

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

Number 4745

Konkoly Observatory
Budapest
7 August 1999

HU ISSN 0374 – 0676

**CCD PHOTOMETRY OF BF ERIDANI —
A LOW-AMPLITUDE DWARF NOVA?**

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BF Eri was originally classified as a slowly varying variable star. The fourth edition of General Catalogue of Variable Stars listed it as a semiregular variable star with a range of 13.5-15.5 pg. However, the likely identification of the Einstein survey source 1ES 0437-046 with BF Eri (Elvis et al. 1992) and optical spectroscopy (Schachter et al. 1996) led to the correct identification as a cataclysmic variable. The source was also detected during the course of the ROSAT All-Sky Survey (1RXS J043929.5-043605, 1RXP J043927-0434.3) and pointed observations (1WGA J0439.4-0433). The ROSAT identification of the Einstein source also led to an identification as a cataclysmic variable of unknown type (Chisholm et al. 1999). Independently noting the identification of BF Eri with the ROSAT source, the VSOLJ (Variable Star Observers' League in Japan) and the author started visual and CCD monitoring of this object. The first result of visual monitoring (Watanabe 1999) led to a conclusion that BF Eri is a dwarf nova with a recurrence period of 40–50 d, and the range of 13.2–14.7 m_v . I here report long-term and short-term variation by CCD photometry.

The observations were done using an unfiltered ST-7 camera attached to the Meade 25-cm Schmidt-Cassegrain telescope. The exposure time was 30 s. The images were dark-subtracted, flat-fielded, and analyzed using the JavaTM-based aperture photometry package developed by the author. The differential magnitudes of the variable were measured against GSC 4743.801 (USNO r -magnitude 11.7), whose constancy was confirmed by comparison with GSC 4743.797 (USNO r -magnitude 12.3). Table 1 summarizes nightly averaged magnitudes relative to GSC 4743.801.

The long-term light curve of BF Eri is shown in Figure 1. Each point represents a nightly averaged magnitude, with an error bar indicating the standard error. The initial part of the light curve corresponds to the final declining stage of the second outburst reported by Watanabe (1999). Around JD 2451230 (1999 February 20), another distinct brightening (outburst) was observed. The outburst smoothly decayed in the following five days, with an average rate of 0.19 mag d⁻¹. The combination of overall CCD observation and the visual monitoring (Watanabe 1999) indicates that the typical amplitude of outbursts is ~ 1 mag. The discovery observation may indicate the amplitude can be as large as 2 mag. The overall behavior of this star resembles those of low-amplitude dwarf novae, or of some NL-type variables. The likely existence of outburst periodicity (Watanabe 1999) prefers the dwarf nova interpretation.

Table 1: CCD observation of BF Eri

JD start ^a	JD end ^a	N^b	mag ^c	error ^d
51196.132	51196.198	140	1.96	0.01
51197.080	51197.154	61	1.96	0.04
51199.113	51199.139	20	2.05	0.03
51201.111	51201.137	33	2.05	0.02
51205.064	51205.112	77	2.14	0.01
51206.079	51206.115	36	2.00	0.03
51207.043	51207.099	97	2.05	0.01
51208.048	51208.050	3	1.93	0.12
51209.046	51209.101	118	2.20	0.01
51210.042	51210.069	23	2.02	0.06
51211.038	51211.060	48	2.05	0.02
51212.031	51212.073	82	2.34	0.02
51214.034	51214.035	3	1.95	0.12
51216.021	51216.098	190	2.21	0.01
51217.040	51217.088	117	2.19	0.01
51218.026	51218.083	138	2.13	0.01
51219.014	51219.081	100	1.99	0.02
51223.061	51223.079	11	2.17	0.14
51224.078	51224.082	8	2.24	0.05
51225.076	51225.078	5	1.96	0.08
51226.116	51226.117	2	2.20	0.17
51229.053	51229.055	5	1.72	0.04
51230.087	51230.089	5	1.58	0.03
51231.031	51231.033	6	1.70	0.07
51231.984	51231.985	4	1.86	0.03
51232.931	51232.933	4	2.02	0.05
51234.901	51234.903	5	2.49	0.04
51236.920	51236.920	1	2.58	-
51237.903	51237.905	5	2.28	0.05
51238.909	51238.910	5	2.18	0.03
51240.906	51240.907	5	2.25	0.10
51242.917	51242.918	3	2.32	0.06
51243.906	51243.908	5	2.19	0.06
51247.912	51247.914	5	1.96	0.05
51248.913	51248.915	7	2.17	0.04
51249.910	51249.912	4	2.16	0.16
51253.913	51253.915	5	1.99	0.09
51260.915	51260.917	4	2.46	0.06

^a JD - 2400000^b Number of frames^c Magnitude relative to GSC 4743.801^d Standard error of nightly average

