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V470 CASSIOPEIAE IS AN RR LYRAE TYPE VARIABLE

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V470 Cas = S8459 Cas was discovered by Hoffmeister (1964) on photographic plates of the Sonneberg Observatory. He classified this star as a short period variable in the range between $12^{\rm m}_{\cdot}5$ and $13^{\rm m}$, possibly eclipsing. First investigation of this variable was performed by Meinunger (1968). She determined the range of variability between $13^{\rm m}_{\cdot}0$ to $13^{\rm m}_{\cdot}5$ and gave first elements as:

$$\mathrm{Min\,I} = \mathrm{HJD}\,2429231.369 + 0^{\rm d}_{\cdot}444692 \times \mathrm{E} \qquad (1)$$

V470 Cas was cited again as eclipsing variable in a paper by Gessner and Meinunger (1973), in which the authors note that the investigation of this variable was handicapped by its relative high brightness and small amplitude. They gave eight times of minima and mentioned that the above elements may not be regarded as ascertained. With these data V470 Cas is listed in the fourth edition of the GCVS (Kholopov et al., 1985).

For a quarter of a century the variable had not been observed, when we put V470 Cas on our observing program. The CCD observations were made with SBIG ST6 cameras without filters, attached to a 32cm RC telescope (W.M.) and a 20cm SC telescope (F.A.). GSC 3678.1232 ($11^{\rm m}_{\cdot}84$) served as comparison star.

A period analysis program, based on the algorithm of Schwarzenberg-Czerny (1989) resulted in a period roughly double as long as the GCVS period. As our CCD observations show, the variable is of RR Lyr type with a rather long period and small amplitude. In our instrumental system the amplitude of variability is $0^{\rm m}_{\cdot}35$ and M−m = $0^{\rm p}_{\cdot}35$.

To expand our knowledge of period changes to the past, one of us (E.S.) investigated this star on 721 plates of the Sonneberg Sky Patrol.

The timespan covered by these plates (1957 – 1993) was divided into several parts. Using a first ephemeris, for each of these parts a mean lightcurve was calculated and the time of the normal maximum was derived (W.K., see Table 1). From that, 23 moments of normal maximum light resulted. The O−C residuals are shown plotted in Figure 2.

Obviously the period did not remain constant in the investigated interval of time. Considering the accuracy of estimates on photographic plates the period probably changed at about JD 2445000.

Least squares fits in each of these intervals yield the following linear elements:

$$\begin{array}{c} \mathrm{Max\,I} = \mathrm{HJD}\,2436200.588 + 0^{\rm d}_{\cdot}874356 \times \mathrm{E} \\ \qquad\qquad\qquad\quad \pm 25 \qquad\qquad \pm 5 \end{array} \qquad (2)$$

(valid between JD 2436200 and JD 2445000), and

Table 1. Times of maxima for V470 Cas, epochs and residuals computed with respect to the ephemeris (3) derived in this paper

N	JD hel. 2400000+	W	T*	Epoch	O−C	Observer
1	36200.613	2	P	−14833	+1.040	[1]
2	37558.455	2	P	−13280	+0.838	[1]
3	37871.528	2	P	−12922	+0.852	[1]
4	38233.474	2	P	−12508	+0.769	[1]
5	38413.621	2	P	−12302	+0.776	[1]
6	38974.812	2	P	−11660	+0.561	[1]
7	39765.286	2	P	−10756	+0.518	[1]
8	40318.762	2	P	−10123	+0.457	[1]
9	41192.386	2	P	−9124	+0.490	[1]
10	41897.052	2	P	−8318	+0.337	[1]
11	42631.510	2	P	−7478	+0.244	[1]
12	43431.382	2	P	−6563	−0.020	[1]
13	44816.563	2	P	−4979	+0.008	[1]
14	45204.812	2	P	−4535	−0.005	[1]
15	46271.676	2	P	−3315	+0.011	[1]
16	46648.542	2	P	−2884	−0.018	[1]
17	46763.152	2	P	−2753	+0.037	[1]
18	47392.762	2	P	−2033	+0.032	[1]
19	47776.617	2	P	−1594	−0.003	[1]
20	47939.302	2	P	−1408	+0.031	[1]
21	48503.249	2	P	−763	−0.052	[1]
22	48600.399	2	P	−652	+0.032	[1]
23	48862.626	2	P	−352	−0.080	[1]
24	49170.529	60	E	0	+0.011	[2]
25	49213.36	30	E:	49	−0.01	[2]
26	49226.467	60	E	64	−0.017	[2]
27	49588.520	30	E:	478	+0.008	[3]
28	49644.491	30	E:	542	+0.013	[3]
29	49658.5005	60	E	558	+0.0308	[2]
30	49659.3690	60	E	559	+0.0248	[2]
31	49693.478	60	E	598	+0.030	[3]
32	49978.561	30	E:	924	+0.037	[3]
33	49979.449	60	E	925	+0.051	[3]
34	50013.525	60	E	964	+0.022	[3]

*) E denotes CCD observed maxima, P are photographic. Those marked with ':' got reduced weight.

