AS Piscium - definitely cleared up

G.A. Richter, Sonneberg, and F. Börngen, Tautenburg

(Eingegangen am 28. Februar 1989)

Abstracts

AS Psc is a U Geminorum star with a cycle length of about $200^{d}...250^{d}$. It can get as bright as $15^{m}.3$, but most of the time it is fainter than $21^{m}.7$.

AS Psc ist ein U-Geminorum-Stern mit einer Zyklenlänge von ungefähr $200^{d}...250^{d}$. Er kann die Helligkeit $15^{m}.3$ erreichen, ist aber die meiste Zeit schwächer als $21^{m}.7$.

After the discovery of this cataclysmic variable by RICHTER (1979) the question arose whether AS Psc is a nova in the galaxy M33 or a foreground U Geminorum star of our Galaxy (RICHTER and BÖRNGEN 1981, SHAROV 1982, RICHTER 1983). To settle this question we took some 300 plates with the Sonneberg astrograph 400/1600 mm and 50 plates with the Tautenburg Schmidt telescope. In the meantime SHAROV (1987) discovered some new maxima which follow in intervals as short as 771^{d}, and so he established that AS Psc indeed is a U Geminorum star. On the Sonneberg and Tautenburg plates some of SHAROV's eruptions are confirmed and a further eruption could be found. In the table all eruptions known are assembled. The magnitudes were determined by use of the comparison stars of RICHTER and BÖRNGEN (1981).

Table: The five known eruptions of AS Psc

J.D.	B		J.D.	B		J.D.	B	
243 8286.52	[$21^{m}.7$	2	244 5671.29	$15^{m}.3$	2	244 5964.31	$16^{m}.7$	1
87.49	16.5	2	.33	15.5	2	65.28	18.3	1
89.51	16.5	2	72.39	16.3	2	66.44	18.9	1
			74.34	15.9	2			
244 4460.50	17.7	1	.37	16.0	2	244 6770.36	19.1	1
61.49	17.5	1	76.34	16.5	2	73.48	16.1	2
.52	17.5	1	.35	16.5	2	.50	16.1	2
66.46	17.7:	2	.36	16.3	2			
89.56	21.2:	3	.38	16.4	2			
90.54	21.3	3	.43	16.4	2			
			.49	16.7	2			

Sources: 1 = Crimea, 2 = Sonneberg, 3 = Tautenburg plates

The table shows that the shortest interval observed between two eruptions is only 293 days.

Considering the observed eruptions with regard to season, one notices that they all have been observed in the autumnal season of good visibility (August to December). By employing the "C_3 method" (RICHTER 1986, WENZEL and RICHTER 1986) it can be shown that in the interval densely covered with plates, from 1980 Jan. to 1988 Nov., the real number of eruptions may be expected to be $\gtrsim 13$, so that the mean cycle length C should be $\lesssim 250^{d}$. This differs only little from the shortest observed interval of 293^{d} mentioned above. So this system resembles DX And, T Leo, and

UV Per, whose cycle-lengths are of the same order of magnitude.

The maximum brightness reached during eruptions is not constant, as can be seen from the table. While during the first observed eruption (243 8287) the object obviously remained fainter than 16^m, it got as bright as $15^m.3$ at 244 5671.29. The duration of the eruptions is nearly 10 days or even longer.

References:

RICHTER, G.A., 1979, Mitt. Veränderliche Sterne 8,119.
RICHTER, G.A., 1983, Astron. Tsirk. no. 1262.
RICHTER, G.A., 1986, Astron. Nachr. 307,224.
RICHTER, G.A., and BÖRNGEN, F., 1981, Astrophys. Letters 21,101.
SHAROV, A.S., 1982, Astron. Tsirk. no. 1229.
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The cycle length of TX Trianguli

G.A. Richter, Sonneberg

(Received February 28, 1989)

Abstract

This SS Cygni star was examined on plates of the Sonneberg astrograph 400/1600 mm. From 1979 to 1988 altogether 13 maxima could be found. The mean cycle length is about 90^d.

The SS Cygni type star TX Tri = SVS 2289 = S 10830, discovered by KUROCHKIN (1978) and independently by RICHTER (1979), was investigated photometrically by KUROCHKIN (1978) and spectroscopically by RICHTER et al. (1981).

For the purpose of studying the photometric behaviour of this star magnitude estimates were performed on about 320 plates from 1980 to 1988 of the astrograph 400/1600 mm of Sonneberg observatory and on 50 plates of the Tautenburg Schmidt telescope.

Unfortunately not a single plate showed the object near maximum brightness (with the exception of the one observation mentioned in RICHTER et al. 1981), but we have observations during the decline and in some cases possibly near the begin of the rise. These observed brightenings are given in Table 1 (p. 3).

Table 1. Observed brightenings

J.D.	B	
244 4194.44	$14^m.4$	2
4655.28	16.63	?
5020.30	16.3:	2
21.26	16.7:	3
22.27	16.5:	3
5621.55	17.6:	
.58	17.5:	
35.32	16.76	3(?)
46.41	17.65	
5911.53	16.69	3(?)
13.52	[16.6	
6003.47	17.8:	
.48	17.7:	
05.46	17.3:	1
.48	17.28	1
06.46	17.24	1
.47	17.06	1
6110.26	17.4:	
13.29	[16.6	
16.29	16.6:	1
.30	16.8:	1
6327.41	17.47	
28.51	17.29	1(?)
.52	17.3:	1(?)
.54	17.04	1(?)
51.42	17.11	3(?)
.44	16.96	3(?)
6385.34	17.4:	
87.51	16.8:	1
6405.37	16.77	3
.41	16.83	3
6463.34	15.45	2
.35	15.62	2
66.22	16.3:	2
6678.55	16.95	3
.58	16.90	3
.60	17.02	3
79.53	17.17	3
.55	16.90	3
.57	17.12	3
83.44	17.6:	

J.D.	B	
244 6762.27	$15^m.64$	2
.30	15.88	2
.33	15.70	2
.37	15.95	2
.38	15.71	2
.43	15.77	2
.46	15.73	2
.48	15.80	2
.53	15.77	2
63.21	15.88	2
.24	16.07	2
.27	15.94	2
.29	16.15	2
.30	16.22	2
.33	16.07	2
.34	16.07	2
.38	15.84	2
.43	16.07	2
.48	16.16	2
.53	16.18	2
.56	16.24	2
64.21	16.68	3
.26	16.72	3
.30	16.68	3
.33	16.68	3
.38	16.63	3
.42	16.58	3
.48	16.63	3
.53	16.6:	3
.54	16.8:	3
65.46	17.44	
7206.25	16.3:	2
.26	16.4:	2
07.25	16.6:	2
.26	16.6:	2
7469.39	15.92	2
.41	15.95	2
.49	16.07	2
70.42	16.04	2
.43	16.24	2
71.33	16.6:	2

1 = begin of rise
2 = decline
3 = end of decline

From the brightenings we get the following probable times of maxima by extrapolation (Table 2,p.4):

Table 2. Supposed times of maxima

244 4194	244 6388:
5016:	6461
5629::	6670:
5905::	6758
6007:	7201:
6117:	7465
6329::	

One can see that most maxima are not quite certain, but it can be established that the individual cycle lengths are between about 60^d and 115^d, the mean value being near 90^d or 95^d. This is not much greater than the value given by KUROCHKIN (70^d for the interval 243 6027...244 3765).

The magnitudes of the comparison stars were calibrated using the photoelectric sequence of SANDAGE and JOHNSON (1974). By chance KUROCHKIN used the same comparison stars, but for some obscure reason his magnitudes deviate considerably from our values. To make a comparison possible between our magnitudes and the values of KUROCHKIN we give both magnitude systems in Table 3.

Table 3. Comparison between our B magnitudes and the values of KUROCHKIN (1978)

Designation by KUROCHKIN	B KUROCHKIN	B this work
b	$13^m.68$	$14^m.2$
e	15.03	15.5
g	16.00	16.63
h	16.36:	17.44
k	16.54:	17.65

With an amplitude of about 3.5 mag the object obeys the classical Kukarkin Parenago relationship. The declines last about 5^d to 7^d, in some cases longer.

I am indebted to the staff of the Karl Schwarzschild Observatory Tautenburg for making the plates available.

References:

KUROCHKIN, N.E., 1978, Astron. Tsirk. no. 1023,4.
RICHTER, G.A., 1979, Mitt. Veränderliche Sterne 8,119.
RICHTER, G.A., NOTNI, P., BÖRNGEN, F., AFANAS'EV, V., KARACHENTSEV, I.D., and KOPYLOV, A., 1981, Astron. Nachr. 302,211.
SANDAGE, A., and JOHNSON, H.L., 1974, Astrophys. J. 191,63.

Photographische Beobachtungen und neue Periode von BU Draconis

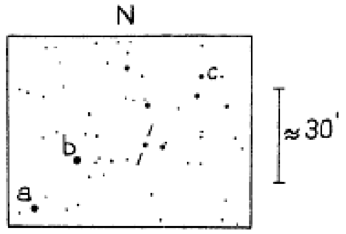
F. Kühnlenz, Sonneberg (Mitglied des AKV)

(Eingegangen am 7. Februar 1989)

Die Variabilität von BU Dra = BV 277 wurde von STROHMEIER (1) entdeckt. NIKULINA (2) veröffentlichte zwei Minima und vermutete Algol-Lichtwechsel, der von MEINUNGER (3) mit folgenden Elementen bestätigt wurde: Min. = 242 8656.530 + $1^d.91417 \cdot E_1$.

LICHTENKNECKER (4) stellte bei BU Dra große (B-R)-Werte fest, was mich veranlaßte, die Periode dieses Sternes zu überprüfen.

Der Stern wurde auf insgesamt 2344 Platten der Sonneberger Himmelsüberwachung des Zeitraumes 1928...1988 untersucht. Es wurden die Felder 14^h+60^o, 16^h+60^o, 15^h+60^o, 14^h+53^o, 15^h+65^o, 16^h+53^o, 15^h+50^o sowie 15^h+70^o benutzt. Der Stern wurde mit Hilfe der Argelanderschen Methode unter Verwendung der in Abb. 1 dargestellten Vergleichssterne mit den Helligkeiten aus Tab. 1 beobachtet.



Tab. 1 Vergleichssternhelligkeiten (mpg)

a	$10^m.57$
b	10.87
c	11.32

Abb. 1 Umgebungskarte von BU Dra

Die Helligkeiten der Vergleichssterne wurden mittels Plattenphotometer im Anschluß an die B-Helligkeiten aus (5) bestimmt.

Die von MEINUNGER (3) gefundene Periode mußte verdoppelt werden, da sich zeigte, daß die Beobachtungen mit ungerader Epochenzahl E_1 bei der Phase 0 entweder nahe der Maximalhelligkeit lagen oder sich nur wenig geschwächt zeigten. Die neuen Elemente lauten:

$$\text{Min.(hel.)} = 242\ 8656.490 + 3^d.8283652 \cdot E \quad \text{(EA)}$$
$$\pm.014 \qquad \pm 49$$

Die Lichtkurve des Sterns ist, getrennt nach Feldern und Kameras, in Abb. 2a...d (S. 7) gezeichnet; die beobachteten Zeiten schwacher Helligkeit sind in Tabelle 2 gegeben.

Tabelle 2 — Minima I

J.D. (hel.) 24...	E	B-R
2 6068.494	- 676	$-0^d.021$
826.547	- 478	+0.015
3 0463.498	+ 472	+0.020
486.451	+ 478	+0.002
704.676	+ 535	+0.011
819.498	+ 565	-0.018
3 1290.420	+ 688	+0.015
554.520	+ 757	-0.042
3 5861.498	+1882	+0.025
903.599	+1893	+0.014
3 6661.593	+2091	-0.009
3 7350.644	+2271	-0.063
779.457	+2383	-0.027
3 8204.456	+2494	+0.023
227.411	+2500	+0.008
319.290	+2524	+0.006
560.460	+2587	-0.011
583.439	+2593	-0.002
675.333	+2617	+0.011
3 9816.225	+2915	+0.050
827.658	+2918	-0.002
827.688	+2918	+0.028
919.551	+2942	+0.011
942.503	+2948	-0.008

(Fortsetzung von Tab. 2)

J.D. (hel.) 24...	E	B-R	
3 9942.533	+2948	+0ᵈ022	
942.563	+2948	+0.052	
965.487	+2954	+0.006	
965.513	+2954	+0.032	
4 0149.253	+3002	+0.011	
149.279	+3002	+0.037	
321.476	+3047	-0.043	
321.506	+3047	-0.013	
4 1217.322	+3281	-0.034	
217.350	+3281	-0.006	
240.283	+3287	-0.043	
240.313	+3287	-0.013	
929.386	+3467	-0.046	
4 2151.468	+3525	-0.009	
151.510	+3525	+0.033	
599.414	+3642	+0.018	
714.256	+3672	+0.009	
840.599	+3705	+0.016	
955.420	+3735	-0.014	
955.443	+3735	+0.009	
4 3288.477	+3822	-0.025	
575.606	+3897	-0.023	
579.443	+3898	-0.015	
4 5141.443	+4306	+0.012	
	Minima II		
2 5561.229	- 808.5	-0.028	
687.578	- 775.5	-0.015	
2 6001.486	- 693.5	-0.033	
3 6307.454	+1998.5	-0.024	
307.483	+1998.5	+0.005	
3 7938.364	+2424.5	+0.003	
3 8849.476	+2662.5	-0.036	
849.526	+2662.5	+0.014	
3 9205.574	+2755.5	+0.024	
894.640	+2935.5	-0.016	
917.596	+2941.5	-0.030	
940.587	+2947.5	-0.009	
944.487	+2948.5	+0.063	
4 0101.428	+2989.5	+0.040	
4 1127.450	+3257.5	+0.060	
4 3956.532	+3996.5	-0.020	
4 4427.436	+4119.5	-0.004	
4 5074.452	+4288.5	+0.018	
4 5116.563	+4299.5	+0.017	(4)

Literatur:

(1) STROHMEIER, W., 1959, Veröff. Sternwarte Bamberg 5, no. 4,2.
(2) NIKULINA, T.G., 1961, Astron. Tsirk. no. 227,17.
(3) MEINUNGER, L., 1965, Mitt. Veränderl. Sterne 3,16.
(4) LICHTENKNECKER, D., 1988, BAV-Rundbrief 37,26.
(5) SANDERS, W.L., 1966, Astron. J. 71, no. 8,719.

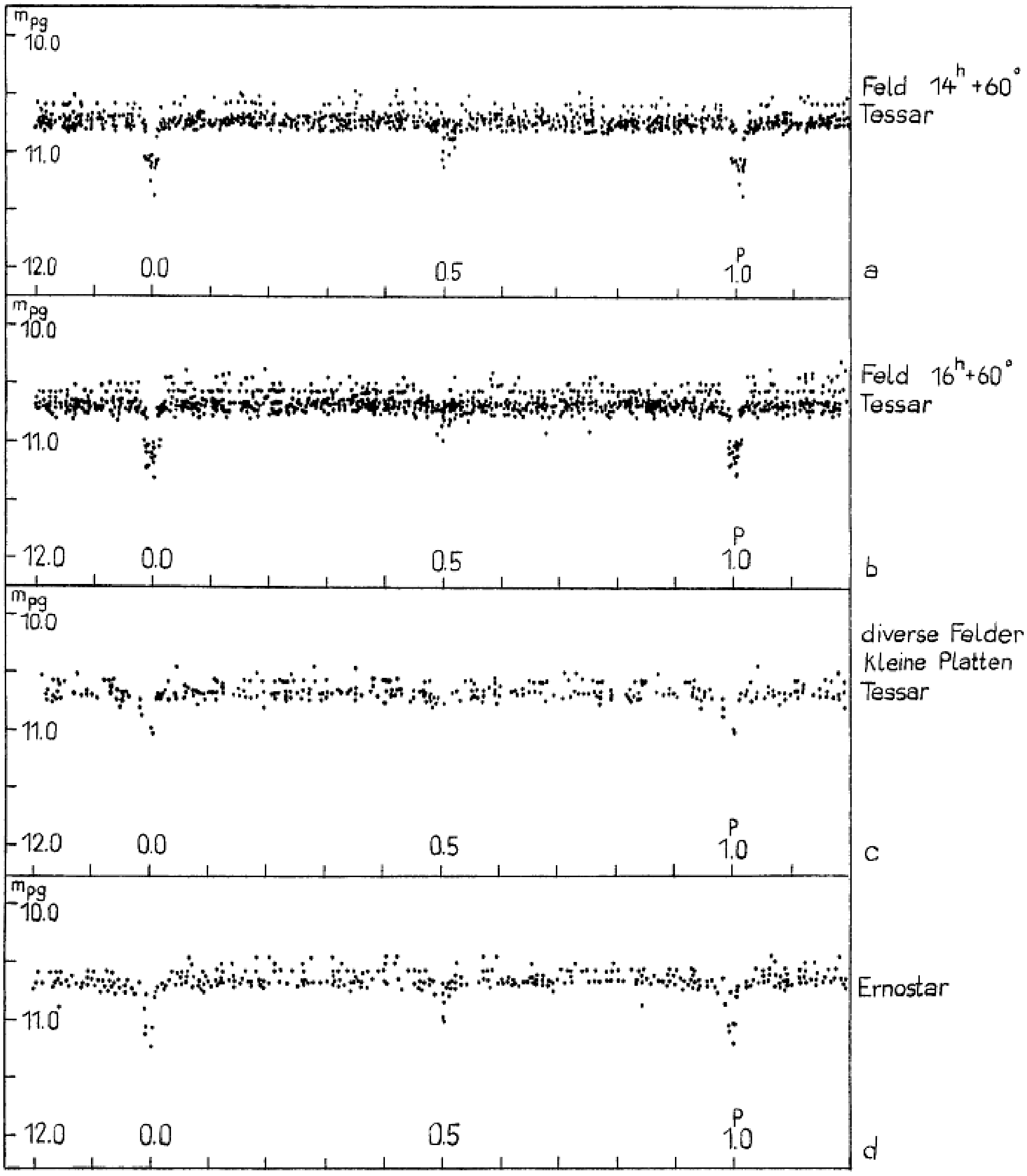


Abb.2 Lichtkurve von BU Dra

Bestätigung der Periode des Bedeckungsveränderlichen NSV 3005

B. Fuhrmann, Sonneberg

(Eingegangen am 7. März 1989)

Abstract

An inspection of more than 2700 Sonneberg plates confirms the period of approximately 1259 days of this long period eclipsing star.

Im März 1988 beobachteten KAISER et al. (1) ein Minimum des Sterns NSV 3005. Sie vermuteten langperiodischen Bedeckungslichtwechsel mit einer Amplitude von 1.8 mag und einer Bedeckungsdauer von 12 bis 14 Tagen.

KAISER (2) untersuchte den Veränderlichen auf 754 Harvard-Aufnahmen und fand ihn auf fast allen Platten im Maximum ($m_b = 9^{m}.0$), auf 6 Platten aber deutlich schwächer. Die von KAISER abgeleiteten Elemente lauten:

$$\mathrm{Min.} = 241\,5779.4 + 1258^{d}.56 \cdot E \qquad (K).$$

Bei einer Inspektion von über 2700 Aufnahmen der Sonneberger Plattensammlung der Jahre 1926 bis 1988 konnte NSV 3005 auf mehreren Platten in der unmittelbaren Nähe von Minima beobachtet werden. Die Minimazeitpunkte wurden aus den vorhandenen Teilstücken der Lichtkurve graphisch ermittelt; sie sind in folgender Tabelle gegeben. Die Tiefe des Minimums selbst wurde dabei in allen Fällen mit $10^{m}.8$ (pg) angenommen.

J.D. 240 0000 +	E	Anzahl der Beobachtungen im Abstieg / Aufstieg
3 4658.0	15	2/10
3 5916.0	16	0/5
3 8435.0:	18	0/5 (in der zweiten Hälfte des Aufstiegs)

Alle hellen Schätzungen stehen im Einklang mit KAISERs Elementen (K) und liegen außerhalb der berechneten Minima. Das vorliegende Beobachtungsmaterial bestätigt die oben angegebene Dauer des Minimums, läßt aber über die Amplitude keine Aussage zu: Meine schwächste Beobachtung liegt bei $10^{m}.4$ (pg).

Unter Berücksichtigung der 3 neu gefundenen Minima liefert die Ausgleichsrechnung nach der Methode der kleinsten Quadrate die folgenden geringfügig verbesserten Elemente (F) für NSV 3005:

$$\mathrm{Min.} = \underset{\pm .35}{241\,5779.40} + \underset{\pm .01}{1258^{d}.59} \cdot E \qquad (F).$$

Literatur:

(1) KAISER, D.H., BALDWIN, M.E., WILLIAMS, D.B., 1988, Inform. Bull. Variable Stars no. 3196

(2) KAISER, D.H., 1988, Inform. Bull. Variable Stars no. 3233

Optical behaviour of the X-ray binary V 1727 Cygni = 4U 2129+47 in the season 1988/1989

W. Götz, Sonneberg

(Received March 8, 1989)

Abstract

Of V 1727 Cyg 45 observations in B are given. All of them are from the low state.

The star was inspected on 45 blue-sensitive plates (ORWO-ZU21 +GG13+BG12) from 29 nights obtained with the 50/70/172 cm Schmidt camera of Sonneberg Observatory covering the time interval between May 11, 1988 and January 3, 1989.

The individual estimates, which are listed in the table, are linked to the sequence of comparison stars given by WENZEL (1983). According to KALUZNY (1988) the comparison star c of this sequence is equal to B = $18^{m}.25$ and not to B = $17^{m}.9$. Therefore, the estimates fainter than B = $17^{m}.9$ in the present series and in the previous ones (GÖTZ 1985, 1986, 1987, 1988) must be corrected by $\triangle$B = 0.35 mag. The faintest observations in the following table then become B = $18^{m}.65$. All observations given there are from the low or inactive state of the star, which in most of the cases is below the limiting magnitude (iv = invisible).

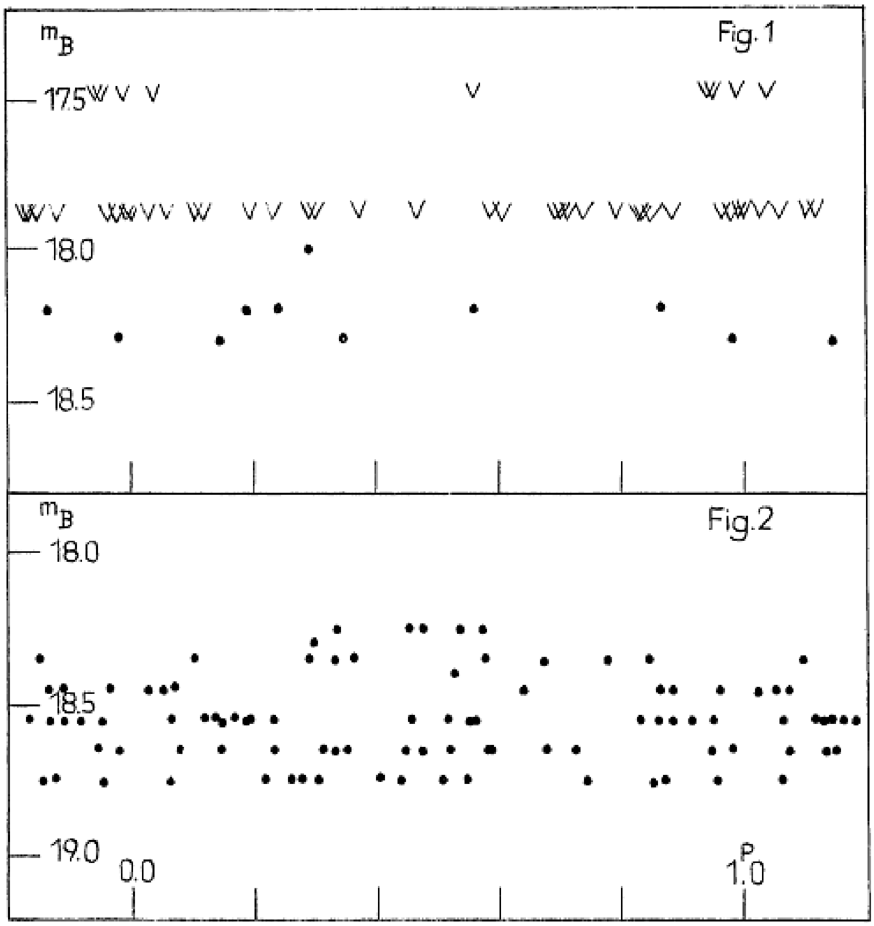
J.D.hel. 244....	m_B	
7298.475	$>17^{m}.5$	iv
7294.473	>17.5	iv
7325.525	>17.9	iv
7329.497	>17.9	iv
7332.508	>17.9	iv
7353.497	>17.9	iv
7365.528	>17.9	iv
.554	>17.5	iv
7366.504	>17.9	iv
.527	>17.9	iv
7368.558	>17.9	iv
7387.517	18.20	
.543	18.30	
7390.570	>17.9	iv
7391.518	18.20	
.540	18.00	
7392.470	18.20	
.502	>17.9	iv
7395.560	>>17.9	iv
7411.470	>17.9	iv
.491	>17.9	iv
7412.471	>17.9	iv
.494	>17.9	iv

J.D.hel. 244....	m_B	
7413.486	$>17^{m}.9$	iv
.508	>17.5	iv
7414.468	18.30	
.495	>17.9	iv
7415.476	>17.9	iv
.497	>17.9	iv
7418.385	>17.9	iv
7436.300	>17.9	iv
7437.302	>17.9	iv
7438.396	>17.9	iv
7469.382	>17.5	iv
.402	>17.5	iv
7470.299	18.30	
.318	18.20	
7471.301	>17.9	iv
.320	>17.9	iv
7473.278	>17.9	iv
.296	>>17.9	iv
7475.300	>>17.9	iv
.309	>17.9	iv
7530.223	>17.9	iv
.243	>17.9	iv

The observations listed in the table are shown in Figure 1 (p.10). They are reduced to one common epoch by means of the elements

$$\text{Min.(hel.)} = 244\ 4403.743 + 0^{d}.2182579 \cdot E$$

given by McCLINTOCK et al. (1982). The arrows indicate "fainter than" observations.



All observations of all series (GÖTZ 1985, 1986, 1987, 1988) from plates on which the star is visible are plotted against the phases in Figure 2. There the magnitudes are reduced to the improved sequence of comparison stars. It can be seen that in the low state no noticeable periodic brightness changes are present. We completely agree with KALUZNY's (1988) remark that a great part or all of the observed fluctuations are due to photometric uncertainties near the plate limit; we never considered any other interpretation.

References:

GÖTZ, W., 1985, Inform. Bull. Variable Stars no. 2732
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GÖTZ, W., 1987, Inform. Bull. Variable Stars no. 3013
GÖTZ, W., 1988, Inform. Bull. Variable Stars no. 3166
KALUZNY, J., 1988, Acta Astron. 38,207
McCLINTOCK, J.E., LONDON, R.A., BOND, H.E., GRAUER, A.D., 1982, Astrophys. J. 258,245
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SiG 9/29/89

Six new variable objects near M33

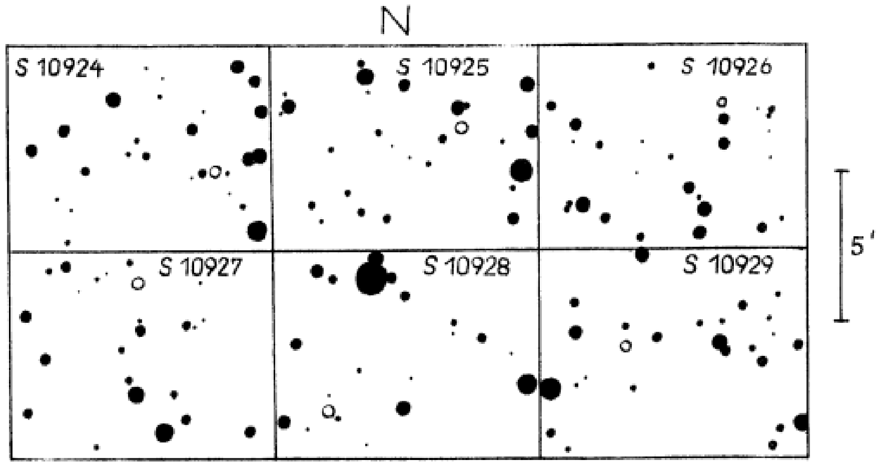
G.A. Richter, Sonneberg

(Eingegangen am 4. Mai 1989)

During photometric investigations of objects with UV excess 6 new variables were discovered near M33 on plates of the Schmidt telescope of Karl Schwarzschild Observatory Tautenburg:

Object	α (1950.0)	δ	B_{max}	B_{min}
S 10924	$1^h23^m44^s.2$	+30°28'56"	$19^m.7$	$20^m.5$
S 10925	1 25 0.2	+31 0 4	19.7	20.6
S 10926	1 27 11.7	+30 27 12	19.3	19.7
S 10927	1 32 6.8	+29 23 36	18.3	18.7
S 10928	1 36 5.4	+31 19 14	18.1	18.5
S 10929	1 36 15.2	+30 36 45	19.6	20.4

A detailed description of the brightness variations will be given later. I am indebted to Dr. F. BÖRNGEN, Tautenburg, for taking the plates and to W. MAI, Potsdam-Babelsberg, for computing the coordinates.



Short remark on the long-term behaviour of the cataclysmic variable QU Carinae

W. Wenzel, Sonneberg

(Eingegangen am 8. Mai 1989)

QU Car, the rapid photometric activity of which was discussed among others by KERN and BOOKMYER (Publ. Astron. Soc. Pacific 98, 1336; 1986) was checked on 33 Ernostar plates of the years 1937 and 1938 and on 41 Tessar films of 1953 and 1954, both series taken mainly by C. HOFFMEISTER. No conspicuous difference in the mean brightness of the two seasons could be found. Small irregular fluctuations (between the brightness of star C and that of the star 7 mm to the northwest of QU on KERN's and BOOKMYER's chart) are obviously due to a superposition of photographic noise and the rapid photometric activity reported by the authors mentioned.

Photographic observations of DR Tauri in the season 1988/89

W. Götz, Sonneberg

(Eingegangen am 27. Juni 1989)

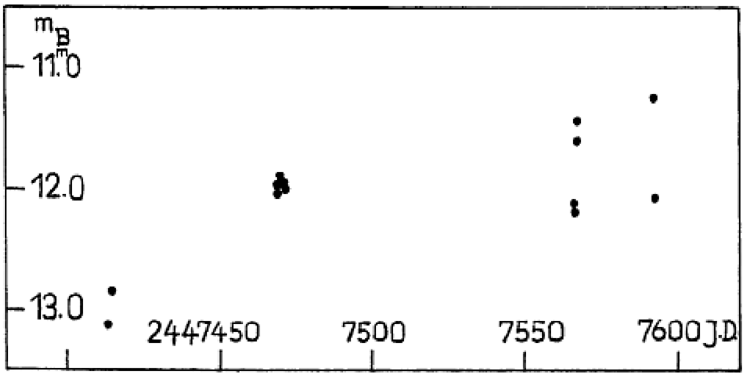
Abstract

The results of measurements of the star on blue-sensitive plates are given.

In completing and supplementing the light-curve in B the star was measured on 14 blue-sensitive plates (ORWO-ZU21+GG13+BG12) from 8 nights obtained with the 50/70/172 cm Schmidt camera of Sonneberg Observatory covering the time interval between September 9, 1988, and March 6, 1989.

The measurements, which are linked to the sequence of comparison stars given by GÖTZ (1982), are listed in the table. In the figure the light-curve is shown. There the star shows a brightness depression at the beginning of the series. The mean brightness of the object in the season 1988/89 amounts to m_B = 12^{m}04 with a total amplitude of Δm_B = 1.9 mag.

J.D. 244....	m_B	J.D. 244....	m_B
7471.415	12^{m}00	7414.576	13^{m}13
7566.311	12.19	7415.566	12.85
7566.328	12.16	7469.465	11.99
7567.265	11.61	7469.491	12.02
7567.277	11.46	7470.387	12.00
7592.331	11.24:	7470.406	11.89
7592.350	12.07	7471.396	11.97



Reference:

GÖTZ, W., 1982, Inf. Bull. Variable Stars 2172

Photometric behaviour of KR Aurigae in the season 1988/1989

W. Götz, Sonneberg

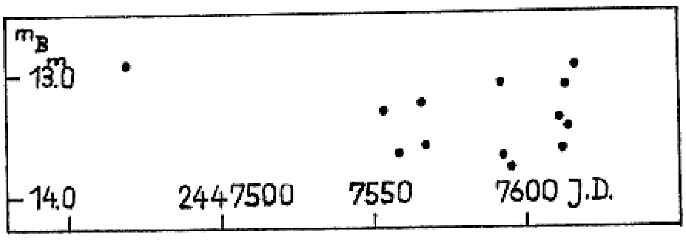
(Eingegangen am 27. Juni 1989)

Abstract

The results of brightness measurements of the star on blue-sensitive plates are given.

In completing the light-curve in B the star was measured on 26 blue-sensitive plates (ORWO-ZU21+GG13+BG12) from 13 nights obtained with the 50/70/172 cm Schmidt camera of Sonneberg Observatory covering the time interval between November 4, 1988, and March 30, 1989. The observations, which are linked to the sequence of comparison stars given by POPOVA (1965), are listed in the table. In the figure the light-curve of the object is shown by using night means of the brightness. As can be seen there and in the table the star was in its bright state, which in the given case is characterized by rapid brightness changes.

J.D. 244....	m_B	J.D. 244....	m_B
7470.471	$12^m.91$	7593.363	$13^m.77$
7470.490	12.90	7595.287	13.94
7554.313	13.17	7595.309	13.69
7554.332	13.44	7611.347	13.54
7558.475	13.64	7611.365	13.23
7558.494	13.70	7612.299	13.54
7566.270	13.12	7612.320	13.73
7566.288	13.36	7613.299	12.97
7567.316	13.48	7613.317	13.28
7567.335	13.73	7614.306	13.44
7592.282	13.10	7614.324	13.48
7592.301	13.10	7616.308	12.99
7593.344	13.62	7616.326	12.94



Reference:

POPOVA, M., 1965, Peremennye Zvezdy 15,534

Optical behaviour of AT Cancri in the season 1988/89

W. Götz, Sonneberg

(Eingegangen am 25. Juli 1989)

Abstract

Results of measurements of the star on blue-sensitive plates are given.

In linking to the sequence of comparison stars given in Inf. Bull. Variable Stars no. 2363 this cataclysmic star was measured on 33 blue-sensitive plates (ORWO-ZU21+GG13+BG12) of 12 nights obtained with the 50/70/172 cm Schmidt camera of Sonneberg Observatory covering the time interval between 4 November 1988 and 30 March 1989. The individual observations, which all show the star in its high state, are listed in the table.

J.D.hel. 244....	m_B	J.D.hel. 244....	m_B
7470.559	$12^m_.39$:	7596.434	$13^m_.15$
7470.578	12.20	7611.387	13.07
7554.375	13.29	7612.344	13.22:
7554.417	13.31	7612.386	13.08:
7558.522	13.17	7613.339	12.91:
7558.541	13.16	7613.359	13.19:
7566.367	13.35	7613.378	13.01:
7566.387	13.49	7613.398	13.13:
7566.406	13.30	7614.344	13.21:
7591.531	13.11	7614.363	13.04:
7591.572	13.05	7616.349	13.26
7592.410	13.31	7616.368	13.51
7592.475	13.23	7616.387	13.34
7596.333	13.00	7616.406	13.37
7596.352	13.18	7616.424	13.40
7596.373	13.00	7616.443	13.38
7596.408	12.94		

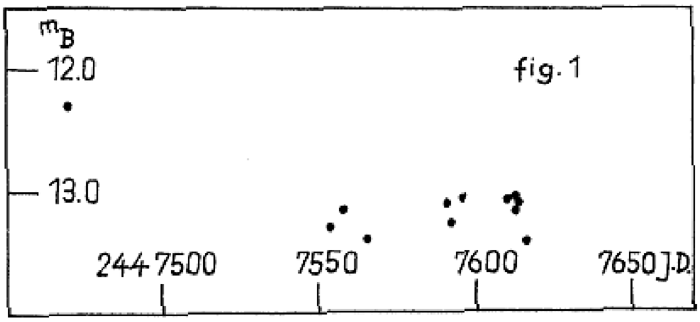
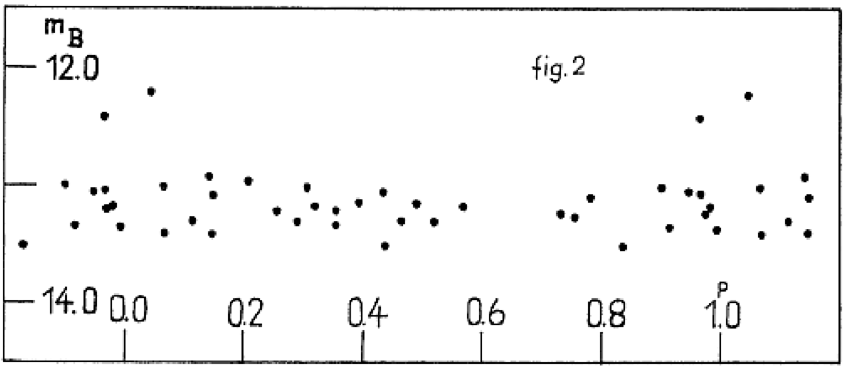


fig. 1

The long-term light-curve of AT Cnc, which results from mean brightness values of each night, is given in figure 1. There can be seen that the brightness variations of the star in comparison with series of former years are relatively small. This is true also for the behaviour of the orbital light changes in the present observations within the range $m_B = 12^m_.91$ and $m_B = 13^m_.51$; the results are given in figure 2, where the magnitudes of brightness are plotted against the phases according to the elements published in Inf. Bull. Variable Stars no. 2734.



References:

GÖTZ,W.,1983-1988,Inf.Bull.Variable Stars 2363;2526;2734;2918;3066;3208

Visuelle Beobachtungen von R Coronae Borealis

Arbeitskreis "Veränderliche Sterne"

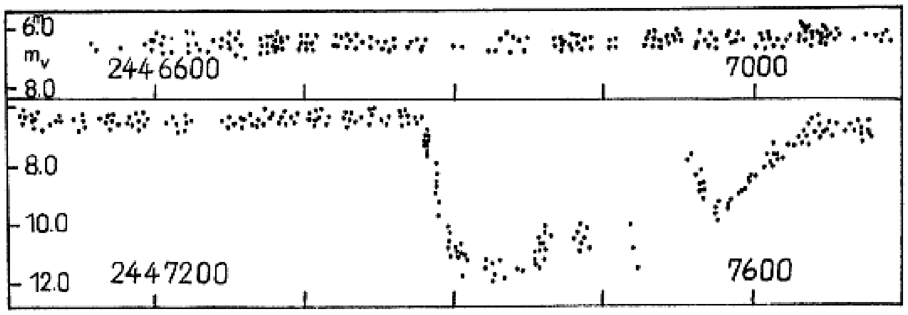
Zusammengestellt von D. Böhme, Nessa (Mitglied des AKV)

(Eingegangen 27. Juni 1989)

Der Veränderliche wurde weiter durch die Mitglieder des Arbeitskreises "Veränderliche Sterne" im Kulturbund der DDR beobachtet. Die Zusammenstellung basiert auf 1257 visuellen Schätzungen aus dem Zeitraum vom 1.5.1986 bis 31.5.1989. Die Lichtkurve bildet den Anschluß an die in Mitt. Veränd. Sterne 10,p.192 veröffentlichte Kurve.

