2450545	13.2	14
2450819	13.2	> 4
2451131	13.1	11
2451631	13.1	11
2451935	13.1	> 4

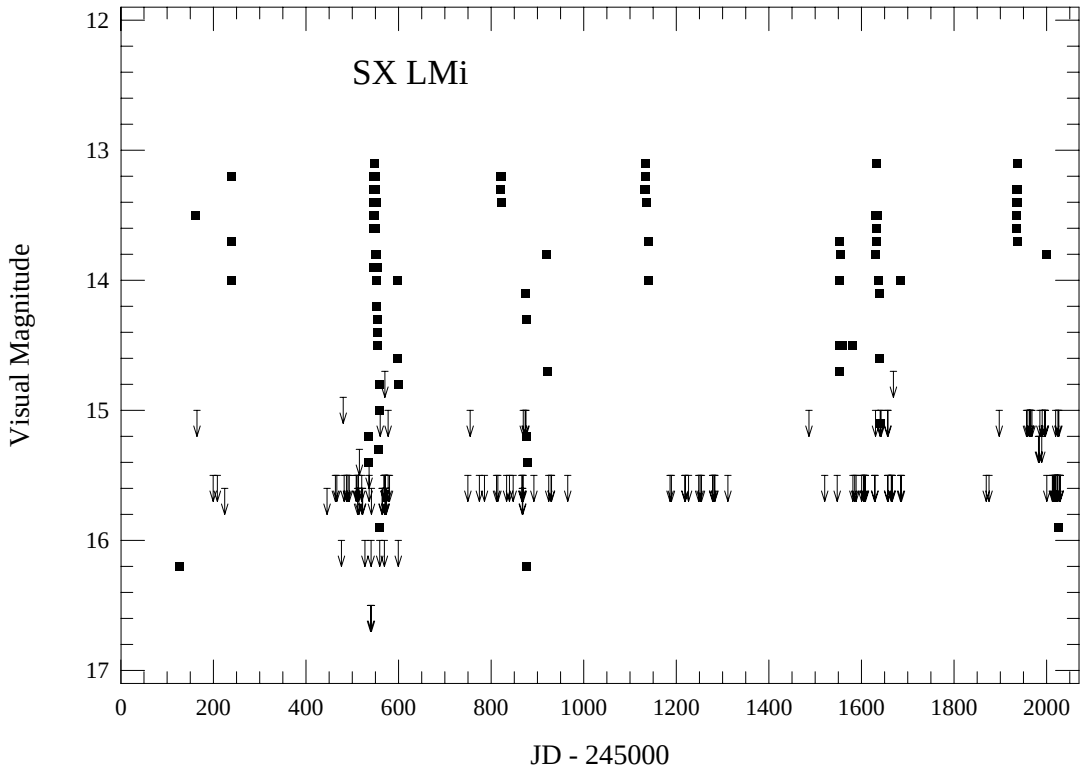

Figure 1. Light curve of SX LMi

By assuming one missed superoutburst between JD 2451131 and 2451631 (the object was not observed because of the solar conjunction), these observations indicate that SX LMi relatively regularly showed superoutbursts with a cycle length of 250–312 d. The mean period of supercycle is 279 d, which is slightly longer than one suggested by Nogami et al. (1997). The present observation has confirmed previously unrecognized regular occurrence of superoutbursts, which also strengthen the finding by Nogami et al. (1997) that normal outbursts are relatively infrequent compared to the relatively short supercycle length. This seems to make a striking difference from HS Vir (Kato et al. 1998) and NY Ser (Nogami et al. 1998), and suggests a different origin of the SX LMi peculiarity.

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