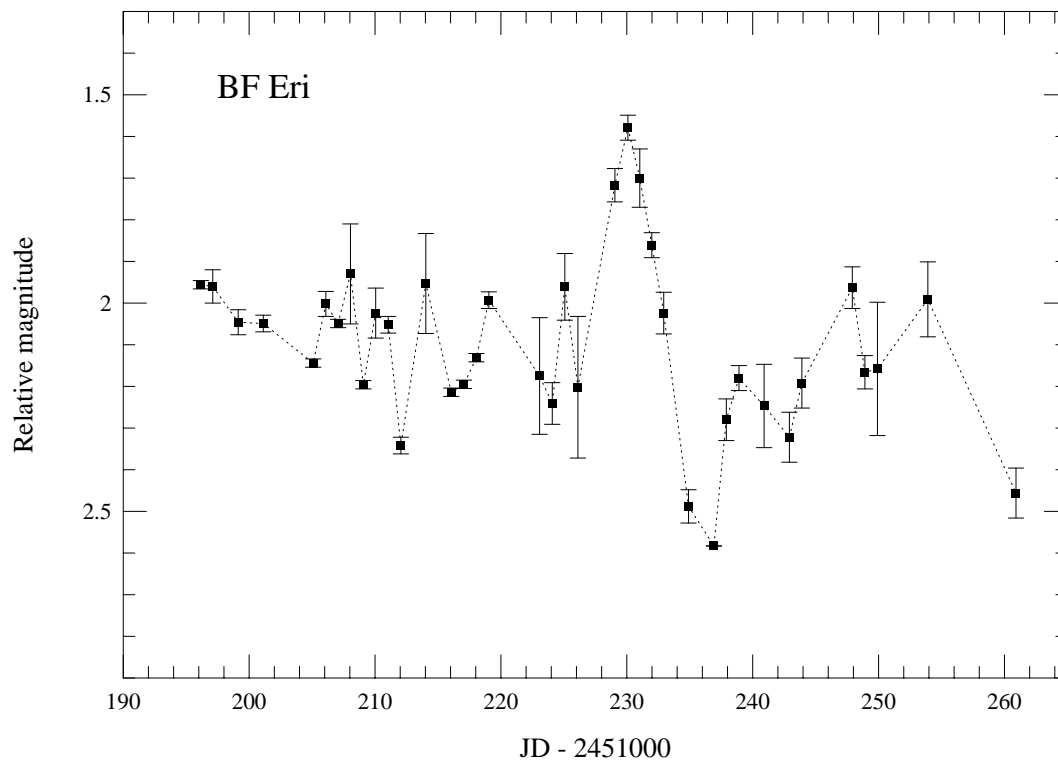


Figure 1. Long-term light curve of BF Eri

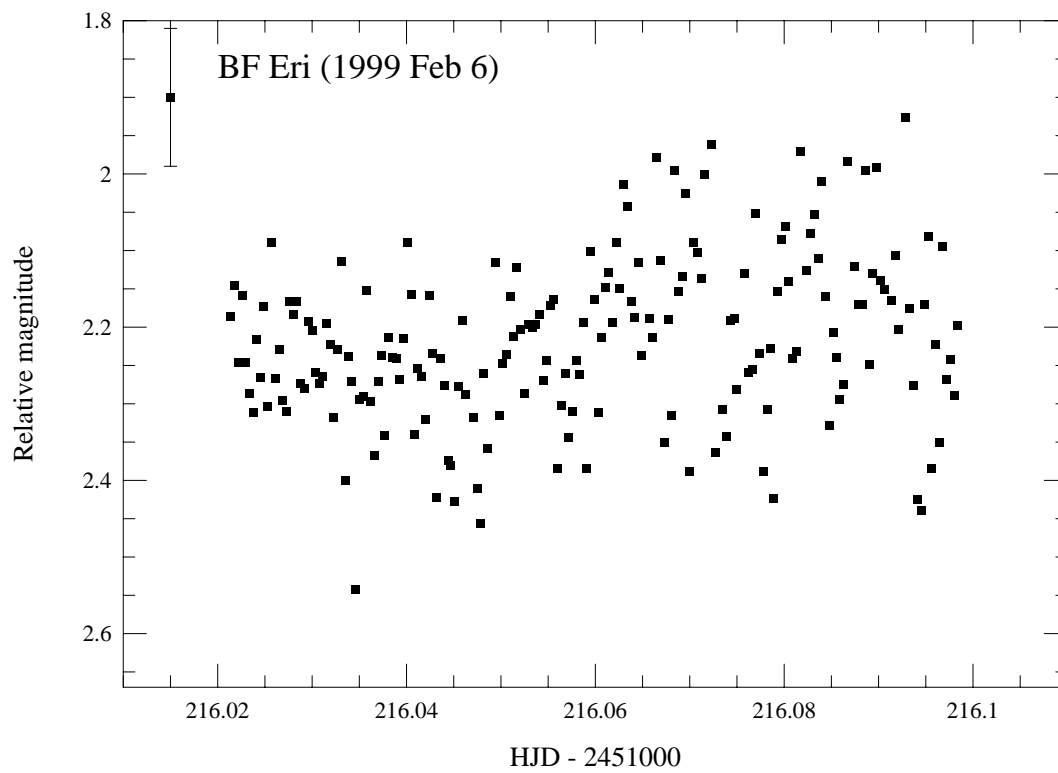


Figure 2. Short-term variability on 1999 February 6

Figure 2 illustrates a representative short-term light curve of BF Eri, where each point represents a single measurement. Slow modulations with a typical time-scale of 1–2 hours usually exist, with possible superposition of shorter time-scale modulations. However, Fourier analysis of the longer data sets, after subtracting the nightly trend, did not yield a stable periodicity between 0.05 d and 0.2 d.

This work is partly supported by the Grant-in-Aid for Scientific Research (10740095) of the Japanese Ministry of Education, Science, Culture, and Sports.

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