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TIME-RESOLVED PHOTOMETRY OF AH Eri IN OUTBURST

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AH Eri is a dwarf nova which had been a candidate for a system with a short orbital period (Szkody 1987). Szkody et al. (1989) performed CCD photometry in quiescence, and found 0.1–0.3 mag modulations with a period of 42 ± 2 min. Szkody et al. (1989) interpreted this period as the possible spin period of a magnetic white dwarf, as in DQ Her systems. However, since the similar period in AL Com, which Howell and Szkody (1988) originally attributed to the spin period, later turned out to be the double-wave modulations of the 81.6-min orbital period (for an extensive review of the object, see Nogami et al. 1997), a question was raised whether the reported 42-min periodicity in AH Eri actually reflects the spin period or is rather related to the orbital period.

The question remained unsettled until the discovery of the firm orbital period of 5.74 hours by Thorstensen (1997). Thorstensen (1997) also argued against the spin-period interpretation of the 42 ± 2 min by Szkody et al. (1989), based on the low strength of He II emission lines, which are usually strong in magnetic cataclysmic variables.

An outburst of AH Eri was announced on 1997 February 28 (Hers 1997). We performed time-resolved CCD photometry on 1997 March 1 in order to test the presence of the claimed 42 ± 2-min periodicity. The observations were done using a CCD camera (Thomson TH 7882, 576×384 pixels, on-chip 2×2 binning adopted) attached to the Cassegrain focus of the 60-cm reflector (focal length = 4.8 m) at Ouda Station, Kyoto University (Ohtani et al. 1992). An interference filter was used which had been designed to reproduce the Johnson V band. The exposure time was 40 s. The frames were first corrected for standard de-biasing and flat fielding, and were then processed by a microcomputer-based aperture photometry package developed by one of the authors (TK). The magnitudes were determined relative to GSC 5319.1471 ($V = 12.18$, $B - V = +0.63$), whose short-term constancy was confirmed using GSC 5319.1526 ($V = 12.56$, $B - V = +0.65$). The magnitudes are taken from Henden and Honeycutt (1997). A total of 90 useful frames were obtained. Barycentric corrections to observed times were applied before the following analysis.

The light curve drawn from these observations is presented in Figure 1. The light curve shows a slow fading, but there were no apparent periodic variations. After removing the linear fading trend, we performed a period analysis between $0^{\rm d}.02$ and $0^{\rm d}.04$ using the Phase Dispersion Minimization (PDM) method (Stellingwerf 1978). The analysis did not yield a significant periodicity. Figure 2 shows the phase-averaged light curve folded by the reported period of 42 min. The light curve suggests that the 42-min period may have