Beobachter:

BLASBERG,Dresden	n=64	LEHMANN,Erfurt	n=122
BRETSCHNEIDER,Schneeberg	66	OHDE,Rostock	16
BÖHME,Nessa	82	RÄTZ,K.,Herges-Hallenberg	50
ENSKONATUS,Berlin	222	RÄTZ,M.,Herges-Hallenberg	56
HINZPETER,Rostock	46	VOHLA,Altenburg	129
GROSSE,Erfurt	35	WITT,Berlin	30
KLIX,Hirschfelde	182	ZIMMERMANN,Großpösna	35
KREJCI,Česke Krumlov	4	ZISCHE,Weigsdorf-Köblitz	118



Beobachtungsergebnisse des Arbeitskreises "Veränderliche Sterne" im Kulturbund der DDR (Teil XVI)

(Eingegangen am 10. Juli 1989)

A) Minima von Bedeckungsveränderlichen

	$J.D._{\odot}$ 244...	E	B-R	n	Art	Beob.	Bemerk.
WW Aur	7479.557	5756	$+0^{d}.007$	21	vis	Brf	
AR Aur	099.453	2103.5	+0.036	17	pev	Bus	
IM Aur	530.295	5624	-0.044	12	pev	Bus	
SV Cam	540.243	8339	+0.017	14	ph	Die	
RZ Cas	436.286	3544	+0.0214	14	vis	Rat	NMIN
	565.360	3652	+0.012	19	vis	Rcr	NMIN
U Cep	553.241	1208	+0.037	103	vis	Ens	NMIN
EG Cep	554.261	9107	+0.008	13	ph	Die	
	555.347	9109	+0.004	13	ph	Die	
	561.335	9120	+0.001	11	ph	Die	
NN Cep	454.870	1432	-0.026	90	vis	Ens	NNMIN
	455.920	1432.5	-0.005	0	vis	Ens	NMIN
	470.349	1439.5	+0.016	15	ph	Ber	
	471.342	1440	-0.021	16	ph	Ber	
SU Cyg	436.059	1075	+0.318	49	vis	Hin	
GO Cyg	375.560	18732	+0.003	18	vis	Brf	
	378.432	18736	+0.003	16	vis	Brf	
	380.534	18739	-0.048	17	vis	Brf	
	411.450	18782	+0.004	15	vis	Brf	
	474.990	18870.5	+0.022	102	vis	Ens	NNMIN
	475.376	18871	+0.049	0	vis	Ens	NMIN
V 367 Cyg	6745.580	503	+0.07	88	vis	Rat	NMIN
u Her	6649.576	19902	+0.004	89	vis	Rat	NMIN
	7410.482	20273	-0.021	50	vis	Gol	
	426.883	20281	-0.028	21	vis	Lhn	NMIN
SW Lac	375.412	6548	-0.016	20	vis	Brf	
	382.469	6570	-0.015	18	vis	Brf	
	408.448	6651	-0.144	18	vis	Brf	
	409.412	6654	-0.013	15	vis	Brf	
	443.408	6760	-0.013	17	vis	Brf	
	471.311	6847	-0.013	17	vis	Brf	
beta Lyr	386.38	819	+0.06	31	vis	Ens	NMIN AA 29.3
VV Ori	558.365	4489	-0.014	61	vis	Bla	NMIN
KR Per	566.338	11894.5	-0.010	14	ph	Ber	
beta Per	201.374	544	+0.047	8	vis	Gru	
	204.243	545	+0.049	6	vis	Gru	
	347.610	595	+0.050	6	vis	Gru	
	350.479	596	+0.052	5	vis	Gru	
	370.549	603	+0.051	6	vis	Gru	
	419.260	620	+0.018	34	vis	Lhn	
	439.333	627	+0.020	11	vis	Gol	
	459.431	634	+0.047	6	vis	Gru	

A) <u>Minima von Bedeckungsveränderlichen</u> (Fortsetzung)

	J.D.$_{\odot}$244...	E	B-R	n	Art	Beob.	Bemerk.
beta Per	7525.357	657	+0^{d}.025	12	vis	Gol	
	525.375	657	+0.043	5	vis	Gru	
	528.241	658	+0.041	6	vis	Gru	
GR Tau	562.326	6954	+0.025	10	ph	Die	
HU Tau	526.487	3040	+0.014	13	vis	Brf	
	592.275	3072	0.000	30	vis	Kuh	
	594.338	3073	+0.007	17	vis	Brf	
	596.393	3074	+0.006	25	vis	Kuh	
V 781 Tau	530.300	10598	-0.010	12	ph	Ber	
	561.344	10688	-0.008	15	ph	Ber	
lambda Tau	6801.772	6399	+0.008	50	vis	Lhn	NMIN
	7181.320	6495	+0.073	5	vis	Gru	
	185.265	6496	+0.066	6	vis	Gru	
	517.314	6580	+0.067	6	vis	Gru	
TX UMa	565.200	838	+0.059	23	vis	Ens	NMIN

B) <u>Maxima von RR-Lyr- und delta-Cep-Sternen</u>

	J.D.$_{\odot}$244...	E	B-R	n	Art	Beob.	Bemerk.
CY Aqr	5605.2825	185078	+0^{d}.0013	22	vis	Bgr	
	609.3716	185145	+0.0008	14	vis	Bgr	
eta Aql	6677.22	1476	-0.16	35	vis	Bgr	
	7409.60	1578	+0.21	32	vis	Gol	NMAX
RT Aur	6507.033	1112	+0.214	20	vis	Bgr	
	7170.833	1290	+0.410	33	vis	Gol	NMAX
RS Boo	391.331	14896	0.000	20	vis	Bla	NMAX
AE Boo	6173.480	50129	+0.020	54	ph	Ber	NMAX IBVS 2247
VZ Cnc	837.381	38909	+0.003	11	vis	Gro	
	837.381	38909	+0.003	13	vis	Lhn	
	864.317	39060	+0.006	9	vis	Lhn	
	883.401	39167	+0.005	13	vis	Lhn	
	883.401	39167	+0.005	17	vis	Gro	
	903.380	39279	+0.007	11	vis	Lhn	
	7267.415	41320	+0.002	22	vis	Lhn	
delta Cep	430.618	871	+0.113	75	vis	Gol	NMAX
XZ Cyg	5246.374	- 643	-0.004	13	vis	Bgr	IBVS 3205
	269.228	- 594	-0.015	10	vis	Bgr	" "
	276.220	- 579	-0.023	15	vis	Bgr	" "
	546.410	0	-0.006	12	vis	Bgr	" "
	568.350	+ 47	+0.003	12	vis	Bgr	" "
	574.414	60	+0.001	11	vis	Bgr	" "
	623.413	165	+0.005	13	vis	Bgr	" "
	631.343	182	+0.001	10	vis	Bgr	" "
	638.343	197	+0.003	10	vis	Bgr	" "
	645.345	212	+0.006	11	vis	Bgr	" "
	646.277	214	+0.004	11	vis	Bgr	" "
	647.205	216	-0.001	11	vis	Bgr	" "

B) Maxima von RR-Lyr- und delta-Cep-Sternen (Fortsetzung)

	J.D. 244...	E	B-R	n	Art	Beob.	Bemerk.
XZ Cyg	5653.283	229	+0ᵈ011	9	vis	Bgr	IBVS 3205
	6338.286	1697	+0.013	10	vis	Bgr	" "
	714.386	2503	+0.016	12	vis	Bgr	" "
	7078.330	3283	-0.004	13	vis	Bgr	" "
	099.319	3328	-0.013	11	vis	Bgr	" "
	100.268	3330	+0.003	11	vis	Bgr	" "
	470.762	4124	-0.001	20	vis	Bla	" "
	471.695	4126	-0.001	18	vis	Bla	" "
	540.279	4273	-0.011	16	vis	Bgr	" "
	540.292	4273	+0.002	20	vis	Bla	" "
zeta Gem	6901.93	307	+0.44	85	vis	Lhn	NMAX
	7388.65	355	-0.03	34	vis	Bgr	NMAX
	480.44	364	+0.42	57	vis	Gol	NMAX
RS Ori	315.29	594	-0.23	79	vis	Gro	NMAX
DY Peg	6002.3084	20572	-0.0017	12	vis	Bgr	
	018.2819	20791	+0.0008	14	vis	Bgr	
	019.2328	20804	+0.0037	20	vis	Bgr	
	035.1978	21023	-0.0021	14	vis	Bgr	
	036.2161	21037	-0.0048	32	vis	Bgr	
	039.2068	21078	-0.0040	14	vis	Bgr	
	100.1724	21914	-0.0048	15	vis	Bgr	
	320.2710	24932	+0.0021	12	vis	Bgr	
	321.2872	24946	-0.0026	12	vis	Bgr	
	322.3141	24960	+0.0033	11	vis	Bgr	
	7109.2658	35751	+0.0073	8	vis	Bgr	
	115.3195	35834	+0.0081	12	vis	Bgr	
	444.3569	40346	+0.0021	31	vis	Bla	NMAX
	526.1762	41468	-0.0018	11	vis	Bgr	
SZ Tau	500.710	4088	+0.132	44	vis	Ens	NMAX
T Vul	431.280	1291	-0.022	17	vis	Sil	NMAX

C) Mirasterne

	J.D. 2447...	E	B-R	m_V	n	Bem.	Beob.
R And	264:	+10	+36ᵈ	-	11		Zis
T And	468	+16	+17	7ᵐ8	17		Hin
W And	458:	+10	- 5:	8.2	17		Zis
	467	+10	+ 4	8.2	14		Hin
	470	+10	+ 7	8.2	21		Voh
SZ And	326:	+18	-20:	10.0	6		Zis
R Aqr	437	+13	+ 9	6.9	12		Voh
T Aqr	383	+20	-19	7.5	18		Hin
	388	+20	-14	7.6	13		Rat/Rcr

C) Mirasterne (Fortsetzung)

	J.D. 2447...	E	B-R	m_v	n	Bem.	Beob.
R Aql	395	+14	-42^d	$5^m.9$	36		Voh
	396	+14	-41	5.9	8		Rcr
	397	+14	-40	6.2	22		Brf
	400	+14	-37	6.1	31		Hin
	400	+14	-37	5.8	10		Lhn
	400	+14	-37	5.9	8		Rat
	402	+14	-35	6.0	31		Brk
	402	+14	-35	6.2	13		Zis
RV Aql	449:	+22	+22:	9.1	6		Zis
R Ari	493	+16	0	8.0	16		Zis
	495	+16	+ 2	7.9	15		Hin
R Aur	228	+ 7	+21	6.9	28		Hin
	228	+ 7	+21	7.3	17		Rat
	231:	+ 7	+24:	7.1	14		Klx
	231	+ 7	+24	6.8	28		Voh
	232	+ 7	+25	7.3	23		Zis
	234:	+ 7	+27:	7.5	5		Ohd
	236	+ 7	+29	7.0	17		Rcr
X Aur	218:	+16	- 7:	8.8:	19		Brk
	230	+16	+ 5	8.9	13		Zis
	232:	+16	+ 7:	8.9:	5		Ohd
	234	+16	+ 9	8.8	10		Hin
	390	+17	+ 2	8.4	12		Hin
	556	+18	+ 4	8.6	18		Brk
	560	+18	+ 8	8.65	15		Zis
	564	+18	+12	8.5	24		Voh
R Boo	190	+12	- 9	7.0	6		Lhn
	193:	+12	- 6:	6.9	13		Zis
	421:	+13	- 1:	7.8	7		Lhn
	423	+13	+ 1	7.9	14		Hin
S Boo	394	+12	+29	8.6	10		Ohd
	397	+12	+32	8.2	8		Zis
	403	+12	+38	8.1	19		Brk
	404	+12	+39	8.4	25		Voh
	410	+12	+45	8.3	20		Hin
T Cam	529	+11	- 9	8.4	10		Hin
	543	+11	+ 5	8.7	33		Brk
X Cam	271	+18	+ 8	8.2	18		Brk
	275	+18	+12	8.2	17		Hin
	403	+19	- 4	7.9	17		Hin
	409	+19	+ 2	8.0	18		Brk
R Cnc	492:	+ 9	+ 7:	6.4:	10		Zis
V Cnc	283:	+14	-12:	7.8	14		Rat/Rcr
R CVn	493	+12	-35	7.2	7		Hin
S CMi	206	+10	-34	6.65	9		Lhn
	208:	+10	-32:	7.0:	9		Ohd
	539:	+11	-34:	7.0	18		Brk
	543	+11	-30	7.1	11		Lhn
R Cas	504	+ 7	+28	6.7	47		Voh
T Cas	271	+ 7	- 3	7.7	20		Zis
	455:	+ 7.44	-15:	11.7:	14	Min.	Zis
U Cas	368:	+10	-25:	8.6	14		Bra
	372	+10	-21	8.5	8		Zis
	374	+10	-19	8.6	22		Voh

C) Mirasterne (Fortsetzung)

	J.D. 2447...	E	B-R	m_v	n	Bem.	Beob.
V Cas	349	+12	-2^d	$8^m.0$	24		Voh
	354	+12	+ 3	7.9	14		Hin
	354:	+12	+ 3:	7.85:	9		Sck
	354	+12	+ 3	7.8	12		Zis
	356	+12	+ 5	7.8	18		Brk
	360:	+12	+ 9:	8.6:	6		Ohd
	569	+13	-11	7.4	30		Klx
	571	+13	- 9	7.7	22		Brk
	576	+13	- 4	7.6	15		Zis
	580	+13	0	7.4	25		Voh
W Cas	251:	+ 7.54	-16:	[11.5	8	Min.	Zis
	457	+ 8	+ 3	8.9	23		Zis
T Cep	340	+ 8	+58	5.5	55		Hin
	341	+ 8	+59	5.7	21		Zis
	342	+ 8	+60	5.6	16		Rat
	346	+ 8	+64	6.3	45		Voh
	348	+ 8	+66	5.7	42		Brk
	348	+ 8	+66	5.75	33		Gol
	350	+ 8	+68	6.0	18		Rcr
	535	+ 8.46	+74	10.2	25	Min.	Voh
omi Cet	502	+ 8	+ 7	3.6:	16		Zis
	505	+ 8	+10	3.5	45		Klx
S CrB	495:	+ 8	+ 9:	6.4	10		Hin
V CrB	326	+10	-13	8.1	19		Zis
	328	+10	-11	8.1	28		Brk
	336	+10	- 3	8.1	37		Hin
W CrB	275:	+13	-16:	8.3	12		Rat/Rcr
	278	+13	-13	8.0	20		Hin
R Cyg	182	+ 6	+28	7.4	24		Zis
U Cyg	314	+ 6	-23	7.55	46		Sck
	315	+ 6	-22	7.5	22		Zis
	316	+ 6	-21	7.5	40		Voh
Z Cyg	258	+10	+ 3	7.9	14		Zis
RT Cyg	269	+14	+17	7.6	16		Zis
	273	+14	+21	7.3	19		Hin
	278	+14	+26	7.8	7		Lhn
	355	+14.56	- 3	11.9	22	Min.	Voh
	356	+14.56	- 2	-	23	Min.	Sck
	433:	+15	- 9:	7.15	13		Sck
	440	+15	- 2	7.2	20		Brk
	442	+15	0	7.0	14		Wit
	443	+15	+ 1	6.8	16		Voh
	445:	+15	+ 3:	7.3	7		Zis
	446	+15	+ 4	7.3	18		Hin
SX Cyg	382	+ 8	+14	10.2	17		Voh
TU Cyg	395:	+12	- 3:	9.6:	7		Zis
	400	+12	+ 2	9.0	16		Voh
WY Cyg	269:	+ 8	+ 1:	9.8	9		Zis
CN Cyg	363	+14	+ 7	9.4	18		Voh
	367:	+14	+11:	8.7	18		Hin
FF Cyg	382	+ 9	+12	9.7	7		Zis
V 369 Cyg	350:	+24	+37:	10.0:	4		Zis
	455:	+25	+37:	9.8:	6		Zis

C) Mirasterne (Fortsetzung)

	J.D. 2447...	E	B-R	m_v	n	Bem.	Beob.
chi Cyg	477	+13	$+32^d$	$4^m.4$	56		Klx
	479	+13	+34	4.4	32		Brk
	481	+13	+36	4.7	13		Zis
	483	+13	+38	4.2	17		Lhn
	484	+13	+39	4.6	24		Hin
	485	+13	+40	4.8	35		Voh
R Dra	241	+10	+ 6	7.3	20		Hin
	244	+10	+ 9	7.5	15		Zis
	245:	+10	+10:	7.1	23		Brk
	486	+11	+ 5	7.5	15		Zis
	488	+11	+ 7	7.3	17		Hin
	490	+11	+ 9	7.5	15		Brk
W Dra	201	+18	+10	9.0	13		Zis
	490:	+19	+21:	9.5:	13		Zis
Y Dra	436	+ 9	+56	8.7	12		Hin
RV Dra	283	+18	+10	10.5	12		Zis
T Gem	278:	+ 9	-22:	8.9	11		Ohd
X Gem	250	+14	- 1	8.3	11		Hin
	502	+15	-13	8.1	10		Hin
S Her	210:	+ 7	+ 5:	7.3	10		Zis
	213	+ 7	+ 8	7.3	8		Hin
T Her	286	+12	0	7.9	13		Zis
	290	+12	+ 4	8.1	19		Hin
	450	+13	- 1	7.8	25		Klx
	454:	+13	+ 3:	7.8	6		Zis
	458	+13	+ 7	7.5	18		Hin
	461:	+13	+10:	7.5:	18		Brk
U Her	431	+ 6	0	7.1	25		Klx
	438	+ 6	+ 7	7.5	12		Hin
W Her	262:	+ 8	-37:	8.35	26		Sck
	264:	+ 8	-35:	8.4	16		Zis
	267	+ 8	-32	8.6	18		Hin
	267:	+ 8	-32:	8.5:	7		Ohd
RS Her	379	+10	-12	7.9	27		Voh
	383	+10	- 8	7.9	24		Hin
RU Her	326	+ 5	+ 3	8.6	16		Hin
SS Her	356	+20	0	8.7	10		Hin
	358	+20	+ 2	9.1	15		Voh
SY Her	349	+18	- 3	8.7	7		Zis
	354	+18	+ 2	8.5	14		Hin
	468	+19	- 1	8.0	9		Hin
S Lac	405:	+15	-22:	8.0	17		Brk
	409	+15	-18	7.9	16		Hin
R Leo	177:	+ 9.57	+47:	9.9	19	Min.	Zis
	305:	+10	+41:	5.8	15		Sil
	623:	+11	+50:	5.4	20		Sil
R Lyn	433	+ 6	-15	7.6	16		Hin
W Lyr	276	+11	+15	7.9	15		Zis
	278	+11	+17	7.8	17		Hin
	474	+12	+15	7.6	15		Hin

C) Mirasterne (Fortsetzung)

	J.D. 2447...	E	B-R	m_v	n	Bem.	Beob.
X Oph	391	+ 8	$+31^d$	$7^m.3$	50		Klx
	396:	+ 8	+36:	7.2	15		Rat/Rcr
	396	+ 8	+36	7.0	15		Zis
	398	+ 8	+38	6.5	29		Hin
	398	+ 8	+38	7.3	28		Voh
	412	+ 8	+52	6.8	34		Brk
RY Oph	456:	+15	- 5:	8.2	11		Hin
U Ori	481	+ 6	+17	6.5	13		Hin
	483:	+ 6	+19:	7.1	28		Klx
	485	+ 6	+21	6.5	16		Zis
	486	+ 6	+22	6.7:	13		Gro
Z Peg	419	+ 7	-15	8.0	23		Hin
RZ Peg	425	+ 5	-17	8.1	25		Hin
R Ser	289	+ 5	-14	6.8	10		Rat
	293	+ 5	-10	6.6	17		Zis
	294	+ 5	- 9	6.55	10		Lhn
	295	+ 5	- 8	6.2	26		Brk
	295	+ 5	- 8	6.1	26		Hin
	295	+ 5	- 8	6.5	12		Rcr
	302	+ 5	- 1	7.0	30		Voh
U Ser	310	+ 7	- 5	8.2	20		Hin
	315:	+ 7	0:	8.5:	6		Ohd
R Tri	364	+ 8	+14	7.0	8		Zis
	507	+ 8.56	+ 7	[11.7	14	Min.	Zis
R UMa	384	+ 6	-19	7.5	11		Ohd
	386	+ 6	-17	7.4	24		Brk
	387	+ 6	-16	7.3	26		Hin
	389	+ 6	-14	7.3:	17		Zis
	392	+ 6	-11	7.2	33		Klx
	392:	+ 6	-11:	6.8	13		Wit
	395	+ 6	- 8	7.5	26		Voh
	398	+ 6	- 5	7.1	13		Rat/Rcr
S UMa	243	+ 6.53	-10	[11.5	11	Min.	Zis
	350	+ 7	- 9	7.7	14		Zis
	351	+ 7	- 8	7.9	36		Voh
	352	+ 7	- 7	8.2	27		Brk
	363	+ 7	+ 4	7.5	25		Hin
	592:	+ 8	+ 7:	7.3	15		Wit
T UMa	412	+ 7	- 7	8.1	23		Hin
	412	+ 7	- 7	8.3	13		Wit
	414	+ 7	- 5	8.5	20		Voh
	417	+ 7	- 2	8.1	17		Brk
	422	+ 7	+ 3	8.3	21		Klx
RS UMa	300:	+ 5	+14:	9.2	11		Hin
	304	+ 5	+18	9.3	18		Voh
	305	+ 5	+19	8.9	12		Zis
	558	+ 6	+13	9.7	13		Zis
	564	+ 6	+19	9.9:	18		Voh
S UMi	239	+ 4	-16	8.3	25		Voh
	247	+ 4	- 8	8.1	18		Zis
	249	+ 4	- 6	8.2	16		Rcr
	250	+ 4	- 5	8.2	13		Rat
	253	+ 4	- 2	8.2	30		Brk
	254	+ 4	- 1	8.2	25		Hin
	422:	+ 4.50	+ 1:	[11.6	10	Min.	Zis

C) Mirasterne (Fortsetzung)

	J.D. 2447...	E	B-R	m_v	n	Bem.	Beob.
T UMi	213	+ 5	-53^d	$8^m.7$	9		Hin
U UMi	212:	+ 5.50	-26:	[11.2	10	Min.	Zis
	365	+ 6	-39	8.9	42		Voh
	382	+ 6	-22	8.2	21		Hin
	385	+ 6	-19	8.5	16		Zis
	400	+ 6	- 4	8.0	35		Brk
R Vir	182:	+ 9	- 1:	7.3	4		Lhn
	319	+10	- 9	6.9	14		Hin
	323	+10	- 5	7.0	15		Voh
U Vir	248:	+12	+32:	8.1	8		Hin
R Vul	362:	+13	- 1:	7.9:	13		Brk
	363	+13	0	7.5	9		Zch
	366	+13	+ 3	8.0	17		Hin
	367:	+13	+ 4:	7.8	6		Zis
	505	+14	+ 5	7.8	14		Hin

Einzelbeobachtungen zu halb- und unregelmäßigen Veränderlichen wurden im Bull. der AFOEV veröffentlicht. Die (B-R)-Werte wurden mit Hilfe der Elemente des GCVS 1985/87 gerechnet. Abweichungen siehe Bemerkungen!

Bemerkungen:

AA 29.3	Acta Astron. 29, Heft 3
IBVS	Inf. Bull. Variable Stars
vis	visuell
ph	photographisch
pev	photoelektrisch (V)
NMIN	Nebenminimum
NNMIN	Normal-Nebenminimum
NMAX	Normalmaximum

Beobachter:

Ber	BERTHOLD, Th.	Döbeln
Bgr	BERGER, H.	Scharfenberg
Bla	BLASBERG, H.-J.	Dresden
Brk	BRANZK, R.	Beerwalde
Brf	BRAUCKHOFF, D.	Plauen
Bus	BUSCH, H.	Hartha
Die	DIETRICH, M.	Radebeul
Ens	ENSKONATUS, P.	Berlin
Gol	GOLDHAHN, H.	Lohmen
Gro	GROSSE, P.	Erfurt
Gru	GRUBE, W.	Quedlinburg
Hin	HINZPETER, R.	Rostock
Klx	KLIX, P.	Sohland
Kuh	KÜHNLENZ, F.	Sonneberg
Lhn	LEHMANN, T.	Erfurt
Ohd	OHDE, T.	Rostock
Rat	RÄTZ, M.	Herges-Hallenberg
Rcr	RÄTZ, K.	Herges-Hallenberg
Sck	SCHENK, H.P.	Weimar
Sil	SCHILLE, D.	Leipzig
Voh	VOHLA, F.	Altenburg
Wit	WITT, U.	Berlin
Zis	ZISCHE, E.	Weigsdorf-Köblitz
Zch	ZSCHECH, M.	Dresden

Observation of a renewed brightness decrease of the flare star V 774 Herculis

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(Eingegangen am 14. Juli 1989)

Abstracts

A new decrease of the apparent brightness of the flare star V 774 Her was detected in August, 1988. In our opinion this observation confirmed the phenomenon of May, 1980. During the new minimum the brightness fell by 4.30 mag below the normal value in our instrumental system. A periodic variation in the brightness of the flare star during its active state has also been registered; the cycle length was 8.2 minutes.

Ein erneuter Abfall der Helligkeit dieses Flare-Sterns wurde im August 1988, wie schon im Mai 1980, beobachtet. Die Amplitude des Minimums betrug 4.30 mag und die beobachtete Gesamtdauer mindestens 22.7 Minuten. Eine zyklische Schwankung von 8.2 Minuten Periode schien aufgeprägt.

Continuous photoelectric monitoring of the flare star V 774 Her (= BD+22°3406 = Gliese No. 718 = HD 171314) was carried out at Kottamia Observatory (λ = -31°49'30"; φ = +29°55'54"; H = 476m), Egypt, as a continuation of the solar vicinity UV Ceti flare stars' programme started at Stephanion Observatory, Department of Geodetic Astronomy, University of Thessaloniki, Greece.

Unfortunately, not enough information is known of the behaviour of this flare star during its activity:

GLEBOCKI et al. (1980) found that the spectral type of the star is K4V while in the General Catalogue of Variable Stars (KHOLOPOV et al. 1985) K2V is given. The conclusions of MAHMOUD and SOLIMAN (1980) concerning the high flare activity of the star were not confirmed during patrol observations of 58.8 hours in the U band (CHUGAINOV 1983). PETTERSEN and TSVETKOV (1985) could not detect hydrogen Balmer lines in the spectrum. CHUGAINOV (1983) did not find any relation between the properties of this flare star and the BY Dra syndrome (KUNKEL 1975), although there are some similiarities between BY Dra and V 774 Her with regard to colours, spectral type and distance.

The photoelectric photometer used for our observations is attached to the f/18 Cassegrain focus of the 74 inch reflector. It has an EMI 9558 B photomultiplier tube with an S-20 photocathode and is equipped with a peltier cooling system and a Brown strip chart recorder. The observations were taken in the B band of the international UBV system.

During the photoelectric patrol observations on 1988 August 19, which lasted 4h50min57s, a sudden big decrease of the flare star's brightness has been registered - called anti-flare. The observed total duration of this "anti-flare" was 22min40s. It shows at least 5 distinct minimum events, which can easily be derived from fig. 1 (p. 25). Their ranges, reckoned in the magnitude scale, amounted to

4.30, 4.30, 0.45, 0.45, and 0.58 mag, respectively.

Applying a Fourier analysis programme on our measured data of the interval from $19^h48^m.25$ to $20^h05^m.00$ UT (i.e. 110 points) we got a sinusoidal cycle with a period of 8.2 minutes as shown in fig. 2.

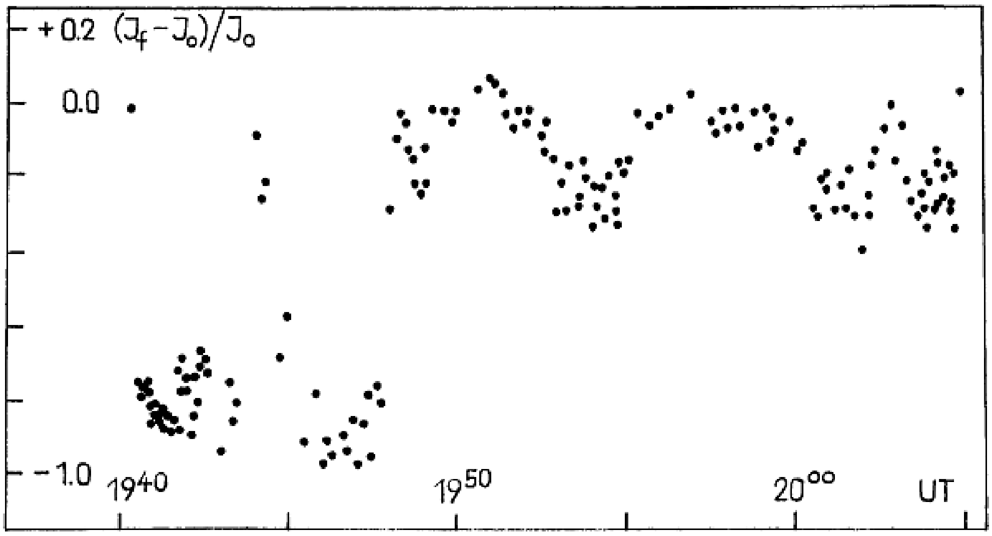

Fig. 1

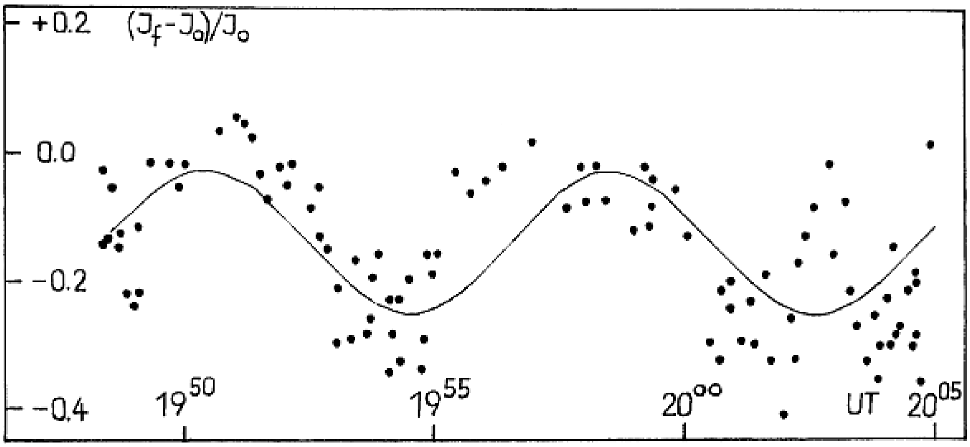

Fig. 2

In the figures the ratio $(I_f-I_o)/I_o$ is composed of the intensity deflections I_o of the quiet state and I_f of the actual measurement, both background-reduced. We should note that the standard deviation of random noise fluctuation σ(mag) = 2.5 lg $[(I_o+\sigma)/I_o]$ during quiescent phase immediately preceding the beginning of the anti-flare is 0.02 mag, and not higher than 0.04 mag at other times that night. The airmass during the "anti-flare" event slightly creased from 1.05 to 1.08.

At this moment, no interpretation can be given for the abnormal behaviour of V 774 Her during its active state. Therefore, more detailed informations about this flare star are strongly needed. Photoelectric and spectroscopic observations in several spectral bands, especially in the international B band, should be started simultaneously in different observatories.

Acknowledgement

The author gives his deepest thanks to Dr. W. GÖTZ, head of Sonneberg Observatory, Zentralinstitut für Astrophysik, G.D.R., for many helps and valuable discussions on the literature of this star. My thanks to him are also for revising the paper so that it could be put into a suitable scientific final form.

Thanks are due to Professor Dr. L. SEHNAL, Ondřejov Observatory, Czechoslovakia, for the Fourier analysis of my data of the anti-flare event.

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Helle Beobachtungen der kurzzyklischen Zwergnova AM Cassiopeiae

E. Splittgerber, Halle

(Eingegangen am 20. Juli 1989)

Abstract

For statistical purposes a listing of 168 maxima, derived from observations on altogether 1419 Sonneberg plates, is given.

Die folgende Aufstellung (S. 27f) enthält 168 Maxima, die von Schätzungen auf 191 Aufnahmen der Sonneberger 40-cm-Astrographen (Feld 48 Cas) und auf N = 1228 Platten der Himmelsüberwachung (SHÜ) abgeleitet wurden. Die Astrographenaufnahmen weisen leider große zeitliche Lücken auf. Nur ein Maximum konnte vollständig mit einer Aufnahmereihe erfaßt werden (Abb. 2, S. 29). Die Maxima 244 1598 und 244 1960 sind für jeden Instrumententyp getrennt ermittelt und zweifach angeführt worden. Auf Astrographenplatten gefundene Maxima sind unter Bemerkungen mit A bezeichnet. Alle anderen Beobachtungen erfolgten auf den Platten der Himmelsüberwachung. Die angegebenen Helligkeiten (Vergleichssterne siehe Abb. 1, S. 28) wurden durch den Anschluß an das SA 2 (Mt.-Wilson-System) mit Hilfe einer Übertragungsplatte und des Sonneberger Katzenaugenphotometers gewonnen. Die Feldmitte des Hilfs-Eichfeldes ist $\approx 1^h30^m +70^\circ37'$ (1950.0). Herrn G. HACKE danke ich für die Übertragungsaufnahme.

Liste der hellen Beobachtungen

J.D. 24...	m_{pg}	n	Bem.
25454.4	$13^m.38$		A,E
25491.5	13.82		A,E
25535.7	13.71		A,E
25623.7	13.69	4	A,1
25653.6	13.83	5	A,1
25688.5	13.49	4	A,1
25719.0	13.35	2	A
26064.6	13.69	4	A,2
26413.5	13.43	4	A,2,g
26421.4	13.35	2	A
26440.4	13.56		A,E
26748.0	13.70	6	A
26770.0	13.41	4	A,1
36466.5	12.65:	4	1
36544.4	13.01	2	1
36596.4	12.93		E
36698.6	12.93		E
36896.4	13.40		E
37000.6	12.93		E
37016.5	13.13		E
37317.6	12.95	2	
37353.6	13.09:		E
37561.6	13.64		A,E
37614.5	12.87:		E
37669.3	12.87:		E
37871.4	12.95	2	2
37917.6	13.37		E
38088.5	13.01	4	2
38147.5	13.31		E
38170.0	12.83	3	2
38237.5	12.95	2	2
38255.4	13.31	2	
38268.4	13.35		E
38284.4	13.03	7	
38327.5	13.34	5	
38348.5	13.22		E
38409.7	13.09	6	
38440.0	13.04	4	2
38473.6	13.09	4	1
38557.4	13.31		E
38640.4	13.25	6	2
38652.0	13.35	4	1
38709.4	13.30	3	
38853.0	13.38	4	
38910.4	13.31		E
38937.0	13.39	2	
39023.5	13.31	7	
39270.4	13.43		E
39389.5	13.40	6	
39408.0	13.05	4	1
39500.0	13.03	2	
39558.6	12.99	3	1
39621.4	$13^m.36$		E
39683.4	12.98	3	
39764.5	13.10	4	
40261.3	12.76	2	1
40301.3	13.04		E
40359.5	12.98		E
40417.0	13.12	2	
40485.5	12.91	4	1
40509.4	13.20	4	
40531.4	12.62	2	
40619.4	12.76	2	
40831.5	13.37	2	
40917.5	13.41		E
40981.5	13.14	3	
41056.0	12.95	6	2
41155.4	13.33		E
41179.4	13.39	2	2
41192.5	13.00		E
41208.4	12.98		E
41249.5	12.85	4	1
41276.2	13.31		E
41300.5	13.40	2	
41322.3	13.39		E
41334.0	12.60	4	2
41351.3	13.33		E
41385.0	12.65	2	
41420.4	13.31		E
41475.0	12.96	2	
41536.5	13.05	4	
41570.4	13.07	2	
41598.3	12.90	44	A
41598.8	12.95	12	
41666.7	12.95		E
41684.6	13.39		E
41797.4	12.92	2	
41830.5	13.43		E
41894.4	12.98		E,a
41900.4	12.60		E
41922.3	13.04		E
41960.0	13.36	2	
41960.5	13.05		A,E
41990.5	13.36		E
42095.3	12.76		E
42251.4	12.92		E
42600.0	12.93	2	b
42609.5	12.65	2	1
42639.0	12.76	4	1
42654.4	13.20		E
42664.3	12.98		E
42717.4	12.94	3	1
42741.2	12.60		E
42816.6	12.76		E

(Fortsetzung der Liste heller Beobachtungen)

J.D. 24...	m_{pg}	n	Bem.	J.D. 24...	m_{pg}	n	Bem.
42831.3	$13\overset{m}{.}37$		E	44854.0	$12\overset{m}{.}94$	4	
42841.6	13.20	2		44967.4	13.00		E
42870.0	13.00		E	44987.3	12.98		E
42891.5	13.35		E,a	45001.6	13.36		E
42895.5	12.87		E	45044.5	13.00		E
42961.4	12.95		E	45055.5	13.35		E
43012.4	12.75	6	2	45103.0	13.00:	3	
43076.5	13.00	4		45268.5	13.00		E
43213.3	13.14		E	45493.4	13.36		E
43250.5	13.37		E	45530.4	13.01		E
43273.4	13.20		E	45561.6	13.33		E
43287.4	13.46	3		45647.5	13.05	2	
43430.0	12.80	5	2	45673.0	13.03	9	A,d
43483.4	12.98	2		45680.5	13.41	3	A
43576.0	13.36	2		45770.6	12.98		E
43749.5	13.40		E	45810.4	13.05	2	1
43849.5	13.42		E	45822.4	12.92		E
44251.4	12.98	3		46093.6	12.98		E
44365.4	13.01		E,c	46113.5	13.50	3	
44373.5	13.37	3		46287.4	13.40		E,e
44490.5	12.98		E	46296.5	13.05	4	A
44523.4	12.65		E	46321.5	13.83		A,E,f
44571.3	12.89		E	46328.5	12.76	2	
44633.2	13.31	3	d	46351.5	13.39		E
44638.3	13.31	2		46685.5	13.38	4	A
44693.4	13.20		E,a	46708.0	13.03	5	A
44701.5	13.47		E	46737.5	13.34		E
44732.4	13.35		E	46763.4	13.10	3	A
44822.5	13.37		E	46773.5	13.00		E

n = Anzahl der die Eruption charakterisierenden Beobachtungen (inkl. An- oder/und Abstiege)

Bemerkungen:

E = Einzelbeobachtung
1 = Anstieg
2 = Abstieg
a: verläßliche Beobachtungen zwischen dieser und der nächst-verzeichneten Eruption fehlen
b: schwach 42601.4
c: schwach 44370.4
d: zwischen dieser und der nächsten Eruption mehrere schwache Beobachtungen
e: schwach 46292.5
f: schwach 46327.5
g: Abstieg bis 26418.4 ($16\overset{m}{.}00$)

Vergleichssternhelligkeiten:
$v=12\overset{m}{.}77$; $w=13\overset{m}{.}19$; $y=13\overset{m}{.}56$; $a=13\overset{m}{.}96$; $r=14\overset{m}{.}34$; $c=14\overset{m}{.}92$; $e=15\overset{m}{.}40$; $f=15\overset{m}{.}81$; $g=16\overset{m}{.}13$

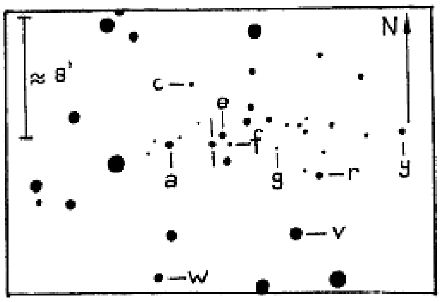

Abb.1

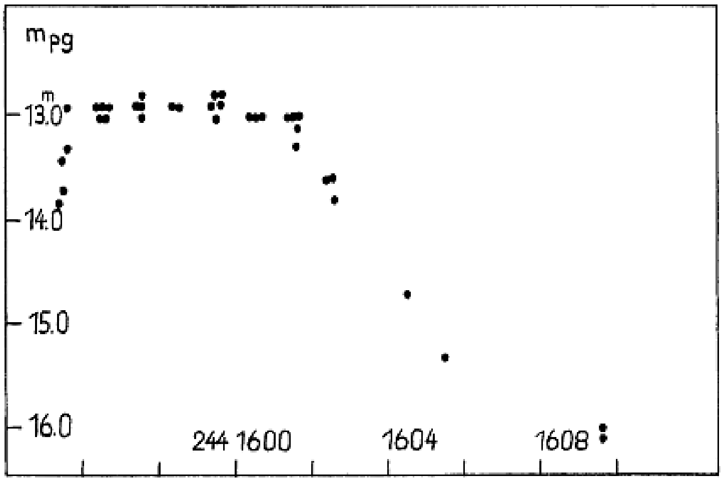

Abb. 2

Anmerkung des Redakteurs zur vorangehenden Arbeit

Das in Abb. 2 gezeigte Maximum scheint von außergewöhnlicher Dauer zu sein (Supermaximum?). Normalerweise wird auf durchschnittlichen Platten der SHÜ eine Eruption im Mittel etwa $\overline{L}$ = 2.5 Tage lang heller als $13^{m}_{.}5$ beobachtbar sein. So sind in dem Material des Autors festgestellt: $L \leq 1^d$ (2mal), 1^d (1), $1...2^d$ (1), $\geq 1^d$ (3), $\leq 2^d$(3), $\leq 3^d$(7), $\leq 4^d$ (3), $\geq 4^d$ (4), $\leq 5^d$ (2), $\geq 5^d$ (2), $5...6^d$ (1), 6^d (1). Siehe hierzu auch die Lichtkurven bei RICHTER (Veröff. Sternw. Sonneberg 4,512; 1961) und bei RICHTER, NOTNI und TIERSCH (Astron. Nachr. 309, 91; 1988 = Mitt. Sternw. Sonneberg Nr. 92). In dem Material des Autors zählt man insgesamt n = 265 SHÜ-Beobachtungen, die $\leq 13^{m}_{.}50$ sind. Damit ergibt sich statistisch eine mittlere Zyklenlänge von

$$\overline{C} = \overline{L} \cdot \frac{N}{n} = 11^{d}_{.}6.$$

Die in genannter Literatur getroffenen Aussagen über die Kürze der Zyklenlänge werden somit anhand eines viel größeren Materials bestätigt.

Zum Periodenverhalten des β-Lyrae-Sterns VY Lacertae

P. Kroll, Jena (Mitglied des AKV)

(Eingegangen am 25. Juli 1989)

Abstract

The star was investigated on blue-sensitive Sky Patrol plates of the Sonneberg Observatory. 63 Minima could be found. With the help of this material and published observations we obtained improved elements. A successiv changing of the period, supposed by previous authors, could not be confirmed.

S. RÖSSIGER untersuchte in (1) das Periodenverhalten dieses Sterns und vermutete eine allmähliche Verkleinerung der Periodenlänge, was durch verschiedene Literaturstellen belegt schien (s. (2)...(6)).

Dieser Sachverhalt wurde auch bereits von J.M. KREINER und J. TREMKO in (9) erwähnt, die den Beginn einer Periodenänderung vermuteten. Da der Stern im photographischen Bereich zwischen $10\overset{m}{.}2$ und $11\overset{m}{.}0$ veränderlich ist, schien eine Analyse des Periodenverhaltens auf der Grundlage des Materials des Sonneberger Plattenarchivs lohnenswert.

Tabelle: Liste aller Minima

Nr.	J.D. (hel.)	E	$(B-R)_I$	$(B-R)_{II}$	Δs	Quelle
1	24 24708.367	-9574	$-0\overset{d}{.}009$	$-0\overset{d}{.}013$		(8)
2	26589.170	-7759	0.009	0.007		(8)
3	26624.397	-7725	0.004	0.001		(3)
4	26937.359	-7423	0.019	0.018		(3)
5	27655.451	-6730	-0.006	-0.008	2	
6	27657.540	-6728	0.010	0.009	0	
7	27683.468	-6703	0.032	0.031	0	
8	27683.446	-6703	0.009	0.008	1	
9	28108.277	-6293	-0.020	-0.020	0	
10	28164.242	-6239	-0.012	-0.013	2	
11	28947.666	-5483	0.010	0.010		(8)
12	30999.402	-3503	-0.020	-0.018	1	
13	32802.486	-1763	-0.004	0.001	0:	
14	32828.402	-1738	0.007	0.011	0:	
15	33887.411	- 716	-0.027	-0.022	0	
16	34228.363	- 387	0.000	0.006		(6)
17	34604.477	- 24	-0.043	-0.037	0	
18	34629.389	0	-0.001	0.005		(6)
19	34768.256	134	0.009	0.015	0:	
20	35400.305	744	-0.052	-0.045	0:	
21	35718.478	1051	-0.006	0.001	2	
22	35742.332	1074	0.014	0.021	2	
23	36432.478	1740	0.021	0.029	2	
24	36461.439	1768	-0.033	-0.025	2	
25	36462.486	1769	-0.022	-0.015	1	
26	37205.479	2486	-0.017	-0.009	3	
27	37286.284	2564	-0.040	-0.031	0	
28	37518.438	2788	-0.004	0.004		(17)
29	37518.440	2788	-0.002	0.006		(17)
30	37518.440	2788	-0.002	0.006		(8)
31	37545.381	2814	-0.004	0.005		(17)
32	37545.383	2814	-0.002	0.007		(17)
33	37545.385	2814	0.000	0.009		(17)
34	37545.402	2814	0.018	0.027	0:	
35	37575.423	2843	-0.013	-0.004	2	
36	37603.424	2870	0.010	0.019	2	
37	38001.294	3254	-0.039	-0.030	0	
38	38179.533	3426	-0.034	-0.024	1	
39	38179.533	3426	-0.034	-0.024	0	
40	38235.523	3480	-0.002	0.008	3	
41	38237.558	3482	-0.039	0.029	0	
42	38290.407	3533	-0.038	-0.029	0:	
43	38290.451	3533	0.006	0.015	1	
44	38371.272	3611	0.000	0.010	1	
45	38398.226	3637	0.011	0.021	2	

Nr.	J.D. (hel.)	E	$(B-R)_{I}$	$(B-R)_{II}$	Δs	Quelle
46	24 38495.621	3731	-0.001	0.009	1:	
47	38549.523	3783	0.017	0.027	0	
48	39060.360	4276	-0.016	-0.006	2	
49	39142.246	4355	0.007	0.017	0	
50	39349.459	4555	-0.030	-0.019	0	
51	39375.387	4580	-0.007	0.003		(8)
52	39828.242	5017	0.008	0.020		(8)
53	40088.384	5268	0.053	0.064		(16)
54	40119.482	5298	0.063	0.075		(16)
55	40147.461	5325	0.064	0.075		(15)
56	40148.450	5326	0.016	0.028	1	
57	40173.314	5350	0.010	0.022	0	
58	40463.439	5630	-0.013	-0.001		(8)
59	40778.489	5934	0.018	0.030	1	
60	40836.487	5990	-0.014	-0.002	2	
61	40858.345	6011	0.083	0.096		(14)
62	40859.371	6012	0.073	0.085		(14)
63	41178.447	6320	-0.014	-0.002		(8)
64	41549.452	6678	0.015	0.028	0:	
65	41604.353	6731	-0.006	0.007	1	
66	41628.289	6754	0.097	0.110		(10)
67	41689.309	6813	-0.021	-0.008	1	
68	41717.272	6840	-0.038	-0.024	2	
69	41920.459	7036	0.046	0.059	0:	
70	41921.445	7037	-0.004	0.009	2	
71	42607.514	7699	0.070	0.084		(11)
72	42609.499	7701	-0.018	-0.003	1	
73	42633.408	7724	0.058	0.072		(11)
74	42775.278	7861	-0.038	-0.024	0	
75	43005.446	8083	0.084	0.098		(12)
76	43436.455	8499	0.014	0.029	0	
77	43749.467	8801	0.080	0.096		(13)
78	44466.449	9493	-0.019	-0.003		(1)
79	44466.475	9493	0.006	0.022	0:	
80	44467.491	9494	-0.014	0.002	3	
81	44577.335	9600	-0.012	0.004	2	
82	45237.398	10237	-0.037	-0.020	2	
83	45238.444	10238	-0.028	-0.011	3	
84	45525.509	10515	-0.003	0.014	1	
85	46270.529	11234	-0.043	-0.025	1	
86	46351.395	11312	-0.004	0.014	1	
87	46404.237	11363	-0.011	0.007	2	
88	46405.244	11364	-0.039	-0.021	2	
89	47039.424	11976	-0.043	-0.024	0	
90	47094.346	12029	-0.042	-0.023	1	
91	47437.357	12360	-0.027	-0.008	2	

(Δs gibt die Stufendifferenz an, um die der Veränderliche schwächer ist als der Vergleichsstern c (s. Abb. 3, S. 32)).

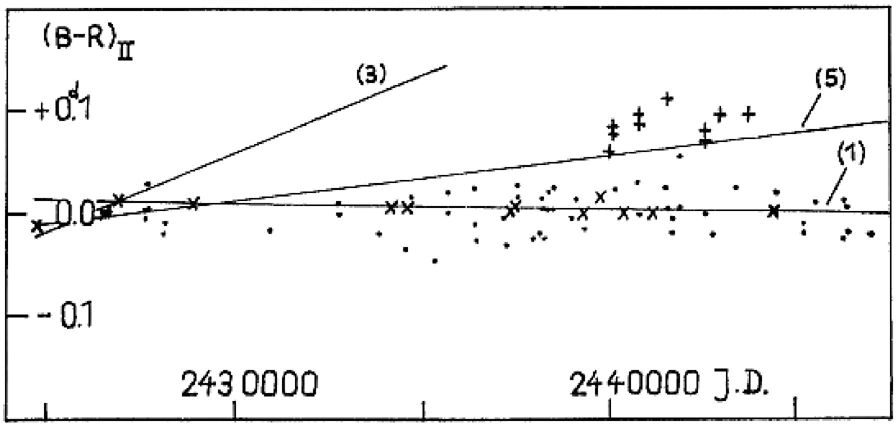

Abb. 1

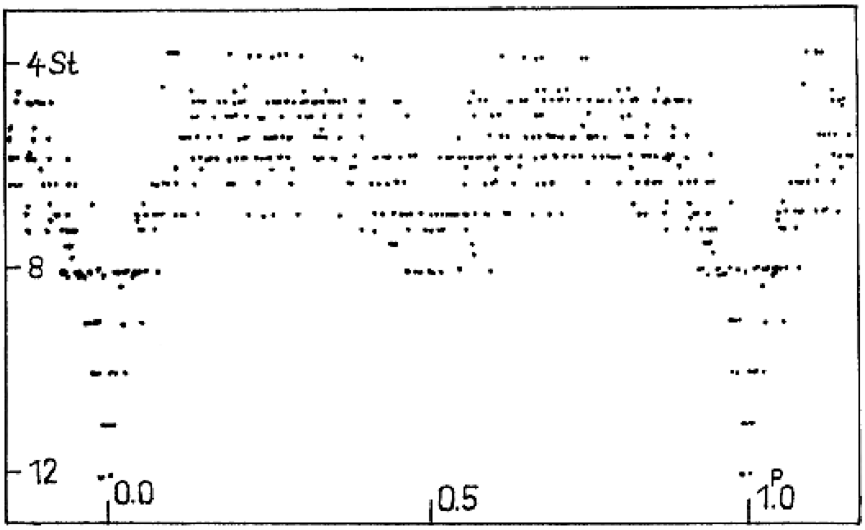

Abb. 2

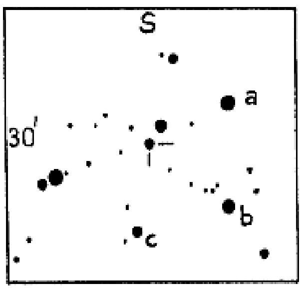

Abb. 3

Der Stern wurde deshalb von mir auf den folgenden alten und neuen Feldern der Himmelsüberwachung untersucht:

Feld	Plattenzahl	Minima	Zeitraum
22^h $+40^o$	≈ 200	8	1934...1956
23^h $+40^o$	≈ 200	5	
22^h $+40^o$	≈ 500	26	1956...1988
23^h $+40^o$	496	24	

Für eine möglichst aussagekräftige Analyse wurden weiterhin publizierte Minima herangezogen. Insgesamt standen damit die in der Tabelle (S. 30f) aufgeführten Minima zur Verfügung. Aus allen Minima wurden folgende Elemente abgeleitet:

$$\text{Min.} = 243\,4629.390 + 1^d\!.036245496 \cdot E \qquad (I)$$

Daraus ergeben sich die $(B-R)_I$-Werte. Es ist auffällig, daß die Minima Nr. 53, 54, 55, 61, 62, 63, 66, 71, 73, 75 recht große (B-R)-Werte aufweisen. Durchweg alle diese Beobachtungen entstammen dem BBSAG-Material ((10)...(16)), d.h., es sind jeweils aus 6 bis 20 visuellen Einzelbeobachtungen abgeleitete Minima.

