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## DETECTION OF SUPERCYCLE IN BF Ara: NORMAL SU UMa-TYPE DWARF NOVA WITH THE SHORTEST SUPERCYCLE

KATO, TAICHI<sup>1</sup>; STUBBINGS, ROD<sup>2</sup>; PEARCE, ANDREW<sup>3</sup>; NELSON, PETER<sup>4</sup>; MONARD, BERTO<sup>5</sup>

<sup>1</sup> Dept. of Astronomy, Kyoto University, Kyoto 606-8502, Japan, e-mail: tkato@kusastro.kyoto-u.ac.jp

 $^2$  19 Greenland Drive, Drouin 3818, Victoria, Australia, e-mail: stubbo@qedsystems.com.au

 $^3$  32 Monash Ave, Nedlands, WA 6009, Australia, e-mail: Andrew.Pearce@worley.com.au

 $^4$  RMB 2493, Ellinbank 3820, Australia, e-mail: pnelson@dcsi.net.au

<sup>5</sup> PO Box 11426, Tiegerpoort 0056, South Africa, e-mail: LAGMonar@csir.co.za

ER UMa stars are a small subgroup of SU UMa-type dwarf novae, which have extremely short supercycles (the interval between successive superoutbursts) of 19–50 d (for a review, see Kato et al. 1999). The shortest known supercycles in "usual" SU UMa-type dwarf novae had been 90–130 d (e.g. Table 1 in Nogami et al. 1997), until the discovery a short supercycle of 84<sup>d</sup>.7 in a normal SU UMa-type dwarf nova, SS UMi (Kato et al. 2000). Although several SU UMa-type dwarf novae have been found to occasionally exhibit short intervals between successive superoutbursts, only few systems are known to have intermediate outburst statistics between ER UMa stars and usual SU UMa-type dwarf novae. The importance of these intermediate objects in understanding the nature of ER UMa-type objects, and eventually the origin of mass-transfer in short-period cataclysmic variables, was described in Kato et al. (2000).

BF Ara is a dwarf nova having a range of variability 13.6-(16.0 p according to the 4th) edition of the General Catalogue of Variable Stars. The star received attention by the discovery of possible superhumps with an amplitude of  $0^{\text{m}}_{25}$  by Bruch (1983). However, the star has been largely neglected by researchers. Upon noting the possible presence of a definite periodicity of occurrence of long, bright outbursts, we have selected the star as monitoring targets of VSNET Collaboration (http://www.kusastro.kyoto-u.ac.jp/vsnet/).

Visual observations were done with 32-cm (R.S.), 40-cm (A.P.), 32-cm (P.N.) and 32-cm (B.M.) reflectors. All observations were done using photoelectrically calibrated V-magnitude comparison stars. The typical error of visual estimates was less than  $0^{m}_{...2}$ , which does not affect the following discussion. The total number of observations between 1997 June 24 and 2001 May 3 was 372.

The overall light curve is presented in Figure 1. Each filled square represents single estimates and ' $\lor$ ' sign represents upper limits. The quasi-periodic occurrence of long, bright outbursts and faint states associated with brief brightenings is clearly demonstrated. The behavior is very reminiscent of that of SS UMi (Kato et al. 2000). Table 1 lists the epochs of long, bright outbursts. Together with the finding by Bruch (1983), made at V = 14.2,



Figure 1. Light curve of BF Ara. Ticks represent epochs of superoutbursts listed in Table 1

Table 1: Superoutbursts of BF Ara		
JD start	peak magnitude	duration $(d)$
2450722	13.8	> 10
2450890	14.0	> 11
2450980	14.1	13
2451055	14.0	17
2451229	13.8	>7
2451301	14.3	17
2451465	13.9	19
2451640	14.0	> 11
2451724	14.2	> 14
2451812	13.9	> 9
2451975	14.2	17:

which is comparable to observed magnitudes of these outbursts, these outbursts are most likely considered as superoutbursts of an SU UMa-type dwarf nova.

Noting that the intervals of these outbursts are close to 83 d or its multiples, the supercycle was determined as 83<sup>d</sup>.4, by assuming the presence of missed superoutbursts during the unobservable seasons. All observations are well expressed by this representative supercycle; Figure 2 presents a folded light curve by this period. Partly because of faint outbursts being close to the detection limit, and possibly because of slight cycle-to-cycle variation, the cycle length of normal outbursts (between superoutbursts) is slightly harder to detect than in SS UMi (Kato et al. 2000).



Figure 2. The 83.4-d supercycle of BF Ara. Upper limits are omitted for simplicity

The present observation suggests that BF Ara is a twin of SS UMi in its outburst pattern. The suggested superhump period slightly longer than  $\sim 2$  hr (Bruch 1983) is, however, significantly longer than that of SS UMi (Chen et al. 1991; Kato et al. 1998), but is close to that of YZ Cnc, as originally suggested by Bruch (1983). Since YZ Cnc is another active SU UMa-type dwarf nova, although its supercycle exceeds 100 d, the similarity is not surprising. Detailed observations to determine the superhump characteristics of BF Ara are strongly encouraged.

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