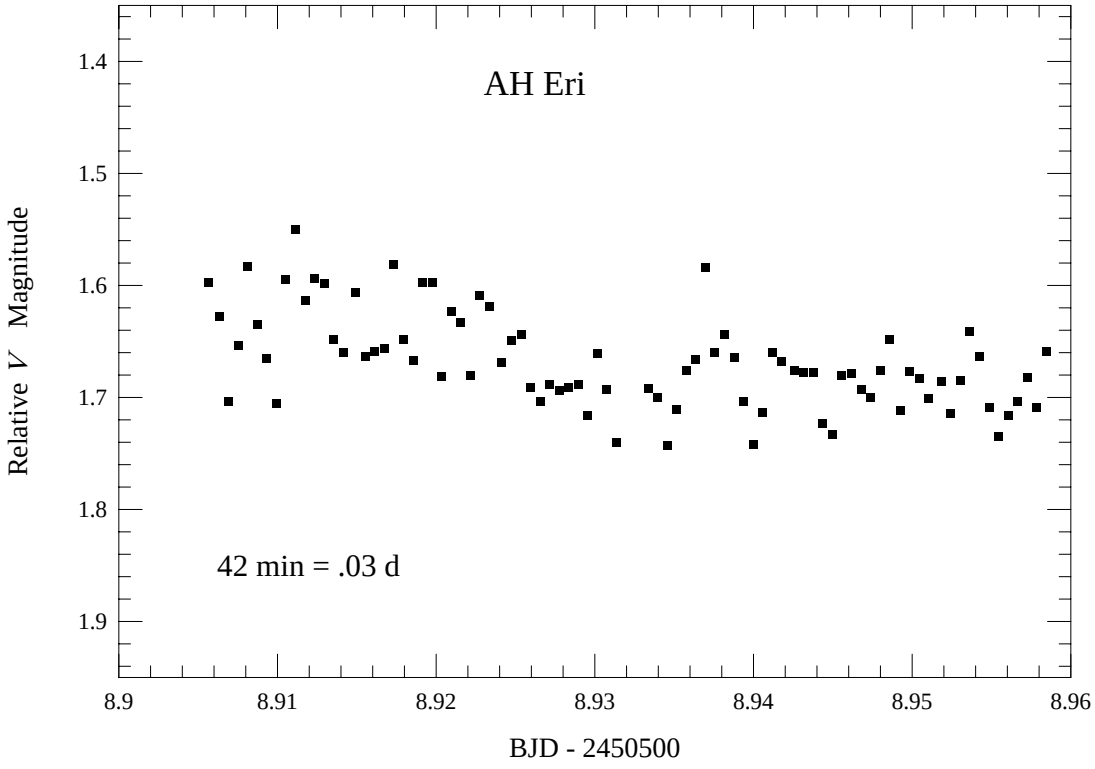

Figure 1. Light curve of AH Eri on 1997 March 1

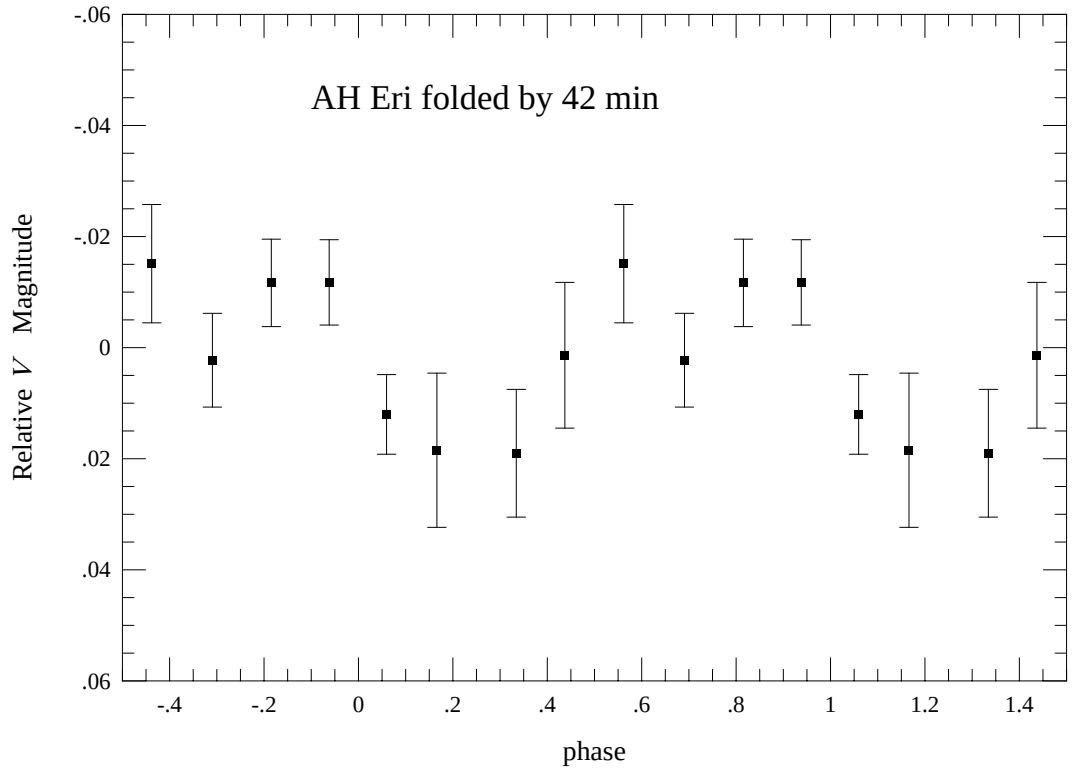

Figure 2. Light curve of AH Eri folded by a test period of 42 min

been marginally detected. But because of the lack of a firm signal in period analysis, we adopt the observed full amplitude ($0^{m}.03$) at the supposed 42-min period as the upper limit of this periodicity. The upper limit of $0^{m}.03$ is 3 to 10 times smaller than reported in Szkody et al. (1989). We conclude that the claimed 42-min periodicity of AH Eri did not appear, or was markedly reduced in amplitude, during its 1997 outburst.

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References:

Henden, A. A., Honeycutt, R. K., 1997, *PASP*, **109**, 441
Hers, J., 1997, *VSNET alert circulation*, No. 755 (available from http://www.kusastro.kyoto-u.ac.jp/vsnet/Mail/alert0/msg00755.html)
Howell, S. B., Szkody, P., 1988, *PASP*, **100**, 224
Nogami, D., Kato. T., Baba, H., Matsumoto, K., Arimoto, J., Tanabe, K., Ishikawa, K., 1997, *ApJ*, **490**, 840
Ohtani, H., Uesugi, A., Tomita, Y., Yoshida, M., Kosugi, G., Noumaru, J., Araya, S., Ohta, K., 1992, *Memoirs of the Faculty of Science, Kyoto University, Series A of Physics, Astrophysics, Geophysics and Chemistry*, **38**, 167
Stellingwerf, R. F., 1978, *ApJ*, **224**, 953
Szkody, P., 1987, *ApJS*, **63**, 685
Szkody, P., Howell, S. B., Mateo, M., Kreidl, T. J., 1989, *PASP*, **101**, 899
Thorstensen, J. R., 1997, *PASP*, **109**, 1241