Es ist unklar, wie diese über einen langen Zeitraum signifikante Abweichung auftreten kann, denn im gleichen Zeitraum lassen sowohl die Beobachtungen anhand der Himmelsüberwachung als auch andere publizierte Minima keinen solchen Trend erkennen.

Ohne Hinzunahme der BBSAG-Beobachtungen ergeben sich die folgenden Elemente:

$$\text{Min.} = 243\,4629.384 + 1^d\!.036244444 \cdot E \qquad (II)$$

Hiermit wurden die $(B-R)_{II}$-Werte berechnet; das entsprechende Diagramm zeigt Abb. 1 (S. 32).

Daraus geht ziemlich deutlich hervor, daß die Periode von VY Lac keiner augenfälligen Änderung unterworfen ist. Die von RÖSSIGER sowie KREINER und TREMKO vermutete Periodenänderung kann damit nicht bestätigt werden. Es ist anzunehmen, daß die aus der Literatur hervorgehende scheinbare Periodenverringerung aus der Möglichkeit resultierte, die Periode zunehmend genauer zu bestimmen. Im Laufe mehrerer Jahrzehnte häufen sich die Beobachtungen an und gestatten dann natürlich eine präzisere Bestimmung der tatsächlichen Periode. In Abb. 1 sind zum Vergleich die Geraden mit (B-R)≡ 0 eingezeichnet, bezogen auf die in (1), (3) und (5) publizierten Elemente. Zusätzlich zur Suche nach Minima wurde der Stern auf allen 496 Platten des Feldes 23^h $+40^o$ (1956...1988) geschätzt. Die daraus resultierende, mit den Elementen II gerechnete, Lichtkurve zeigt Abb. 2 (S. 32). Die Ordinate des Diagramms gibt die relative Stufe der Schätzung an.

Trotz der starken Streuung ist das typische Bild eines β-Lyrae-Veränderlichen gut erkennbar.

Von W.P. TSESEVICH (7) wurde eine Umgebungskarte publiziert, die aber entweder fehlerhaft ist oder wenigstens für photographische Untersuchungen nicht taugt. Deshalb ist in Abb. 3 (S. 32) eine neue Karte angegeben (nach Platte Te_4 3254), nebst den Stufenzahlen der benutzten Vergleichssterne.

Herrn Dr. W. WENZEL möchte ich für die Empfehlung, diesen Stern zu untersuchen, sehr herzlich danken.

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Bemerkungen zu dem Stern Küstner 1082 im Kugelhaufen M15

I. Meinunger, Sonneberg

(Eingegangen am 28. Juli 1989)

Den Stern 1082 aus KÜSTNERs Katalog von M15 (Veröff. Bonn 15; 1921) verdächtigte CHU YU-HUA (Acta Astron. Sinica 17,p.164; 1976) der ultrakurzperiodischen Veränderlichkeit mit geringer Amplitude (P = 0ᵈ087, A = 0.2 mag). Das Objekt wurde auf Platten des Tautenburger Schmidtspiegels geschätzt, die zu folgenden Zeiten aufgenommen worden waren. U-Bereich: 243 9794.368;9796.344;9798.363;9799.241; 9801.301;9801.379;B-Bereich: 243 7903.453;9791.344;9791.371; 9792.342;9801.244;V-Bereich: 243 7903.477;7907.464;7932.415.

Erhellungen von K 1082 waren um 243 7903.453 (B);9792.342 (B); 7907.464 (V) erkennbar. Inwieweit diese Erhellungen aber echte Maxima oder nur Streuwerte darstellen, kann nicht entschieden werden.

Remark on the period change of the RR Lyrae star IR Monocerotis

W. Wenzel, Sonneberg

(Eingegangen am 30. August 1989)

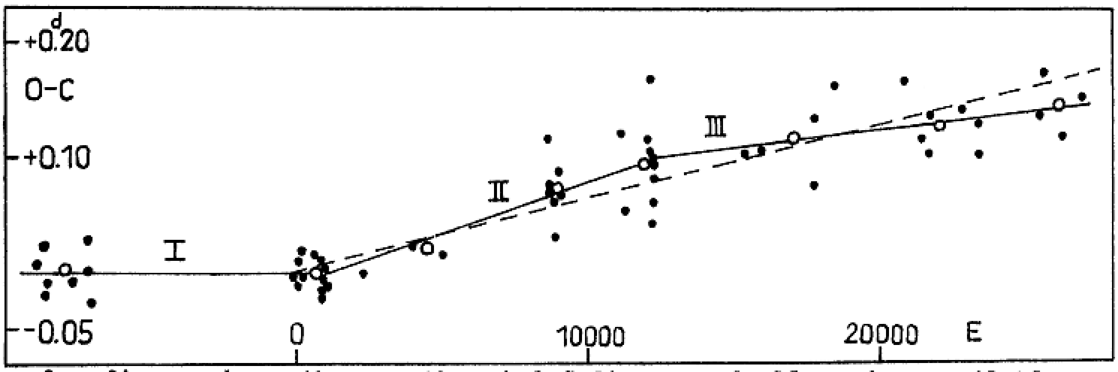
Abstract

Two period changes (or a continuous variation of the period) are documented by Sonneberg plates of the years 1941 to 1987.

This faint RR Lyrae star, which happened to have been observed fairly intensively (chronological references see below), was estimated by S. LEHMANN on newly taken Sonneberg plates of the years 1984 to 1987. 4 maximum observations at J.D. (hel.)

244 6083.493
6084.374
6361.661
6707.64:

are not in good accordance with the refined elements of CALVO and RÖSSIGER (1985), who already took into account a period change in 1951/52.



Our figure shows these authors' O-C diagram of all maxima available in the literature, supplemented by the dates given above, and computed on the basis of the elements published by RATHMANN and WENZEL (1960):

$$C \equiv \text{Max.} = 243\ 4342.562 + 0^d\!.4576044 \cdot E \qquad (I)$$

Not considering the gap between 1944 and 1952 and the possibility that the period was (or is) continuously varying, we find that the data are best represented by the following three periods:

$0^d\!.457\ 6044$	(1941?...1954?)	(I)
0.457 6131	(1954?...1967)	(II)
0.457 6074	(1968...1987)	(III)

In the diagram the full lines correspond to these periods, whereas the period of CALVO and RÖSSIGER is indicated by the broken line. Open circles denote mean values of appropriate groups.

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Maxima der Zwergnova CY Ursae Majoris

D. Böhme, Nessa (Mitglied des AKV)

(Eingegangen am 22. August 1989)

Der von GORANSKIJ (Astron. Tsirk. 955,8) 1977 entdeckte Veränderliche wurde bisher im wesentlichen nur in Japan und der BRD von Amateurastronomen beobachtet. Nach der anfänglichen Vermutung, daß es sich um einen normalen U-Geminorum-Stern handelt, identifizierten KATO et al. (Variable Star Bull. Japan, no. 5) den Stern als SU-UMa-System. Durch die intensive Beobachtung eines wahrscheinlichen Supermaximums fanden sie einen kurzperiodischen Lichtwechsel mit einer Periode von 0.0598 Tagen.

Der Verfasser prüfte die Gegend des Sterns auf 296 Blauplatten der Sonneberger Himmelsüberwachung (SHÜ) aus den Jahren 1962...88. Der Stern konnte nur auf 7 Platten sicher beobachtet werden, und dadurch sind 6 neue Ausbrüche nachweisbar. Ein weiterer bislang nicht bekannter Ausbruch wird im Atlas Stellarum belegt, in dem der Stern auf Karte 50 deutlich sichtbar ist. Die Tabelle enthält alle bislang bekannten Eruptionen.

Nr.	J.D.	Hell.	Quelle
1.	243 7824	$13^m.1$ pg	BÖHME (SHÜ)
2.	3 8709	13.2 pg	BÖHME (")
3.	3 9942	13.8 pg	BÖHME (")
4.	4 0331	14.0 pg	Atlas Stellarum
5.	4 1717	14.3 pg	BÖHME (SHÜ)
6.	4 2839	12.8 pg	BÖHME (")
7.	4 3192	11.9 vis	GORANSKIJ, Astron. Tsirk. 955
8.	4 5783	13.0 pg	BÖHME (SHÜ)
9.	4 7167	12.3 vis	WATANABE, IAU Circ. 4526
10.	4 7300	13.5 vis	KUSHIRO, AAVSO Circ. 212
11.	4 7464	12.2 vis	WAAGEN, IAU Circ. 4763
12.	4 7614	12.3 vis	SCHMEER, IAU Circ. 4763 und 4765
13.	4 7679	12.6 vis	SCHMEER, IAU Circ. 4791

Die kleinsten Intervalle zwischen zwei aufeinanderfolgenden beobachteten Ausbrüchen betragen 65, 133, 150 und 164 Tage.

WATANABE (Variable Star Bull. Japan, no. 10) vermutete ein Intervall zwischen zwei Supermaxima von 297 Tagen. Die jetzt gefundenen weiteren Eruptionen erlauben nicht die Ableitung einer klaren Periodizität, was aber für einen SU-UMa-Stern natürlich ist.

Lichtwechsel von PZ Cassiopeiae (BD 60° 2613)

P. Stein, Oberweißbach

(Eingegangen am 14. Dezember 1989)

Im voraus erscheint der Hinweis sinnvoll, daß in unmittelbarer Nachbarschaft des Sterns ein weiterer Stern von mpv 10^m vorhanden ist (KUDASHKINA 1984). Dem Autor ist nicht bekannt, ob von diesem Nachbarstern Helligkeitsschwankungen ausgehen, die sich störend auf die Untersuchungen an PZ Cas auswirken. Auch WENZEL erwähnt z.B., daß der Nachbarstern auf Sonneberger Astrographenplatten bei 160 cm Brennweite nicht immer klar vom Veränderlichen getrennt werden konnte.

Zum Lichtwechsel des Veränderlichen geben die aufgeführten Autoren in chronologischer Reihenfolge folgende Zyklenlänge an:

900 Tage	WENZEL (1956)
880 Tage	BÖHME (1983)
801.3 Tage	KUDASHKINA (1984)

WENZEL verweist weiterhin auf die Möglichkeit von raschen Helligkeitsänderungen von rund 1.0 mag innerhalb von 6 Tagen sowie auf wellenartige Schwankungen im Bereich 30...100 Tagen.

Der Veränderliche wurde auf Platten der Sonneberger Himmelsüberwachung (SHÜ) vom Autor geschätzt, davon 358 im Bereich mpv sowie 579 im Bereich mpg. Es wurden Aufnahmen aus dem Zeitraum J.D. 243 6400...244 1300 sowie 244 4900...6700 herangezogen. Unter Einbeziehung der Schätzungen von BÖHME ist somit durch den Arbeitskreis Veränderliche (AKV) der gesamte Bereich 243 6400... 244 6700 auf Platten der SHÜ abgedeckt. Zu den Vergleichssternen im Bereich mpv siehe KUDASHKINA. Abb. 1 zeigt einen Ausschnitt aus der vom Autor gewonnenen Lichtkurve. Charakteristisch (in beiden Farbbereichen) ist im Abstieg das Auftreten eines Buckels oder Helligkeitsausbruches.

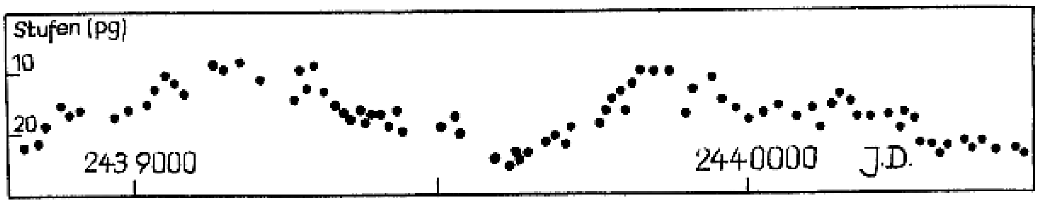

Abb. 1 10 Tage-Mittel

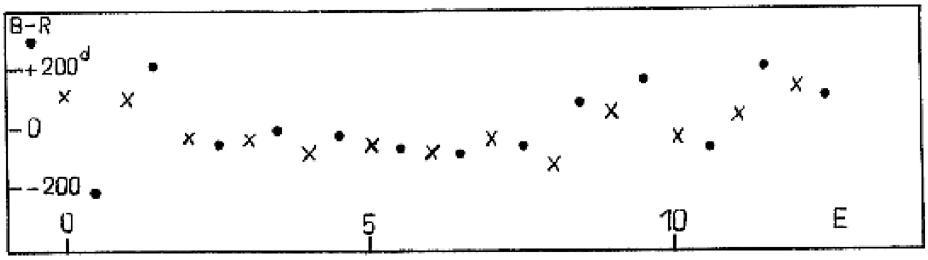

Abb. 2 x Max. • Min.

Die Auswertung der durch den AKV (BÖHME/STEIN) ermittelten Maxima und Minima ergibt folgende Elemente:

$$Max. = 243\,6618 + 841.7 \cdot E$$
$$t(max) - t(min) = 0.43 \cdot P$$

Mit diesen Elementen errechnen sich folgende B-R:

E	Max. B-R	Min. B-R
-1		+ 292^d
0	+ 112^d	- 199 :
1	+ 90	+ 216
2	- 33	- 43
3	- 24	+ 11
4	- 81	- 16
5	- 43	- 47
6	- 70	- 80
7	- 42	- 61
8	- 114	+ 107
9	+ 54	+ 175
10	- 31 :	- 66
11	+ 25 :	+ 207
12	+ 128 :	+ 105

Das entsprechende Diagramm zeigt Abb. 2 (S. 37). Gegenwärtig deutet sich wieder eine Zunahme der Periodenlänge an.

Abb. 3 (S. 39) zeigt aus den Schätzungen des Autors gewonnene Periodogramme. Dazu wurde das Verfahren nach JURKEVICH angewandt. In beiden Farbbereichen treten u.a. Perioden von 1 und 2 Jahren auf, die sich als Scheinperioden interpretieren lassen. Die Lage der Hauptmaxima bei 810 und 850 Tagen bestätigen am besten die Elemente nach KUDASHKINA sowie aus den AKV-Beobachtungen. Weiterhin deutet sich im Bereich von 600...650 Tagen eine weitere Periode P' an. Allerdings läßt sich P', wenn P = 842 d gelten soll, durch folgenden Zusammenhang erklären:

$$1/P' = 1/365\,d - 1/P$$
$$= 0.0016\,d^{-1}$$
$$P' = 625\,d$$

Es kann also davon ausgegangen werden, daß für den langsamen Lichtwechsel nur eine Periode verantwortlich ist.

Abb. 4 (S. 39) gibt die mittlere Lichtkurve wieder, gerechnet mit den Elementen aus den AKV-Schätzungen. Auch diese Kurve zeigt deutlich den Helligkeitsbuckel im abfallenden Ast der Lichtkurve.

Die Schätzungen des Autors ergeben eine Gesamtamplitude im photovisuellen Bereich von 7.4...9.0 mag und langsamen regelmäßigen Lichtwechsel. Als mittlere Helligkeit wurde mpv = $8^m_.24$ ermittelt. Die Schätzungen des Autors schließen eine geringfügige Abnahme der mittleren Helligkeit um ca. 0.25 mag im untersuchten Zeitraum im Photovisuellen nicht aus.

Nach LEE (1970) gilt für das Spektrum M3.5Ia, das er PZ Cas zuordnet, $M_V = -6^M_.5$, $B-V = +1^m_.73$.

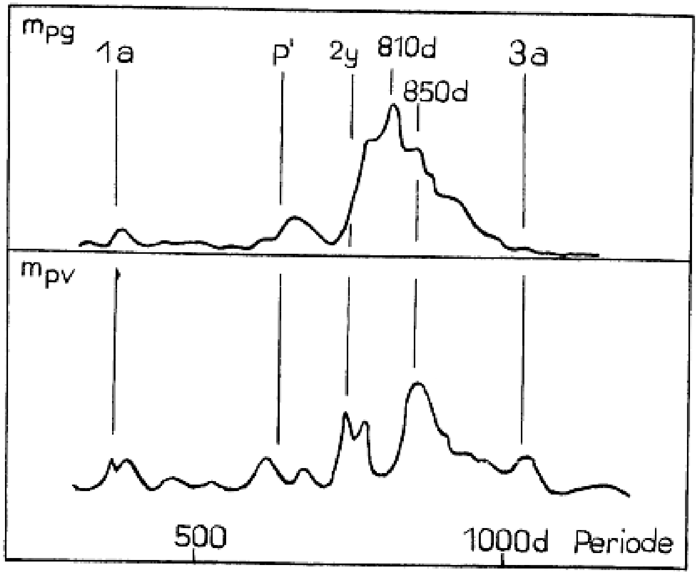

Abb. 3

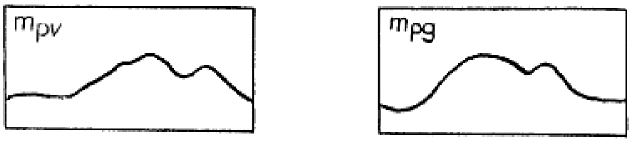

Abb. 4

In der gleichen Arbeit werden für den Stern folgende Werte angegeben:

$V = 8^m.90$

$B-V(Messung) = 2^m.58$

$A(v) = 3.3$ mag

Entfernung = 2.6 kpc

Der Unterschied zwischen dem Wert $V = 8^m.90$ von LEE und unserem mittleren Wert $m_{pv} = 8^m.24$ erklärt sich nicht nur durch den Lichtwechsel des Sterns, sondern auch durch die Farbgleichung der RP1- und der ZP3-Platten (KUDASHKINA) plus Gelbfilter.

Bei WEGNER (1989) wird die interstellare Extinktion in einigen Feldern in Cas untersucht. PZ Cas fällt in das untersuchte Feld "B". Für PZ Cas errechnet sich die interstellare Verfärbung zu

$$\begin{aligned} E(B-V) &= B-V(Messung) - (B-V)(soll) \\ &= (2.58 - 1.73) \text{ mag} \\ &= 0.85 \text{ mag} \end{aligned}$$

In dem oben genannten Feld "B" teilt WEGNER für Sterne V heller 10.5 R = 3.67 mit. Entsprechend

$$A(v) = R \cdot E(B-V) = 3.67 \cdot 0.85 \text{ mag} = 3.12 \text{ mag}$$

ergibt sich ein Entfernungsmodul

$$y = m - M - A(v) = 9\overset{m}{.}10 + 6\overset{m}{.}5 - 3.12 \text{ mag} = 12\overset{m}{.}48 \ (2.9 \text{ kpc}).$$

Literatur:

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Optical behaviour of the X-ray binary V 1727 Cygni = 4U 2129+47 in the season 1989

W. Götz, Sonneberg

(Received February 19, 1990)

Abstract

From the star 33 observations in B are given. All of them are from the low state.

In studying the long term behaviour the star was inspected on 33 blue-sensitive plates (ORWO-ZU21+GG13+BG12) from 24 nights obtained with the 50/70/172 cm Schmidt camera of Sonneberg Observatory covering the time interval between April 11 and November 29, 1989.

The individual estimates, which are listed in the table, are linked to the sequence of comparison stars given by WENZEL (1983). For the comparison star c of this sequence the magnitude B = $18\overset{m}{.}25$, given by KALUZNY (1988), was used.

As in the series of former years (GÖTZ 1985, 1986, 1987, 1988, 1989) all observations given in the table are from the low or inactive state of the star, which in most of the cases is below the limiting magnitude of the plates (iv = invisible).

J.D. hel. 244....	m_B
7628.587	$>$18.25 iv
.605	18.65
7651.469	$\gg$17.50 iv
7669.430	$\gg$17.50 iv
7670.433	$>$18.25
7671.432	$>$18.25 iv
7672.428	$>$18.25 iv
7673.454	18.35
7682.431	18.65
.448	$\gg$17.50 iv
7691.499	18.75
.515	$>$18.25 iv
7703.461	$>$18.25 iv
7714.520	18.75
7715.500	18.75
7749.402	18.75
7763.436	$>$18.25 iv

J.D. hel. 244....	m_B
7769.568	$>$18.25 iv
7770.530	$\gg$18.25 iv
7777.543	$>$17.50 iv
7792.339	$\gg$18.25 iv
.358	18.25 iv
7803.431	18.75
.448	18.45
7805.358	18.40
.436	$>$18.75 iv
7822.316	18.75
7827.410	18.55
.437	$>$18.25 iv
7850.373	$>$18.25 iv
.392	18.25
7860.407	$>$17.50 iv
.430	$>$18.25 iv

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GÖTZ, W., 1985, Inf. Bull. Variable Stars no. 2732
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KALUZNY, J., 1988, Acta Astron. 38,207
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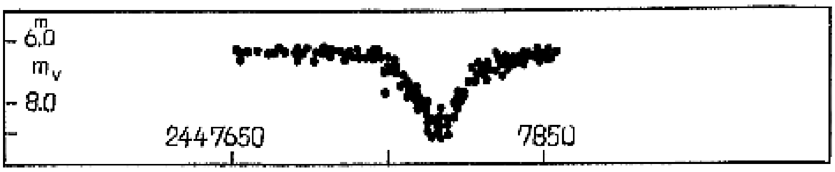
Visuelle Beobachtungen von R Coronae Borealis

Arbeitskreis "Veränderliche Sterne" (AKV)
Zusammengestellt von D. Böhme, Nessa

(Eingegangen am 12. Dezember 1989)

Der Veränderliche wurde weiter durch die Mitglieder des Arbeitskreises "Veränderliche Sterne" beobachtet. Der Zusammenstellung liegen 235 visuelle Schätzungen aus dem Zeitraum vom 1.6.1989 bis 30.11.1989 zugrunde. Die Lichtkurve bildet den Anschluß an die in Mitt. Veränderl. Sterne 12,p.15 veröffentlichte Kurve.



Beobachter:

BRETSCHNEIDER, Rostock	n=16	RÄTZ, K., Herges-Hallenberg	8
BÖHME, Nessa	19	RÄTZ, M., Herges-Hallenberg	4
ENSKONATUS, Berlin	31	VOHLA, Altenburg	43
KLIX, Hirschfelde	67	WITT, Berlin	13
LEHMANN, Erfurt	4	ZIMMERMANN, Großpösna	11

Optical behaviour of the polar AM Herculis in 1989

W. Götz, K. Heiland, Sonneberg

(Eingegangen am 31. Januar 1990)

Abstract

Photographic UBV observations of the star obtained in the season 1989 are given in detail to complete the long-term light-curves and to study the optical behaviour.

Using the sequence for comparison stars given by HUDEC and MEINUNGER (1977) we measured the star on 111 blue-sensitive (ORWO-ZU21+GG13+BG12), 31 photovisual (ORWO-RP1+GG14) and 37 uv-sensitive (ORWO-ZU21+UG2) plates from 55, 20 or 23 nights respectively obtained with the 50/70/172 cm Schmidt camera of Sonneberg Observatory covering the time interval between 5 March and 26 December 1989.

The annual light-curves in B, V and U are given in Figure 1 (p.45). The individual night means show the star in the high and the low state alternately. From the light-curve in B 4 high state phases and 3 phases of low state can be seen there. In this connection it is worth mentioning that the first high state in the light-curve, which stops at J.D. 244 7660, is the end of a long term high state of 987^d duration. From this high state of AM Her at the mean brightness B = $13\overset{m}{.}0$ and at J.D. 244 7648 two emission spectra were obtained by LUTHARDT and NOTNI. A further one, which dates from J.D. 244 7803 at the mean brightness B = $14\overset{m}{.}2$, characterizes the fainter range of the high state. As can be seen from Figure 1 in this phase the B brightness of the star is decreasing continuously to the following low state. Details of the spectroscopic observations, which were obtained at the 2 m telescope of Tautenburg Observatory will be given in another publication.

The annual mean brightness of the high state, which is caused by X-ray heating, amounts to B = $13\overset{m}{.}78$, V = $14\overset{m}{.}07$ and U = $13\overset{m}{.}34$, but the brightness in V and U represents only a small number of observations.

From 23 nights we obtained 36 U-B and 33 B-V colour indices. The B-V colour indices complete the colour magnitude diagram m_B/(B-V) given by GÖTZ (1984) and are in agreement with the behaviour shown there. The colour-magnitude diagram B/(U-B) is given in Figure 2 (p.46). It completes the former ones given by GÖTZ (1986, 1988), but in most of the cases with fainter mean B-brightness.

The two-colour diagram (U-B)/(B-V) of the series 1989 given in Figure 3 (p.45) is similar to those of other years published by GÖTZ (1986, 1988). The B-V colour indices become larger with decreasing U-B.

In order to study the influences of occultation light changes on the overall light-curves, all observations were reduced to one common epoch by means of the improved orbital elements published by GÖTZ (1984). It can be seen from the observations that in the bright state periodic variations only in U with minima at the phase 0.0 are recognizable. In the low state on the contrary only in B such variations with maxima at the phase 0.0 can be stated.

The individual observations in B, V and U obtained in the season 1989 are given in detail in the following tables.

1. Photographic observations in B

J.D. hel. 244....	m_B	
47591.633	13.08	
47591.652	12.74	
47592.633	12.96	
47616.540	12.96	
47616.579	12.92	
47626.487	13.22	
47628.554	13.19	
47628.572	12.97	
47648.410	13.16	
47648.447	12.85	
47651.410	13.03	
47651.429	13.31	
47651.448	13.16	
47653.404	13.56	
47655.448	14.19	
47655.475	14.08	
47661.565	15.48	
47669.396	15.44	
47669.415	15.40	
47670.394	15.56	
47670.413	15.07	
47671.393	15.49	
47671.412	15.58	
47672.393	15.35	
47672.411	15.22	
47673.414	15.37	
47674.422	15.19	
47682.412	15.28	
47682.487	15.55	
47690.504	15.36	
47692.517	15.40	
47703.409	15.26	
47706.435	15.43	:
47706.472	15.44	
47714.433	14.98	
47714.485	14.95	
47715.430	14.74	
47717.449	14.13	
47719.418	13.96	
47719.435	13.96	
47719.489	14.00	
47720.440	14.24	
47720.457	14.19	
47736.449	14.28	
47737.399	14.46	
47737.416	14.38	
47737.434	14.46	
47737.457	14.58	
47743.437	15.39	
47743.456	15.29	:
47743.487	15.41	:
47743.511	15.34	
47744.387	15.55	::
47744.425	15.44	::
47744.463	15.42	
47744.505	15.48	

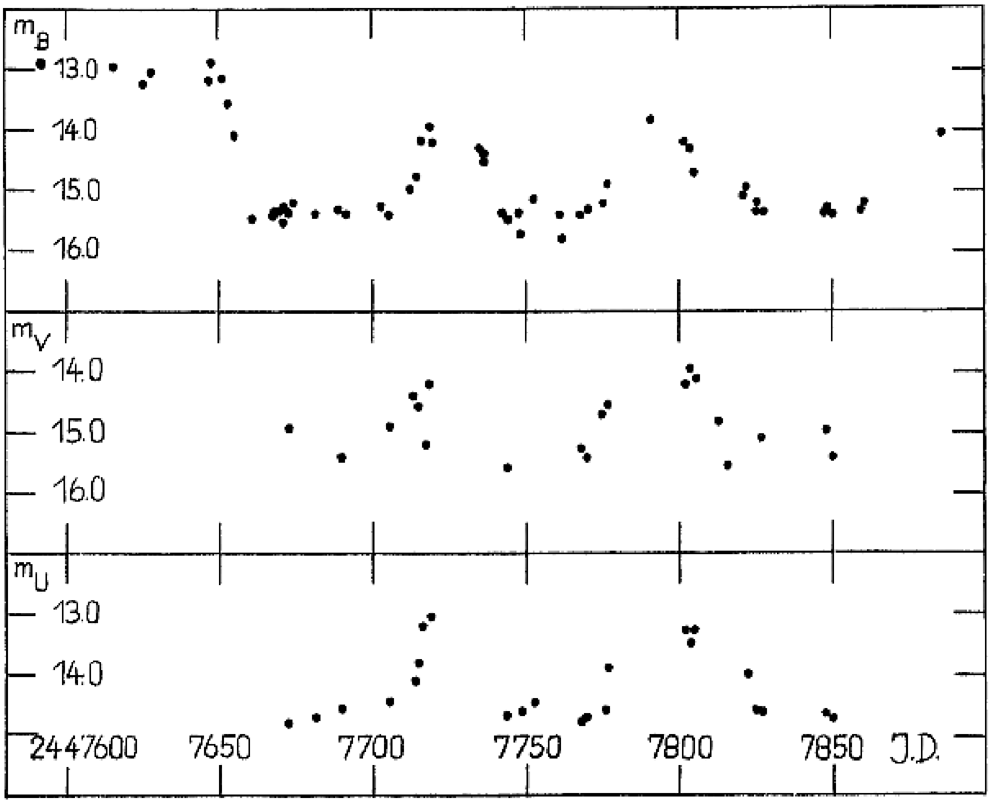
J.D. hel. 244....	m_B	
47744.524	15.46	
47748.372	15.38	
47748.391	15.34	
47748.414	15.33	
47748.433	15.38	
47749.563	15.74	:
47753.574	15.13	:
47762.339	15.23	
47762.358	15.58	::
47763.416	15.77	::
47769.352	15.41	
47769.422	15.35	
47770.325	15.30	
47770.362	15.30	
47770.425	15.36	
47770.470	15.41	
47776.334	15.28	
47776.394	15.09	
47777.313	14.92	
47777.332	14.86	
47777.390	14.89	
47792.292	13.82	
47803.294	14.17	
47803.352	14.24	
47804.300	14.36	
47804.360	14.35	
47804.435	14.23	
47805.317	14.53	
47805.393	14.88	
47822.272	15.14	
47822.294	15.09	
47823.272	15.00	
47823.310	14.93	
47826.299	15.31	
47826.317	15.22	
47826.358	15.35	:
47826.397	15.37	
47827.289	15.58	
47827.348	15.38	
47827.386	15.38	
47848.260	15.30	
47848.299	15.30	
47848.317	15.57	
47849.231	15.25	
47849.251	15.36	
47850.230	15.38	
47850.271	15.29	
47850.330	15.52	
47860.244	15.28	
47860.267	15.44	
47860.288	15.11	
47861.250	15.19	
47861.314	15.32	
47887.245	14.09	
47887.263	13.96	

2. Photographic observations in V

J.D. hel. 244....	m_V		J.D. hel. 244....	m_V	
47673.435	14.92		47777.410	14.53	
47690.520	15.37		47803.314	14.40	
47706.454	14.88		47803.372	14.05	
47714.450	14.05		47804.319	13.81	
47714.502	14.79		47804.378	14.13	
47715.448	14.57		47804.455	13.92	
47717.466	15.18	:	47805.336	14.12	
47719.515	14.20	:	47805.413	14.04	
47744.406	15.20		47823.292	14.79	
47744.483	15.98		47826.378	15.54	
47769.375	14.93		47827.308	15.25	
47769.444	15.51		47827.367	14.97	
47770.384	15.03		47848.279	15.01	:
47770.448	15.81	:	47850.290	15.10	
47776.354	14.74		47850.349	15.73	
47776.406	14.61				

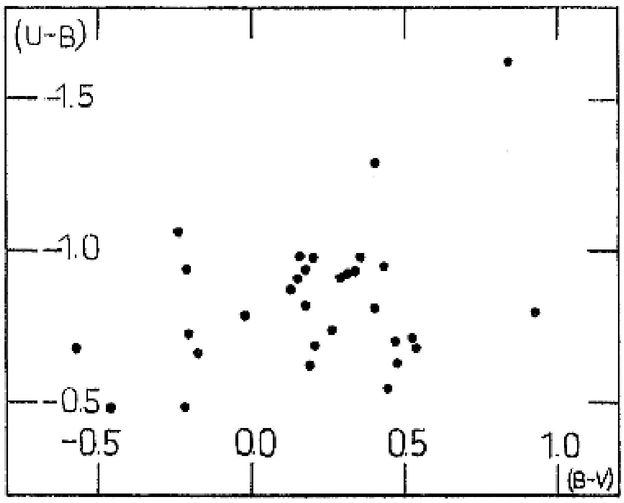
3. Photographic observations in U

J.D. hel. 244....	m_U	J.D. hel. 244....	m_U
47673.394	14.82	47776.316	14.57
47682.469	14.68	47776.374	14.39
47690.487	14.57	47777.370	13.91
47706.417	14.48	47803.276	13.11
47706.489	14.37	47803.333	13.42
47714.416	14.18	47804.281	13.67
47714.467	14.04	47804.339	13.46
47715.413	13.77	47804.408	13.31
47717.432	13.14	47805.297	13.24
47719.472	13.06	47805.374	13.25
47744.369	14.62	47823.248	14.02
47744.443	14.73	47823.355	14.05
47749.433	14.61	47826.337	14.62
47753.555	14.56	47827.269	14.66
47769.334	14.77	47827.328	14.56
47769.397	14.68	47848.235	14.67
47770.343	14.56	47850.251	14.33
47770.406	14.88	47850.310	15.03
47770.490	14.73		



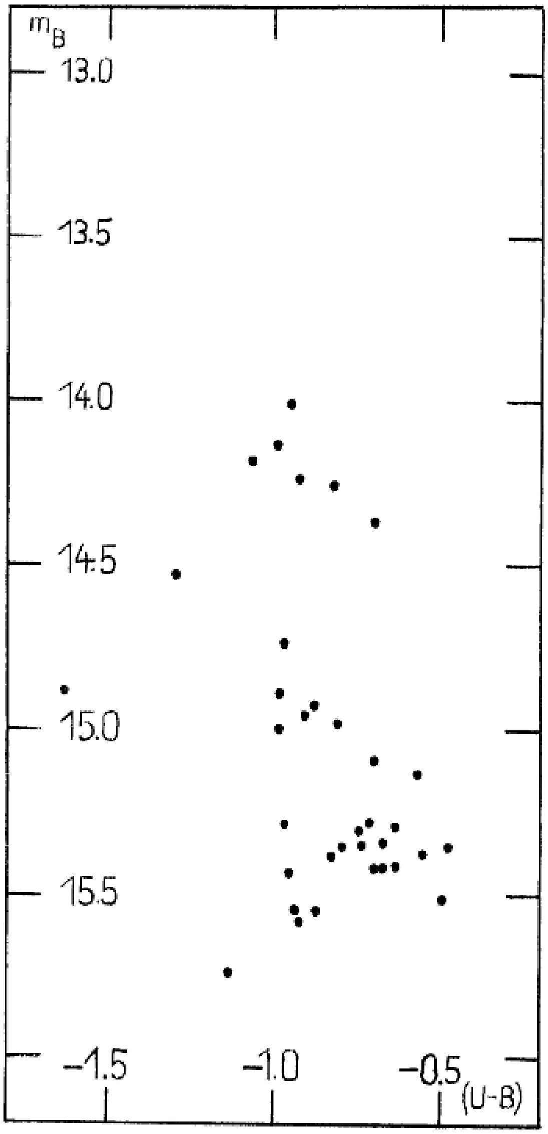
m_B
13.0
14.0
15.0
16.0
m_V
14.0
15.0
16.0
m_U
13.0
14.0
2447600
7650
7700
7750
7800
7850
J.D.

Abb.1



(U-B)
-1.5
-1.0
-0.5
-0.5
0.0
0.5
1.0
(B-V)

Abb.3



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GÖTZ, W., 1986, Inf. Bull. Variable Stars No. 2967
GÖTZ, W., 1988, Inf. Bull. Variable Stars No. 3279

Photometric behaviour of KR Aurigae in the season 1989/1990

W. Götz, Sonneberg

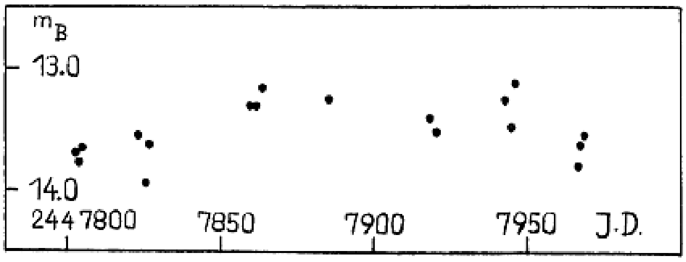
(Eingegangen am 25. April 1990)

Abstract

Brightness measurements of KR Aur on blue-sensitive plates are given.

In linking to the sequence of comparison stars given by POPOVA (1965) the star was measured on 37 blue-sensitive plates (ORWO-ZU21+GG13+BG12) from 18 nights obtained with the 50/70/172 cm Schmidt camera of Sonneberg Observatory and covering the time interval between October 3, 1989 and March 18, 1990. The individual observations are listed in the table. Using the means of brightness of each night, in figure 1 the light-curve of the object is shown. As in the season 1988/1989 (GÖTZ 1989) the star is in its bright state.

J.D. hel. 244....	m_B	J.D. hel. 244....	m_B
7803.538	$13^{m}.65$	7886.417	$13^{m}.37$
7803.584	13.74	7919.345	13.22
7804.551	13.85	7919.384	13.58
7804.568	13.65	7921.307	13.70
7805.555	13.68	7921.326	13.34
7805.573	13.62	7921.345	13.59
7823.483	13.43	7921.369	13.43
7823.500	13.67	7943.370	13.28
7826.600	13.92	7943.391	13.25
7826.617	13.94	7945.431	13.40
7827.646	13.59 :	7945.462	13.53
7827.663	13.58	7946.383	12.97
7860.609	13.23 :	7946.401	13.26
7860.630	13.35 :	7967.314	13.84
7861.528	13.17 :	7967.333	13.82
7861.548	13.40 :	7968.304	13.62
7864.600	13.22 :	7969.326	13.55
7864.619	13.08 :	7969.345	13.55
7886.386	13.15		



References:

POPOVA, M., 1965, Peremennye Zvezdy 15,534
GÖTZ, W., 1989, Mitt. Veränderl. Sterne 12,13

Verbesserte Periode von UW Hydrae

Th. Fuhrmeister, Sonneberg

(Eingegangen am 8. Januar 1990)

Der Algol-Stern UW Hya wurde bereits von VAN SCHEWICK (1) und RICHTER (2) untersucht. Nach (2) ist die seinerzeit ermittelte Lichtkurve nicht eindeutig, da zufällig in der Nähe der Phase $0^{p}.33$ und $0^{p}.67$ keine Beobachtungen lagen, bis auf zwei deutliche Schwächungen bei $0^{p}.64$. Hieraus wurde in (2) die Vermutung abgeleitet, daß entweder nahe der Phase $0^{p}.64$ ein exzentrisches Nebenminimum liegt oder die berechnete Periode $P = 3^{d}.1662915$ durch 3 geteilt werden muß.

Die Schätzung von UW Hya auf Sonneberger Astrographenplatten erbrachte die im folgenden aufgelisteten Minima, wobei die Minima bis 243 5868 von (2) übernommen wurden und die nachfolgenden Minima neuen Schätzungen des Objektes auf 215 Astrographenplatten aus den Jahren 1965 bis 1988 entstammen.

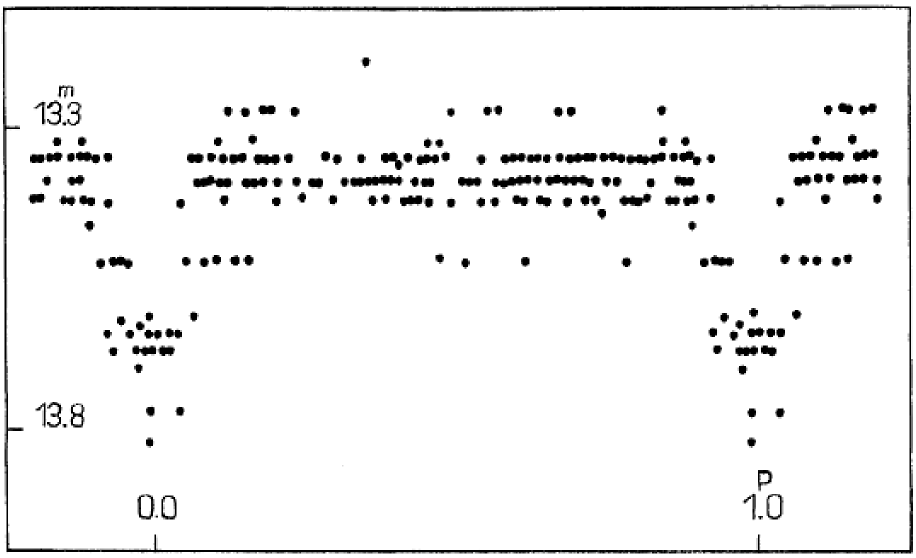
Aus allen zur Verfügung stehenden Minima wurde die Periode $P = 1^{d}.055438$ abgeleitet, was die Vermutung, daß die in (2) angenommene Periode durch 3 geteilt werden muß, tatsächlich unterstützt.

Schwächungen J.D.	E	B-R
242 5248.705	0	$-0^{d}.003$
2 5302.536	51	0.000
2 6692.548	1368	0.000
2 8250.385	2844	+0.009
2 8956.468	3513	+0.004
243 0077.318	4575	-0.021
3 0349.646	4833	+0.003
3 5868.572	10062	+0.041
3 9145.598	13167	-0.069
244 0301.391	14262	+0.018
4 0319.341	14279	+0.026
4 0320.386	14280	+0.015
4 0321.419	14281	-0.006
4 1332.551	15239	+0.015
4 1333.554	15240	-0.037
4 1334.614	15241	-0.032
4 1385.301	15289	-0.006
4 1390.518	15294	-0.066
4 1765.330	15649	+0.064
4 1766.357	15650	+0.036
4 5783.355	19456	+0.035
4 6093.611	19750	-0.008
4 6147.428	19801	-0.018

Die Elemente lauten nunmehr:

$$\text{Min.} = 242\ 5248.708 + 1^{d}.055438 \cdot E\ .$$

Der Helligkeitsanschluß wurde wiederholt. Hierzu wurde das Eichfeld SA 100 (Harvard-Größen) verwendet. Die 3 Vergleichssterne für die Schätzungen waren mit den früher verwendeten Vergleichssternen identisch. Die Lichtkurve (S. 49) enthält nur die Werte der neuen Schätzungen.



Literatur:

(1) VAN SCHEWICK, H., 1942, Mitt. Veränderl. Sterne 1,114
(2) RICHTER, G., 1961, Mitt. Veränderl. Sterne 4,499

CM Delphini - Antizwergnova?

Th. Fuhrmeister, Sonneberg

(Eingegangen am 2. Mai 1990)

Abstract

A second minimum of this interesting cataclysmic variable was observed on Sonneberg plates of August 1983.

Der blaue Veränderliche CM Del (GCVS 1987 - Daten: Typ IS; Lichtwechsel $13^{m}.4...15^{m}.3$; Spektrum PEC (E+CONT) wurde bereits von L. MEINUNGER auf Sonneberger Astrographenplatten geschätzt. Die Lichtkurve von 1928 bis 1978 ist in (1) angegeben. Schon hier fiel auf, daß "gelegentlich sehr tiefe Minima auftreten". CM Del wurde nunmehr auf weiteren 58 Sonneberger Astrographenplatten von 1978 bis 1989 (Abb. 1, S. 50) beobachtet. Hierbei wurden die Vergleichssterne von (1) beibehalten; ihre Stufenzahlen sind in Abb. 1 markiert.

Am 9. August 1983 wurde auf zwei aufeinanderfolgenden Platten (J.D. 244 5556.450 und 244 5556.486, Belichtungszeiten 20 min) ein ausgeprägtes Minimum registriert. Es ist in Abb. 2 (S. 50) mit vergrößertem Zeitmaßstab dargestellt. Die lange Dauer des Minimums macht es angesichts der Bahnperiode von 3.9 h (2) unwahrscheinlich, daß es sich um ein Bedeckungsminimum handelt.

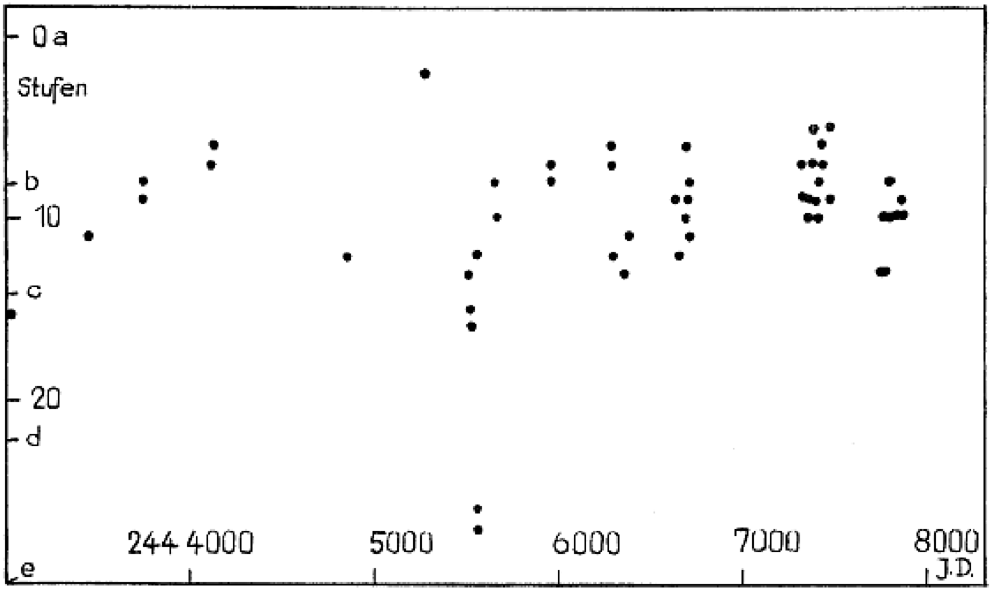


Abb. 1

Somit wurde neben dem ausgeprägten Minimum von 1928 (1) noch ein zweites beobachtet, welches nach ca. 55 Jahren auftrat. Selbstverständlich besteht die Möglichkeit, daß in diesem Zeitintervall weitere, nichtregistrierte Minima liegen, was eine Verwandtschaft mit den VY-Scl-Sternen (Antizwergnovae) nahelegen würde.