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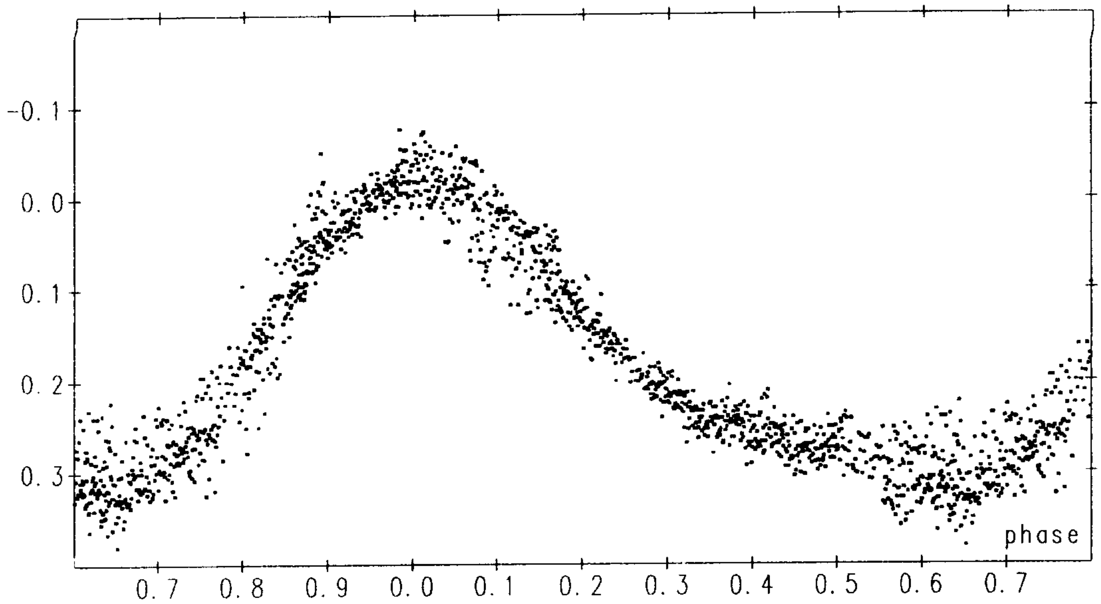

Figure 1: Differential light curve of V470 Cas with respect to the new ephemeris (3).

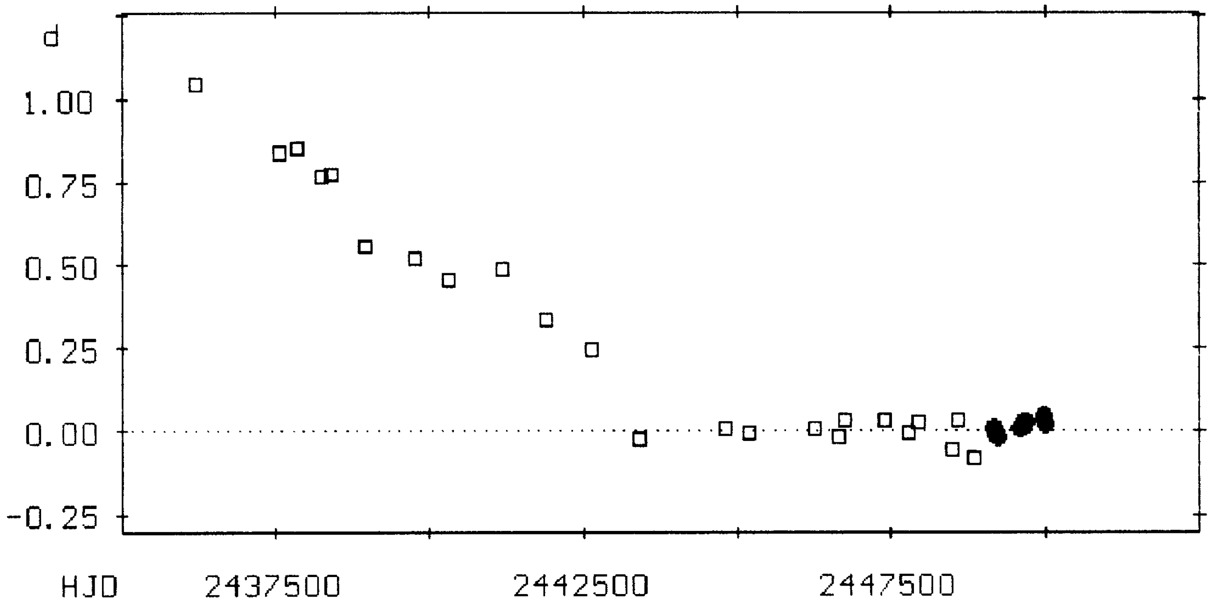

Figure 2. O−C diagram for V470 Cas computed with respect to Max = HJD 2449170.518 + 0.8744654 × E using all available maximum timings. • represents photoelectric and ▫ photographic normal maxima.

$$\mathrm{Max\,I} = \mathrm{HJD}\,2449170.518 \underset{\pm 1}{} + 0\overset{\mathrm{d}}{.}8744654 \underset{\pm 14}{} \times \mathrm{E} \qquad (3)$$

(valid after JD 2445000)

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