Vergleicht man das Spektrum von CM Del (2) mit denen charakteristischer VY Scl-Sterne (3), so fällt auf, daß das blaue Kontinuum zwar durchaus Ähnlichkeit aufweist, die Balmerlinien von CM Del jedoch wesentlich schwächer sind. Die Bahnperiode von CM Del ist mit 3.9h etwas größer als die der charakteristischen VY-Scl-Sterne (3) Die Lichtkurve von VY Scl zeigt schließlich, daß die Minima hier in kürzeren Zeitabständen folgen und wesentlich länger andauern (4).

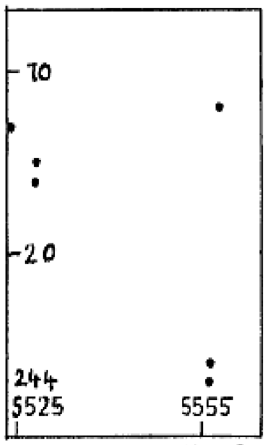


Abb. 2

Zusammenfassend ist einzuschätzen, daß mit CM Del ein kataklysmischer Veränderlicher vorliegt, dessen relativ selten auftretende ausgeprägte Minima ihn besonders charakterisieren. Zweifellos wäre eine gezielte spektroskopische Untersuchung während eines Minimums von größtem Wert. Eine sichere Zuordnung zu den VY Scl-Sternen ist auf der Basis des vorliegenden Materials noch nicht möglich.

Literatur:

(1) MEINUNGER, L., Veröff. Sternw. Sonneberg 9 (1978),201
(2) SHAFTER, A., Astron. J. 90 (1985),643
(3) SZKODY, P., Astrophys. J. 63 (1987),685
(4) LA DOUS, C., Br. Astron. Assoc. Circ. 68 (1989),18

Beobachtungsergebnisse des Arbeitskreises "Veränderliche Sterne" der DDR (Teil XVII)

(Eingegangen am 6. Juni 1990)

A) Minima von Bedeckungsveränderlichen

	J.D.$_\odot$ 24...	E	B-R	n	Art	Beob.	Bemerk.
RT And	47737.4741	+10487	+0^d.0013	54	vis	Kro	
HP Aur	42448.300	- 216.5	-0.008	9	pg	Bus	a)
LY Aur	47530.777	+ 2116	+0.035	74	vis	Gol	Nm
U Cep	47660.442	+ 1251	+0.036	19	vis	Ens	Nm
	887.307	+ 1342	+0.034	41	vis	Ens	Nm
	914.749	+ 1353	+0.053	22	vis	Ens	Nm
NN Cep	47792.42	+ 1596	-0.04	62	vis	Ens	Nm
GO Cyg	47834.940	+19372	+0.014	67	vis	Ens	Nm
V367 Cyg	47675.437	+ 553	+0.037	40	vis	Rcr	Nm
V822 Cyg	44847.409	+ 9716	+0.004	61 insg.	pg	Bus	
	45562.431	+10280	+0.001		pg	Bus	
	903.465	+10549	+0.004		pg	Bus	
V1147 Cyg	47194.535	+ 652	-0.006	49insg.	vis	Ens	Nm Min.I
	192.589	+ 651.5	+1.868		vis	Ens	Nm Min.II
u Her	47767.371	+20447	-0.011	31	vis	Gol	Nm
beta Lyr	47386.39	+ 819	+0.01	69	vis	Hem	NM AA29.3
	761.80	+ 848	+0.31	50insg.	vis	Ens	Nm Min.I
	768.00	+ 848.5	+0.04		vis	Ens	Nm Min.II
	852.36	+ 855	+0.31	66insg.	vis	Sar	Nm Min.I
	884.25	+ 857.5	-0.14		vis	Sar	Nm Min.II
V536 Mon	37588.651	- -	- -	317insg.	pg	Bus	Schwächung
	38004.602	- -	- -		pg	Bus	"
	005.624	- -	- -		pg	Bus	"
	842.370	- -	- -		pg	Bus	"
	39054.616	- -	- -		pg	Bus	"
	508.477	- -	- -		pg	Bus	"
	827.56	- -	- -		pg	Bus	"
	42839.285	- -	- -		pg	Bus	"
beta Per	45280.233	- 126	0.000	18	le	Bus	(Integr.)
TX UMa	47626.477	+ 858	+0.071	19	vis	Ens	Nm
Z Vul	47744.4145	+ 1954	-0.0042	28	le(B)	Bus	

B) Maxima von RR-Lyr- und Delta-Cep-Sternen

	J.D.⊙24...	E	B-R	n	Art	Beob.	Bemerk.
GP And	41980.3903	+103186	$-0\overset{d}{.}0008$	11	pg	Bus	a)
	42036.2521	+103896	-0.0037	18	pg	Bus	a)
	741.3303	+112857	-0.0012	15insg.	pg	Bus	a)
	.4080	+112858	-0.0022		pg	Bus	a)
eta Aql	47395.357	+ 1576	+0.315	20	vis	Rat	NM
	775.75	+ 1629	+0.35	36	vis	Gol	NM
	804.47	+ 1633	+0.36	26	vis	Sar	NM
	804.490	+ 1633	+0.379	19	vis	Rcr	NM
RT Aur	47610.844	+ 1408	+0.503	34	vis	Gol	NM
	849.242	+ 1472	+0.302	33	vis	Rat	NM
	946.226	+ 1498	+0.355	22	vis	Rcr	NM
VZ Cnc	45780.397	+ 32983	+0.002	28	le(V)	Bus	
	47611.482	+ 43249	+0.006	23	vis	Kuh	
	616.298	+ 43276	+0.006	9	vis	Kuh	
	653.392	+ 43484	0.000	8	vis	Kuh	
	655.356	+ 43495	+0.002	16	vis	Kuh	
delta Cep	47795.507	+ 939	+0.096	81	vis	Gol	NM
	822.314	+ 944	+0.072	39	vis	Sar	NM
	849.258	+ 949	+0.185	42	vis	Rcr	NM
	849.339	+ 949	+0.266	59	vis	Rat	NM
X Cyg	47173.574	+ 204	+0.371	32	vis	Rcr	NM
	418.316	+ 219	+0.683	24	vis	Rat	NM
SU Cyg	47770.316	+ 1162	+0.012	35	vis	Rat	NM
XZ Cyg	47833.3197	+ 4901	-0.0083	7	vis	Bgr	NM
	847.3126	+ 4931	-0.0140	11	vis	Bgr	NM
	861.7836	+ 4962	-0.0083	10	vis	Bgr	NM
	862.2462	+ 4963	-0.0123	14	vis	Bgr	NM
zeta Gem	47592.05	+ 375	+0.38	53	vis	Gol	NM
T Mon	47947.28	+ 154	-0.40	23	vis	Sil	NM
DY Peg	47822.3373	+ 45529	+0.0055	15	vis	Bgr	
	823.3586	+ 45543	+0.0059	15	vis	Bgr	
	825.3999	+ 45571	+0.0052	16	vis	Bgr	
SZ Tau	47834.47	+ 4194	+0.13	51	vis	Ens	NM

C) Mirasterne

	J.D. 244...	E	B-R	m_v	n	Beob.
W And	7860	+11	$+ 1^d$	$6\overset{m}{.}7$	19	Zis
	7861	+11	+ 2	7.0	23	Voh
	7863	+11	+ 4	6.8	29	Hin
X And	7869	+13	-60	8.7	8	Hin
Y And	7936	+24	+ 3	8.5	10	Hin
SV And	7881	+16	-65	8.2	12	Hin
R Aqr	7845:	+14	+30:	6.7	15	Voh
R Aql	7689	+15	-32	6.6	16	Zis
X Aql	7742:	+18	+ 8:	8.2:	8	Brk

C) Mirasterne (Fortsetzung)

	J.D. 244...	E	B-R	m_v	n	Beob.
RV Aql	7661:	+23	$+15^d$:	$9^m.4$	7	Zis
R Ari	7876	+18	+ 9	8.4	14	Hin
	7878	+18	+11	8.2:	12	Zis
R Aur	7693	+ 8	+29	8.0:	30	Voh
X Aur	7895	+20	+15	8.9	16	Hin
	7895	+20	+15	9.0	14	Zis
	7905	+20	+25	9.1	18	Voh
R Boo	7642	+14	- 4	7.2	15	Zis
	7643	+14	- 3	7.1	25	Brk
	7645	+14	- 1	7.5	32	Voh
	7648	+14	+ 2	7.1	10	Mos
S Boo	7677	+13	+42	8.5	22	Brk
	7948	+14	+42	8.8	20	Hin
	7951	+14	+45	8.5:	44	Voh
R Cam	7724:	+14	-37:	8.5:	23	Brk
T Cam	7908	+12	- 3	8.3	15	Hin
X Cam	7554	+20	+ 4	8.2	14	Brk
	7695:	+21	+ 1:	8.2:	12	Brk
	7840	+22	+ 3	8.0	16	Hin
	7840	+22	+ 3	8.2	10	Zis
	7842	+22	+ 5	8.0	17	Brk
R Cnc	6768	+ 7	+ 6	6.7	17	Hin
	7853	+10	+ 6	6.5	13	Zis
R CVn	7821	+13	-36	7.5	17	Hin
S CMi	7875	+12	-31	6.8	22	Hin
R Cas	7498	+ 7	+22	-	18	Zis
	7499	+ 7	+23	6.3	19	Hin
T Cas	7701:	+ 8	-18:	7.6:	13	Brk
U Cas	7912	+12	-35	8.3	12	Zis
	7916	+12	-31	8.3	13	Hin
V Cas	7794	+14	-15	8.1	25	Voh
	7800	+14	- 9	7.9	19	Hin
	7800	+14	- 9	7.3	30	Klx
	7803	+14	- 6	7.7	19	Brk
W Cas	7843:	+ 9	-16:	9.5:	11	Brk
	7870	+ 9	+11	9.0	22	Zis
SS Cas	7815:	+26	-48:	10.1	7	Zis
T Cep	7545	+ 8.46	+84	10.5	21m	Zis
	7548:	+ 8.46	+87:	10.4:	30m	Brk
	7739	+ 9	+69	5.7	45	Brk
	7744	+ 9	+74	5.75	49	Gol
	7745	+ 9	+75	5.7	38	Zis
	7751	+ 9	+81	6.3	68	Voh
	7758:	+ 9	+88:	-	31	Hin
	7764	+ 9	+94	6.1	21	Rat/Rcr
R Cet	7910	+25	-14	8.2	12	Hin
omi Cet	7512	+ 8	+17	3.6	19	Gol
	7805:	+ 9	-22:	2.5	52	Klx
	7816	+ 9	-11	2.9	24	Zis
	7820	+ 9	- 7	3.45	21	Gol
	7823	+ 9	- 4	2.8	20	Hin
S CrB	7846	+ 9	0	7.8	18	Hin
V CrB	7693	+11	- 4	8.2	28	Brk
W CrB	7764:	+15	- 4:	-	11	Hin
	7771	+15	+ 3	8.3	16	Brk

C) Mirasterne (Fortsetzung)

	J.D. 244...	E	B-R	m_v	n	Beob.
U Cyg	7773	+ 7	-28^d	$7^m.3$	52	Voh
Z Cyg	7778	+12	- 4	8.1	17	Brk
RT Cyg	7630	+16	- 2	6.5:	16	Wit
	7825	+17	+ 2	7.7	23	Hin
	7825	+17	+ 2	8.2	13	Zis
	7826	+17	+ 3	7.7	17	Brk
	7832	+17	+ 9	8.0:	40	Voh
	7832	+17	+ 9	7.7	15	Wit
	7836	+17	+13	7.9:	17	Rat/Ror
TU Cyg	7844	+14	+ 7	10.0	10	Zis
WY Cyg	7873:	+10	- 4:	9.4:	9	Zis
BG Cyg	7799	+14	-17	10.0	15	Voh
CN Cyg	7764	+16	+11	8.9	16	Voh
V 369 Cyg	7663	+27	+35	10.3	7	Zis
chi Cyg	7872	+14	+19	6.0	40	Klx
	7875	+14	+22	5.8	21	Hin
	7875	+14	+22	6.3	15	Voh
	7876	+14	+23	5.7	20	Brk
R Del	7810	+13	+13	7.5	18	Hin
R Dra	7739	+12	+13	7.9	18	Brk
S Her	7819	+ 9	- 1	7.8	20	Voh
	7822	+ 9	+ 2	7.1	21	Hin
	7825	+ 9	+ 5	6.8	18	Brk
T Her	7777	+15	- 4	7.6	15	Zoh
	7778	+15	- 3	7.7	26	Klx
	7779	+15	- 2	8.0	21	Voh
	7783	+15	+ 2	7.7	14	Hin
	7783	+15	+ 2	7.9	9	Zis
	7951	+16	+ 5	7.4	16	Hin
U Her	7846:	+ 7	+ 9:	7.0	14	Brk
	7848:	+ 7	+11:	7.2	19	Klx
	7857	+ 7	+20	7.1	19	Hin
W Her	7815	+10	-44	8.0	21	Hin
	7815	+10	-44	8.1	18	Voh
	7821	+10	-38	7.9	16	Brk
RS Her	7805	+12	-25	7.9	20	Hin
	7807	+12	-23	7.4	20	Brk
	7807	+12	-23	8.4	19	Voh
RU Her	7801	+ 6	- 7	7.3	21	Hin
SY Her	7821	+22	+ 1	7.9	14	Hin
	7943:	+23	+ 6:	9.4	11	Hin
S Hya	7918	+17	+46	7.4	17	Hin
S Lac	7892:	+17	-18:	8.6:	10	Brk
R Leo	7621	+11	+48	5.5	24	Gol
	7624	+11	+51	5.5	45	Klx
	7624	+11	+51	5.6	18	Rat/Ror
	7626	+11	+53	5.7	36	Mos
	7627	+11	+54	5.6	31	Brf
	7630	+11	+57	5.0	32	Brk
	7630	+11	+57	5.3	27	Zis
	7939	+12	+56	5.9	22	Sil
	7946	+12	+63	6.2	21	Voh
S LMi	7613	+10	-17	7.9	10	Brk
R Lyn	7844	+ 7	+18	8.2	22	Hin
W Lyr	7671	+13	+15	7.8	25	Voh
	7869:	+14	+15:	7.5:	20	Brk
	7869	+14	+15	7.7	16	Hin

C) Mirasterne (Fortsetzung)

	J.D. 244...	E	B-R	m_v	n	Beob.
X Oph	7715:	+ 9	$+26^d$:	$7^m.2$	45	Klx
U Ori	7839:	+ 7	+ 7:	6.6	28	Klx
	7846	+ 7	+14	7.1	18	Zis
	7854	+ 7	+22	7.0	15	Hin
S Peg	7869	+ 8	+ 4	8.7	11	Hin
	7874	+ 8	+ 9	8.3	15	Brk
V Peg	7841	+11	+ 9	8.7	13	Hin
RZ Peg	7861	+ 6	-19	8.0	23	Hin
R Per	7880:	+12	+22:	-	9	Zis
	7881	+12	+23	9.0	9	Hin
U Per	7903	+ 9	-45	8.0:	29	Voh
R Ser	7651	+ 6	- 8	6.6	19	Zis
	7663:	+ 6	+ 4:	6.2:	21	Brk
R Tri	7900	+10	+16	5.65	22	Gol
	7900	+10	+16	5.4	39	Klx
	7900	+10	+16	5.7	31	Voh
	7902	+10	+18	5.8	21	Hin
	7902	+10	+18	5.8	20	Zis
R UMa	7694	+ 7	-10	7.2	27	Brk
	7695	+ 7	- 9	7.1	26	Zis
	7696	+ 7	- 8	7.5	39	Voh
	7698:	+ 7	- 6:	7.0	15	Wit
S UMa	7579	+ 8	- 6	8.1	27	Zis
	7582	+ 8	- 3	7.7	26	Brk
	7592	+ 8	+ 7	-	11	Wit
	7811	+ 9	0	8.2	14	Hin
	7816	+ 9	+ 5	7.4	19	Wit
	7819	+ 9	+ 8	8.05	14	Gol
	7825:	+ 9	+14:	8.0	21	Klx
T UMa	7671:	+ 8	- 5:	7.8	11	Wit
	7676	+ 8	0	8.0	27	Voh
	7682	+ 8	+ 6	7.7	20	Brk
	7909	+ 9	-23	7.1	30	Hin
	7916:	+ 9	-16:	7.8	28	Klx
	7916	+ 9	-16	7.5	25	Voh
	7928:	+ 9	- 4:	7.5	9	Wit
RS UMa	7829	+ 7	+25	9.3	14	Zis
S UMi	7556:	+ 5	-30:	8.4	7	Hin
	7564	+ 5	-22	8.2	49	Voh
	7566	+ 5	-20	8.2	26	Brk
	7566	+ 5	-20	8.2	21	Zis
	7884	+ 6	-33	8.3	28	Hin
	7889	+ 6	-28	8.1	25	Zis
	7895	+ 6	-22	8.2	38	Voh
U UMi	7545:	+ 6.50	-24:	11.6	13m	Zis
	7668	+ 7	-66	8.1	51	Voh
	7688:	+ 7	-46:	8.4	22	Zis
	7696	+ 7	-38	8.2	30	Brk
	7883:	+ 7.50	-17:	11.8:	16m	Zis
R Vir	7618	+12	- 2	7.4	9	Zis
	7901	+14	-10	7.5	19	Hin
R Vul	7363	+13	0	7.5	9	Zch
	7775	+16	+ 1	8.3	15	Zch
	7776	+16	+ 2	8.4	22	Voh
	7782:	+16	+ 8:	8.2	14	Hin
	7785:	+16	+11:	9.0:	11	Brk

Einzelbeobachtungen von halb- und unregelmäßigen Veränderlichen wurden im Bull. der AFOEV veröffentlicht. Die (B-R)-Werte wurden mit Hilfe der Elemente des GCVS 1985/87 gerechnet.

Bemerkungen:

Nm	Normalminimum
NM	Normalmaximum
m	Minimum (bei Mirasternen)
vis	visuell
pg	photographisch
le	lichtelektrisch
a)	80/500 NF27 ohne Filter

Beobachter:

Bgr	Berger, H.	Scharfenberg
Brk	Branzk, R.	Beerwalde
Brf	Brauckhoff, D.	Plauen
Bus	Busch, H.	Hartha
Ens	Enskonatus, P.	Berlin
Gol	Goldhahn, H.	Lohmen
Hem	Hemmerling, R.	Dahnsdorf
Hin	Hinzpeter, R.	Coswig
Klx	Klix, P.	Sohland
Kro	Kroll, P.	Jena
Kuh	Kühnlenz, F.	Sonneberg
Mos	Mosch, J.	Meißen
Rat	Rätz, M.	Herges-Hallenberg
Ror	Rätz, K.	Herges-Hallenberg
Sar	Scharnhorst, D.	Erfurt
Sil	Schille, D.	Leipzig
Voh	Vohla, F.	Altenburg
Wit	Witt, U.	Berlin
Zis	Zische, E.	Weigsdorf-Köblitz
Zch	Zschech, M.	Weixdorf

Fehlerberichtigung:

MVS 8, H.8,136 VI. Ausw. RZ Cas statt 3795.461 lies 3715.461
10,H.2,42 X. Ausw. U Cep 5102.540 5112.540
10,H.7,168 XII. Ausw. Im Namensverzeichnis fehlt Schi=Schille,D., Leipzig

NSV 01098 ist ein Mira-Stern

D. Böhme, Nessa

(Eingegangen am 26. März 1990)

Der als BD +70°0236 bekannte Stern wurde bereits 1936 von MORGENROTH als veränderlich angezeigt (Astron. Nachr. 258,265). Aus späterer Zeit liegen keine Beobachtungen vor.

Der Verfasser schätzte den Stern auf 195 Platten der Sonneberger Himmelsüberwachung aus den Jahren 1968...1988 im Bereich m_{pv}. Es war schnell ersichtlich, daß es sich hier um einen Mira-Stern handelt. Nachgenannte Elemente wurden abgeleitet:

$$\text{Max.} = 244\ 4465 + 347^{d} \cdot E$$

$$\text{Ampl. } 8\overset{m}{.}7 - 13\overset{m}{.}0\ (m_{pv})$$

Maxima:

J.D.	E	B-R	m_{pv}
244 4465	0	0^d	$8^m.9$
4822	1	10	8.9
5146	2	-13	9.0
5523	3	17	9.0
5832	4	-21	8.8
6200	5	0	8.8
6540	6	- 7	8.8
6901	7	7	8.7
7242	8	1	8.8

Das nächste Maximum wird für Ende Januar 1991 erwartet.

Lichtelektrische Beobachtung von R Coronae Borealis

D. Böhme, Nessa (Mitglied des AKV)

(Eingegangen am 12. Dezember 1989)

Der Veränderliche wurde im Zeitraum Mai bis November 1989 mit einem 250/3250 mm-Cassegrainspiegel der Amateursternwarte Nessa in B und V beobachtet. Während des Helligkeitsabfalles zeigte sich auch eine Änderung des Farbenindex.

J.D.	V	B-V
244 7656.38	$6^m.11$	$0^m.72$
7659.38	6.09	0.61
7660.42	6.10	0.64
7662.40	6.12	0.62
7668.39	5.99	0.62
7670.40	5.96	
7671.38	5.98	0.63
7673.44	5.96	0.60
7675.40	5.97	0.60
7682.39	6.04	0.57
7691.40	6.08	0.65
7719.42	6.02	0.57
7757.38	7.36	
7758.38	7.52	0.54
7759.35	7.62	0.56
7762.35	7.75	0.83
7770.34	8.24	0.82
7778.38	8.42	
7788.29	7.91	0.86
7791.28	7.66	0.79
7803.30	6.74	0.84
7804.30	6.68	0.91
7818.25	6.39	0.84
7822.26	6.44	0.75
7823.26	6.44	0.82
7825.25	6.41	0.78
7848.21	6.10	0.78
7850.20	6.01	0.71

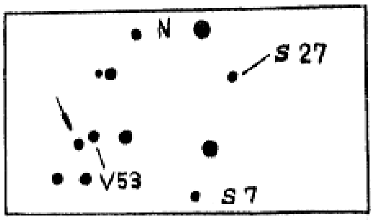
Veränderliches Objekt auf M15-Reproduktion?

I. Meinunger, Sonneberg

(Eingegangen am 28. Juli 1989)

Auf der Identifikationskarte von A. SANDAGE in Astrophys. J. 162, p.841-870, Fig. 7, Platte 9 für Standardsterne (V-Bereich) um den Kugelhaufen M15 wurde das durch einen Pfeil auf beigefügter Umgebungskarte gekennzeichnete photographische Objekt ($\approx 15^m$) festgestellt. Dagegen ist in Fig. 8 (Platte 10) der angegebenen Literatur (Reproduktion einer Aufnahme von M15 mit dem 200-inch-Reflektor) an diesem Ort nur ein schwacher Stern von etwa 20^m (V) sichtbar.

Die Nachprüfung durch weitere Beobachtungen ist sinnvoll.



Beobachtungen der Doppelmoden-RR-Lyrae-Sterne V17, V30, V31, V39, V53, V58, V61, V67 im Kugelhaufen M15

I. Meinunger, Sonneberg

(Eingegangen am 28. Juli 1989)

Die Doppelmoden-Veränderlichen V17, V30, V31, V39, V53, V58, V61, V67 (KOVACS, G., et al., 1986, Astrophys. J. 307, p.593-608) wurden auf Tautenburger M15-Platten geschätzt. Dabei konnten folgende Feststellungen getroffen werden.

Stern	Erhellung	Bereich
V17	243 7903.453	B
	7903.477	V
	9798.363	U
	9801.379	U
V30	7903.453	B
V31	9798.363	U
	9801.244	B
V39	9794.368	U
V53	7903.477	V
	9792.342	B
V58, V61	Wegen Kernnähe schlecht schätzbar.	
V67	Keine ausgeprägte Erhellung beobachtet.	

Photographic observations of the cataclysmic variable GD 552

G.A. Richter, Sonneberg

(Eingegangen am 19. Juli 1990)

F.V. HESSMAN und U. HOPP from the Max-Planck-Institut für Astronomie Heidelberg called attention to GD 552. In a recent paper they gave a detailed report on time-resolved spectroscopy of this $16^{m}.5$ object (HESSMAN and HOPP 1990).

Neither they (on 3 nights) nor GREENSTEIN and GICLAS (1978; 12 nights) could find dwarf nova-like outbursts. To find outbursts, the object was estimated on 215 blue plates of the Sonneberg field ι Cephei (triplet 170/1200 mm, limiting magnitude $\approx 16^{m}.5$, and astrographs 400/1600 mm and 400/1950 mm, limiting magnitude $\approx 18^{m}$).

The annual distribution of the plates is as follows:

year	number of plates	nights	year	number of plates	nights	year	number of plates	nights
1932	14	14	1957	2	1	1973	7	4
1933	31	31	1961	2	2	1974	2	1
1934	16	16	1962	1	1	1976	2	1
1935	7	7	1963	28	10	1983	2	1
1936	8	8	1964	22	11	1984	4	2
1937	4	4	1965	4	3	1986	2	2
1938	4	4	1966	1	1	1987	1	1
1940	14	5	1967	23	9	1988	4	3
1947	1	1	1968	5	2	1989	4	4

No outburst could be found, only small variations with an amplitude of not more than 0.4 mag.

One may conclude that either the number of plates is still too small or, which is more likely, there are no eruptions at all.

Presumably GD 552 is an exnova or an UX Ursae Maioris type star.

References:

GREENSTEIN, J.L., and GICLAS, H.L., 1978, Publ. Astron. Soc. Pacific 90,460

HESSMAN, F.V., and HOPP, U., 1990, Astron. Astrophys. 228,387

Optical behaviour of AT Cancri in the season 1989/90

W. Götz, Sonneberg

(Eingegangen am 20. Juni 1990)

Abstract

Measurements of the star on blue-sensitive plates are given.

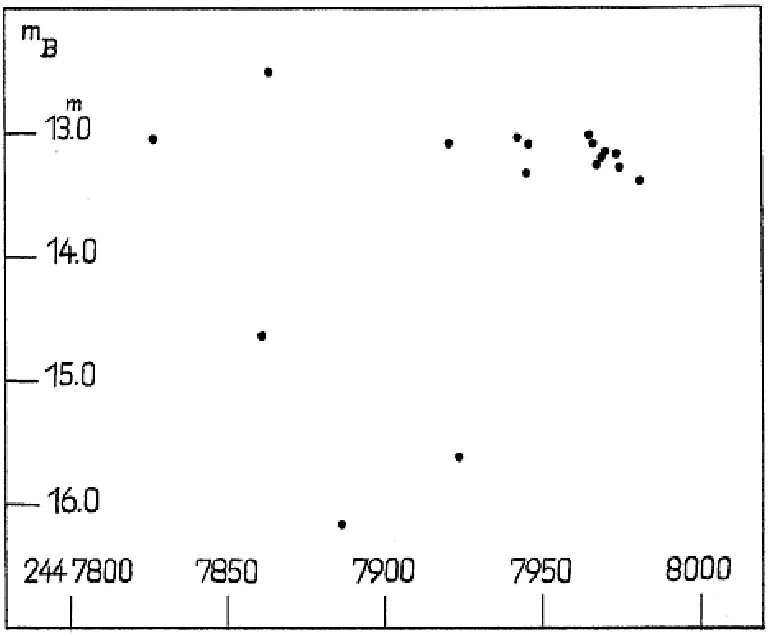
This cataclysmic star was measured on 41 blue-sensitive plates (ORWO-ZU21+GG13+BG12) from 17 nights obtained with the 50/70/172 cm Schmidt camera of Sonneberg Observatory covering the time interval between October 27, 1989, and March 30, 1990. The individual observations, which were obtained in linking to the sequence of comparison stars given by GÖTZ and which are listed in Table I, show the star in its high ($12^m.3 < m_B < 14^m.5$) and low ($14^m.5 < m_B < 16^m.4$) state.

Table I

J.D.hel. 244....	m_B	J.D.hel. 244....	m_B
7827.678	$13^m.06$	7946.481	$13^m.09$
7861.678	14.63	7966.343	13.07
7864.664	12.52	7966.361	12.98
7864.682	12.52	7967.356	13.12
7886.625	16.36	7967.373	13.10
7886.643	15.99	7968.324	13.24
7921.393	13.09	7969.371	13.27
7924.497	15.58	7969.396	13.25
7924.517	15.88	7969.415	13.32
7924.536	15.41	7969.437	13.07:
7924.556	15.69	7970.296	13.27
7924.579	15.67	7970.377	13.09
7943.511	13.17	7974.370	13.25
7943.532	12.82:	7974.413	13.29
7943.565	13.06	7974.431	13.13
7943.583	13.13:	7974.459	13.14
7945.533	13.26	7975.327	13.30
7945.555	13.33:	7981.434	13.46
7945.581	13.34	7981.449	13.38
7945.616	13.39	7981.465	13.39
7946.463	13.11		

The long-term light-curve, which is given in the figure (p.61) and which results from mean brightness values of each night, shows variations between $m_B = 12^m.52$ and $m_B = 16^m.36$. Some remarkable changes in brightness were observed with $\Delta m_B = -1^m.89$ within $2^d.986$ between November 30 and December 3, 1989, and $\Delta m_B = 2^m.49$ within $3^d.104$ between January 29 and February 1, 1990. In the first case the star starts its brightness increase from the low state, and in the second one the object decreases from the high to the low state.

The orbital light changes of the star as described in the IBVS No. 2918 can be observed in the high state only with a small amplitude. The observations of the low state on the contrary are in agreement with the given one there.



References:

GÖTZ, W., 1983, Inf. Bull. Var. Stars No. 2363
GÖTZ, W., 1986, Inf. Bull. Var. Stars No. 2918

Photographic observations of DR Tauri in the season 1989/90

W. Götz, Sonneberg

(Eingegangen am 20. Juli 1990)

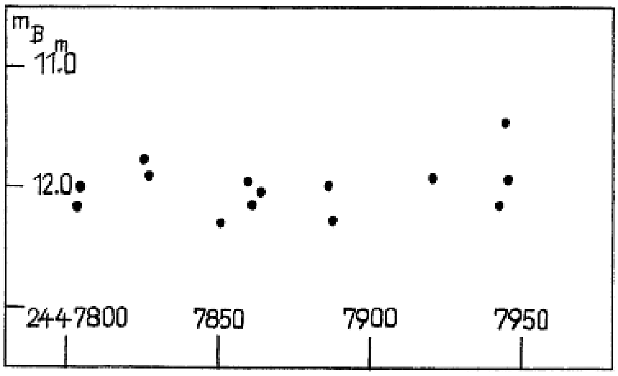
Abstract

Measurements of the star on blue-sensitive plates are given.

In completing and supplementing the B light-curve the star was measured on 28 blue-sensitive plates (ORWO-ZU21-GG13+BG12) from 14 nights covering the time interval between October 4, 1989, and February 23, 1990. All plates were obtained with the 50/70/172 cm Schmidt camera of Sonneberg Observatory.

The measurements, which are linked to the previous sequence of comparison stars given by GÖTZ, are listed in the table page 62. In the figure (p.62) the light-curve from the averaged data of each night is shown. No remarkable light depressions were observed. The mean brightness of the star in the season 1989/90 amounts to $m_B = 11^m.99$ at a total amplitude of $\Delta m_B = 0^m.96$.

J.D.hel. 244....	m_B	J.D.hel. 244....	m_B
7804.640	$12^m.25$	7861.506	$12^m.11$:
7804.657	12.15	7864.513	12.01:
7805.516	12.03	7864.532	12.06:
7805.533	11.96	7886.326	11.99
7826.560	11.89	7886.350	11.97
7826.582	11.78	7887.334	12.23
7827.611	12.02	7921.252	11.94
7827.628	11.88	7921.267	11.83
7851.451	12.32:	7943.323	12.12
7851.474	12.30:	7943.343	12.18:
7860.528	12.01:	7945.334	11.40
7860.560	12.02:	7945.353	11.36
7860.589	11.94:	7946.302	11.98
7861.488	12.17:	7946.320	11.88



Reference:

GÖTZ, W., 1982, Inf. Bull. Var. Stars No. 2172

Optical behaviour of the polar ST Leonis Minoris = CW 1103+254 in the seasons 1989 and 1990

W. Götz, Sonneberg

(Eingegangen am 25. Sept. 1990)

Abstract

The results of brightness measurements of the star on blue-sensitive plates are given.

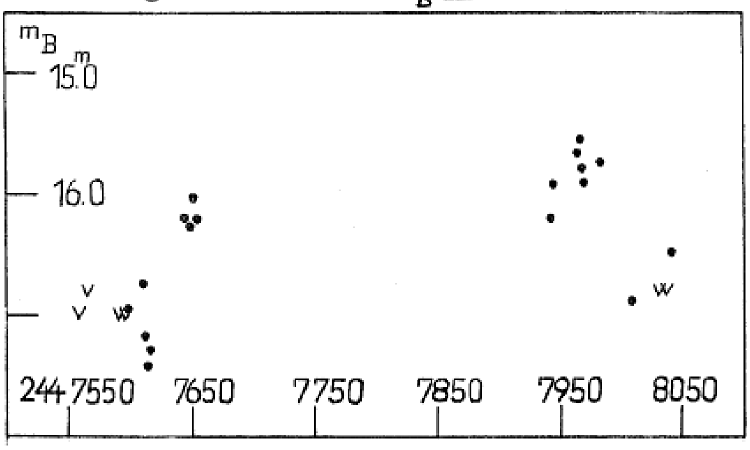
ST LMi belongs to the group of AM Her type stars (LIEBERT and STOCKMAN, 1984) and is a cataclysmic variable binary system containing a strongly magnetic white dwarf primary.

In linking to the sequence of comparison stars given in the IBVS No. 2735 the star was measured on 41 blue-sensitive plates (ORWO-ZU21+GG13+BG12) from 24 nights obtained with the 50/70/172 cm Schmidt camera of Sonneberg Observatory covering the time intervals between January 31, 1989, and May 8, 1989, and between February 20, 1990, and May 27, 1990.

The individual observations are listed in the table.
The "fainter than" observations marked by > are from plates on which the star is invisible.

J.D.hel. 244....	m_B	J.D.hel. 244....	m_B
7558.563	$>17^{m}.02$	7653.363	$16^{m}.04$
.582	>17.00	7655.415	16.20
7566.426	>16.79	7943.610	16.19
7591.595	>16.99	7945.643	15.93
.614	>14.86	7966.383	15.51
7592.555	>17.07	.403	15.80
.575	>16.81	7967.395	15.60
7596.520	17.18	.414	15.54
.538	16.77	7968.344	15.91
7612.430	16.86	7969.461	15.66
.447	16.59	.480	15.99
7613.420	16.78	7981.493	15.68
.438	17.61	.511	15.77
7614.398	17.39	8009.447	>13.27
.416	17.48	.471	16.88
7616.488	17.51	8030.414	>16.80
.506	17.08	8038.395	>16.42
7648.369	16.26	.412	>17.62
.387	16.18	8039.397	>16.96
7651.369	16.23	.414	16.50
.389	16.26		

The light-curve in B is shown in the figure. As can be seen there, in both seasons the star is in its low and high state. Concerning the high state the observations confirm the brightness distribution given in the IBVS No. 2955, whereas the individual observations of the low state show that this state can be expected in the range fainter than $m_B \geq 16^{m}.8$.



Both the light-curves in the low and in the high state are influenced by occultation light changes. In order to study these influences all observations of the high state were reduced to one common epoch by means of the preliminary orbital elements given in IBVS No. 2735. It can be stated that all the observations of the high state with $m_B \leq 16^{m}.5$ are in agreement with these elements.

References:

LIEBERT, J., and STOCKMAN, H.S., 1984, Steward Obs. Prepr. 441
GÖTZ, W., 1986, Inf. Bull. Var. Stars No. 2955
GÖTZ, W., 1985, Inf. Bull. Var. Stars No. 2735

Beobachtungen von V 61, V 62, V 63, V 64, V 65 im Kugelhaufen M 3

I. Meinunger, Sonneberg

(Eingegangen am 28. Juli 1989, revidiert am 20. Juni 1990)

Einleitende Bemerkungen siehe Mitt. Veränd. Sterne 10,31 (1983) und 10,123 (1985). Als Vergleichsstern diente auch I-I-51 aus Astrophys. J. 162,part I,843 (1970).

V 61

Die Lichtkurve dieses RRab-Sternes variiert auch im Beobachtungszeitraum von 1963 bis 1978 beträchtlich: Aus den Saisonlichtkurven mit P (SZEIDL) = $0^{d}.5209312$ und dem Ausgangsmaximum 243 8827.551 (U) ist eine Phasenverschiebung der Maxima in Richtung geringerer Phasenwerte von etwa $-0^{P}.2$ abschätzbar. Folgende Maxima und Erhellungen wurden beobachtet:

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8118.554	-1361	$-0^{d}.010$	V	243 9997.489	+2246	$-0^{d}.073$	U
8164.427	-1273	+0.021	V	244 0274.625	+2778	-0.073	r
8827.551	0	0.000	U	0318.437	+2862	-0.019	B
8849.465	+ 42	+0.035	i	0319.438	+2864	-0.060	B
8851.475	+ 46	-0.039	i	0319.467	+2864	-0.031	V
8852.507	+ 48	-0.049	i	0380.434	+2981	-0.013	V
8911.426	+ 161	+0.005	U	0381.427	+2983	-0.062	B
8914.496	+ 167	-0.050	V	0418.429	+3054	-0.046	B
9117.691	+ 557	-0.019	V	0622.656	+3446	-0.024	B
9210.427	+ 735	-0.008	o.F.	0622.695	+3446	+0.015	U
9286.465	+ 881	-0.026	V	0656.461	+3511	-0.079	U
9309.410	+ 925	-0.002	V	0684.539	+3565	-0.132	U
9527.669	+1344	-0.013	B	1369.581	+4880	-0.114	B
9536.485	+1361	-0.053	B	1389.411	+4918	-0.080	B
9537.564	+1363	-0.016	B	1389.430	+4918	-0.061	V
9538.610	+1365	-0.012	B	1392.566	+4924	-0.050	U
9540.679	+1369	-0.027	B	2163.559	+6404	-0.035	B
9596.442	+1476	-0.003	V	2476.564	+7005	-0.110	V
9609.456	+1501	-0.013	V	2837.588	+7698	-0.091	B
9610.426	+1503	-0.085	V	3247.541	+8485	-0.111	B
9622.503	+1526	+0.011	i	3571.582	+9107	-0.089	V

V 62

Dieser RRab-Stern zeigt im Beobachtungszeitraum von 1963 bis 1978 ebenfalls Unregelmäßigkeiten in der Lichtkurve. Aus den Saisonlichtkurven mit dem Ausgangsmaximum 243 9205.434 und P (SZEIDL) = $0^{d}.6524077$ läßt sich eine weitere Zunahme des realen Periodenwertes gegenüber dem SZEIDLschen Mittelwert erkennen.

Folgende Maxima oder Erhellungen wurden in den verschiedenen Farbbereichen beobachtet:

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8146.535	-1623	$-0^{d}.041$	V	243 9537.526	+ 509	$+0^{d}.016$	B
8407.625	-1223	+0.086	r	9597.577	+ 601	+0.046	V
8471.466	-1125	-0.009	B	9610.573	+ 621	-0.006	B
8473.513	-1122	+0.080	B	9616.393	+ 630	-0.058	V
8831.645	- 573	+0.041	U	9997.489	+1214	+0.032	U
8852.507	- 541	+0.026	i	244 0237.654	+1582	+0.111	r
8901.400	- 466	-0.012	U	0380.434	+1801	+0.014	V
8910.459	- 452	-0.087	V	0652.497	+2218	+0.023	B
8914.428	- 446	-0.032	U	0652.526	+2218	+0.052	U
8914.469	- 446	+0.009	B	0656.461	+2224	+0.072	U
8914.496	- 446	+0.036	V	0684.510	+2267	+0.068	B
8963.403	- 371	+0.012	V	1337.533	+3268	+0.031	r
9180.610	- 38	-0.032	U	1369.557	+3317	+0.087	B
9205.434	0	0.000	B	2897.368	+5659	-0.041	V
9527.669	+ 494	-0.054	B	3250.386	+6200	+0.024	V

V 63

Aus den Saisonlichtkurven mit dem Ausgangsmaximum 243 9538.684 und P (SZEIDL) = 0.5704164 konnte man das gleiche Verhalten dieses RRab-Sternes beobachten, wie in Budapest Mitt. Nr. 5,p.70 bereits beschrieben: Veränderliche Lichtkurve mit unterschiedlichen Helligkeitswerten im Maximum, sowie Verschiebung der Maxima zu geringeren Phasenwerten (etwa $-0^{P}.15$ im Zeitraum von 1963 bis 1978). Folgende Maxima beziehungsweise Erhellungen wurden in den verschiedenen Farbbereichen festgestellt:

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8106.374	-2511	$+0^{d}.006$	V	243 9589.451	+ 89	$0^{d}.000$	V
8118.395	-2490	+0.048	U	9593.426	+ 96	-0.018	V
8134.418	-2462	+0.099	r	9609.399	+ 124	-0.017	V
8171.449	-2397	+0.053	V	9610.541	+ 126	-0.015	V
8407.625	-1983	+0.077	r	9610.573	+ 126	+0.017	B
8471.466	-1871	+0.031	B	9618.528	+ 140	-0.014	V
8500.498	-1820	-0.028	r	9622.503	+ 147	-0.032	i
8831.429	-1240	+0.061	V	9622.552	+ 147	+0.017	B
8852.507	-1203	+0.034	i	9965.384	+ 748	+0.029	r
8908.416	-1105	+0.042	U	244 0318.437	+1367	-0.006	B
8941.461	-1047	+0.003	B	0383.430	+1481	-0.041	B
9180.470	- 628	+0.008	U	0415.422	+1537	+0.008	B
9204.457	- 586	+0.037	U	0679.504	+2000	-0.013	B
9205.568	- 584	+0.007	V	0679.525	+2000	+0.008	V
9232.370	- 537	0.000	i	1772.400	+3916	-0.035	B
9529.546	- 16	-0.011	B	2162.506	+4600	-0.093	V
9537.526	- 2	-0.017	B	2866.430	+5834	-0.063	V
9538.684	0	0.000	B	3247.488	+6502	-0.043	B

V 64

Im Rahmen der Schätzgenauigkeit war bei diesem RRab-Stern keine Periodenänderung im Beobachtungszeitraum von 1963 bis 1978 aus den Saisonlichtkurven - P (SZEIDL) = 0^{d}.6054588; Ausgangsmaximum 243 8831.645 (U) - zu erkennen. Beobachtete Maxima oder Erhellungen:

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8106.374	-1198	+0^{d}.069	V	243 9204.559	+ 616	-0^{d}.049	o.F.
8107.489	-1196	-0.027	r	9232.370	+ 662	-0.089	i
8113.567	-1186	-0.004	r	9537.564	+1166	-0.046	B
8118.395	-1178	-0.019	U	9540.602	+1171	-0.035	B
8144.427	-1135	-0.022	V	9597.553	+1265	+0.003	V
8170.471	-1092	-0.013	r	244 0004.420	+1937	+0.001	B
8415.646	- 687	-0.049	r	0383.430	+2563	-0.006	B
8415.695	- 687	0.000	B	0622.656	+2958	+0.064	B
8471.415	- 595	+0.018	r	0679.504	+3052	-0.001	B
8831.645	0	0.000	U	0679.525	+3052	+0.020	V
8851.579	+ 33	-0.046	i	1385.438	+4218	-0.032	r
8853.413	+ 36	-0.029	i	1391.588	+4228	+0.063	V
8856.432	+ 41	-0.037	i	1772.400	+4857	+0.042	B
8882.529	+ 84	+0.025	V	2132.546	+5452	-0.060	B
8902.416	+ 117	-0.068	U	2132.583	+5452	-0.023	V
8902.491	+ 117	+0.007	B	2476.564	+6020	+0.057	V
8908.462	+ 127	-0.076	V	2866.430	+6664	+0.008	V
9204.533	+ 616	-0.075	V	2897.368	+6715	+0.067	V

V 65

Eine geringfügige Periodenvergrößerung ist aus den Saisonlichtkurven - Ausgangsmaximum 243 8473.634 (B) und P (SZEIDL) = 0^{d}.6683397 - im Beobachtungszeitraum von 1963 bis 1978 durchaus ablesbar, aber unsicher. Folgende Maxima oder Erhellungen wurden festgestellt:

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8107.489	- 548	+0^{d}.105	r	243 9616.393	+1710	-0^{d}.102	V
8111.407	- 542	+0.013	r	9618.486	+1713	-0.014	V
8113.426	- 539	+0.027	r	9620.465	+1716	-0.040	V
8413.536	- 90	+0.053	B	9997.420	+2280	-0.029	U
8473.634	0	0.000	B	244 0352.373	+2811	+0.036	V
8495.593	+ 33	-0.096	r	0380.434	+2853	+0.027	V
8830.577	+ 534	+0.050	U	0418.429	+2910	-0.073	B
8832.653	+ 537	+0.121	V	0656.461	+3266	+0.029	U
8850.536	+ 564	-0.042	i	0684.510	+3308	+0.008	B
8881.366	+ 610	+0.045	U	0684.539	+3308	+0.037	U
8883.385	+ 613	+0.059	U	1337.533	+4285	+0.063	r
8901.381	+ 640	+0.010	B	1369.557	+4333	+0.007	B
8901.400	+ 640	+0.029	U	1389.591	+4363	-0.009	B
8911.426	+ 655	+0.029	U	1389.646	+4363	+0.046	r
8941.461	+ 700	-0.011	B	2163.559	+5521	+0.022	B
9205.434	+1095	-0.032	B	2453.551	+5955	-0.046	r
9529.496	+1580	-0.115	B	2834.567	+6525	+0.016	B
9537.564	+1592	-0.067	B	2836.616	+6528	+0.060	V
9592.440	+1674	+0.005	V	2897.368	+6619	-0.006	V
9610.426	+1701	-0.054	V	3247.541	+7143	+0.043	B

Bemerkungen zum Stern Küstner 1040 im Kugelhaufen M 15

I. Meinunger, Sonneberg

(Eingegangen am 31. Juli 1990)

Der rote Riese Küstner 1040 = Sandage 6 (Astrophys. J. 162,p.841, 1970) in M 15 zeigt nach YAO BAO-AN (Inf. Bull. Variable Stars No. 3431) einen periodischen Lichtwechsel (P = 4.3 Stunden) mit der geringen Amplitude von 0,04 mag. Zur Prüfung, ob eine überlagerte größere Variabilität mit längerer Zeitskala vorhanden ist, wurde der Stern zu folgenden Zeiten auf Tautenburger Schmidt-Platten beobachtet.

U-Bereich: 243 9794.368; 9796.344; 9798.363; 9799.241; 9801.301; 9801.379.
B-Bereich: 243 7903.453; 9791.344; 9791.371; 9792.342; 9801.244.
V-Bereich: 243 7903.477; 7907.464; 7908.505; 7932.415; 244 3432.338.

Auf den wenigen B- und V-Aufnahmen zeigten sich keine Helligkeitsänderungen. Aus den größeren Streuwerten der U-Platten konnte auf keine ausgeprägte Veränderlichkeit des Sternes geschlossen werden.

Beobachtungen von V 66, V 67, V 68, V 69, V 70 im Kugelhaufen M 3

I. Meinunger, Sonneberg

(Eingegangen am 22. Januar 1990, revidiert am 20. Juni 1990)

Einleitende Bemerkungen siehe Mitt. Veränderl. Sterne 10,31 (1983) und 10,123 (1985). Als Vergleichsstern diente auch I-I-51 aus Astrophys. J. 162,843 (1970).

V 66

Die Saisonlichtkurven - Ausgangsmaximum 243 8493.456; P (SZEIDL) = $0^d.6201827$ - im Beobachtungszeitraum von 1963 bis 1978 dieses RRab-Sternes mit abrupt sich ändernder Lichtkurve zeigen die bereits in Mitt. Sternw. Budapest 5, Nr. 58 (1965),p.72 beschriebenen Eigenschaften: Differenzen in der Höhe der Maxima und der Periodenlängen. Folgende Erhellungen wurden festgestellt:

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8106.535	- 624	$+0^d.073$	V	243 9618.555	+1814	$+0^d.088$	V
8493.456	0	0.000	B	244 0415.422	+3099	+0.020	B
8831.484	+ 545	+0.028	V	0684.539	+3533	-0.023	U
8882.375	+ 627	+0.064	U	2836.616	+7003	+0.021	V
8908.416	+ 669	+0.058	U	2836.645	+7003	+0.050	B
9123.684	+1016	+0.122	U	2866.430	+7051	+0.066	V
9238.372	+1202	+0.077	r	2897.368	+7101	-0.005	V
9536.672	+1682	+0.069	B	3571.582	+8188	+0.070	V
9538.535	+1685	+0.071	B				

V 67

Dieser RRab-Stern zeigt auch im Zeitraum von 1963 bis 1978 das in Mitt. Sternw. Budapest 5, Nr. 58 (1965),p.73 beschriebene Verhalten: Bis 0.5 mag reichende Differenzen in der Höhe der Maxima. In den Saisonlichtkurven (mit P (SZEIDL) = 0ᵈ5683609 und dem Ausgangsmaximum 243 9287.434) der Jahre 1966, 1968, 1969, 1975 sind die nicht sehr zahlreichen beobachteten Maxima deutlich überhöht (in nachfolgender Tabelle mit + gekennzeichnet) gegenüber denen der Jahre 1967 und 1970. Die Verschiebung der Maxima in Richtung geringerer Phasenwerte zeigt die weitere Verminderung der wahren Periode im Vergleich zum SZEIDLschen Periodenmittelwert.

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8118.395	-2057	+0ᵈ079	U	244 0002.458	+1258	+0ᵈ026	B +
8414.466	-1536	+0.034	o.F.	0318.437	+1814	-0.004	B +
8415.646	-1534	+0.078	r	0418.429	+1990	-0.043	B +
8473.634	-1432	+0.093	B	0652.555	+2402	-0.082	B
8493.456	-1397	+0.022	B +	0652.581	+2401	-0.056	U
8831.645	- 802	+0.036	U	0656.564	+2409	-0.051	B
8851.579	- 767	+0.078	i	0676.513	+2444	+0.005	B
8883.385	- 711	+0.056	U	1392.566	+3704	-0.077	U
9180.610	- 188	+0.028	U	1421.562	+3755	-0.067	V
9205.597	- 144	+0.007	V	1421.583	+3755	-0.046	B
9266.427	- 37	+0.022	r	1773.379	+4374	-0.066	V
9287.434	0	0.000	B +	1773.437	+4374	-0.008	U
9529.546	+ 426	-0.010	B	2132.546	+5006	-0.103	B
9537.526	+ 440	+0.013	B	2132.583	+5006	-0.066	V
9538.684	+ 442	+0.034	B	2477.518	+5613	-0.126	B +
9587.582	+ 528	+0.053	B	2477.540	+5613	-0.104	V
9596.584	+ 544	-0.038	V	2839.590	+6250	-0.100	V
9615.367	+ 577	-0.011	V	2900.420	+6357	-0.084	V
9616.515	+ 579	0.000	V	3571.582	+7538	-0.156	V

V 68

Von diesem Doppelmoden-RR-Lyrae-Stern (V.P. GORANSKI, Inf. Bull. Variable Stars No. 2007) wurden folgende Erhellungen oder Maxima im Zeitraum von 1963 bis 1978 beobachtet, und die (B-R)-Werte wurden mit P (SZEIDL) = 0ᵈ3559732 und dem Ausgangsmaximum 243 8827.551 berechnet:

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8553.457	- 770	+0ᵈ005	V	243 9529.546	+1972	+0ᵈ016	B
8827.551	0	0.000	U	9540.602	+2003	+0.037	B
8831.484	+ 11	+0.017	V	9589.426	+2140	+0.092	V
8851.475	+ 67	+0.074	i	9597.577	+2163	+0.056	V
8852.507	+ 70	+0.038	i	9610.426	+2199	+0.090	V
8883.528	+ 157	+0.089	V	9618.555	+2222	+0.032	V
8908.416	+ 227	+0.059	U	9966.383	+3199	+0.074	B
8908.462	+ 227	+0.105	V	244 0676.527	+5194	+0.051	B
8940.472	+ 317	+0.078	U	0676.584	+5194	+0.108	U
9204.597	+1059	+0.070	V	1421.562	+7287	+0.034	V
9232.370	+1137	+0.078	i	1421.583	+7287	+0.055	B
9286.434	+1289	+0.034	V	1773.379	+8275	+0.150	V
				2122.567	+9256	+0.128	B

V 69

Der RRab-Stern V 69 war wegen eines störenden Nachbarsternes teilweise schwierig zu schätzen. Die Saisonlichtkurven - Ausgangsmaximum 243 9527.669; P (SZEIDL) = $0^d.5665878$ - von 1963 bis 1978 lassen erkennen, daß der reale Periodenwert weiterhin größer ist als der SZEIDLsche mittlere Periodenwert. Beobachtete Erhellungen und Maxima:

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8883.528	-1137	$+0^d.069$	V	243 9964.520	+ 771	$+0^d.012$	r
8963.403	- 996	+0.055	V	9997.420	+ 829	+0.050	U
9123.684	- 713	-0.008	U	244 0002.486	+ 838	+0.016	B
9287.434	- 424	-0.002	B	0380.434	+1505	+0.050	V
9527.669	0	0.000	B	0624.622	+1936	+0.039	U
9589.426	+ 109	-0.001	V	0649.547	+1980	+0.034	B
9609.375	+ 144	+0.117	V	1771.436	+3960	+0.079	B
9615.565	+ 155	+0.075	V	2836.645	+5840	+0.103	B

V 70

Der Lichtwechsel dieses wahrscheinlichen RRc-Sternes scheint auch im Beobachtungszeitraum von 1963 bis 1978 erheblichen Schwankungen unterworfen zu sein. Folgende Erhellungen wurden festgestellt:

J.D.	Bereich	J.D.	Bereich
243 8144.427	V	243 9596.442	V
8473.513	B	9610.594	B
8493.456	B	9964.429	r
8827.551	U	9997.489	U
8831.429	V	244 0002.431	B
8850.536	i	0274.625	r
8851.475	i	0318.357	V
8853.413	i	0319.407	V
8883.528	V	0352.373	V
8902.416	U	0624.589	B
9117.691	V	0653.651	U
9180.470	U	0656.581	B
9205.568	V	0679.525	V
9232.770	i	2897.368	V

Bemerkungen zum Stern Spasova 23 im Kerngebiet des Kugelhaufens M 15

I. Meinunger, Sonneberg

(Eingegangen am 22. Januar 1990)

Bei der Überprüfung von Tautenburger M 15-Platten hinsichtlich der Untersuchungsmöglichkeit von Sternen im Kerngebiet des Kugelhaufens M 15 konnte der Stern Nr. 23 (N. SPASOVA, Space Research in Bulgaria 5, Sofia 1989,p.72) auf folgenden Platten grob geschätzt werden: 243 9799.241 (U), 9801.244 (B), 9801.301 (U). Die beiden U-Platten zeigten den der Veränderlichkeit verdächtigen Stern Nr. 23 nahezu gleich hell.

Beobachtungen von V 71, V 72, V 73, V 74, V 75 im Kugelhaufen M 3

I. Meinunger, Sonneberg

(Eingegangen am 31. Juli 1990)

Einleitende Bemerkungen siehe Mitt. Veränderl. Sterne 10,31 (1983) und 10,123 (1985). Als Vergleichsstern diente auch I-I-51 aus Astrophys. J. 162,843 (1970).

V 71

Dieser RRab-Stern ist mit dem Veränderlichen V 57 (nicht V 54, wie in Mitt. Sternw. Budapest 5, Nr. 58,p.75 (1965) fälschlicherweise angegeben) eng benachbart, was die Schätzungen von V 71 teilweise erschwerte. Im Zeitraum von 1963 bis 1978 sind keine ausgeprägten Lichtkurvenänderungen - P (SZEIDL) = $0^{d}.5490517$, Ausgangsmaximum 244 0002.486 (B) - aus den Beobachtungen zu entnehmen. Die Erhellungen lassen sich mit den genannten Elementen wie folgt berechnen:

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8831.429	-2133	$+0^{d}.070$	V	244 0002.486	0	$0^{d}.000$	B
8881.366	-2042	+0.044	U	0652.555	+1184	-0.008	B
8883.528	-2038	+0.009	V	0652.581	+1184	+0.018	U
8910.435	-1989	+0.013	U	0653.651	+1186	-0.010	U
8932.462	-1949	+0.078	B	1329.611	+2417	+0.067	r
9242.580	-1384	-0.018	r	1390.525	+2528	+0.036	B
9538.535	- 845	-0.002	B	2163.559	+3936	+0.006	B
9609.375	- 716	+0.010	V	2476.564	+4506	+0.051	V
9616.515	- 703	+0.012	V	2836.645	+5162	-0.046	B
9622.566	- 692	+0.024	B				

V 72

Das Lichtkurvenverhalten dieses RRab-Sternes wurde im Zeitraum von 1963 bis 1978 beobachtet. Die Saisonlichtkurven - Ausgangsmaximum: 243 9180.470 (U); P (SZEIDL) = $0^{d}.4560739$ - deuten auf eine geringfügige Verschiebung der Maxima in Richtung höherer Phasenwerte, d.h. der Periodenwert vergrößert sich weiterhin, wie aus dem (O-C)-Diagramm in Mitt. Sternw. Budapest 5, Nr. 58,p.251 (1965) bereits ersichtlich.

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8415.646	-1677	$+0^{d}.012$	r	243 9615.565	+ 954	+0.001	V
8521.499	-1445	+0.056	V	9616.515	+ 956	+0.038	V
8827.484	- 774	+0.015	U	244 0274.625	+2399	+0.034	r
8901.381	- 612	+0.028	B	0318.437	+2495	+0.063	B
8910.459	- 592	-0.015	V	0380.434	+2631	+0.034	V
8911.426	- 590	+0.040	U	0649.547	+3221	+0.063	B
8963.403	- 476	+0.024	V	0653.651	+3230	+0.062	U
9180.470	0	0.000	U	1390.635	+4846	+0.031	B
9205.568	+ 55	+0.014	V	1771.436	+5681	+0.010	B
9238.441	+ 127	+0.050	i	2476.564	+7227	+0.048	V
9537.601	+ 783	+0.025	B	2839.590	+8023	+0.039	V
9538.535	+ 785	+0.047	B	2924.420	+8209	+0.039	B
9596.442	+ 912	+0.033	V	3571.582	+9628	+0.032	V
9610.573	+ 943	+0.025	B				

V 73

Von diesem Veränderlichen konnten im Zeitraum von 1963 bis 1978 lediglich folgende Erhellungen beobachtet werden. U-Bereich: 243 8830.577; 8882.375; B-Bereich: 243 8473.634, 9529.496, 9537.638; V-Bereich: 243 8112.529, 9589.451, 9592.440, 9596.442, 9616.515, 244 0347.359, 0679.525, 2900.420; r-Bereich: 243 8801.637; i-Bereich: 243 9232.370.

V 74

Der Trend der leichten Periodenvergrößerung scheint sich bei diesem RRab-Stern im Beobachtungszeitraum von 1963 bis 1978 fortzusetzen, wie in Mitt. Sternw. Budapest 5, Nr. 58 (1965) bei der (O-C)-Kurve sichtbar. Auf dem Plattenmaterial wurden folgende Erhellungen oder Maxima beobachtet:

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8106.535	- 746	+0^{d}.041	V	243 9536.672	+2160	+0^{d}.007	B
8168.435	- 620	-0.070	r	9537.638	+2162	-0.012	B
8170.471	- 616	-0.002	r	9538.610	+2164	-0.024	B
8171.449	- 614	-0.009	V	9609.456	+2308	-0.047	V
8414.576	- 120	-0.001	r	9615.367	+2320	-0.041	V
8473.634	0	0.000	B	9616.393	+2322	0.000	V
8851.579	+ 768	-0.022	r	244 0676.513	+4476	+0.042	B
8882.560	+ 831	-0.046	V	1391.588	+5929	+0.032	V
8883.528	+ 833	-0.062	V	1392.566	+5931	+0.025	U
9123.684	+1321	-0.072	U	1421.562	+5990	-0.015	V
9204.457	+1485	-0.011	U	1421.583	+5990	+0.006	B
9205.434	+1487	-0.018	B	1773.437	+6705	-0.023	U
9238.372	+1554	-0.054	r	2456.549	+8093	-0.007	r

V 75

Der in Mitt. Sternw. Budapest 5, Nr. 58, p.76 (1965) als RRc-Typ beschriebene Stern erinnert bei der Betrachtung der Saisonlichtkurven von 1963 bis 1978 - Ausgangsmaximum 243 9536.562; P (SZEIDL) = 0^{d}.3140790 - mehr an eine RRab-Lichtkurvenform. Die Tendenz des sich geringfügig vermindernden wahren Periodenwertes scheint sich fortzusetzen. Folgende Erhellungen oder Maxima wurden beobachtet:

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8168.435	-4356	+0^{d}.001	r	243 9618.528	+ 261	-0.009	V
8501.359	-3296	+0.001	r	9965.579	+1366	-0.015	B
8521.499	-3232	+0.040	V	244 0318.357	+2489	+0.052	V
8801.637	-2340	+0.020	r	0419.421	+2811	-0.017	V
8831.469	-2245	+0.014	V	0622.656	+3458	+0.009	B
8852.507	-2178	+0.009	r	0652.497	+3553	+0.012	B
8881.366	-2086	-0.027	U	0652.526	+3553	+0.041	U
8882.375	-2083	+0.040	U	0679.504	+3639	+0.009	B
8902.416	-2019	-0.020	U	0684.510	+3655	-0.011	B
8914.428	-1981	+0.056	U	0684.539	+3655	+0.018	U
8940.472	-1898	+0.032	U	1369.557	+5836	+0.030	B
9238.487	- 949	-0.014	r	1391.588	+5906	+0.075	V
9242.580	- 936	-0.004	r	1773.437	+7122	+0.004	U
9536.562	0	0.000	B	2163.559	+8364	+0.040	B
9537.564	+ 3	+0.060	B	2836.616	+10507	+0.026	V
9593.426	+ 181	+0.016	V	2866.430	+10602	+0.002	V
9610.426	+ 235	+0.055	V	3571.582	+12847	+0.047	V
9615.367	+ 251	-0.029	V				

New elements of the eclipsing binary DW Cephei

W. Wenzel and A. Wicklein, Sonneberg

(Eingegangen am 1. November 1990)

Abstract

The previously given period for DW Cep has to be doubled.

From the compilation of KLEIKAMP and MOSCHNER (1990) we learned that DW Cep (= BV 68) showed "no variation at the times computed" by the elements of GEYER (1956),

$$\text{Min.} = 242\ 6980.297 + 2\overset{d}{.}51686 \cdot E_1,$$

which entered also into the GCVS 1985.

We therefore checked the star on about 600 plates of the Sonneberg Sky Patrol of the years 1959 to 1989, mainly taken by H. HUTH and B. FUHRMANN and centred at 20^h and 21^h $+60^o$. On these, 47 minima are recorded. An evaluation of their dates led to the conclusion that the period found by GEYER has to be doubled and the new value slightly increased. While maintaining GEYERs initial minimum we derived the new elements:

$$\text{Min.} = 242\ 6980.297 + 5\overset{d}{.}033804 \cdot E \quad (E = E_1/2).$$

Curiously enough, GEYER did not realize that his deep minima without exception fall on even epoch E_1 numbers and thus demonstrate the probable need for doubling his period, all the more as no sign of a secondary minimum is present in his mean lightcurve.

References:

KLEIKAMP, W., a. MOSCHNER, W., 1990: BAV Rundbrief 39, Nr. 1,p.23
GEYER, E., 1956: Kleine Veröff. Remeis-Sternwarte Bamberg Nr. 16

On a period change of the eclipsing binary GT Cassiopeiae

W. Wenzel and A. Wicklein, Sonneberg

(Eingegangen am 7. November 1990)

Abstract

A small period change seems to have occurred in 1974.

The remark of KLEIKAMP and MOSCHNER (1990) "O-C: large positive values, no minimum recorded" induced us to check the star on about 350 plates of the Sonneberg Sky Patrol taken mainly by H. HUTH and B. FUHRMANN in the years 1973 to 1990. The following list includes the faintest observations made by us (W) and additionally all minima dates which we could find in the literature (K - KUKARKIN

1946, Wh - WHITNEY 1957, L - LAVROV 1961, B - BERTHOLD 1977). The O-C were computed by means of the elements of WHITNEY (1957), which are also given in the GCVS 1985,

$$C = 242\ 7341.425 + 2\overset{d}{.}989804 \cdot E.$$

The trend of the O-C values is around zero between E = 0 and ≈ 4800 and seems increasingly positive afterwards. We suppose that a slightly longer period has been valid since 1974:

$$C_1 = 244\ 1988.480 + 2\overset{d}{.}989880 \cdot E_1 \quad (E_1 = E - 4899).$$

A variability of the period is also indicated by the fact that the first minimum of KUKARKIN's (1946) series at E = -3427 deviates by O-C = $+0\overset{d}{.}17$.

We direct the attention of observers to the note of GÖTZ and WENZEL (1969), according to which GT Cas is identical with the comparison star "a" of DOBRITZ (1968) for V 337 Cas; moreover, and curiously enough, the comparison star "c" of KUKARKIN's (1946) map of GT Cas is identical with V 337 Cas.

J.D.24...	E	O-C		J.D.24...	E	O-C	
1 7095.54:	-3427	$+0\overset{d}{.}17$:	K	4 2009.407	4906	+0.004	B
2 7341.425	0	0.000	K,Wh	2009.365	4906	-0.038	W
8576.21	+ 413	0.00	K	2036.328	4915	+0.016	B
8776.53	480	0.00	K	2069.322	4926	+0.122	W
9117.399	594	+0.030	L	2275.482	4995	-0.014	W
9135.32	600	+0.01	K	2302.445!	5004	+0.041	W
9727.27:	798	-0.02:	K	3483.337	5399	-0.040	W
3 1192.238	1288	-0.055	L	5211.519	5977	+0.035	W
1404.563!	1359	-0.006	Wh	5229.468!	5983	+0.046	W
1730.412	1468	-0.045	L	5238.489!	5986	+0.097	W
2609.466!	1762	+0.006	Wh	5268.437!	5996	+0.147	W
3500.323	2060	-0.098	L	5525.508!	6082	+0.095	W
3506.312	2062	-0.089	L	5528.501!	6083	+0.098	W
3566.293	2082	+0.096	L	5531.512!	6084	+0.119	W
3569.179	2083	-0.008	L	5534.517!	6085	+0.135	W
5754.730!	2814	-0.003	Wh	5555.441	6092	+0.130	W
7016.431	3236	0.000	B	6679.582!	6468	+0.105	W
7025.372	3239	-0.028	B	6763.351	6496	+0.159	W
9088.363	3929	-0.002	B	7029.524	6585	+0.240	W
4 1988.424	4899	-0.050	W	8132.556	6954	+0.034	W

K = KUKARKIN W = WICKLEIN
L = LAVROV B = BERTHOLD
Wh= WHITNEY

References:

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Elemente des Bedeckungssternes NSV 14387

K. Häußler, Bruno-H.-Bürgel-Sternwarte Hartha

(Eingegangen am 5. November 1990)

Beobachtungen zu diesem Stern (S 10104) wurden von BUSCH und HÄUSSLER (1990) veröffentlicht. Eine nochmalige Untersuchung der Beobachtungen führte zum Auffinden der Elemente des Lichtwechsels.

NSV 14387 ist ein Algol-Stern mit einer veränderlichen Periode. Für den Beobachtungszeitraum 242 8000...243 8000 gelten folgende Elemente:

$$\text{Min.} = 242\ 8373.406 + 2^{d}.4788737 \cdot E_1 \quad \text{(I)},$$

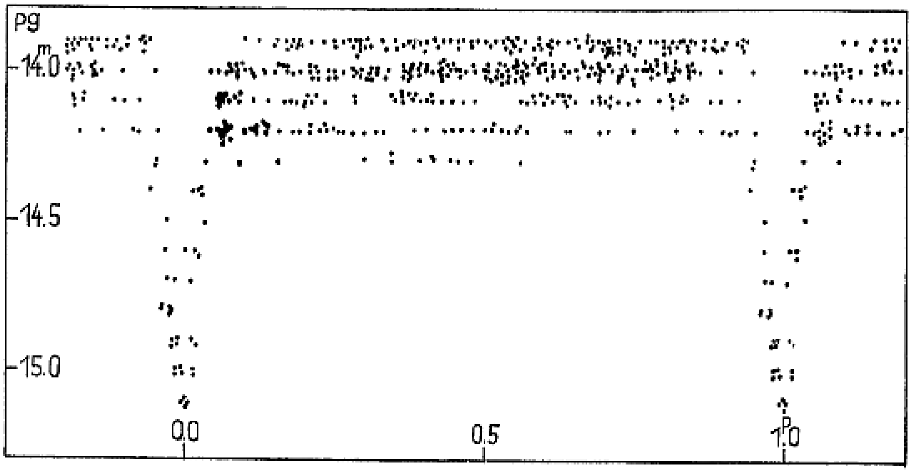
ab 243 8000 bis jetzt:

$$\text{Min.} = 244\ 0150.474 + 2^{d}.478783 \cdot E_2 \quad \text{(II)}.$$

Amplitude $14^{m}.0 - 15^{m}.0$ pg, $D = 0^{P}.10$.

Min. 24...	E_1	B-R I	E_2	B-R II
2 8373.401	0	$-0^{d}.005$		
3 0319.388	785	+0.066		
1003.499	1061	+0.008		
1645.455	1320	-0.064		
3239.413	1963	-0.022		
3928.580	2241	+0.018		
5988.454	3072	-0.052		
6541.355	3295	+0.060		
4 0150.476	4751	-0.059	0	$+0^{d}.002$
6000.394	7111	-0.283	2360	-0.007
7470.283	7704	-0.366	2953	-0.037
7475.317	7706	-0.290	2955	+0.039

Die mittlere Lichtkurve ist kombiniert aus den Beobachtungen beider Abschnitte I und II.



Literatur:

BUSCH, H., HÄUSSLER, K., 1990: Veröff. Sternwarte Sonneberg 10,p.369

Das Periodenverhalten des Mira-Sternes R Draconis

F. Kühnlenz, Sonneberg

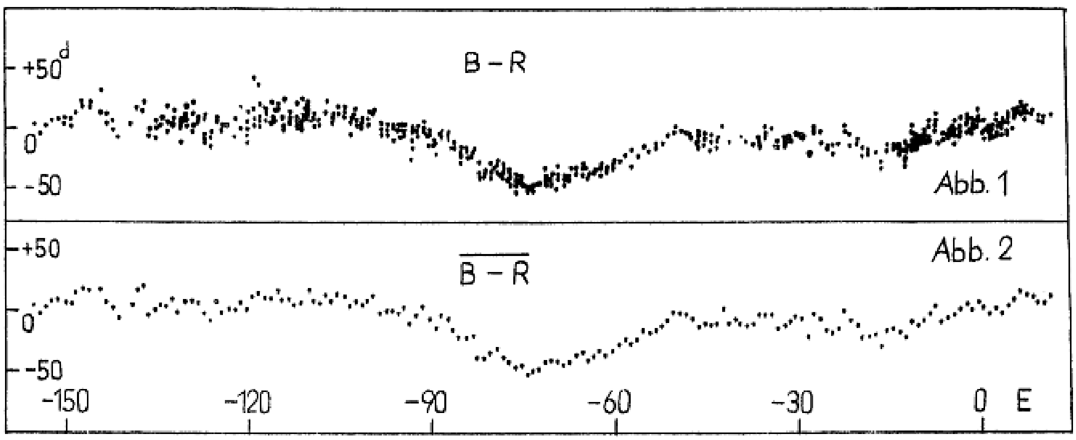
(Eingegangen am 8. November 1990)

Dieser Veränderliche vom Mira-Typ wurde 1876 entdeckt, und seit 1877 liegen lückenlose Beobachtungen vor. In der vorliegenden Arbeit wurde die Periode dieses Objektes von 1877 bis 1989 untersucht. Insgesamt wurden 631 Maximabeobachtungen verwendet. Bei meinen Recherchen stützte ich mich vor allem auf die in (1), (2) und (3) angegebene Literatur. Für die Maxima ab 1958 erhielt ich von Herrn H. BUSCH (AKV) eine Zusammenstellung, wofür ich ihm an dieser Stelle meinen Dank aussprechen möchte. Da die Maximawerte alle bereits veröffentlicht sind, wurde im Rahmen dieser Arbeit auf eine Zusammenstellung verzichtet. Interessenten können die Liste der Maxima beim Verfasser anfordern.

In Abbildung 1 ist die (B-R)-Kurve mit allen 631 Maximadaten dargestellt. Abbildung 2 enthält die Kurve der (B-R)-Mittelwerte, d.h., falls bei einer Epoche mehrere Beobachtungen vorlagen, wurde das arithmetische Mittel gebildet.

Die Berechnung der (B-R)-Werte erfolgte mit den im GCVS 1985 angegebenen Elementen:

$$\text{Max.} = 244\ 4779 + 245\overset{d}{.}60 \cdot E.$$



Literatur:

(1) MÜLLER, HARTWIG, 1920: Geschichte u. Literatur des Lichtwechsels der veränderl. Sterne I, Bd. II

(2) PRAGER, 1936: Geschichte u. Literatur des Lichtwechsels der veränderl. Sterne II, Bd. II

(3) SCHNELLER, 1957: Geschichte u. Literatur des Lichtwechsels der veränderl. Sterne II, Bd. IV

On the nature of the eruptive variable NSV 895

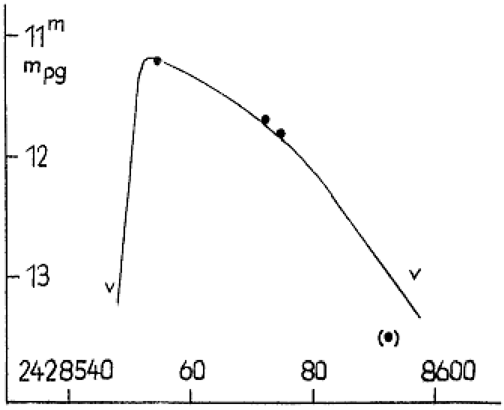
W. Wenzel and A. Wicklein, Sonneberg

(Eingegangen am 29. November 1990)

Abstract

The object is not a dwarf nova, but a nova or supernova.

The position of the star (SVS 918) has been checked on about 940 Sonneberg Sky Patrol plates of the years 1928 to 1989 taken mainly by P. AHNERT, H. HUTH, and B. FUHRMANN. The star is distinctly visible on only one plate, of 1937 Jan. 31, where it appears of magnitude $11^m.2$ in the system of comparison stars of KHOLOPOV (1953). This observation belongs to the eruption described already by MESHKOVA (1940) and KHOLOPOV (1953), the light-curve of which can now be given in somewhat greater detail (see figure, which contains KHOLOPOV's and Sonneberg observations). No further outburst has been discovered. Therefore and because of the long duration of the maximum the possibility can be ruled out that this is a dwarf nova.



No decision, however, can be made whether the object belongs to the supernova or nova class. The light-curve fits both types. The object is projected onto the outer part of the ZWICKY galaxy 539.078; the amplitude is ≧ 10 mag (invisible on POSS sheets).

References:

KHOLOPOV, P.N., 1953, Perem. Zvezdy 9,334
MESHKOVA, 1940, Perem. Zvezdy 5,255

Maxima des Mirasterns V 418 Cassiopeiae

B. Fuhrmann, Sonneberg

(Eingegangen am 19. November 1990)

Abstract

Slightly improved elements and an extremely bright maximum of Nov. 1989 are described.

Die Veränderlichkeit dieses Sterns wurde 1965 von HOFFMEISTER (1965, 1966) entdeckt. I. MEINUNGER (1968) untersuchte V 418 Cas im Jahre 1968 auf Sonneberger Platten und klassifizierte ihn als Mirastern mit folgenden Elementen:

$$\text{Max.} = 242\ 8235 + \frac{480^d}{n} \cdot E \qquad (1) .$$

Als Amplitude fand sie $14^m.6 - [17^m.5$ (pg).

In einem Brief vom Oktober 1990 berichtete D. KAISER, daß er den Stern auf zwei seiner Überwachungsplatten vom 24. November 1989 bei 10^m gesehen hat. Ich nahm diese Mitteilung zum Anlaß, den Veränderlichen im Anschluß an die Arbeit von I. MEINUNGER erneut auf Platten des Sonneberger Archivs nachzusehen. Zur Verfügung standen ≈ 70 Astrographenaufnahmen (f = 1600 mm; Plattengrenzgröße ≈ $17^m.5$) der Jahre 1963 bis 1989, sowie ≈ 840 Blau- und ≈ 650 Rotplatten der Sonneberger Himmelsüberwachung (f = 250 mm; Plattengrenzgröße $14^m.5$ pg und $13^m.5$ pv aus dem Zeitraum 1958 bis 1990. In der Tabelle sind die gefundenen Maxima aufgelistet.

Max.	Autor	E	$(B-R)_1$	$(B-R)_2$
242 8250	M	0	$+15^d$	$+ 5^d$
9200	M	2	+ 5	− 4
243 0615	M	5	−20	−27
6385:	F	17	−10	−11
8310	F	21	− 5	− 4
9260	F	23	−15	−13
9770	M	24	+15	+18
244 1215	F	27	+20	+24
1685	F	28	+10	+15
2670	F	30	+35	+41
4570:	F	34	+15	+23
5980	F	37	−15	− 6
7400	F	40	−35	−25
7860	F	41	−55	−44

M – MEINUNGER
F – FUHRMANN

Eine Ausgleichsrechnung ergab die folgenden neuen, nur geringfügig verbesserten Lichtwechselelemente und n = 1 :

$$\text{Max.} = 242\ 8244.5 + 479^d.5 \cdot E \qquad (2) .$$

Der Stern erreicht im Maximum durchschnittlich 14^m (pg). Eine Ausnahme bildet das Maximum bei der Epoche E = 41 (November 1989). Auf den Platten der Himmelsüberwachung beträgt die Helligkeit von V 418 Cas zu diesem Zeitpunkt etwa $13^m\!.0$ (pg). Der Anschluß der Vergleichssterne erfolgte an den Sternhaufen NGC 457, von dem in HOAG (1961) UBV-Helligkeiten vorliegen.

Literatur:

HOFFMEISTER, C., 1965, Mitt. Veränderl. Sterne 3,77
HOFFMEISTER, C., 1966, Astron. Nachr. 289,139
MEINUNGER, I., 1968, Mitt. Veränderl. Sterne 5,12
HOAG,A.A.,et al.,1961,Naval Obs. Publ. Ser.2,17,VII,444

Beobachtungen von V 76, V 77, V 78, V 79, V 80 im Kugelhaufen M 3

I. Meinunger, Sonneberg

(Eingegangen am 22. Januar 1991)

Einleitende Bemerkungen siehe Mitt. Veränderl. Sterne 10,31 (1983) und 10,123 (1985). Als Vergleichsstern diente auch I-I-51 aus Astrophys. J. 162,843 (1970).

V 76

Der RRab-Stern V 76 befindet sich in Kernnähe des Kugelhaufens M 3 und war deshalb meist nur schwierig schätzbar. Eine geringfügige Periodenvergrößerung kann aus den Saisonlichtkurven - P (SZEIDL) = $0^d\!.5017544$; Ausgangsmaximum = 243 8932.462 - von 1963 bis 1978 entnommen werden.

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8106.535	-1646	$-0^d\!.039$	V	243 9538.535	+1208	-0.046	B
8113.567	-1632	-0.032	r	9615.367	+1361	+0.017	V
8496.407	- 869	-0.030	r	9964.520	+2057	-0.051	r
8501.414	- 859	-0.041	r	244 0648.510	+3420	+0.048	B
8521.499	- 819	-0.026	V	0652.526	+3428	+0.050	U
8830.577	- 203	-0.029	U	0656.461	+3436	-0.029	U
8832.653	- 199	+0.040	V	0676.562	+3476	+0.002	B
8901.400	- 62	+0.047	U	0676.584	+3476	+0.024	U
8914.428	- 36	+0.029	U	0684.539	+3492	-0.049	U
8932.462	0	0.000	B	1392.566	+4903	+0.002	U
8940.472	+ 16	-0.018	U	1772.400	+5660	+0.008	B
8941.461	+ 18	-0.033	B	2836.645	+7781	+0.032	B
9238.487	+ 610	-0.045	r	2898.366	+7904	+0.037	V
9529.496	+1190	-0.054	B	2924.420	+7956	0.000	B
9536.562	+1204	-0.012	B	3247.541	+8600	-0.009	B
9537.564	+1206	-0.014	B				

V 77

Bei diesem RRab-Stern scheint sich der Trend des sich wenig vergrößernden Periodenwertes (Mitt. Sternw. Budapest Nr. 58,p.252; 1965) auch im Beobachtungszeitraum von 1963 bis 1978 fortzusetzen. Die Saisonlichtkurven wurden mit P (SZEIDL) = $0^{d}.4593425$ und dem Ausgangsmaximum bei 244 0002.404 (B) berechnet. Kernnähe erschwerte die Schätzungen des Veränderlichen.

Beobachtete Erhellungen:

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8473.634	-3328	$-0^{d}.078$	B	243 9589.426	- 899	$-0^{d}.029$	V
8493.456	-3285	-0.008	B	9610.573	- 853	-0.012	B
8801.637	-2614	-0.046	r	9622.503	- 827	-0.025	i
8830.577	-2551	-0.044	U	9622.552	- 827	+0.024	B
8831.484	-2549	-0.056	V	244 0002.404	0	0.000	B
8883.385	-2436	-0.061	U	0380.434	+ 823	-0.009	V
8911.426	-2375	-0.040	U	0649.614	+1409	-0.004	B
9117.691	-1926	-0.019	V	0656.461	+1424	-0.047	U
9123.684	-1913	+0.002	U	0684.510	+1485	-0.018	B
9180.610	-1789	-0.030	U	1385.438	+3011	-0.046	r
9204.457	-1737	+0.031	U	2163.559	+4705	-0.051	B
9238.487	-1663	-0.030	r	2866.430	+6235	+0.025	V
9536.635	-1014	+0.004	B	2900.420	+6309	+0.024	V
9537.526	-1012	-0.023	B	3250.386	+7071	-0.029	V
9587.582	- 903	-0.036	B				

V 78

Dieser RRab-Stern befindet sich in Kernnähe von M 3 und war deshalb schwierig zu schätzen. Aus den Saisonlichtkurven - P (SZEIDL) = $0^{d}.6119254$; Ausgangsmaximum: 243 8471.466 - im Beobachtungszeitraum von 1963 bis 1978 ist keine Periodenänderung beobachtbar. Folgende Erhellungen wurden festgestellt:

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8118.395	- 577	$+0^{d}.010$	U	243 9538.647	+1744	$-0^{d}.017$	B
8471.466	0	0.000	B	9587.582	+1824	-0.036	B
8493.456	+ 36	-0.039	B	9620.553	+1878	-0.109	B
8553.457	+ 134	-0.007	V	9964.520	+2440	-0.044	r
8851.475	+ 621	+0.003	i	9966.357	+2443	-0.043	B
8881.366	+ 670	-0.090	U	244 0002.486	+2502	-0.017	B
8911.426	+ 719	-0.014	U	0319.438	+3020	-0.043	B
8914.428	+ 724	-0.072	U	0319.467	+3020	-0.014	V
8914.469	+ 724	-0.031	B	0653.558	+3566	-0.034	B
8914.496	+ 724	-0.004	V	1421.484	+4821	-0.074	U
9117.691	+1056	+0.032	V	1421.562	+4821	+0.004	V
9204.533	+1198	-0.020	V	2132.583	+5983	-0.033	V
9527.669	+1726	+0.020	B	2924.420	+7277	-0.027	B
9529.496	+1729	+0.011	B	3247.488	+7805	-0.056	B

V 79

Siehe Mitt. Veränderl. Sterne 9, Seite 44 (1981)

V 80

V 80 ist ein RRab-Stern mit stark variierender Lichtkurve: In den Saisonlichtkurven (mit P (SZEIDL) = 0^d.5384827 und dem Ausgangsmaximum 243 8413.536) der Jahre 1963, 1964, 1965, 1966 und 1970 zeigen die Beobachtungen einen typischen RRab-Lichtwechsel, während in den Jahren 1967, 1968, 1969, 1972, 1973 aus den Beobachtungen kaum ein Lichtwechsel auszumachen ist. 1974 scheint sich eine flache Erhellung um den Phasenwert 0^P.7 und 1976, 1977 eine solche um den Phasenwert 0^P.6 abzuzeichnen.

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8111.407	- 561	-0^d.040	r	243 8902.491	+ 908	+0^d.013	B
8112.529	- 559	+0.005	V	8908.416	+ 919	+0.014	U
8407.625	- 11	+0.012	r	8908.462	+ 919	+0.060	V
8413.536	0	0.000	B	9204.559	+1469	-0.008	o.F.
8415.695	+ 4	+0.005	B	9238.487	+1532	-0.004	r
8415.725	+ 4	+0.035	o.F.	9610.541	+2223	-0.042	V
8817.384	+ 750	-0.014	r	9616.515	+2234	+0.009	V
8831.429	+ 776	+0.030	V	244 0624.589	+4106	+0.043	B
8901.400	+ 906	-0.001	U	0679.525	+4208	+0.054	V

Berichtigungen

zu den Arbeiten in MVS 12, S. 67ff

V 66: Statt E = 1202 schreibe 1201

V 67: " E = 2401 " 2402

V 70: " J.D. 9232.770 schreibe 9232.370

Spasova 23: Die Literatur heißt Astrophysical Investigations, nicht Space Research (Irrtum des Redakteurs).

I. Meinunger

Optical behaviour of the X-ray binary V 1727 Cygni = 4U 2129+47 in the season 1990

W. Götz, Sonneberg

(Eingegangen am 28. Februar 1991)

Abstract

From the star 33 low state observations in B are given.

The star was inspected on 33 blue-sensitive plates (ORWO-ZU21+GG13+BG12) from 20 nights obtained with the 50/70/172 cm Schmidt camera of Sonneberg Observatory covering the time interval between April 30 and December 7, 1990.

The individual estimates, which are listed in the table, are linked to the sequence of comparison stars given by WENZEL (1983). Of comparison star c the magnitude B = 18^{m}25 given by KALUZNY (1988) was used.

As in the series of former years all observations given in the table are from the low or inactive state of the star. In most cases the object is below the limiting magnitude of the plates (iv = invisible).

J.D. 244....	m_B		J.D. 244....	m_B	
8012.576	>18.25	iv	8148.363	>18.25	iv
8014.576	18.45		8148.426	>18.25	iv
8030.506	>18.25	iv	8151.495	>18.25	iv
8030.524	≫17.5	iv	8151.513	≫17.5	iv
8031.511	>18.25	iv	8176.346	>18.25	iv
8031.531	>18.25	iv	8176.365	≫17.5	iv
8038.504	>18.25	iv	8177.369	>18.25	iv
8038.521	≫17.5	iv	8177.388	>18.25	iv
8068.516	>18.25	iv	8179.383	>18.25	iv
8088.421	≫18.25	iv	8179.404	>18.25	iv
8096.453	≫18.25	iv	8182.431	18.75	
8096.471	18.55		8182.454	18.75	
8100.494	>18.25	iv	8186.465	>18.25	iv
8100.517	>18.25	iv	8206.340	18.75	
8106.540	>18.25	iv	8233.283	>18.25	iv
8127.482	>18.25	iv	8233.303	>18.25	iv
8127.548	>18.25	iv			

References:

WENZEL, W., 1983, Inf. Bull. Variable Stars No. 2452
KALUZNY, J., 1988, Acta Astron. 38,207
GÖTZ, W., 1990, Mitt. Veränderl. Sterne 12,40

Optical behaviour of the polar AM Herculis in the season 1990

W. Götz, K. Heiland, Sonneberg

(Eingegangen am 28. Februar 1991)

Abstract

Photographic UBV observations of the star obtained in the season 1990 are given in detail to complete the long-term light-curves and to study the optical behaviour.

In linking to the sequence of comparison stars given by HUDEC and MEINUNGER (1977) the star was measured on 106 blue-sensitive (ORWO-ZU21+GG13+BG12), 29 photovisual (ORWO-RP1+GG14) and 33 UV-sensitive (ORWO-ZU21+UG2) plates from 53, 26 or 28 nights, respectively, obtained with the 50/70/172 cm Schmidt camera of Sonneberg Observatory covering the time interval between February 20 and December 7, 1990.

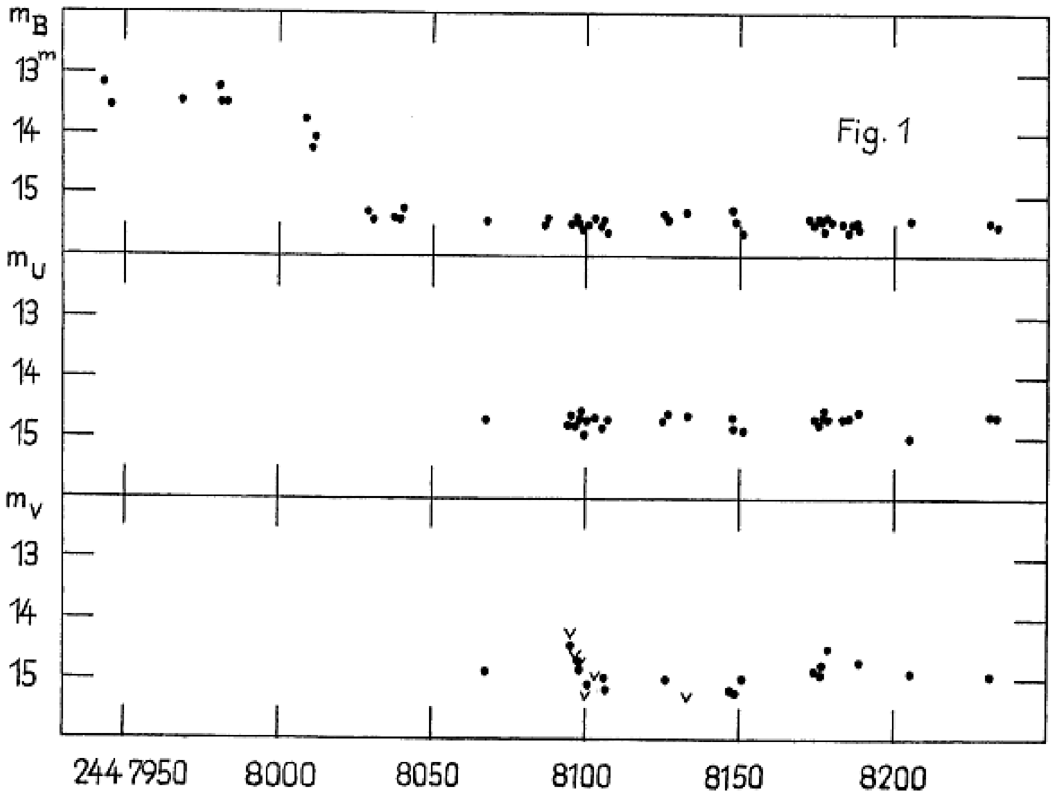
The annual light-curves in B, V and U are shown in Figure 1, where night averages of the brightness data are given. As can be seen from the light-curve in B the star was decreasing from the high to the low state between J.D. 244 8014 and 8030. Since this date the object remained in the low state up to the end of the series for more than 200 days.

The annual mean brightness of the high state, which is caused by X-ray heating, amounts to B = 13^{m}60.

From 19 nights we obtained 24 B-V and from 26 nights 30 U-B colour indices. The B-V colour indices complete the colour magnitude diagram m_B/(B-V) given by GÖTZ (1984) and are in agreement with the behaviour shown there. All the colour indices B-V and U-B are from the low state and from a small brightness range as also can be seen from the colour magnitude diagram m_B/(U-B) in Figure 2.

The two-colour diagram (U-B)/(B-V) of the series 1990 is given in Figure 3. It is similar to those of the other years published by GÖTZ and GÖTZ and HEILAND (1986, 1988, 1989). The B-V colour indices become larger with decreasing U-B.

In order to study the influences of occultation light changes on the overall light-curves, all observations are reduced to one common epoch by means of the orbital elements published by GÖTZ (1984). It can be seen from the observations that in the high state in B no periodic variations are recognizable. In the low state on the contrary only in B such variations with maxima at the phase 0.9 can be stated. - The individual observations in B, V and U obtained in the season 1990 are given in detail in the following tables.



1. Photographic observations in B

J.D. hel. 244....	m_B
7943.650	$13^{m}.13$
7945.682	13.51
7969.564	13.44
7969.584	13.42
7981.583	13.25
7981.598	13.22
7981.618	13.19
7982.507	13.34
7982.521	13.42
7982.535	13.45
7982.548	13.56
7982.561	13.64
7982.574	13.69
7982.588	13.61
7982.601	13.45
7982.614	13.30
7983.502	13.47
7983.513	13.35
7983.523	13.25
7983.533	13.41
7983.545	13.65
7983.557	13.45
7983.569	13.94
7983.583	13.49
7983.598	13.32
8009.542	13.87:
8009.565	13.66:
8011.509	14.21:
8011.522	14.05:
8011.536	14.07:
8011.549	14.04:
8011.563	13.92:
8012.518	14.01:
8012.532	14.09:
8013.537	14.28:
8014.561	13.48:
8030.461	15.47:
8030.485	15.15:
8031.442	15.40
8031.467	15.34:
8031.493	15.48
8038.469	15.45
8038.487	15.29
8039.471	15.37
8039.488	15.31
8040.419	15.38
8040.438	15.36
8041.455	15.23
8041.472	15.24
8068.429	15.48
8068.496	15.36
8087.405	15.47
8088.404	15.39

J.D. hel. 244....	m_B
8095.418	15.47
8096.418	15.43
8097.467	15.38:
8098.470	15.50
8098.523	15.50
8099.457	15.47
8099.502	15.44
8099.520	15.69
8100.425	15.57
8101.456	15.46
8102.399	15.43
8102.417	15.42
8102.433	15.57
8103.401	15.50
8103.462	15.25
8105.465	15.55
8105.482	15.50
8105.501	15.35
8106.504	15.41
8107.547	15.58
8126.378	15.32
8127.385	15.33
8127.459	15.41:
8133.515	15.25:
8148.325	15.20
8149.330	15.39
8151.375	15.58
8174.319	15.38
8175.332	15.45
8176.283	15.64
8176.325	15.37
8177.326	15.41
8178.305	15.58
8179.314	15.36
8179.362	15.32
8180.355	15.46
8180.370	15.47
8180.385	15.51
8180.399	15.41
8184.371	15.56
8184.406	15.33
8184.421	15.44
8186.354	15.57
8186.389	15.52
8187.325	15.50
8187.343	15.54
8187.363	15.46
8188.325	15.46
8188.343	15.41
8189.369	15.50
8206.299	15.41
8232.252	15.44
8233.239	15.48

2. Photographic observations in V

J.D. hel. 244....	m_V
8068.479	$14\overset{m}{.}68$
8095.436	>14.28
8096.436	14.44:
8097.485	>14.59
8098.487	14.70:
8098.542	14.95
8099.475	>14.75
8100.444	>14.26
8101.474	15.07
8103.481	>15.00
8103.510	>14.90
8106.523	14.93
8107.565	15.13:
8127.411	14.98
8127.435	15.04:

J.D. hel. 244....	m_V
8133.538	$>15\overset{m}{.}31$
8148.343	15.17:
8149.349	15.18:
8151.394	14.95
8175.352	14.87
8176.305	14.90
8177.348	14.76:
8179.340	14.49:
8184.389	>12.23
8186.372	>14.96
8189.387	14.68
8206.319	14.92
8232.271	14.91
8233.260	>14.34

3. Photographic observations in U

J.D. hel. 244....	m_U
8068.450	$14\overset{m}{.}71$
8095.399	14.78
8096.399	14.63
8097.449	14.73
8098.452	14.56
8098.506	14.81
8099.440	14.60
8100.406	14.93
8101.438	14.71
8103.422	14.66
8106.485	14.78
8107.532	14.69
8126.362	14.68
8127.363	14.60
8133.491	14.64
8148.307	14.67
8149.313	14.87

J.D. hel. 244....	m_U
8151.356	$14\overset{m}{.}86$
8175.295	14.56
8175.314	14.89
8176.264	14.78
8177.276	14.75
8177.307	14.64
8178.286	14.59
8179.276	14.65
8179.295	14.70
8184.353	14.70
8186.337	14.75
8186.407	14.64
8189.351	14.56
8206.280	14.99
8232.233	14.64
8233.220	14.71

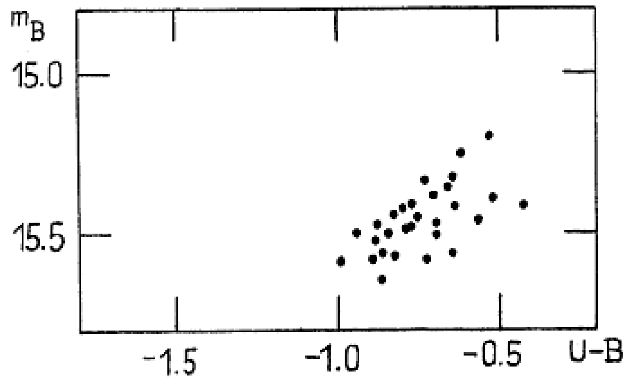


Fig. 2

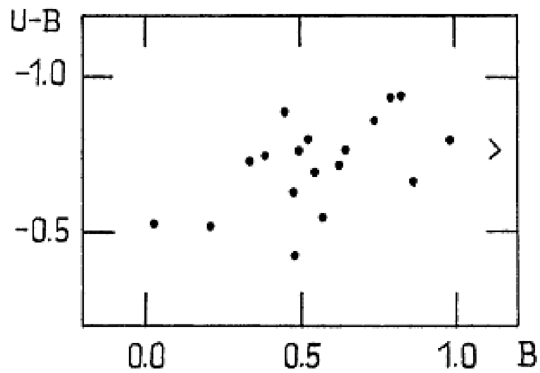


Fig. 3

References:

HUDEC, R., MEINUNGER, L., 1977, Mitt. Veränderl. Sterne 7,194
GÖTZ, W., 1984, Inf. Bull. Variable Stars No. 2649
GÖTZ, W., 1986, Inf. Bull. Variable Stars No. 2967
GÖTZ, W., 1988, Inf. Bull. Variable Stars No. 3279
GÖTZ, W., HEILAND, K., 1990, Mitt. Veränderl. Sterne 12,42

Nova Muscae 1991 - unsichtbar auf alten Sonneberger Aufnahmen

B. Fuhrmann, Sonneberg

(Eingegangen am 4. März 1991)

Abstract

Prior to outburst nova Muscae 1991 is invisible on 216 Sonneberg photographic exposures of the years 1937/38 and 1952/53.

Auf insgesamt 216 photographischen Aufnahmen des Sonneberger Archivs wurde der Ort dieser Nova nach etwaigen Erhellungen ihres Vorläufers inspiziert.

Das vorwiegend unsensibilisierte Aufnahmematerial setzt sich zusammen aus 93 Platten der Ernostarkamera 135/240 mm (Grenzgröße $\approx 14\overset{m}{.}5$), aufgenommen April 1937 bis Februar 1938, sowie aus 123 Planfilmaufnahmen des Tessars 50/165 mm (Grenzgröße $\approx 14^m$) aus dem Zeitraum August 1952 bis Juli 1953.

Ergebnis: Der Vorläufer der Nova Muscae 1991 ist auf allen unseren Aufnahmen nicht sichtbar.

Maxima des RR-Lyrae-Sterns XZ Cygni

H. Berger, Scharfenberg

(Eingegangen am 28. März 1991)

Abstract

The dates of four visually observed maxima and their deviation from previous elements are given.

Im Herbst 1990 beobachtete ich visuell die folgenden vier Maxima dieses wegen seiner variablen Periode bekannten RR-Lyrae-Sterns; die Zeitpunkte wurden anhand des Schnittpunktes der beiden Regressionsgeraden von Auf- und Abstieg errechnet:

Max. ⊙	n	E	B-R
244 8175.3513	13	5634	$-0\overset{d}{.}0102$
8176.2850	16	5636	-0.0098
8189.3516	15	5664	-0.0086
8190.2749	17	5666	-0.0186

Diese Beobachtungen bilden die Fortsetzung der in Mitt. Veränderl. Sterne 12,p.52 gegebenen Daten. Die (B-R)-Werte basieren wie dort auf den Elementen von BLASBERG und WENZEL (1988). Ob die sich abzeichnende systematische negative Abweichung auf eine neuerliche Periodenänderung zurückgeht oder lediglich auf eine kleine Ungenauigkeit der benutzten Elemente hinweist, ist gegenwärtig noch nicht zu entscheiden.

Literatur:

BLASBERG, H.-J., WENZEL, W., 1988, Inform. Bull. Variable Stars 3205

Maxima des Mira-Sterns SY Draconis

A. Wicklein, Sonneberg

(Eingegangen am 2. April 1991)

Abstract

19 maxima, derived from observations on Sonneberg plates, confirm the constant period given in the GCVS 1985.

Eine zusammenfassende Arbeit über SY Draconis stammt von T.S. CHERNOVA (1951). Die von ihr benutzte Periode von $391\overset{d}{.}6$, die von KUKARKIN und PARENAGO stammt, wurde durch die Bearbeiter des GCVS 1985 geringfügig verändert ($391\overset{d}{.}38$) in letzteren Katalog übernommen. Da der Artikel von CHERNOVA jetzt 40 Jahre alt ist, habe ich den Stern auf Sonneberger Überwachungsplatten geschätzt, und es konnten 19 Maximumzeiten abgeleitet werden. Diese sind im zweiten Teil der folgenden Tabelle aufgelistet; der erste Teil enthält die von CHERNOVA (l.c.) zusammengetragenen Daten (mit Ch bezeichnet). Die (B-R)-Werte wurden mittels der Elemente

$$R \equiv \text{Max.} = 241\,7019 + 391\overset{d}{.}38 \cdot E$$

berechnet. Man erkennt, daß kein wesentlicher systematischer Gang der (B-R)-Werte vorliegt und daß daher die benutzte Periode für den gesamten Zeitraum Gültigkeit besitzt. Es sei bemerkt, daß aus neuerer Zeit auch visuelle Beobachtungen der Scandinavian Variable Star Observers vorliegen (in der Tabelle mit Sc bezeichnet).

Max.			E	B-R
241	7036	Ch	0	+ 15^d
	7409	Ch	1	- 1
	7789	Ch	2	- 13
	8185	Ch	3	- 8
	8596	Ch	4	+ 12
	8976	Ch	5	0
	9385	Ch	6	+ 18
242	4477	Ch	19	+ 23
	5687	Ch	22	+ 59
	6427	Ch	24	+ 17
	6825	Ch	25	+ 23
	7189	Ch	26	- 4
	7596	Ch	27	+ 12
	7976	Ch	28	+ 1
243	6540::		50	- 44
	7800:		53	+ 42
	8160		54	+ 11
	8560!		55	+ 20
	8935!		56	+ 3
	9340		57	+ 17
	9715!		58	+ 1
244	0112:		59	+ 6
	0525		60	+ 28
	0915:		61	+ 27
	1300::		62	+ 20
	1685::		63	+ 14
	1700	Sc	63	+ 29
	2085	Sc	64	+ 23
	2450	Sc	65	- 4
	2855		66	+ 10
	2860	Sc	66	+ 15
	3272		67	+ 36
	3620:		68	- 7
	3630	Sc	68	+ 3
	4390::		70	- 20
	5183	Sc	72	- 10
	5195		72	+ 2
	5592	Sc	73	+ 6
	5990	Sc	74	+ 15
	5995::		74	+ 20
	6358!		75	- 9
	6361	Sc	75	- 6
	6774	Sc	76	+ 16
	7547	Sc	78	+ 7

Literatur:

CHERNOVA, T.S., 1951, Perem. Zvezdy 8,p.40
Reports of the Scandinavian Variable Star Observers, mehrere Jahrgänge

Photographische Beobachtung des roten Sterns V 447 Ophiuchi

E. Rudolph, Jena

(Eingegangen am 8. April 1991)

Abstract

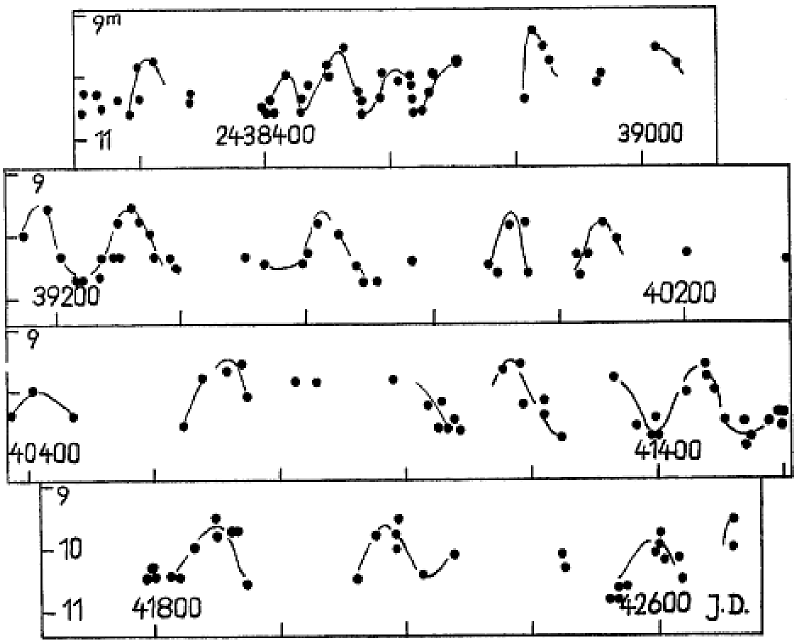
The star proves to be a semiregular variable with the cycle length variing between 105 and 155 days.

Der Veränderliche wurde auf 322 photovisuellen Platten (RP 1 + Filter GG14) der Sonneberger Himmelsüberwachung aus den Jahren 1963 bis 1989 geschätzt.

Durch die Beobachtung konnte ein deutlicher halbregelmäßiger Lichtwechsel festgestellt werden.

Die Zyklenlänge des Sterns schwankt zwischen 105 und 155 Tagen.

Im Beobachtungszeitraum variierte die Helligkeit des Sterns zwischen $9^m.3$ und $10^m.8$.



TY Leonis - period and class of variability not confirmed

W. Wenzel and A. Wicklein, Sonneberg

(Received April 22, 1991)

Abstract

Observations on Sonneberg plates cast severe doubts on the class of variability and the period of this supposed Algol star.

Recently D. LICHTENKNECKER + (1990) directed the attention to discrepancies which arose when people tried to observe eclipse minima at moments computed by means of the elements of RÜGEMER (1933).

The inspection of about 300 suitable plates of the Sonneberg Sky Patrol, taken 1929 to 1967 mainly by C. HOFFMEISTER, P. AHNERT and H. HUTH, showed that the photographic amplitude is 0.5 mag at the most. Especially by checking the discovery minima of HOFFMEISTER (1932) on the original plates we became aware of the small range of the variations. To derive or improve elements on the basis of this material seems hardly possible. Therefore the formula given by RÜGEMER cannot be confirmed. Though the spectral class G given by GÖTZ and WENZEL (1960) matches an eclipsing star of small amplitude, to determine even the class of variability seems to be impossible without photoelectric or exact visual observational series.

The lack of relevant references for 57 years indicates that other astronomers, too, did not succeed in confirming class, period, or indeed the variability.

References:

GÖTZ, W., WENZEL, W., 1960, Mitteil. Veränderl. Sterne 1,p.505
HOFFMEISTER, C., 1932, Astron. Nachr. 247,p.287
LICHTENKNECKER, D., 1990, BAV Rundbrief 39,111
RÜGEMER, H., 1933, Astron. Nachr. 248,p.76

Photometric behaviour of KR Aurigae in the season 1990/1991

W. Götz, Sonneberg

(Received April 30, 1991)

Abstract

On brightness measurements of the star on blue-sensitive plates is reported.

The star was measured on 27 blue-sensitive plates (ORWO-ZU21+GG13+BG12) obtained with the Schmidt camera 50/70/172 cm of Sonneberg Observatory in 17 nights covering the time interval between September 16, 1990, and April 6, 1991. The measurements are linked to the sequence of comparison stars given by POPOVA (1965). The individual observations are listed in the table of p. 90. As can be seen there the star shows brightness variations between $m_B = 12^m.94$ and $m_B = 14^m.16$.

J.D.hel. 244....	m_B	J.D.hel. 244....	m_B
8151.570	$13^m.44$	8274.418	$13^m.20$
8151.587	13.26	8275.394	13.57
8179.563	14.16	8275.411	13.51
8182.602	14.11	8289.302	13.05
8182.618	13.82	8290.308	13.16
8186.601	14.09	8290.330	13.34
8187.605	14.09	8290.347	13.15
8188.576	14.09	8306.448	13.40
8189.578	14.02	8329.300	13.44
8272.359	13.39	8329.320	13.40
8272.378	13.53	8330.377	13.53
8273.356	13.36::	8330.398	13.27::
8273.373	13.34	8353.334	12.96:
8274.398	12.94		

Reference:

POPOVA, M., 1965, Peremennye Zvezdy 15, p.534

The period of the eclipsing binary FR Aurigae

W. Wenzel and A. Wicklein, Sonneberg

(Received May 18, 1991)

Abstract

New observations on Sonneberg plates confirm the period of $2^{d}.60675$.

In one of his last publications the late D. LICHTENKNECKER (1990) pointed to two errors which have crept into the GCVS 1985: the misprint of the initial minimum (first present in the 1971 Supplement of the GCVS 1969) and a slightly deviating period computed on the basis of an erroneous epoch counting.

New observations on Sonneberg 40 cm astrograph plates confirm the elements of LICHTENKNECKER (l.c.),

$$C = \text{Min.} = 244\ 7862.509 + 2^{d}.6067535 \cdot E \ ,$$

as can be seen from our table and the mean light-curve. In the table the dates already given by GESSNER (1973; S 10490) are slightly improved (G); s designates dates interpolated from 6 or 2 individual observations of the respective night. The sequence of comparison star magnitudes of KUROCHKIN (1951) was used.

O	m_{pg}	E	O-C	
243 8397.27	$13^{m}.45$	-3631	$-0^{d}.12$	G
9536.42	13.40	-3194	-0.12	G
9557.30	13.95	-3186	-0.09	G
244 0206.47!	[14.2	-2937	0.00	G, s (6)
1361.27	14.3	-2494	0.00	
5052.42!	[14.15	-1078	-0.01	s (2)
6491.36	14.2	- 526	0.00	
7862.47	14.15	0	-0.04	

The scatter of observations in normal light (average: $13^{m}.1$) is larger than usual because of the relatively great brightness of the star and of the fact that both the variable and the comparison star c have faint companions which merge in their "primary" stars on a number of exposures. Therefore also the existence of a secondary minimum cannot be ascertained by our data without doubts.

References:

GESSNER, H., 1973, Veröff. Sternwarte Sonneberg 7, p.633
KUROCHKIN, N.E., 1951, Perem. Zvezdy 8, p.355
LICHTENKNECKER, D., 1990, BAV Rundbrief 39, p.109

Photographic observations of DR Tauri in the season 1990/91

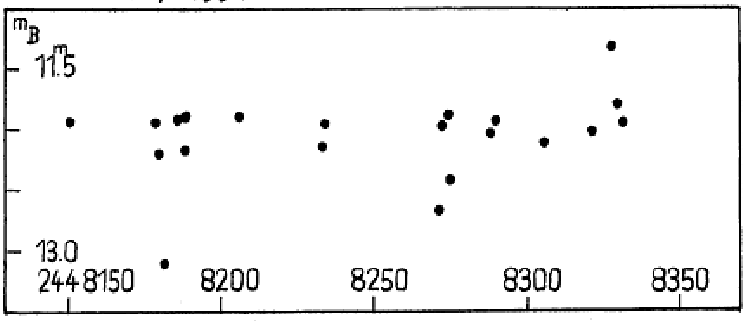
W. Götz, Sonneberg

(Eingegangen am 18. Mai 1991)

Abstract

Measurements of the star on blue-sensitive plates are given.

In completing and supplementing the light-curve in B the star was measured on 36 blue-sensitive plates (ORWO-ZU21+GG13+BG12) from 22 nights obtained with the Schmidt camera 50/70/172 cm of Sonneberg Observatory covering the time interval between September 16, 1990, and March 16, 1991.



The measurements listed in the table are linked to the previous sequence of comparison stars given by GÖTZ (1982). In the figure the light-curve in B is shown. As can be seen there, 3 remarkable light depressions and a short-time brightness increase starting from a mean level were observed. The mean brightness of the star in the season 1990/91 amounts to $m_B = 12^m.06$ with a total amplitude of $\Delta m_B = 1^m.96$.

J.D.hel 244...	m_B	J.D.hel 244...	m_B
8151.533	$11^m.91$	8272.337	$12^m.58$
8151.551	11.95	8273.276	11.98
8179.476	11.92::	8273.296	11.94:
8179.495	11.96:	8274.334	11.96
8179.517	11.95	8274.350	11.85
8180.611	12.20	8275.326	12.30
8180.628	12.19	8275.346	12.48
8182.512	13.19	8289.283	12.02
8182.529	13.03	8290.275	11.93
8186.583	11.89	8290.293	11.96
8187.585	11.89	8306.428	12.11
8188.557	11.89	8322.301	12.01
8189.560	12.14	8328.329	11.34
8206.423	11.89	8328.347	11.23
8233.362	12.16	8330.300	11.65
8233.379	12.10	8330.329	11.92
8234.323	11.93	8332.302	11.90
8272.317	12.71	8332.325	11.95

References:

GÖTZ, W., 1982, Inf. Bull. Variable Stars no. 2172

Untersuchung des Lichtwechsels des eruptiven Veränderlichen FS Aurigae auf Sonneberger Astrographenplatten

Th. Fuhrmeister, Sonneberg

(Eingegangen am 18. Mai 1991)

FS Aur ist im RITTER-Katalog (1) als Zwergnova registriert. Die v-Maximalhelligkeit im Minimum wird mit $16^m.2$ und im Maximum mit $14^m.4$ angegeben. Die Orbitalperiode beträgt $1^h.416$ (spektroskopisch) oder $1^h.45...1^h.75$ (photometrisch) (2).

Um Aussagen über die Zyklenlänge treffen zu können, habe ich die Helligkeit des Objektes auf ca. 280 Sonneberger Astrographenplatten geschätzt. Hierbei wurden folgende Erhellungen ermittelt:

J.D.	m_{pg}	J.D.	m_{pg}
242 6351	$13^m.8$	243 1530	$14^m.2$
6352	13.8	243 7582	14.3
6353	13.8	243 8472	14.0
242 6677	14.3	244 0148	13.4
6687	14.3	244 1322	14.2
242 7046	13.8	244 1390	14.1
242 7424	14.0	244 2449	14.3
242 7718	14.2	244 6147	14.3

Aus Amateurbeobachtungen sind weiterhin bekannt (3):

244 6085	$14^m.0$
244 6307	13.5
244 6335	14.0
244 6420	14.7

Da das Beobachtungsmaterial recht ungleichmäßig verteilt ist (große Lücken), lassen sich für die Zyklenlänge nur sehr unsichere Werte abschätzen. Bei formaler Anwendung der Poisson-Verteilung nach (4) ergibt sich ein Wert von etwa 200^d. Leider stehen die Amateurbeobachtungen von August bis Dezember 1985 dazu im Widerspruch.

Auch die Kukarkin-Parenago-Beziehung (5) liefert bei Vorgabe der Amplitude und der Periode eine wesentlich kürzere Zyklenlänge, wobei aber die Streuung hier ohnehin groß ist.

Literatur:

(1) RITTER, H., 1990, München-Garching MPA 500
(2) HOWELL, S., SZKODY, P., 1988, Publ. Astron. Soc. Pac. 100,224
(3) SVSO Rep. 1985 1A S. 21/2A S. 33
(4) WENZEL, W., RICHTER, G., 1986, Astron. Nachr. 307,209
(5) RICHTER, G., BRÄUER, H.-J., 1989, Astron. Nachr. 309,413

Untersuchung des Lichtwechsels des eruptiven Veränderlichen AQ Eridani auf Sonneberger Astrographenplatten

Th. Fuhrmeister, Sonneberg

(Eingegangen am 18. Mai 1991)

Das Objekt wurde auf ca. 110 Astrographenplatten geschätzt. Folgende 4 Erhellungen wurden registriert (n = Zahl der Platten):

J.D.	m_{pg}	n
243 8000	$12^m.5$	3
8001	13.0	3
8002	13.0	6
8003	13.0	5
8004	13.5	3
8005	13.5	
243 8086	13.5	2
244 3893	13.0	1
244 4166	13.0	1
4170	14.0	1

Der RITTER-Katalog (1) weist AQ Eri als Zwergnova aus mit einer Zyklenlänge von etwa 40^d (nach (2)). Dieser Wert kann auf der Basis des sehr lückenhaften Plattenmaterials und der 4 Erhellungen nicht verbessert werden.

Literatur:

(1) RITTER, H., 1990, München-Garching MPA 500
(2) KATO, T., FUJINO, S., IIDA, M., 1989, Variable Star Bull. 9,33

Untersuchung des Lichtwechsels des eruptiven Veränderlichen V 725 Aquilae auf Sonneberger Astrographenplatten

Th. Fuhrmeister, Sonneberg

(Eingegangen am 30. Mai 1991)

Bereits im Jahre 1949 wurden 3 Erhellungen des Objektes, die auf Sonneberger Platten gefunden wurden, veröffentlicht (1). Das Objekt wurde als Zwergnova klassifiziert mit einem Lichtwechsel im Bereich von $16^m.2$ - $13^m.7$.

Die Durchsicht von ca. 250 weiteren Astrographenplatten erbrachte lediglich zwei weitere Erhellungen:

J.D.	
242 8040...48	nach (1)
242 9429	nach (1)
243 0704	nach (1)
244 1921	(2 Aufnahmen)
244 7039	

Die Zyklenlänge kann auf Grund des geringen Materials und der nur durch eine einzige Beobachtungsreihe angedeuteten Dauer der Erhellungen (1) noch nicht abgeschätzt werden.

Literatur:

(1) ROHLFS, E., 1949, Veröff. Sternwarte Sonneberg 1, Nr. 3

Bemerkungen zu V 133 in Kernnähe des Kugelhaufens M 3

I. Meinunger, Sonneberg

(Eingegangen am 2. Mai 1991)

Dieser RRab-Stern befindet sich in unmittelbarer Nähe eines für die Schätzungen sehr störenden Nachbarsterns sowie in Kernnähe von M3: Auf einem großen Teil der zur Verfügung stehenden Tautenburger M3-Platten (1963 bis 1978) war der Veränderliche vom Nachbarstern nicht getrennt wahrnehmbar; außerdem war der Veränderliche oftmals (bei länger belichteten Platten) Bestandteil des nicht aufgelösten Kerns von M3. Mit der von Th. MÜLLER (Berlin-Babelsberg Veröff. 11, p.70; 1933) angegebenen mittleren Periode $0\overset{d}{.}5507230$ und dem Ausgangsmaximum 241 5021.482 ließen sich die hier beobachteten Maxima oder Erhellungen wie folgt berechnen:

J.D.	E	B-R	Bereich
241 5021.482	0	$0\overset{d}{.}000$	pg
243 8473.513	42584	+0.043	B
8843.531	43256	-0.025	U
8901.400	43361	+0.018	U
8902.462	43363	-0.021	U
8940.472	43432	-0.011	U
9287.450	44062	+0.011	B
9309.430	44102	-0.038	V
9537.488	44516	+0.021	B
9538.535	44518	-0.034	B
9597.553	44625	+0.057	V
9620.566	44667	-0.060	B
9965.384	45293	+0.005	r
244 0004.420	45364	-0.060	B
0319.438	45936	-0.056	B
0656.496	46548	-0.040	U
1421.484	47937	-0.006	U
2122.567	49210	+0.006	B
2924.420	50666	+0.006	B

Beobachtungen von V 81, V 82, V 83, V 84, V 85 im Kugelhaufen M 3

I. Meinunger, Sonneberg

(Eingegangen am 11. Juni 1991)

Einleitende Bemerkungen siehe Mitt. Veränderl. Sterne 10,31 (1983) und 10,123 (1985). Als Vergleichsstern diente auch I-I-51 aus Astrophys. J. 162,843 (1970).

V 81

Die Saisonlichtkurven dieses RRab-Sterns wurden mit dem Ausgangsmaximum 243 8914.469 (B) und P (SZEIDL) = 0ᵈ5291105 berechnet: Der Trend des sich geringfügig vergrößernden Periodenwertes, wie in Budapest Mitt. Nr. 5,p.254 (1965) im (O-C)-Diagramm angezeigt, setzt sich auch im Beobachtungszeitraum von 1963 bis 1978 fort. Folgende Erhellungen oder Maxima wurden beobachtet:

J.D.	E	B-R	Ber.
243 8106.535	-1527	+0ᵈ018	V
8168.435	-1410	+0.012	r
8473.634	- 833	-0.086	B
8831.429	- 157	+0.030	V
8843.531	- 134	-0.037	U
8851.475	- 119	-0.030	i
8852.507	- 117	-0.056	i
8878.448	- 68	-0.041	U
8914.428	0	-0.041	U
8914.469	0	0.000	B
8914.496	0	+0.027	V
9180.547	+ 503	-0.065	U
9205.488	+ 550	+0.008	V
9286.434	+ 703	0.000	V
9287.450	+ 705	-0.042	B
243 9527.669	+1159	-0ᵈ039	B
9536.672	+1176	-0.031	B
9596.442	+1289	-0.050	V
9597.577	+1291	+0.026	V
9615.565	+1325	+0.025	V
9997.489	+2047	-0.069	U
244 0004.420	+2060	-0.017	B
0652.526	+3285	-0.071	U
0652.555	+3285	-0.042	B
0679.525	+3336	-0.057	V
1335.695	+4576	+0.016	B
2132.546	+6082	+0.027	B
2477.518	+6734	+0.019	B
2477.540	+6734	+0.041	V

V 82

Aus den Saisonlichtkurven (Ausgangsmaximum 243 8901.381 (B) und P (SZEIDL) = 0ᵈ5245061) im Beobachtungszeitraum von 1963 bis 1978 dieses RRab-Sterns ist das weitere Anwachsen des Periodenwertes - wie bereits in Mitt. Sternw. Budapest 5, Nr. 58,p.80 und p.254 (1965) sichtbar - zu beobachten:

J.D.	E	B-R	Ber.
243 8112.529	-1504	+0ᵈ005	V
8413.536	- 930	-0.054	B
8817.517	- 160	+0.057	U
8827.484	- 141	+0.058	U
8830.577	- 135	+0.004	U
8849.465	- 99	+0.010	i
8850.536	- 97	+0.032	i
8901.381	0	0.000	B
8901.400	0	+0.019	U
8902.416	+ 2	-0.014	U
8914.428	+ 25	-0.066	U
8914.469	+ 25	-0.025	B
8914.496	+ 25	+0.002	V
243 9204.533	+ 578	-0ᵈ013	V
9204.559	+ 578	+0.013	o.F.
9205.568	+ 580	-0.026	V
9232.370	+ 631	+0.026	i
9266.427	+ 696	-0.010	r
9287.450	+ 736	+0.033	B
9309.430	+ 778	-0.017	V
9527.669	+1194	+0.028	B
9536.562	+1211	+0.004	B
9537.638	+1213	+0.031	B
9538.647	+1215	-0.009	B
9589.504	+1312	-0.029	V
9596.442	+1325	+0.090	V
9609.456	+1350	-0.008	V

(Fortsetzung)

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 9620.465	+1371	$-0^d.014$	V	244 0679.504	+3390	$+0^d.047$	B
9622.566	+1375	-0.011	B	2477.518	+6818	+0.054	B
244 0004.420	+2103	+0.003	B	2477.540	+6818	+0.076	V
0648.510	+3331	-0.001	B	2924.420	+7670	+0.077	B
0649.614	+3333	+0.054	B	3247.541	+8286	+0.102	B

V 83

Auch im Zeitraum von 1963 bis 1978 vergrößerte sich der Periodenwert dieses RRab-Sterns gegenüber der von B. SZEIDL (Mitt. Sternw. Budapest 5, Nr. 58,p.81; 1965) angegebenen mittleren Periode, wie aus den Saisonlichtkurven mit dem Ausgangsmaximum 243 8827.551 (U) und P (SZEIDL) = $0^d.5012408$ entnommen werden konnte. Folgende Erhellungen oder Maxima wurden beobachtet:

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8168.435	-1315	$+0^d.016$	r	244 0002.486	+2344	$+0^d.027$	B
8413.536	- 826	+0.010	B	0352.373	+3042	+0.047	V
8414.466	- 824	-0.063	o.F.	0380.434	+3098	+0.039	V
8473.634	- 706	-0.041	B	0381.427	+3100	+0.030	B
8817.517	- 20	-0.009	U	0383.430	+3104	+0.028	B
8827.551	0	0.000	U	0624.589	+3585	+0.090	B
8830.577	+ 6	+0.019	U	0649.614	+3635	+0.053	B
9180.470	+ 704	+0.046	U	0653.651	+3643	+0.080	U
9204.533	+ 752	+0.049	V	1385.438	+5103	+0.055	r
9205.488	+ 754	+0.001	V	1389.430	+5111	+0.037	V
9242.580	+ 828	+0.002	r	1421.562	+5175	+0.090	V
9589.451	+1520	+0.014	V	1421.583	+5175	+0.111	B
9596.442	+1534	-0.012	V	1771.436	+5873	+0.098	B
9610.541	+1562	+0.052	V	1772.400	+5875	+0.059	B
9615.565	+1572	+0.063	V	1773.437	+5877	+0.094	U
9616.515	+1574	+0.011	V	2836.616	+7998	+0.141	V
9618.528	+1578	+0.019	V	2837.588	+8000	+0.111	B
9619.545	+1580	+0.034	V	2839.590	+8004	+0.108	V
9622.566	+1586	+0.047	B				
9966.383	+2272	+0.013	B				
9997.489	+2334	+0.042	U				

V 84

Die Saisonlichtkurven dieses RRab-Sterns zeigten keine ausgeprägten Besonderheiten. Die beobachteten Maxima oder Erhellungen im Zeitraum von 1963 bis 1978 ließen sich mit P (SZEIDL) = $0^d.5957289$ und dem Ausgangsmaximum bei 243 9529.546 wie folgt berechnen:

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8144.427	-2325	-0^{d}.049	V	243 9622.503	+ 156	+0^{d}.023	i
8521.499	-1692	-0.074	V	9965.579	+ 732	-0.041	B
8801.637	-1222	+0.072	r	244 0319.467	+1326	-0.015	V
8801.562	-1222	-0.003	o.F.	0381.427	+1430	-0.011	B
8853.413	-1135	+0.019	i	0622.695	+1835	-0.014	U
8856.432	-1130	+0.060	i	0652.497	+1885	+0.002	B
8882.560	-1086	-0.024	V	0652.526	+1885	+0.031	U
9180.470	- 586	+0.021	U	0653.651	+1887	-0.035	U
9205.488	- 544	+0.019	V	1337.533	+3035	-0.050	r
9286.465	- 408	-0.024	V	1389.430	+3122	+0.018	V
9529.546	0	0.000	B	1421.562	+3176	-0.019	V
9609.375	+ 134	+0.001	V	2476.564	+4947	-0.053	V
9610.541	+ 136	-0.024	V	2898.366	+5655	-0.027	V
9610.573	+ 136	+0.008	B	3247.488	+6241	-0.002	B
9615.367	+ 144	+0.036	V	3571.582	+6785	+0.015	V
9616.515	+ 146	-0.007	V				

V 85

Im Beobachtungszeitraum von 1963 bis 1978 ist bei diesem RRc-Stern mit variierender Lichtkurve eine Tendenz des wachsenden Periodenwertes aus den Saisonlichtkurven - mit P (SZEIDL) = 0^{d}.3558189 und dem Ausgangsmaximum 243 8473.634 - ersichtlich. Die Breite der Maxima erscheint nach der Verteilung der Beobachtungen unterschiedlich: Im B-Bereich wurden in den Jahren 1967, 1970 Maxima beobachtet, die etwa 0^{P}.4 breit waren, wogegen 1964 und 1974 die Breite nur etwa 0^{P}.15 betrug. Doppelmaxima konnten nicht zweifelsfrei (z.B. 1963, V-Bereich) festgestellt werden.

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8118.554	- 998	+0^{d}.027	V	243 9538.647	+2993	+0^{d}.047	B
8413.536	- 169	+0.035	B	9589.504	+3136	+0.022	V
8473.634	0	0.000	B	9593.426	+3147	+0.030	V
8830.577	+1003	+0.057	U	9609.425	+3192	+0.017	V
8831.645	+1006	+0.057	U	9610.541	+3195	+0.066	V
8832.653	+1009	-0.002	V	9615.565	+3209	+0.108	V
8881.366	+1146	-0.036	U	9616.515	+3212	-0.009	V
8883.528	+1152	-0.009	V	9620.465	+3223	+0.027	V
8901.381	+1202	+0.053	B	244 0004.420	+4302	+0.053	B
8902.416	+1205	+0.020	U	0319.407	+5187	+0.140	V
8908.416	+1222	-0.029	U	0352.373	+5280	+0.015	V
8908.462	+1222	+0.017	V	0354.482	+5286	-0.011	V
8914.469	+1239	-0.025	B	0415.422	+5457	+0.084	B
8914.496	+1239	+0.002	V	0624.622	+6045	+0.063	U
8940.472	+1312	+0.004	U	0649.547	+6115	+0.080	B
9117.691	+1810	+0.025	V	0682.578	+6208	+0.020	U
9123.684	+1827	-0.031	U	1771.436	+9268	+0.072	B
9180.610	+1987	-0.036	U	2132.583	+10283	+0.063	V
9205.568	+2057	+0.015	V	2163.559	+10370	+0.083	B
9309.430	+2349	-0.023	V	2839.590	+12270	+0.058	V
9536.523	+2987	+0.058	B	2898.366	+12435	+0.124	V
9537.564	+2990	+0.032	B	3571.582	+14327	+0.131	V

Co-ordinates of SX Canis Minoris

G.A. Richter, Sonneberg

(Received May 28, 1991)

According to a private communication by A. PASCHKE, Rueti (Switzerland), the published co-ordinates of SX CMi cannot be correct.

An examination of the original data concerning the discovery of this object shows that all declinations published anywhere must be increased by exactly 30'. So, for example, instead of the 1950.0 co-ordinates in the GCVS please read:

$$7^h31^m55^s \quad +5^\circ45'\!.1 \quad .$$

AL Comae - search for further maxima

G.A. Richter, Sonneberg

(Received May 30, 1991)

AL Com is a long cyclic dwarf nova with an amplitude of about 7 mag (GCVS 1985), or perhaps even 9 mag (HOWELL and SKODY 1988). It is known to have erupted in 1892 April, 1941 June, 1961 November, 1965 March, 1974 April, 1975 March, and possibly 1976 April (see also HOWELL and SKODY 1988).

AL Com was already observed on Sonneberg plates by WENZEL (1965), who confirmed the outbursts of 1961 and 1965.

In order to find additional eruptions, all available plates of the 40 cm astrograph and Schmidt telescopes of Sonneberg observatory were examined. Sky patrol plates were omitted because of the low maximum brightness of the object. Altogether 323 plates of 171 nights, rather unevenly distributed over the time interval 1956 to 1991, were inspected. (For the years 1959, 1960, 1964, 1974, and 1975 no plates are available.)

No further maximum could be found. Only a single plate from 1976 March 3 (J.D. 244 2841.53) shows an indication of a faint object near the plate limit ($\approx 17^m\!.5$). But it is difficult to say whether it belongs to the possible maximum of 1976 April 15 supposed by FORD (see HOWELL and SKODY 1988) or whether it is only a small brightening or simply a plate fault.

References:

HOWELL, S.B., and SKODY, P., 1988, Publ. Astron. Soc. Pacific 100,224
WENZEL, W., 1965, Inf. Bull. Variable Stars no. 110

Periode und Klassifizierung des veränderlichen Sterns DD Draconis

F. Kühnlenz, Sonneberg (Mitglied des AKV)

(Eingegangen am 4. Juli 1991)

Die Variabilität von DD Dra = BV 234 wurde von STROHMEIER (1958) entdeckt und als langperiodisch klassifiziert. FILATOV (1960) veröffentlichte 9 Minima und stellte Algollichtwechsel mit folgenden Elementen fest:

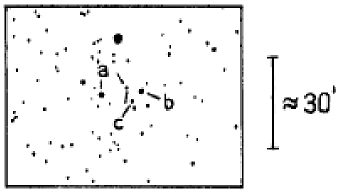
$$\text{Min.} = 243\ 1587.248 + 0^{d}.784 \cdot E \quad .$$

AGERER und LICHTENKNECKER (1988) beobachteten DD Dra mittels Zweifarbenphotometrie und ermittelten 3 Maxima und RR-Lyrae-Lichtwechsel mit den Elementen

$$\text{Max.(hel.)} = 244\ 7271.460 + 0^{d}.32673 \cdot E \quad .$$

Diese recht widersprüchlichen und spärlichen Angaben veranlaßten mich, den Stern zu beobachten.

Der Veränderliche wurde auf insgesamt 1129 Blauplatten der Sonneberger Himmelsüberwachung des Zeitraumes 1958...1989 untersucht. Es wurden die Felder 18^{h} $+60^{o}$ und 19^{h} $+60^{o}$ benutzt. Der Stern wurde mit Hilfe der Argelanderschen Methode unter Verwendung der in der Abbildung dargestellten Vergleichssterne mit den Stufenhelligkeiten der Tabelle beobachtet.



a	0	Stufen
b	4.6	
c	9.2	

Eine erste Überprüfung der Elemente ergab eine Periode von $0^{d}.32675$. Diese Periode beruht auf den 129 Reihenaufnahmen des Jahres 1964 (Feld 19^{h} $+60^{o}$), die einen Zeitraum von 93 Tagen umfassen. Bei einer Ausdehnung des Zeitintervalles auf 1000 Tage ließen sich meine Beobachtungen mit dieser Periode nicht mehr darstellen.

Aus diesem Grund untersuchte Herr SCHULT, Sternwarte Sonneberg, die Periode von DD Dra mit Hilfe des Rechners, wofür ich ihm hier Dank sagen möchte. Zuerst wurde die Periode im Intervall von $0^{d}.17...0^{d}.5$ mit Hilfe eines Programmes zur Fourieranalyse untersucht. Die Beobachtungen wurden hierzu in Zeitintervalle zu 1000 Tagen unterteilt, wobei die Daten ab J.D. 244 5000 wegen zu geringer Datendichte unberücksichtigt blieben. Als Ergebnis erhielten wir eine Periode P_0 von $0^{d}.32679$, was dem anfangs ermittelten Wert entspricht. Allerdings traten im Diagramm auch bei einer Periode P_1 von $0^{d}.24631$ Spitzen auf, die etwa die gleiche Höhe hatten wie die Spitzen bei P_0, in 2 Fällen sogar stärker ausgeprägt waren als diese. Bildet man das Verhältnis P_1/P_0, so erhält man den Wert 0.753 - das liegt genau in der Größenordnung, die bei HOFFMEISTER et al. (1990) für das Periodenverhältnis P_1/P_0 von mehrfachperiodischen Pulsationssternen angegeben wird. Daraufhin versuchten wir, die Beobachtungen durch zwei Sinuskurven unterschiedlicher Periode darzustellen. Es wurden diejenigen Periodenwerte ermittelt, bei denen die Abweichung der Beobachtungen von den Kurven minimal wird. Als Ergebnis erhielten wir die Werte $P_0 = 0^{d}.32679$ und $P_1 = 0^{d}.24813$, was wiederum den mit der Fourieranalyse ermittelten Werten entspricht. Aus den

Resultaten kann nicht ausgeschlossen werden, daß DD Dra ein mehrfachperiodischer Stern ist. Allerdings sind zur Bestätigung oder Widerlegung dieser Hypothese genauere Beobachtungen erforderlich. Als zusätzliches Erschwernis liegen die beiden Perioden nahe dem Bruchteil eines ganzen Tages (1/3 bzw. 1/4), so daß eine längere systematische Untersuchung des Sterns erforderlich ist.

Literatur:

AGERER, LICHTENKNECKER, 1990, Inf. Bull. Variable Stars no. 3213
FILATOV, 1960, Astron. Tsirk. no. 215,22
HOFFMEISTER, RICHTER, WENZEL, 1990, Veränderliche Sterne, 3. Auflage, Verlag J.A. Barth, Leipzig
STROHMEIER, 1958, Kleine Veröff. Sternwarte Bamberg Nr. 24

Photographic observations of TT Ari in the season 1990/91

W. Götz and K. Heiland, Sonneberg

(Eingegangen am 15. Juli 1991)

Abstract

Photographic observations of the star in the blue range are given. The star is in its high state.

The star was measured on 41 blue sensitive plates (ORWO-ZU21+GG13+BG12) from 20 nights obtained with the Schmidt camera 50/70/172 cm of Sonneberg Observatory covering the time interval between September 14, 1990, and February 2, 1991. The observations are linked to the sequence of comparison stars given by GÖTZ (1985). The lightcurve in B, which shows the long-term behaviour of the star, is given in Figure 1, where the means of brightness of each night are depicted. The individual observations are listed in the table (p. 102).

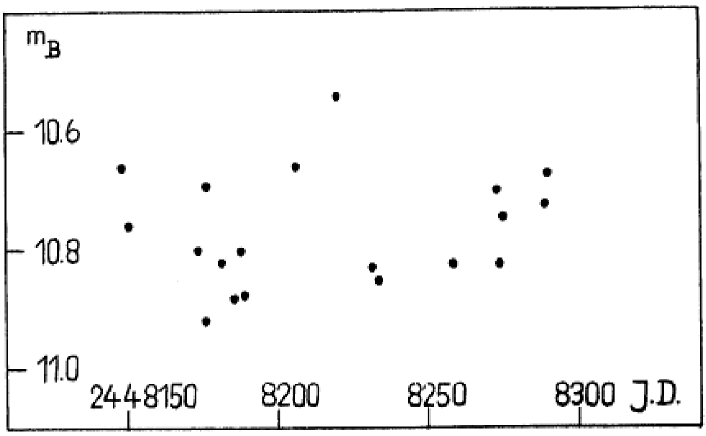


Fig. 1

J.D.hel 244....	m_B	J.D.hel 244....	m_B
8149.448	$10^m_.66$	8220.480	$10^m_.59$
8151.437	10.79	8232.317	10.87
8151.454	10.74	8232.334	10.80
8174.300	10.80	8233.330	10.93
8176.390	10.94:	8233.347	10.77
8176.408	10.89	8234.286	10.97
8177.410	10.67	8234.314	10.72
8177.429	10.66	8273.242	10.70
8177.449	10.74	8273.259	10.70
8179.426	10.76	8274.245	10.76
8179.447	10.70	8274.284	10.79
8182.475	10.89	8274.302	10.78
8182.493	10.76	8274.320	10.93
8186.512	10.98	8275.258	10.73
8186.567	10.77	8275.277	10.72
8188.522	10.77	8275.295	10.70
8188.540	10.83	8275.312	10.81
8189.473	10.88	8289.270	10.72
8206.385	10.69	8290.244	10.67
8206.403	10.64	8290.261	10.68
8220.463	10.50		

As can be seen from Figure 1 (p.101) and the table the star is in its high state. The observations are scattering in the range between $m_B = 10^m_.50$ and $m_B = 10^m_.98$. This scattering is caused by sinusoidal variations with an amplitude of about $\Delta m_B \approx 0.2$ mag, and a period of $P = 0^d_.13246$ and by irregular flickering. The light-curve given in Figure 2 where crosses represent mean values, is in agreement with the instaneous elements

$$\mathrm{Max.} = 244\ 8149.464 + 0^d_.13246 \cdot E \quad .$$

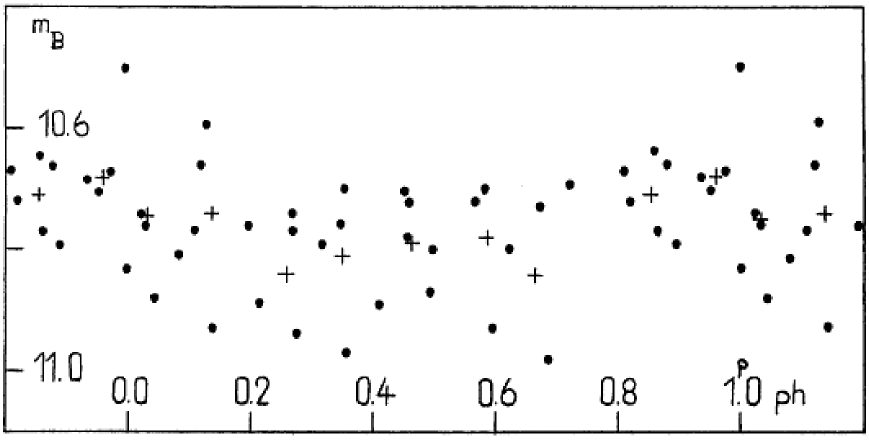


Fig. 2

Reference:

GÖTZ, W., 1985, Inf. Bull. Variable Stars No. 2823

Beobachtungsergebnisse des Arbeitskreises "Veränderliche Sterne" (Teil XVIII)

Bruno-H.-Bürgel-Sternwarte, Hartha

(Eingegangen am 22. Juli 1991)

A) Minima von Bedeckungsveränderlichen

	J.D.⊙244...	E	B-R	n	Art	Beob.	Bemerk.
AR Aur	8263.3670	+ 2385	+0ᵈ.0610	31	pe(V)	Bus	a)
	290.2446	+ 2391.5	+0.0641	14	pe(V)	Bus	Min.II
LY Aur	8175.128	+ 2277	-0.016	59	vis	Gol	Nm
RX Cas	8170.10			49	vis	Ens	Nm
	185.15			-	vis	Ens	
RZ Cas	8330.322	+ 4292	+0.016	53	vis	Rcr	Nm
U Cep	8256.291	+ 1490	+0.047	71	vis	Ens	Nm
NN Cep	8206.19	+ 1797	+0.01	72	vis	Ens	Nm
GO Cyg	8206.046	+19889	+0.036	71	vis	Ens	Nm
u Her	8093.510	+20606	+0.015	46	vis	Gol	Nm
beta Lyr	8162.72	+ 879	+0.18	35	vis	Gol	Nm b)
	169.22	+ 879.5	+0.21	-	vis	Gol	Nm Min.II
	188.47	+ 881	+0.05	61	vis	Rat	Nm
	188.74	+ 881	+0.32	61	vis	Rcr	Nm
	253.20	+ 886	+0.10	46	vis	Ens	Nm
	272.29	+ 887.5	-0.22	68	vis	Rcr	Nm Min.II
SAO 023229	8118.374	+ 58	+0.011	14	vis	Kuh	c)

B) Maxima von RR-Lyr und Delta-Cep-Sternen

	J.D.⊙244...	E	B-R	n	Art	Beob.	Bemerk.
eta Aql	8177.47	+ 1685	+0ᵈ.17	32	vis	Gol	NM
	177.78	+ 1685	+0.48	18	vis	Rat	NM
RT Aur	8229.66	+ 1574	+0.45	35	vis	Gol	NM
delta Cep	8101.36	+ 996	+0.07	68	vis	Gol	NM
	176.42	+ 1010	+0.01	30	vis	Rcr	NM
	187.17	+ 1012	+0.02	31	vis	Rat	NM
X Cyg	8189.05	+ 266	-0.11	19	vis	Rat	NM
SU Cyg	7770.421	+ 1162	+0.117	59	vis	Rcr	NM
	8174.298	+ 1267	+0.212	26	vis	Rat	NM
zeta Gem	221.29	+ 437	+0.34	34	vis	Gol	NM
RR Lyr	7849.285	+ 2108	+0.020	35	vis	Rcr	NM d)
	8180.288	+ 2692	-0.011	34	vis	Rat	NM
T Mon	8299.76	+ 167	+0.54	30	vis	Gol	NM
DY Peg	8175.3702	+50370	+0.0022	12	vis	Bgr	
	176.3210	+50383	+0.0049	12	vis	Bgr	
S Sge	8177.36	+ 656	-0.08	48	vis	Rat	NM
SZ Tau	8262.663	+ 4330	+0.092	56	vis	Ens	NM
T Vul	8274.33	+ 1481	+0.29	45	vis	Rcr	NM

C) Mirasterne

		J.D.244...	E	B-R	m_v	n	Beob.	Bem.
R	And	8100	+12	$+53^d$	$8^m.4$	17	Hin	
V	And	8197:	+20	+41:	9.1	12	Bra	
W	And	8248	+12	- 7	7.2	15	Bra	
		8252	+12	- 3	7.6	10	Voh	
R	Aqr	8229	+15	+27	6.85	16	Gol	
T	Aqr	8187	+24	-23	7.5	13	Bra	
		8188:	+24	-22:	7.6	7	Rcr	
		8188	+24	-22	7.8	8	Rat	
R	Ari	8243:	+20	+ 2:	8.7:	9	Zis	
		8244	+20	+ 3	9.0	12	Bra	
R	Aur	8152	+ 9	+30	7.6	21	Voh	
X	Aur	7897	+20	+17	9.0	16	Bra	
		8222	+22	+15	8.7	14	Bra	
		8222	+22	+15	9.1	12	Voh	
		8223	+22	+16	-	13	Zis	
R	Boo	8088	+16	- 4	7.7	23	Voh	
		8090	+16	- 2	6.6	17	Bra	
		8090	+16	- 2	7.0	22	Hin	
		8096	+16	+ 4	6.7	13	Gol	
S	Boo	7950	+14	+44	8.5	14	Zis	
		7957:	+14	+51:	8.7	8	Bra	
		8220	+15	+43	7.9	20	Bra	
		8224	+15	+47	7.7	13	Zis	
R	Cam	7999	+15	-32	8.6	21	Bra	
		8004:	+15	-27:	8.3	18	Zis	
		8287	+16	-15	8.1	20	Bra	
T	Cam	7900	+12	-11	8.6	33	Bra	
		8270	+13	-15	8.6	29	Bra	
V	Cam	8097	+ 9	- 7	8.2	13	Hin	
X	Cam	7983	+23	+ 2	8.0	11	Hin	
		7987	+23	+ 6	8.0	15	Bra	
		8128:	+24	+ 4:	8.0	15	Bra	
		8132	+24	+ 8	7.8	11	Hin	
		8264	+25	- 4	8.1	10	Bra	
R	Cas	7922	+ 8	+15	5.2	38	Bra	
		7928	+ 8	+21	5.1	39	Hin	
		7931	+ 8	+24	5.5	32	Zis	
T	Cas	7892	+ 8.44	-22	[11.6	17	Zis	Min.
		8125:	+ 9	-38:	-	16	Zis	
		8134:	+ 9	-29:	7.7	22	Bra	
U	Cas	7918	+12	-29	8.5	14	Bra	
		8188	+13	-36	8.5	13	Bra	
V	Cas	8013	+15	-24	8.2	19	Voh	
		8016	+15	-21	8.0	12	Hin	
		8018	+15	-19	7.9	13	Bra	
		8018	+15	-19	7.9	12	Zis	
		8231:	+16	-35:	7.8	12	Bra	
		8234	+16	-32	-	15	Zis	
		8249	+16	-17	8.0	18	Klx	
S	Cep	8157	+ 9	-12	6.6	36	Bra	
T	Cep	7949	+ 9.46	+100	10.7	27	Zis	Min.
		8140	+10	+82	6.2	39	Gol	
		8148	+10	+90	5.9	28	Zis	
		8153	+10	+95	6.4	58	Voh	

(Fortsetzung)

	J.D.244...	E	B-R	m_v	n	Beob.	Bem.
omi Cet	8189	+10	$+30^d$	$3^m.9$	15	Ror	
V CrB	8031	+12	-24	8.2	26	Bra	
W CrB	8005	+16	- 1	8.7	13	Hin	
R Cyg	8016:	+ 8	+ 9:	6.8	12	Bra	
	8020	+ 8	+13	6.5	11	Gol	
	8023	+ 8	+16	6.9	20	Hin	
	8026:	+ 8	+19:	6.5	13	Zis	
	8028	+ 8	+21	6.2:	13	Wtt	
U Cyg	8020:	+ 7.52	-22:	10.3	19	Zis	Min.
	8246	+ 8	-18	6.8	22	Bra	
RT Cyg	8005	+18	- 8	7.2	9	Wtt	
	8013	+18	0	7.3	12	Zis	
	8015	+18	+ 2	7.0	16	Hin	
	8110	+18.56	-10	11.8	18	Voh	Min.
	8200	+19	- 3	7.8	15	Bra	
	8200:	+19	- 3:	8.3	10	Zis	
	8204	+19	+ 1	7.8	13	Wtt	
	8205	+19	+ 2	8.05	13	Gol	
CN Cyg	7953	+17	+ 1	8.6	14	Hin	
chi Cyg	8275	+15	+14	5.4	25	Klx	
R Del	8095	+14	+13	8.4	14	Hin	
R Dra	7972	+13	0	7.0	23	Hin	
	7976	+13	+ 4	7.2	17	Zis	
	7977	+13	+ 5	6.9	19	Bra	
	7978	+13	+ 6	6.9	10	Rat	
	8224	+14	+ 7	7.8	14	Zis	
	8228	+14	+11	7.8	19	Bra	
X Gem	8302	+18	- 6	7.8	11	Bra	
S Her	8112	+10	-15	7.3	15	Hin	
	8112	+10	-15	7.5	18	Voh	
	8116	+10	-11	7.4	19	Bra	
T Her	7785	+15	+ 4	7.9	19	Bra	
	8104:	+17	- 7:	8.1	18	Klx	
	8111	+17	0	8.6	12	Hin	
	8112	+17	+ 1	8.3	13	Bra	
U Her	7846:	+ 7	+ 9:	7.0	13	Bra	
W Her	8099	+11	-40	8.8	20	Voh	
	8104	+11	-35	8.6	16	Hin	
RS Her	8025	+13	-25	7.8	14	Hin	
	8026:	+13	-24:	7.7	10	Zis	
SY Her	8057	+24	+ 3	8.5	12	Hin	
S Lac	8117	+18	-34	8.6	12	Hin	
	8122	+18	-29	8.4	13	Bra	
R Leo	7940	+12	+57	6.2	44	Klx	
	7943	+12	+60	5.9	19	Hin	
	7945	+12	+62	5.95	30	Zis	
	7946	+12	+63	6.0	25	Bra	
	8265:	+13	+72:	5.8:	23	Klx	
W Lyr	8062	+15	+10	7.6	15	Bra	
	8062	+15	+10	7.6	21	Hin	
	8065	+15	+13	8.0	33	Voh	
X Oph	8040:	+10	+23:	6.8:	24	Klx	
	8057	+10	+40	6.7	26	Hin	
	8219	+10.47	+47	9.2	35	Klx	Min.

(Fortsetzung)

		J.D.244...	E	B-R	m_v	n	Beob.	Bem.
RY	Oph	8047	+19	-16^d	7^m8	10	Hin	
U	Ori	8210	+ 8	+10	6.5	16	Zis	
S	Peg	8183	+ 9	- 1	7.3	20	Bra	
V	Peg	8131	+12	- 3	8.6	13	Bra	
Z	Peg	8076	+ 9	-27	7.7	14	Hin	
R	Per	8293:	+14	+16:	9.1	9	Bra	
U	Per	7916	+ 9	-32	8.0	35	Bra	
		8229:	+10	-40:	8.3	28	Bra	
Y	Per	7946:	+11	-34:	8.9	13	Bra	
		8210	+12	-18	9.0	25	Voh	
R	Ser	8006	+ 7	-10	7.2	12	Zis	
		8008	+ 7	- 8	6.7	21	Hin	
		8022	+ 7	+ 6	7.1	15	Bra	
S	Ser	8021	+ 7	-15	8.2	12	Hin	
U	Ser	8029	+10	+ 2	8.4	13	Hin	
R	Tri	7906	+10	+22	5.7	28	Bra	
		8168	+11	+17	6.6	17	Gol	
		8169	+11	+18	6.1	22	Bra	
		8170	+11	+19	6.7	16	Rat	
		8179	+11	+28	6.6	21	Voh	
R	UMa	7995	+ 8	-11	7.3	20	Bra	
		7996	+ 8	-10	7.3	24	Hin	
		7996	+ 8	-10	7.3	15	Zis	
		7998:	+ 8	- 8:	7.5	21	Klx	
		8000	+ 8	- 6	7.45	23	Gol	
		8002	+ 8	- 4	7.9	23	Voh	
		8003	+ 8	- 3	7.3	7	Wtt	
		8008	+ 8	+ 2	7.5	9	Rat	
		8296	+ 9	-12	7.45	26	Gol	
S	UMa	7809	+ 9	- 2	8.1	24	Bra	
		8029	+10	- 8	8.2	24	Bra	
		8032:	+10	- 5	7.6:	9	Wtt	
		8040	+10	+ 3	8.0	26	Hin	
		8046	+10	+ 9	8.2	20	Gol	
		8054	+10	+17	8.2	30	Voh	
		8241	+11	-22	8.4	15	Bra	
		8241:	+11	-22:	7.7	14	Wtt	
		8251	+11	-12	8.3	12	Gol	
		8251	+11	-12	8.2	24	Klx	
T	UMa	7915	+ 9	-17	7.5	25	Bra	
		7918	+ 9	-14	7.4	21	Zis	
		8177	+10	-12	7.3	20	Bra	
		8181	+10	- 8	7.75	18	Gol	
		8182	+10	- 7	7.5	18	Wtt	
		8186	+10	- 3	7.6	15	Voh	
RS	UMa	8072	+ 8	+ 9	8.6	10	Hin	
S	UMi	7890	+ 6	-27	8.2	34	Bra	
		8069	+ 6.50	-13	11.8	19	Voh	Min.
		8225:	+ 7	-23:	8.2	14	Zis	
		8229	+ 7	-19	8.2	27	Bra	
		8231	+ 7	-17	8.2	28	Voh	
U	UMi	7995:	+ 8	-70:	8.4	18	Zis	
		8003	+ 8	-62	8.8	28	Voh	

(Fortsetzung)

		J.D.244...	E	B-R	m_v	n	Beob.	Bem.
R	Vir	7982	+14.50	-2^d	$10^m.7$:	13	Zis	Min.
		8044:	+15	-12:	6.8	8	Bra	
		8044	+15	-12	6.8	13	Voh	
		8046	+15	-10	7.0	8	Hin	
R	Vul	8047	+18	0	9.0	10	Hin	
		8192	+19	+ 8	8.3	12	Bra	

Bemerkungen:

Nm Normalminimum
NM Normalmaximum

vis visuell
pe photoelektrisch (V)

Elemente nach:

a) Bull. Astron. Inst. ČSFR 39,p.69 (1988)
b) Acta Astron. 29,p.393 (1979)
c) Inf. Bull. Variable Stars no. 3479
d) Astron. Tsirk. no. 1508,p.7

Beobachter:

Bgr	Berger, H.	Scharfenberg
Bra	Branzk, R.	Beerwalde
Bus	Busch, H.	Hartha
Ens	Enskonatus, P.	Berlin
Gol	Goldhahn, H.	Lohmen
Hin	Hinzpeter, R.	Coswig
Klx	Klix, P.	Sohland
Kuh	Kühnlenz, F.	Sonneberg
Rat	Rätz, M.	Herges-Hallenberg
Rcr	Rätz, K.	Herges-Hallenberg
Voh	Vohla, F.	Altenburg
Wtt	Witt, U.	Berlin
Zis	Zische, E.	Weigsdorf-Köblitz

Fehlerberichtigung:

In der 16. Auswertung (Mitt. Veränderl. Sterne 12,p.16) muß es bei β Lyr richtig heißen

$$J.D._{\odot} = 244\ 7386.39,\ B-R = +0^d.07.$$

Adresse für Anfragen:

Bruno-H.-Bürgel-Sternwarte, O-7302 Hartha, Deutschland

Light-curve of the eclipsing system V 1156 Cygni

W. Wenzel and A. Wicklein, Sonneberg

(Eingegangen am 12. August 1991)

Abstract

The catalogued value of the period ($44^{d}.5$) was checked by means of 385 photographic exposures. The mean light-curve and the statistics of observations yield a very small D/P ≈ 0.02.

Stimulated by the identification of V 1156 Cyg with an IRAS infrared point source by FRIEDEMANN and LÖWE (1990) and the photoelectric ubvy measurements by FRIEDEMANN and REIMANN (1991) we checked WACHMANN's (1966) elements of the star (HBV 430) by observations on 385 photographic plates of the Sonneberg collection.

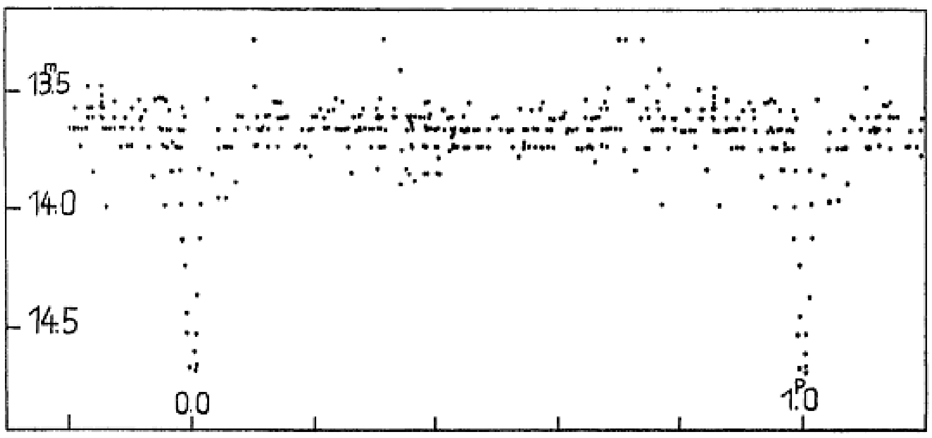
The minima which could be found on our material are listed in the following table, where we give, for the sake of completeness, also WACHMANN's eclipse dates (Wa):

Min.	E	O-C	m_{pg}	
243 3541.80 :	- 41	$+0^{d}.06$		Wa
4121.05	- 28	-0.03		Wa
5368.90	0	+0.01		Wa
6661.570	+ 29	+0.299	$14^{m}.66$	(3 plates)
7909.08	57	0.00		Wa
9379.376	90	-0.342	14.52	
244 5930.360	237	-0.369	14.33	(2 plates)
6287.490	245	+0.243	14.67	
6554.531	251	-0.104	14.66	
6644.481	253	+0.717	14.11	
6733.427	255	+0.533	14.35	

E and O-C are computed on the basis of WACHMANN's elements,

$$\text{Min.} = 243\ 5368.895 + 44^{d}.5647 \cdot E \quad .$$

In order to enable a direct comparison with WACHMANN's light-curve, we used his m_{pg} system of comparison star magnitudes (slightly adjusted), although there exists a systematic deviation between them and the B series of VOROSHILOV et al. (1969).



The figure (p.108) shows the mean light-curve deduced by folding our observations by means of the given elements.

Table and light-curve demonstrate the correctness of WACHMANN's elements. A large discrepancy however exists in the D/P values: WACHMANN gave 0.08, whereas from our light-curve follows ≈ 0.02, what is confirmed by the statistics of our data,

$$\frac{\text{number of nights when } [14^{m}\!.10}{\text{total number of observ. nights}} = 0.015 \quad \text{or}$$

$$\frac{\text{number of plates on which } [14^{m}\!.10}{\text{total number of plates}} = 0.016 \quad .$$

If we take the provisional value of $\mathfrak{M}_1 + \mathfrak{M}_2 = 3\,\mathfrak{M}_\odot$, from D/P = 0.02 and wellknown relations we get for the sum of the radii of the two involved bodies

$$r_1 + r_2 = 4\, r_\odot \quad .$$

This is not in contrast to the spectral type of F3V, photometrically derived by FRIEDEMANN and REIMANN (1991) for the bright component of this binary.

References:

FRIEDEMANN and LÖWE, 1990, Inf. Bull. Variable Stars no. 3516
FRIEDEMANN and REIMANN, 1991, Inf. Bull. Variable Stars no. 3549
VOROSHILOV et al., 1969, Katalog Velichin B i V 12000 Zvezd, Naukova Dumka (Glavnaya Astron. Obs.) Kiev
WACHMANN, 1966, Astron. Abhandl. Hamburg VI, Nr. 4

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Optical behaviour of AT Cancri in the season 1990/91

W. Götz, Sonneberg

(Eingegangen am 30. September 1991)

Abstract

Observations of the star on blue-sensitive plates are given.

In complementing the series of observations the star was measured on 28 blue-sensitive plates (ORWO-ZU21+GG13+BG12) from 18 nights obtained with the 50/70/172 cm Schmidt camera of Sonneberg Observatory covering the time interval between October 22, 1990, and April 15, 1991. The individual observations, which were obtained in linking to the sequence of comparison stars given by GÖTZ (1983) and which are listed in the table show the star in its high state ($12^{m}.42 < m_B < 13^{m}.33$).

J.D. hel. 244....	m_B	J.D. hel. 244....	m_B
8187.628	$13^{m}.13$	8329.358	$12^{m}.65$
8249.530	13.03	8330.455	12.88
8249.548	13.03	8330.495	12.93
8249.565	12.82	8332.433	13.16
8249.583	12.93	8332.450	13.11
8249.601	12.92	8353.391	12.87
8251.525	12.98	8356.327	13.08
8273.460	13.17	8358.342	12.93::
8274.510	13.02	8360.420	12.89
8275.509	13.10	8360.441	12.75::
8306.484	13.33	8360.461	12.81::
8306.502	13.22	8361.376	13.06
8308.490	13.30	8361.396	12.94
8328.443	12.42	8362.378	13.14

The long-term light-curve is given in Figure 1. Small short time-

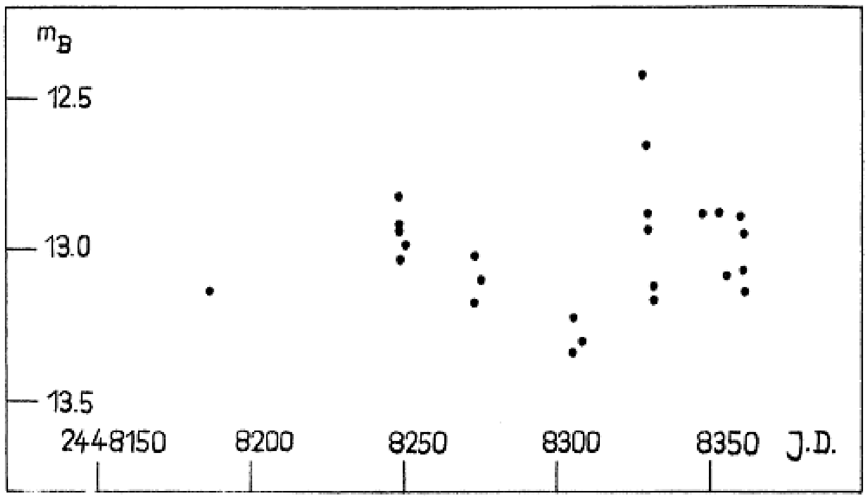


Fig. 1

scale variations can be observed there. A remarkable decrease in brightness with $\triangle B = 0\overset{m}{.}74$ was observed between J.D. hel. 244 8328.443 and 8332.433.

About the behaviour of the orbital changes no positive statement can be made. The results mentioned are given in Figure 2, where the magnitude values are plotted against the phases according to the elements published by GÖTZ (1985).

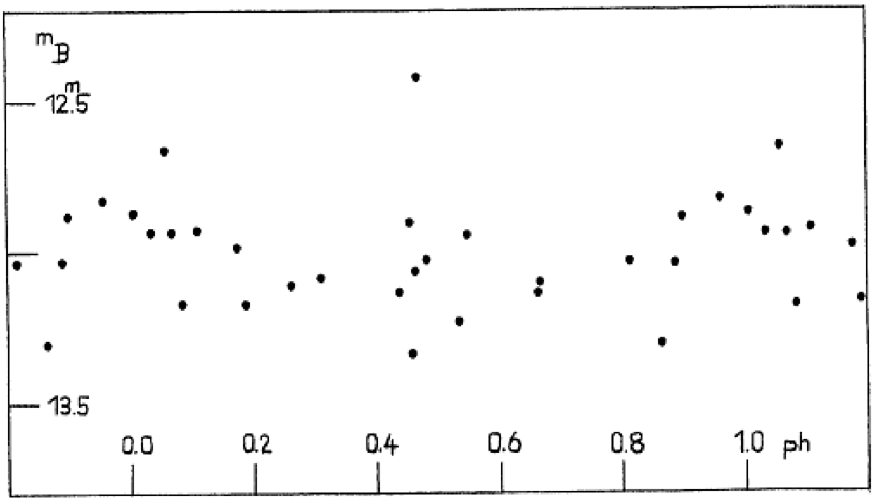


Fig. 2

References:

GÖTZ, W., 1983, Inf. Bull. Variable Stars no. 2363
GÖTZ, W., 1985, Inf. Bull. Variable Stars no. 2734

A period change of the eclipsing binary LS Persei

W. Wenzel and A. Wicklein, Sonneberg

(Eingegangen am 10. Oktober 1991)

Abstract

Observations on Sonneberg plates disclosed a period decrease of $0\overset{d}{.}0001525$ = 0.0052%, which happened around 1974.

Recently ISLES (1991) directed the attention of observers to the fact that in the eighties LS Per showed large O-C of $-0\overset{d}{.}22$ against the 1987 GCVS elements - see also BRELSTAFF (1984; 1985). Deviations of this order of magnitude were also observed by LOCHER (1988; 1989), whereas BUSCH (1978) believed to be able to confirm the elements by observations on Sonneberg astrograph plates of the sixties and early seventies.

In order to clear up the origin of this discrepancy we observed the star on about 220 Sonneberg Sky Patrol plates taken mainly by H. HUTH and B. FUHRMANN from 1970 to 1991, and we searched for minima on exposures of 1947, 1948, 1956, 1957, and 1958. The comparison stars a...g of KUROCHKIN (1971), who also derived the GCVS elements, were used.

O	E	O-C	$O-C_1$	Remarks
243 2441.525	-2385	$-0^d.067$		
2444.474	-2384	- 034		image disturbed
6526.543	- 984	+ 065		
8433.340	- 330	- 001		STROHMEIER (1964)
8739.521	- 225	+ 032		BUSCH
9395.52.	0	000		KUROCHKIN
244 0506.388	+ 381	- 011		BUSCH
0917.453	522	- 059		
1337.355	666	- 017		BUSCH
1573.512	747	- 031		
1990.473	890	- 014		
2095.286	926	- 166		shallow
2302.512	997	+ 046	$+0^d.046$	
2448.272	1047	+ 021	+ 029	
2716.467	1139	- 027	- 006	
3401.561	1374	- 131	- 074	
3436.511	1386	- 159	- 100	
4853.533	1872	- 164	- 031	
4967.371	1911	- 038	+ 101	
5229.508	2001	- 314	- 161	shallow
5238.543	2004	- 026	+ 127	shallow
5681.525	2156	- 229	- 053	BRELSTAFF vis.
6002.440	2266	- 040	+ 153	shallow
6066.410	2288	- 216	- 019	BRELSTAFF vis.
6110.274	2303	- 087	+ 111	
6713.548	2510	- 361	- 132	shallow
6763.397	2527	- 079	+ 153	shallow
6827.256	2549	- 365	- 130	shallow
7107.206	2645	- 322	- 072	LOCHER vis.
7174.34.	2668	- 25.	00.	8 plates
7524.232	2788	- 240	+ 032	LOCHER vis.
8273.385	+3045	- 420	- 109	shallow

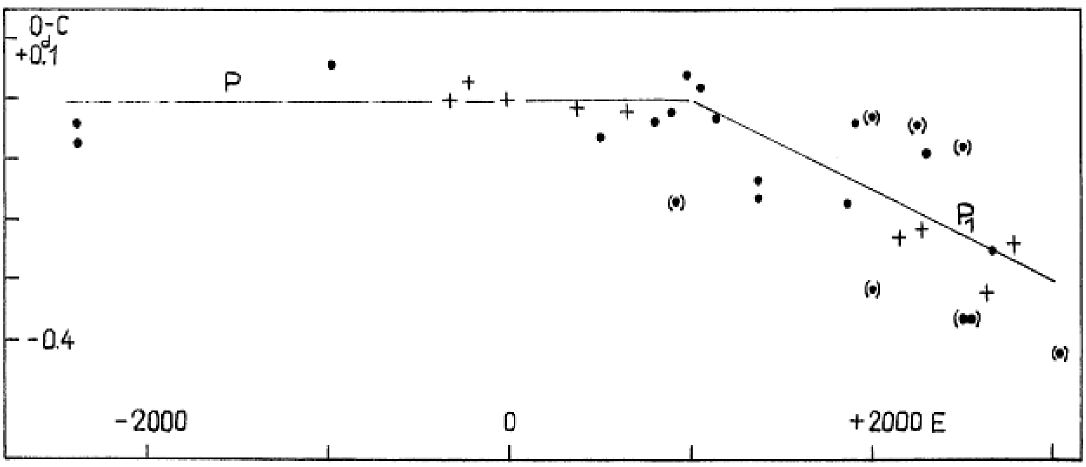


Fig. 1 • Present work + Literature Brackets: shallow

Our table (p.113) gives the faint observations found by us, and in addition the dates of minima which could be deduced from literature. The O-C have been computed by KUROCHKIN's elements,

$$C = 243\ 9395.52 + 2\overset{d}{.}915693 \cdot E\ .$$

Around 1974 ($E \approx 1000$) obviously the period decreased by $0\overset{d}{.}0001525$ = 0.0052%, and the new elements, valid since then, are

$$C_1 = 244\ 2302.466 + 2\overset{d}{.}915541 \cdot (E-997)\ .$$

The O-C diagram is depicted in Figure 1 (p.113), and Figure 2 shows the minimum region of our mean light-curve, folded by C and C_1; the crosses and three of the arrows near phase 0.0 belong to dates before the period change.

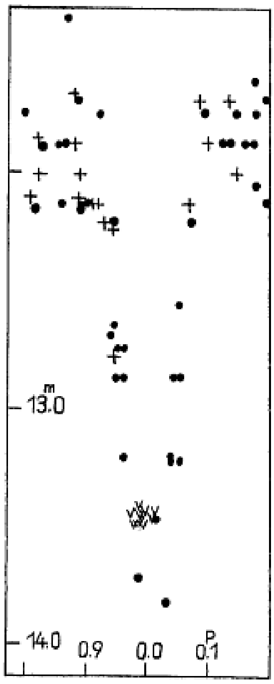


Fig. 2

References:

BRELSTAFF, 1984; 1985, BAA Variable Star Sect. Circ. 60 + 61
BUSCH, 1978, Mitt. Hartha 12
ISLES, 1991, JBAA 101, p.221
KUROCHKIN, 1971, Perem. Zvezdy 18, p.85
LOCHER, 1988; 1989, BBSAG Bull. 86 + 90
STROHMEIER, 1964, cited by WEBER, Inf. Bull. Variable Star no. 64

Beobachtungen von V 86, V 87 im Kugelhaufen M 3

I. Meinunger, Sonneberg

(Eingegangen am 15. Oktober 1991)

Einleitende Bemerkungen siehe Mitt. Veränderl. Sterne 10,31 (1983) und 10,123 (1985). Als Vergleichsstern diente auch I-I-51 aus Astrophys. J. 162,843 (1970).

V 86

Die Verteilung der Beobachtungen des RRc-Sternes V 86 im Zeitraum von 1963 bis 1978 in den Saisonlichtkurven - mit P(SZEIDL) = $0^{\rm d}.2926601$ und dem Ausgangsmaximum 243 8827.484 (U) - deutet auf eine Verringerung des Periodenwertes hin. Folgende Erhellungen wurden festgestellt:

J.D.	E	B-R	Ber.	J.D.	E	B-R	Ber.
243 8107.489	-2460	$-0^{\rm d}.051$	r	243 9609.456	+2672	$-0^{\rm d}.016$	V
8112.529	-2443	+0.014	V	9610.594	+2676	-0.048	B
8413.622	-1414	-0.041	r	9615.565	+2693	-0.053	V
8415.695	-1407	-0.016	B	9616.515	+2696	+0.019	V
8415.725	-1407	+0.014	o.F.	9618.528	+2703	-0.016	V
8472.477	-1213	-0.010	r	9620.553	+2710	-0.040	B
8473.634	-1209	-0.024	B	9621.488	+2713	+0.017	V
8500.570	-1117	-0.013	r	9965.579	+3889	-0.060	B
8827.484	0	0.000	U	244 0002.486	+4015	-0.028	B
8843.531	+ 55	-0.049	U	0319.407	+5098	-0.058	V
8851.475	+ 82	-0.007	i	0319.438	+5098	-0.027	B
8878.372	+ 174	-0.035	U	0622.656	+6134	-0.005	B
8882.529	+ 188	+0.025	V	0652.497	+6236	-0.015	B
8883.385	+ 191	+0.003	U	0652.526	+6236	+0.014	U
8914.428	+ 297	+0.024	U	0653.651	+6240	-0.032	U
9123.684	+1012	+0.028	U	0656.564	+6250	-0.046	B
9205.597	+1292	-0.004	V	0676.513	+6318	+0.002	B
9266.427	+1500	-0.047	r	1389.430	+8754	-0.001	V
9529.546	+2399	-0.030	B	1390.525	+8758	-0.076	B
9536.598	+2423	-0.001	B	2476.564	+12469	-0.099	V
9537.488	+2426	+0.011	B	2477.518	+12472	-0.023	B
9538.647	+2430	-0.001	B	2866.430	+13801	-0.056	V
9540.679	+2437	-0.018	B	3247.488	+15103	-0.041	B
9589.504	+2604	-0.067	V	3250.386	+15113	-0.070	V

V 87

Störende Nachbarsterne erschwerten die Beobachtungen (Kernnähe) dieses wahrscheinlichen RRc-Sternes. Aus der Verteilung der Beobachtungen könnte man auf veränderliches Lichtkurvenverhalten schließen. Im Beobachtungszeitraum von 1963 bis 1978 wurden folgende Erhellungen festgestellt:

	J.D.	Bereich		J.D.	Bereich
243	8473.634	B	244	0648.510	B
	8882.560	V		0649.614	B
	8910.435	U		0652.526	U
	8914.428	U		1369.581	B
	8914.469	B		1421.414	U
	9538.535	B		1772.400	B
	9966.383	B		2162.506	V
244	0002.486	B		2477.518	B
	0004.420	B		2866.430	V
	0319.407	V		3247.488	B
	0354.482	V		3571.582	V

Photoelektrische Beobachtungen von TT Arietis im September 1988

S. Rößiger u. R. Luthardt, Sonneberg

(Eingegangen am 5. November 1991)

Abstract

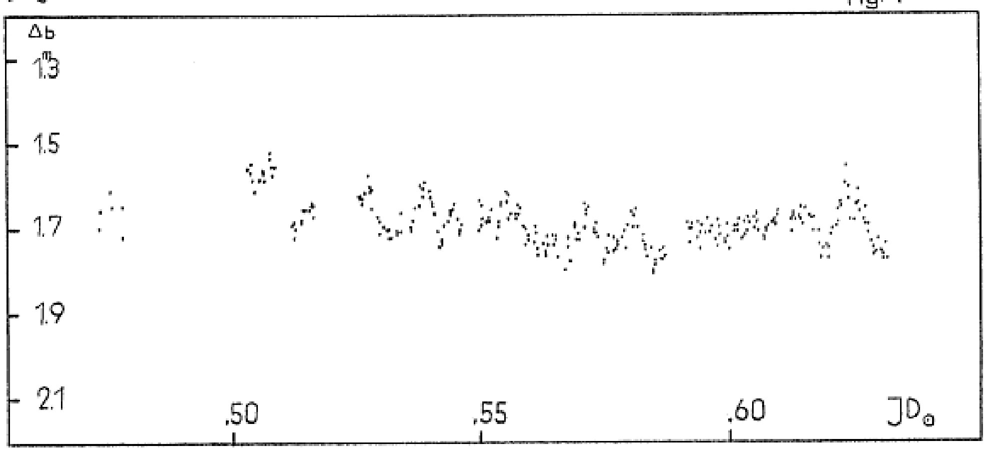
The paper presents light-curves of TT Arietis, an accreting white dwarf in a low-mass binary.

Während einer gemeinsamen Beobachtungsaktion mit anderen Observatorien wurden im September 1988 in 4 aufeinanderfolgenden Nächten am 60-cm-Teleskop II in Sonneberg photoelektrische Beobachtungen von TT Arietis mit relativ hoher Zeitauflösung ($\approx$ 20 s) erhalten. Als Vergleichsstern diente der Stern BD+14°336 ≡ HD 12720, die Messungen erfolgten im blauen Spektralbereich.

Die Lichtkurven (Fig. 1-4) zeigen die Helligkeitsdifferenz zum Vergleichsstern im instrumentellen System, Δb. Aus dem Verlauf der Kurven lassen sich über den Lichtwechsel folgende Aussagen treffen:

$JD_\odot$ = 244 7412.

Fig. 1



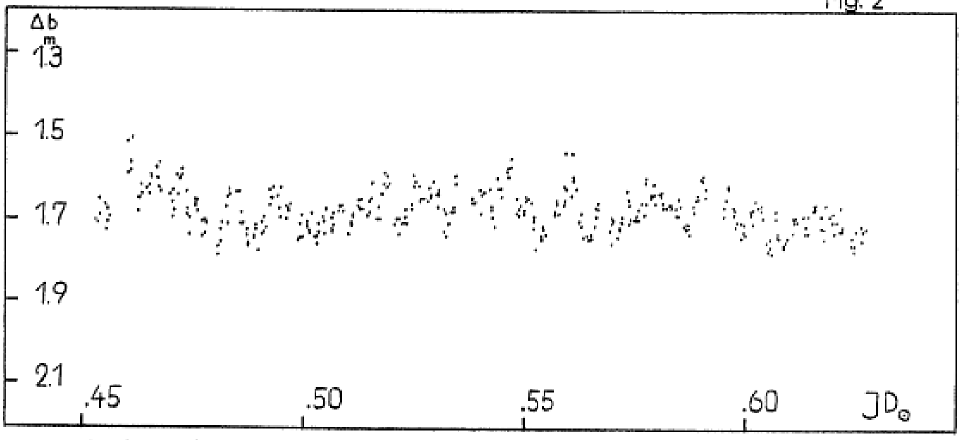
1. Zur Zeit der Beobachtung befand sich der Veränderliche im "aktiven" Stadium, d.h. er war hell (10.2 ≲ B ≲ 10.5).
2. Die Lichtkurven verlaufen, abgesehen von den kurzzeitigen Schwankungen, ziemlich flach, so daß die früher festgestellte photometrische Periode von rund 0.13 Tagen kaum erkennbar ist.
3. Es treten quasiperiodische Fluktuationen ("flickering") mit einer Amplitude um 0.1 mag auf, deren Zyklenlänge 18 ± 5 Minuten beträgt. Eine Frequenzanalyse hat SCHULT (1992) durchgeführt.
4. In der Nacht JD 244 7414 konnte auch ein kurzzeitiger stärkerer Helligkeitsabfall ("dip") beobachtet werden, die Schwächung betrug etwa 0.4 mag.

Literatur:

RÖSSIGER, S., 1987, Inf. Bull. Variable Stars no. 3007
SCHULT, R., 1992, Contr.Astron.Obs. Skalnaté Pleso (in preparation)
TREMKO, J. et al., 1990, Contr. Astron. Obs. Skalnaté Pleso 20,69
WENZEL, W. et al., 1986, Astron.Inst.Czechoslovak.Acad.Sci.Prepr.38

$JD_{\odot}$ = 244 7413.

Fig. 2



$JD_{\odot}$ = 244 7414.

Fig. 3

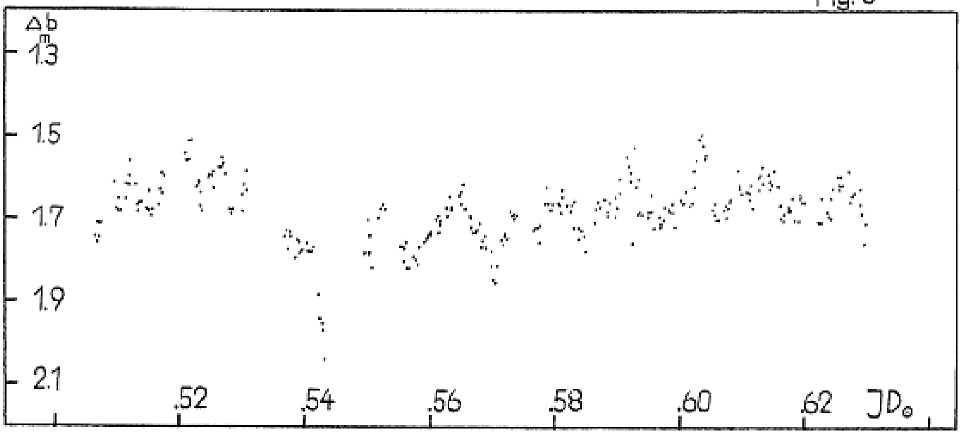
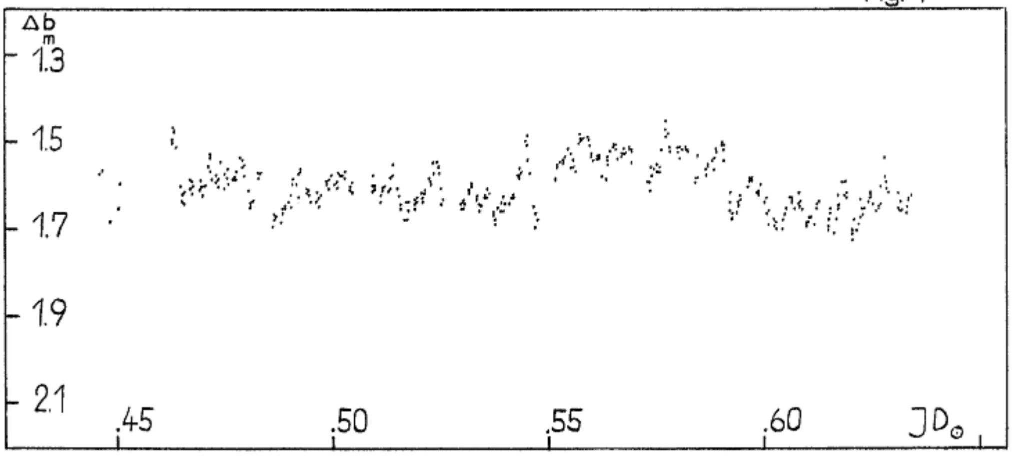


Fig. 4 s. S. 118

JD⊙ = 244 7415.

Fig. 4



Optical behaviour of AM Herculis in the season 1991

W.Götz, Sonneberg
(Eingegangen 02.04.1992)

Abstract

Photographic U and B observations obtained in the season 1991 are given in detail to complete the long-term lightcurves of the star and to study its optical behaviour.

In linking to the sequence of comparison stars given by HUDEC and MEINUNGER (1977) the star was measured on 112 blue sensitive (ORWO-ZU21 + GG13 + BG12) and 4 UV sensitive (ORWO-ZU21 + UG2) plates from 68 nights obtained with the 50/70/172 cm Schmidt camera of Sonneberg Observatory covering the time interval between January 17 and December 9 1991.

The annual lightcurve in B is shown in fig. 1, where the individual means of the nights are given. As can be seen there the object shows alternating low and high state phases. At the beginning of the series the low state is characterized by a minimum of 66^d. Considering the light curve obtained in 1990 (GÖTZ, 1991) the given minimum is probably the continuation of the more than 200^d low state at the end of the series mentioned. If this is the case the total duration of this low state phase crossing the season 1990/91 amounts to 320^d.

The following high state is characterized by a duration of 107^d and is in agreement with a well-known relation between the duration of the low state and that of the following high state. This relation is shown in fig. 2, where from all series obtained since 1982, the logarithm of the ratios, log[t(l)/t(h)], derived from the durations of the low and the corresponding high state are plotted against the logarithm of the duration of the low state. From fig. 2 it can be learned that after a long-time low state a relatively short high state can be expected. In contrast, a short-time low state is characterized by a relatively long, following high state.

As can be seen from fig. 2 most of the derived values are in agreement with the given statement. An exception to the rule only results from the short-term low and high states (16^d, 18^d) given in fig. 1. In this connection it is noteworthy that these phenomena are the shortest ones within the whole observational series.

Since its last brightness decrease the star remained in the low state up to the end of the series for more than 110^d. The annual mean brightness of the high state, which is caused by X-ray heating amounts to $m_B = 13.^m98$.

In order to study the influences of the occultation light changes on the overall light curve, all observations were reduced to one common epoch by means of the orbital elements published by GÖTZ (1984). From the observations it can be seen that in the high state no periodic variations are recognizable. This statement also applies to the observations of the low state. The individual observations in B and U obtained in the season 1991 are listed in the following table.

Tab. 1: Photographic observations of AM Her in B

J.D. hel. 24....	B m	J.D. hel. 24....	B m
48274.683	15.29	48458.417	15.22
48275.685	15.43	48458.435	15.13
48306.635	15.51	48458.470	15.45
48309.614	15.42	48468.368	14.43
48309.631	15.34	48473.401	14.16
48309.648	15.38	48473.439	14.54
48328.650	15.36	48474.427	13.95
48329.536	15.44	48474.464	14.34
48332.628	15.45	48475.440	14.40
48353.524	13.71	48475.506	14.37
48356.530	13.52	48476.410	14.11
48359.525	13.63	48476.442	14.29
48360.485	13.45	48480.391	14.51
48360.515	13.43	48481.415	15.06
48361.460	13.36	48483.397	15.22
48362.500	13.37	48483.413	15.44
48362.528	13.24	48485.486	15.41
48382.510	13.38	48488.489	15.63
48383.497	13.21	48490.465	15.60
48383.516	13.43	48490.481	15.54
48385.409	13.39	48490.530	15.26
48385.439	13.63	48491.340	15.44
48390.428	13.29	48491.351	15.33
48390.445	13.86	48491.361	15.42
48394.454	13.89	48494.401	15.30
48394.473	13.58	48498.365	14.98
48395.480	13.91	48499.343	15.33
48395.497	14.05	48500.349	15.35
48400.481	14.01	48501.343	15.98
48400.491	14.22	48509.322	15.44
48409.408	14.18	48509.426	15.32
48411.408	13.97	48512.403	15.42
48413.417	14.01	48512.421	15.32
48413.434	13.97	48512.441	15.38
48413.473	13.83	48513.356	15.31
48439.423	14.26	48513.399	15.32
48440.411	14.21	48513.417	15.38
48440.421	14.11	48513.439	15.37
48442.412	14.28	48514.356	15.97
48442.426	13.79	48514.401	15.41
48443.410	14.32	48520.292	15.59
48443.432	13.95	48534.364	15.43
48444.413	14.44	48535.332	15.44
48444.426	14.28	48535.353	15.43
48445.456	14.00	48537.272	15.44
48445.474	14.24	48537.325	15.44
48446.421	14.23	48539.356	15.44
48446.440	14.01	48540.328	15.43
48446.506	14.23	48556.253	14.94
48449.409	14.44	48557.232	15.43
48449.428	14.35	48557.248	15.44
48449.492	14.35	48559.259	15.61
48454.430	15.36	48591.205	15.40
48454.450	15.39	48592.234	14.96
48457.510	15.40	48593.234	15.36
48457.538	15.36	48600.283	14.63

Tab. 2: Photographic observations of AM Her in U

J.D. hel. 244....	U_m	J.D. hel. 244....	U_m
48490.495	14.92	48514.337	14.55
48513.335	14.57	48556.237	13.99

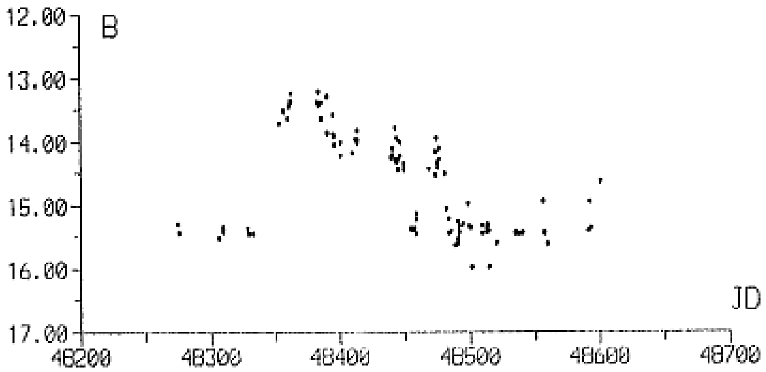


fig. 1: B- light curve of AM Her

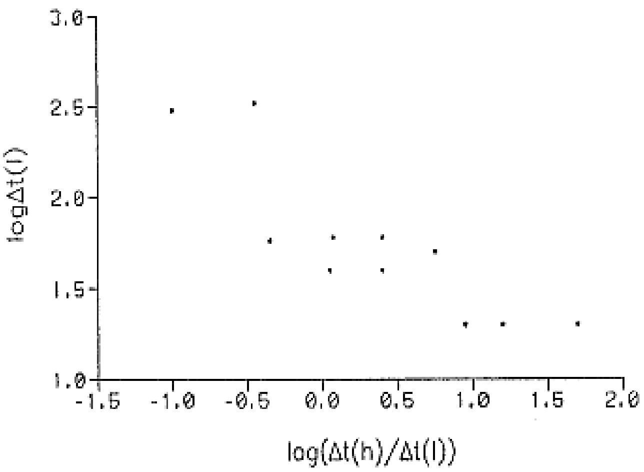


fig. 2: ratio duration high state - low state

References:

HUDEC, R., MEINUNGER, L., 1977, Mitt. Veränderl. Sterne **7**, 194

GÖTZ, W., 1991, Mitt. Veränderl. Sterne **12**, 81

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Photoelectric observations of selected symbiotic stars

R. Luthardt, Sonneberg

(Eingegangen am 29. September 1992)

Abstract
Photoelectric UBV-observations of selected symbiotic stars of the years 1982 ... 1991 are given.

Symbiotic stars are binary stars consisting (mostly) of an M-giant, a hot compact object (white dwarf, subdwarf) and a common gaseous envelope. Orbital periods amount some hundret days up to several years. Source of the envelope is the red giant losing mass by stellar wind or by pulsation. Because of mass accretion by the hot component activities like outburst are possible.

Symbiotic stars show irregular or semiregular variations in brigthness. The amplitude often depends on colour.

Long term photometry of these objects is necessary to study the behaviour.

The following observations are obtained with the Sonneberg 60 cm II photoelectrical telescope during the last years. For each star I only give very short remarks.

AG Dra

This star differs from most symbiotics in its K-type primary component and in its high galactic latitude.

MEINUNGER (1979) found periodic variations of 554^d in U. This period also continuous after the great outburst in 1980. Two smaller outbursts occured after 1983. The outburst maxima correlate with the maxima in U found by MEINUNGER during the quiet stage. In V the period of 554^d is not visible, but there are semiregular variations of small amplitude with a period of about 300^d ... 370^d.

Tab.1: Photoelectric observations of AG Dra

JD 244....	V m	B m	U m
5037.46	9.06	9.74	8.95
5044.45	9.15	9.92	9.08
5061.45	9.20	9.96	9.15
5064.48	9.21	9.96	9.17
5082.49	9.34	10.18	9.40
5085.48	9.32	10.16	9.37
5093.48	9.30	10.12	9.34
5103.55	9.38	10.25	9.53
5104.50	9.41	10.27	9.57
5116.46	9.42	10.31	9.63
5123.47	9.43	10.33	9.67
5130.50	9.44	10.35	--
5141.43	9.46	10.38	9.78

JD 244....	V m	B m	U m
5159.45	9.47	10.39	9.75
5160.41	9.48	10.39	9.76
5161.41	9.47	10.37	9.73
5162.42	9.47	10.37	9.76
5165.54	9.49	10.38	9.81
5183.49	9.49	10.46	9.99
5186.52	9.48	10.42	9.94
5193.48	9.50	10.48	9.92
5194.51	9.51	--	--
5203.49	9.51	10.44	9.96
5204.47	9.50	10.47	9.97
5229.48	9.54	10.53	10.09
5231.45	9.54	10.53	10.11
5306.59	9.60	10.68	10.25
5381.54	9.69	10.91	10.70
5388.54	9.67	10.86	10.56
5389.54	9.66	10.85	10.52
5390.53	9.66	10.85	10.57
5403.51	9.71	10.84	10.47
5452.43	9.76	--	--
5453.39	9.75	10.96	11.04
5474.52	9.75	11.00	11.02
5505.40	9.72	11.01	11.11
5509.44	9.71	11.00	11.09
5518.49	9.74	11.03	11.07
5555.51	9.74	11.02	11.14
5561.50	9.75	11.06	11.13
5566.49	9.72	11.00	11.16
5572.48	9.72	11.00	11.12
5577.44	9.70	11.00	11.06
5583.32	9.74	11.03	11.03
5613.45	9.76	11.08	11.16
5621.58	9.77	11.13	11.25
5632.36	9.81	11.14	11.20
5634.49	9.83	11.18	11.34
5635.37	9.83	11.14	11.32
5673.68	9.84	11.20	11.40
5683.69	9.85	10.45	10.42
5684.69	9.84	11.24	11.41
5746.55	9.75	11.10	11.49
5759.60	9.75	11.10	11.56
5761.66	9.75	11.07	11.55
5763.56	9.75	11.06	11.58
5770.52	9.74	11.10	11.57
5780.48	9.78	11.10	11.56
5810.37	9.84	11.18	11.70
5822.48	9.82	11.17	11.77
5854.45	9.78	11.10	11.81
5889.42	9.74	11.12	11.72
5890.39	9.76	11.12	11.73
5905.47	9.74	11.11	--
5912.41	9.76	11.13	11.68
5926.44	9.75	11.09	11.61
5936.38	9.80	11.12	11.60
6002.43	9.74	11.07	11.18
6004.36	9.73	11.02	11.14
6036.34	9.74	11.09	11.17
6113.59	9.63	10.75	10.04

JD 244....	V_m	B_m	U_m
6121.62	9.67	10.75	10.07
6148.40	9.36	10.34	9.49
6159.51	9.44	10.49	9.85
6173.43	9.61	10.72	10.30
6175.51	9.63	10.82	10.37
6203.44	9.74	10.97	11.12
6211.40	9.72	10.96	11.08
6212.41	9.72	10.96	11.11
6212.46	9.71	10.99	11.11
6251.44	9.75	11.06	11.34
6261.46	9.76	11.06	11.38
6299.37	9.80	11.16	11.51
6305.42	9.80	11.13	11.42
6307.41	9.83	11.19	11.49
6311.42	9.86	11.22	11.52
6327.52	9.87	11.15	11.45
6335.46	9.86	11.13	11.40
6338.42	9.86	11.13	11.44
6343.46	9.83	11.10	11.46
6359.43	9.85	11.13	11.47
6488.64	9.48	10.36	--
6550.48	9.51	10.50	9.86
6552.56	9.55	10.56	9.95
6553.59	9.56	10.56	9.99
6555.46	9.57	10.63	--
6592.40	9.70	10.86	10.68
6596.45	9.71	10.87	10.78
6607.45	9.71	10.89	10.86
6610.43	9.69	10.89	10.90
6644.38	9.74	10.98	10.99
6645.42	9.72	11.00	11.07
6646.41	9.74	10.96	11.03
6648.41	9.74	10.98	11.02
6649.39	9.75	10.97	11.05
6718.38	9.80	11.06	11.17
6719.36	9.80	11.05	11.19
6762.68	9.86	11.12	11.33
6826.66	9.78	11.10	11.50
6868.55	9.81	11.11	11.61
6869.54	9.80	11.10	11.59
6877.62	9.84	11.15	11.68
6910.50	9.80	11.12	11.67
6925.46	9.77	11.06	11.67
6939.44	9.81	11.11	11.71
6982.41	9.76	11.05	11.53
6989.45	9.72	11.06	11.53
6991.41	9.75	11.03	11.51
7018.40	9.75	11.03	11.47
7023.44	9.78	11.05	11.52
7038.33	9.78	11.06	11.47
7039.34	9.77	11.07	11.44
7071.35	9.82	11.10	11.42
7078.37	9.83	11.10	11.41
7205.68	9.82	11.07	11.16
7276.38	9.78	11.09	11.21
7304.45	9.77	11.04	11.18
7305.45	9.77	11.05	11.15
7349.42	9.76	11.05	11.24

JD 244....	V m	B m	U m
7353.43	9.74	11.02	11.26
7366.41	9.77	11.07	11.36
7368.40	9.79	11.09	11.39
7427.35	9.83	11.16	11.68
7438.52	9.84	11.18	11.79
7554.58	9.80	11.19	11.79
7566.56	9.82	11.21	11.71
7611.43	9.77	11.15	11.53
7613.50	9.78	11.16	11.49
7616.55	9.78	11.14	11.50
7626.46	9.75	11.12	11.41
7628.59	9.76	11.11	11.45
7642.46	9.70	11.03	11.18
7662.40	9.72	11.06	11.24
7663.46	9.72	11.06	11.23
7668.41	9.71	11.03	11.21
7670.43	9.72	11.04	11.17
7691.44	9.72	11.04	11.06
7694.41	9.72	10.45	--
7696.41	9.70	11.01	11.05
7703.41	9.68	10.99	11.01
7727.42	9.73	11.04	11.13
7743.46	9.70	11.03	11.18
7763.42	9.74	11.08	11.28
7770.42	9.70	11.05	11.23
7776.46	9.74	11.07	11.28
7787.39	9.80	11.14	11.12
7842.42	9.75	11.12	11.49
7849.66	9.78	11.19	11.51
7861.66	9.79	11.19	11.59
7928.55	9.86	11.28	11.87
7929.54	9.86	11.28	11.92
7943.66	--	11.30	11.86
7965.52	9.82	11.22	11.93
7968.59	9.81	11.21	11.92
7982.58	9.78	11.20	11.89
7990.52	9.79	11.18	11.89
8012.50	9.76	11.16	11.85
8013.49	9.76	11.14	11.80
8018.46	9.75	11.12	11.88
8032.43	9.77	11.19	11.85
8039.43	9.79	11.20	11.88
8127.39	9.77	11.15	11.77
8179.36	9.86	11.25	--
8179.36	9.85	11.26	11.66
8274.64	9.83	11.20	11.38
8329.62	9.76	11.10	11.32
8332.58	9.76	11.11	11.34
8353.53	9.70	11.06	11.36
8359.51	9.71	11.07	11.32
8362.54	9.73	11.07	11.33
8409.45	9.73	11.08	11.28
8440.48	9.72	11.09	11.43
8494.39	9.77	11.15	11.67
8500.42	9.74	11.12	11.65
8681.47	9.71	11.08	11.54
8691.61	9.73	11.08	11.59
8747.47	9.73	11.02	8.95

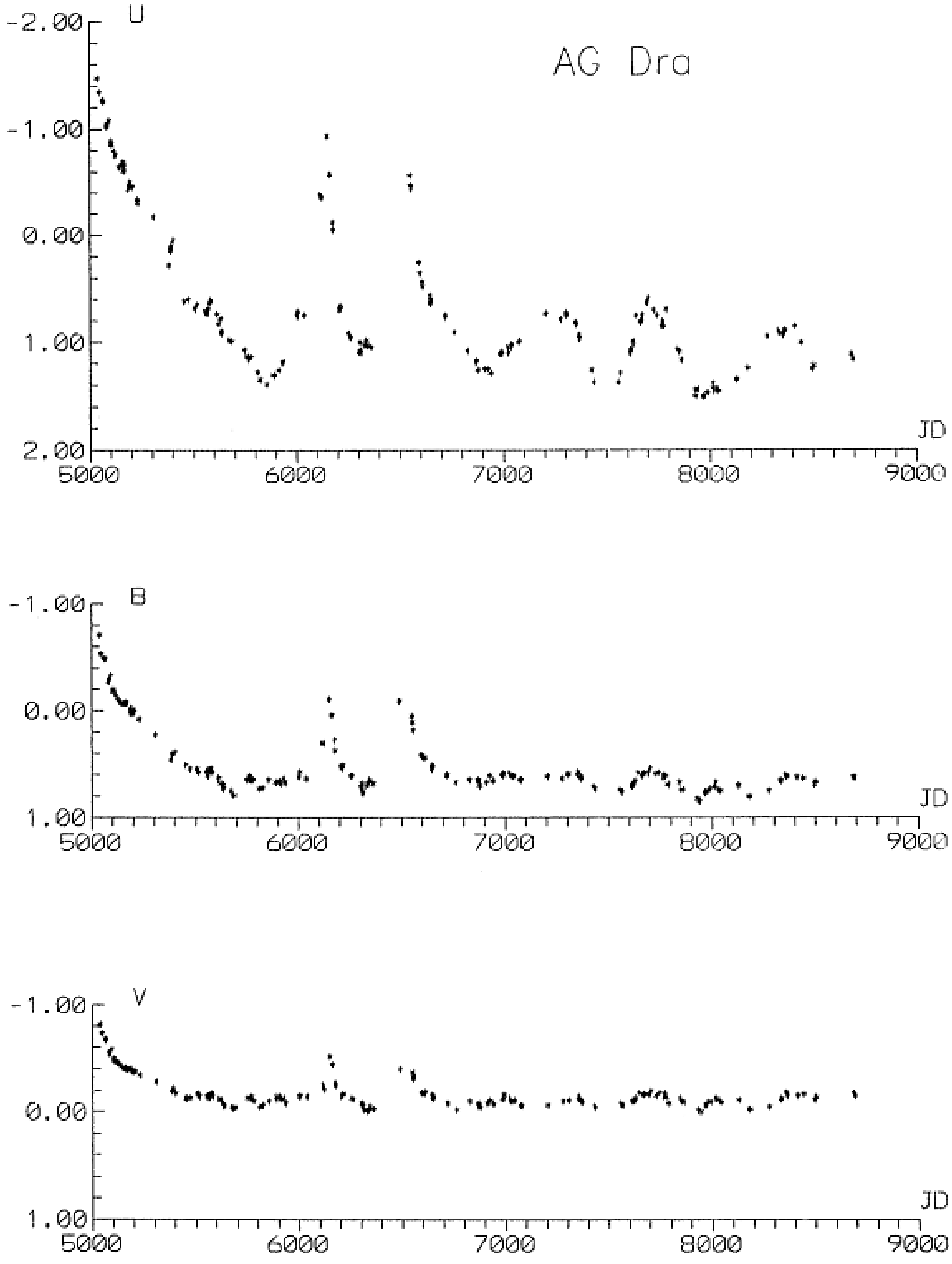

fig.1: UBV-lightcurve of AG Dra

AX Per

AX Per is a classical symbiotic system with its typical behaviour, quiet stages with small variations and outbursts with amplitudes up to 2 ... 3 mag. A greater outburst occured 1987/88. The amplitude is comparable in all three colours.

Tab.2: Photoelectric observations of AX Per

JD 244....	V m	B m	U m
6004.46	11.41	12.58	12.23
6006.54	11.44	12.61	12.28
6036.46	11.52	12.70	--
6334.61	11.63	12.70	12.50
6335.58	11.61	12.71	12.50
6338.59	11.62	12.70	12.45
6359.53	11.71	12.70	12.43
6474.35	11.25	12.31	--
6718.54	11.49	12.49	12.26
6762.53	11.24	12.24	11.97
6764.48	11.23	12.20	11.86
6982.45	11.69	12.70	--
7039.57	11.28	12.33	12.12
7071.58	11.14	12.18	11.89
7078.56	11.18	12.22	11.79
7138.55	10.99	11.98	--
7438.55	9.81	10.40	9.89
7469.52	10.18	10.80	10.23
7566.39	10.36	10.11	11.12
7769.61	9.42	9.96	9.47
7779.55	9.30	9.79	9.40
7788.53	9.15	9.68	9.23
7791.55	9.18	9.68	9.23
7842.50	9.23	9.70	9.27
7847.56	9.14	9.59	9.19
7849.55	9.13	9.58	9.16
7850.53	9.13	9.58	9.17
7851.49	9.12	9.57	--
7859.53	9.12	9.62	9.21
7861.52	9.17	9.66	9.25
7928.37	9.41	10.00	9.50
7929.43	9.43	10.00	9.59
7968.39	9.48	10.14	9.92
8133.61	10.18	10.90	10.50
8151.62	10.42	11.17	10.69
8177.50	10.69	11.41	10.95
8233.45	11.93	12.81	12.40
8271.38	10.96	11.71	--
8500.58	10.75	11.61	11.28
8514.55	10.63	11.52	11.14
8592.48	10.68	11.39	10.97

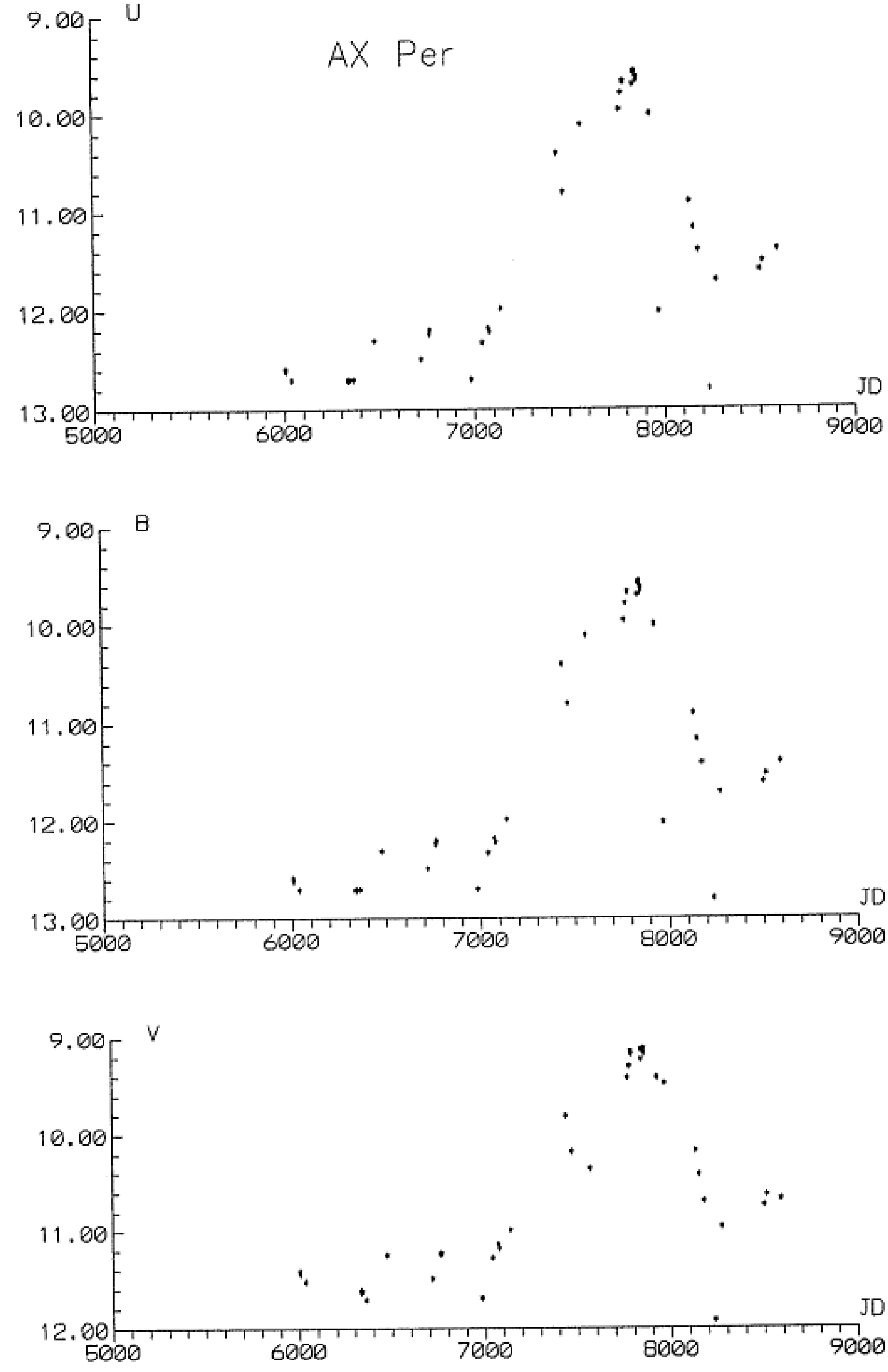

fig.2: UBV-lightcurve of AX Per

BF Cyg

BF Cyg also shows semiregular variations in U ,B and V. A period was determinded with $757.^{d}3$ (PUCINSKAS (1970)). Since 1985 a general rise in brightness is visible. Deep minima correspond to the period mentioned above.

Tab.3: Photoelectric observations of BF Cyg

JD 244....	V m	B m	U m
5928.44	12.22	12.70	--
5930.53	12.14	12.43	--
5935.45	12.22	12.69	12.32
5936.44	12.20	12.66	12.21
5944.44	12.14	12.70	12.06
5946.41	12.16	12.68	12.05
6004.76	12.35	12.79	12.18
6251.53	12.08	12.60	12.18
6261.53	12.05	12.51	--
6328.35	11.83	12.32	11.85
6338.38	11.79	12.23	11.31
6343.32	11.72	12.19	11.59
6592.53	11.51	11.89	11.43
6596.51	11.56	11.91	--
6611.47	11.66	12.81	11.38
6642.43	11.88	11.89	11.57
6645.47	11.83	12.24	11.61
6646.45	11.83	12.24	11.66
6648.44	11.87	12.24	11.68
6649.41	11.87	12.28	11.71
6718.41	12.02	12.49	12.14
6910.59	11.80	12.31	11.93
6925.52	11.43	11.95	11.63
6939.52	11.16	11.70	11.34
6982.49	11.08	11.64	11.28
6990.47	11.08	11.59	11.31
7018.43	10.94	11.50	11.19
7023.48	11.05	12.43	--
7038.47	10.87	11.32	11.10
7039.37	10.91	11.39	10.95
7071.37	10.68	11.03	10.6
7349.48	11.69	12.08	0.00
7366.43	11.56	12.01	11.38
7368.48	11.53	11.95	11.57
7418.37	11.49	11.73	--
7427.41	11.54	11.95	11.45
7669.54	10.62	11.09	11.02
7670.51	10.56	11.03	10.97
7691.48	10.26	10.65	10.66
7696.45	10.23	10.62	10.45
7703.50	10.22	10.58	10.42
7726.49	10.12	10.45	10.16
7727.55	10.14	10.44	10.14
7762.43	10.07	10.36	10.09
7776.48	10.05	10.33	10.09
8013.52	9.79	10.04	9.73
8038.52	9.72	9.96	9.68
8127.48	9.86	10.10	9.54

JD 244....	V m	B m	U m
8133.41	9.88	10.14	9.53
8494.42	11.66	12.07	--
8499.36	11.65	12.05	11.54
8501.38	11.64	12.10	11.55
8512.38	10.66	11.07	10.38

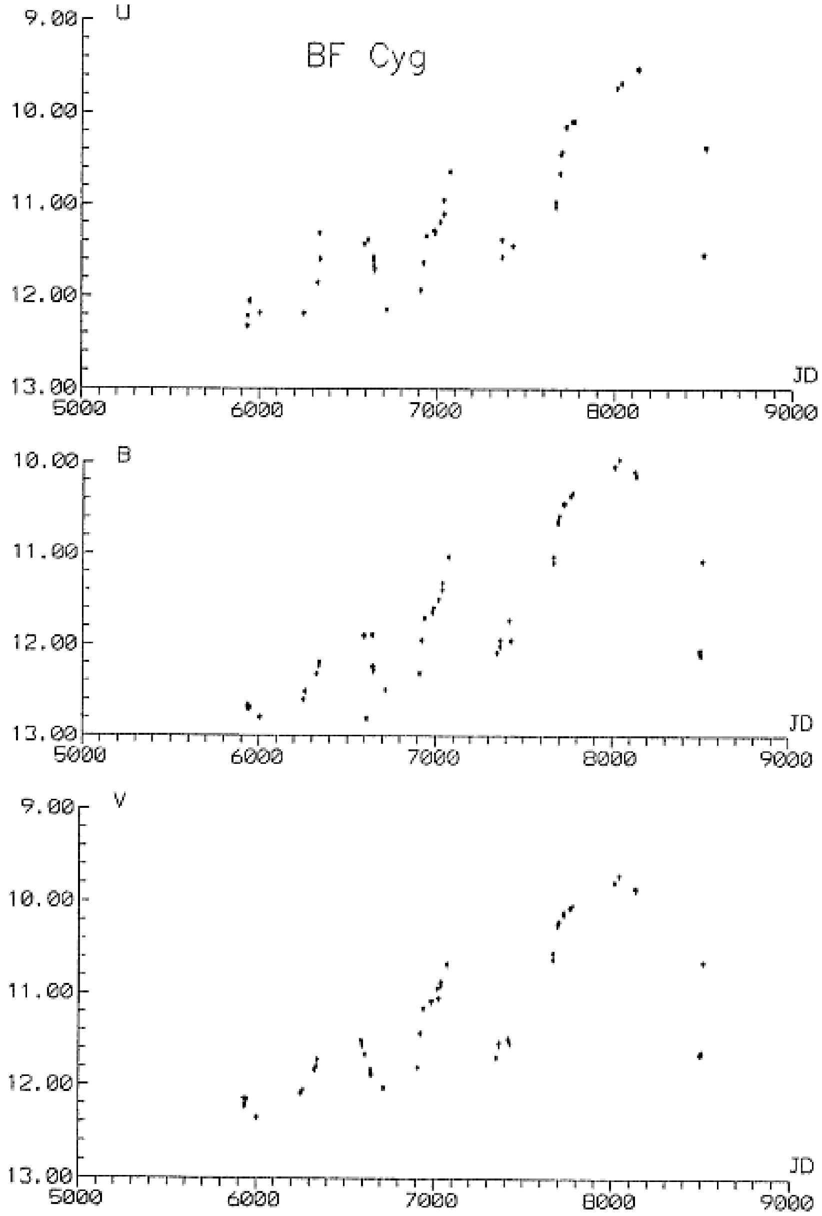

fig.3: UBV-lightcurve of BF Cyg

CI Cyg

CI Cyg is an eclipsing symbiotic with a period of 855^d. During the last years no outbursts occured.

Tab.4: Photoelectric observations of CI Cyg

JD 244....	V m	B m	U m
5933.48	10.84	12.13	12.12
5936.47	10.87	12.13	12.17
5946.44	10.89	12.14	12.10
6004.28	11.02	12.36	12.34
6212.58	11.20	12.42	--
6251.55	11.00	12.20	12.08
6343.30	10.80	11.97	11.72
6596.49	10.98	12.06	11.79
6607.51	11.02	12.08	11.74
6648.48	10.94	12.04	11.75
6718.44	10.88	12.03	11.90
6868.67	11.07	12.29	12.32
6925.55	11.18	12.49	12.63
6939.55	11.15	12.46	12.66
6982.52	11.35	12.64	12.60
6983.41	11.32	12.58	12.61
6989.48	11.33	12.66	12.69
6990.49	11.30	12.55	12.62
6991.43	11.30	12.60	12.45
7018.45	11.32	12.53	12.28
7023.46	11.31	12.53	12.41
7039.40	11.09	12.34	12.32
7071.42	11.08	12.27	12.25
7078.42	11.05	12.26	12.32
7304.48	10.76	11.89	11.68
7353.49	10.76	11.93	11.64
7366.45	10.77	11.91	11.70
7368.46	10.78	11.92	11.65
7420.37	10.83	11.96	11.86
7427.38	10.83	11.98	11.69
7665.53	10.91	12.27	12.31
7670.53	10.95	12.30	12.28
7696.50	11.00	12.35	12.37
7743.48	11.04	12.46	12.64
7762.48	11.21	12.67	--
7770.44	11.26	12.73	12.94
7779.44	11.28	12.70	12.87
8014.56	10.91	12.13	11.94
8038.53	10.63	11.99	11.75
8499.41	10.95	12.27	12.29
8512.43	10.79	12.20	12.35
8514.38	10.77	12.16	12.36
8127.52	10.73	11.95	11.74
8133.46	10.76	11.99	11.73

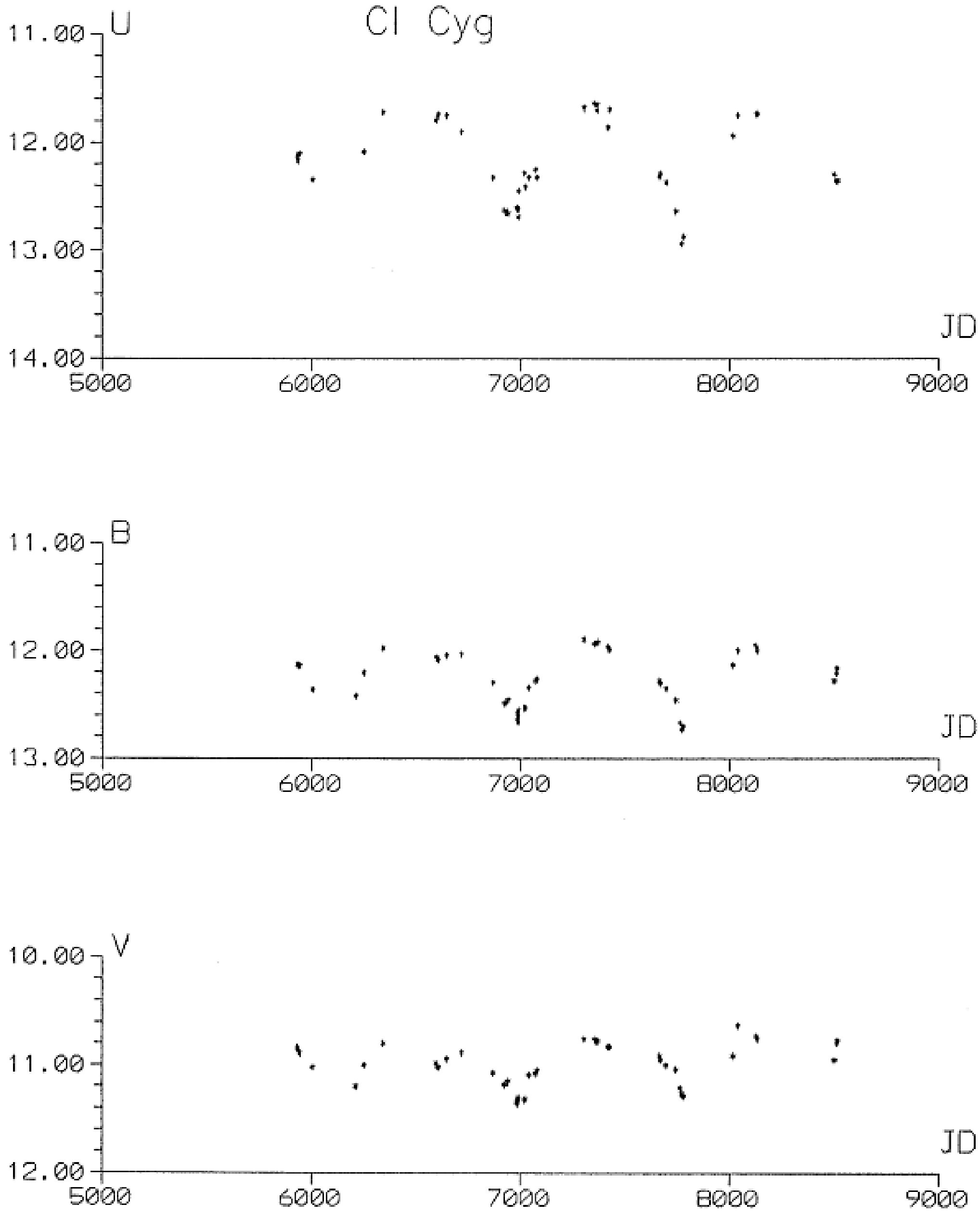

fig.4: UBV-lightcurve of CI Cyg

UV Aur

The system UV Aur contains an evolved carbon star as the primary component. The magnitudes vary in V and B with a period of 396^d. The amplitude decreases from about 1.5 mag in V to about 0.5 mag in B whereas in U the brightness is constant.

Tab.5: Photoelectric observations of UV Aur

JD 244....	V m	B m	U m
6006.58	9.98	11.09	11.88
6334.66	9.67	11.05	11.88
6335.61	9.66	11.04	11.86
6338.62	9.67	11.05	11.87
6358.60	9.84	11.08	12.10
6359.56	9.85	11.09	11.87
6360.56	9.84	11.13	11.92
6364.56	9.91	11.18	11.92
6474.38	8.99	10.91	11.86
6488.50	8.83	10.92	11.93
6489.47	8.69	10.76	--
6762.55	10.13	11.13	11.91
6764.58	10.14	11.12	11.89
6869.35	9.30	11.05	11.90
7039.59	8.79	10.72	11.84
7071.61	9.18	10.89	11.85
7078.61	9.28	10.92	11.86
7138.57	9.97	11.14	--
7438.61	8.77	10.71	11.81
7469.59	9.13	10.86	11.84
7554.50	10.00	11.15	11.95
7566.47	10.04	11.14	11.92
7613.42	9.73	11.22	--
7842.53	9.14	10.88	11.87
7843.55	9.18	10.89	11.85
7848.53	9.26	10.97	11.92
7850.61	9.29	10.94	11.93
7859.66	9.47	--	--
7861.59	9.43	10.99	11.90
7924.51	10.03	11.16	--
7928.45	10.08	11.15	11.91
7929.46	10.06	11.13	11.92
7943.49	10.14	11.18	11.96
8177.59	8.84	10.82	--
8273.41	9.95	11.10	11.94
8290.41	10.05	11.15	11.95
8646.45	10.41	11.13	11.94
8681.40	10.61	11.15	11.96
8686.41	10.65	11.16	11.95
8691.39	10.64	11.17	11.96

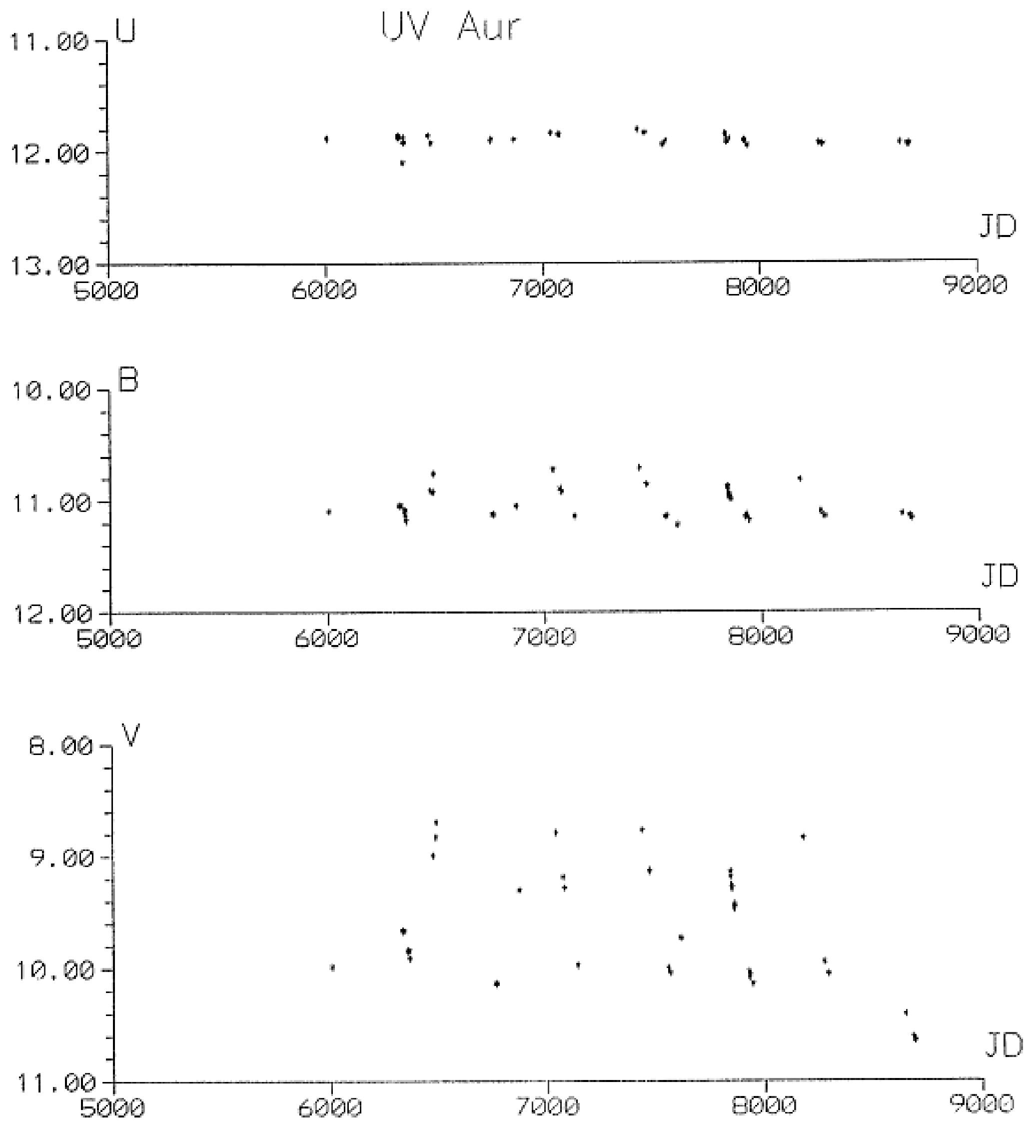

fig.4: UBV-lightcurve of UV Aur

References:

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LUTHARDT, R.: 1990, Contr. Astron. Obs. Skalnate Pleso, Vol. XX, p. 83

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TASV 1924 + 57 ein Halbregelmäßiger vom Typ SRb

D. Böhme, Nessa (Mitglied des AKV)
(Eingegangen am 21. Dezember 1991)

Dieser Veränderliche wurde 1990 vom britischen Amateurastronomen M. COLLINS entdeckt (1). In der Entdeckungsanzeige wird die Identität mit IRAS 19243 + 5707 festgestellt.

Der Verfasser beobachtete den Stern auf 202 Rotplatten der Sonneberger Himmelsüberwachung aus den Jahren 1983 bis 1990. Dabei konnte ein halbregelmäßiger Lichtwechsel (Typ SRb) mit den nachgenannten Elementen nachgewiesen werden.

$$\text{Max. (J.D.)} = 244\,5520 + 380^{d}\ E$$

Tabelle 1: Beobachtete Maxima

E	JD	(B-R)	m_{pv}
0	244 5530	+10	10.3
1	5950	+50	10.6
2	6360	- 20	10.5
3	6700	+40	10.5
4	7060	+20	10.7
5	7410	- 10	10.7
6	7800	0	10.4
7	8190	+10	10.3

Der Lichtwechsel bewegte sich zwischen $10.^{m}3$ und $11.^{m}6$ (m_{pv}). Ein zweiter wesentlich längerer Zyklus ist im Lichtwechsel angedeutet.

Die Zyklenlängen schwanken von 340^{d} bis 420^{d} bei Amplituden von 0.4 bis 1.3 mag.

Literatur

(1) COLLINS, M., The Astronomer, Vol. 27, p. 240

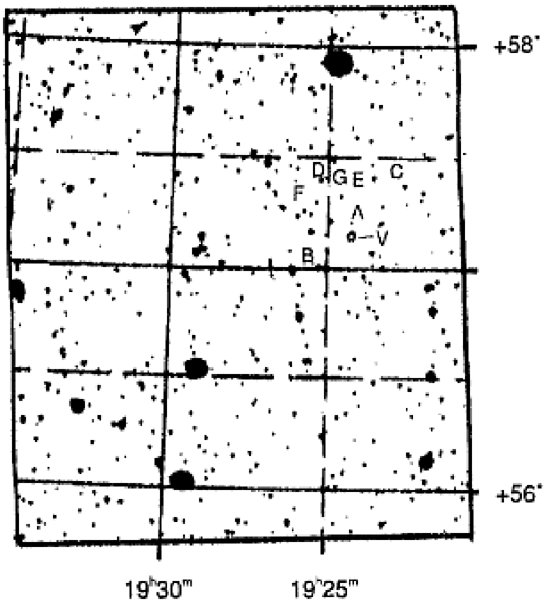


Abb. 1: Umgebungskarte von TASV 1924 + 57

Vergleichssternhelligkeiten:

A :	$8.^{m}9$	E :	$10.^{m}2$
B :	9.3	F :	10.6
C :	9.5	G :	11.1

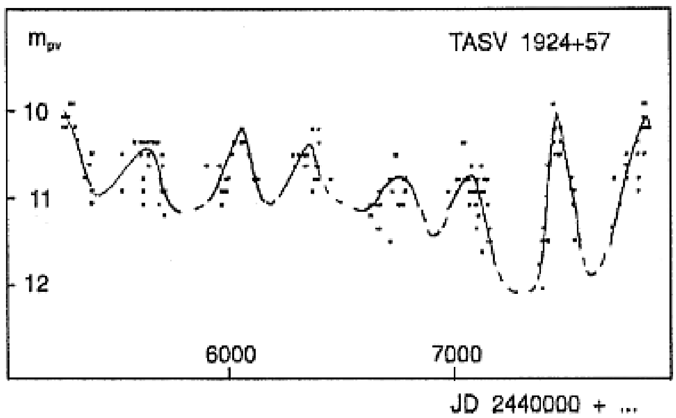


Abb.2: Lichtwechsel von TASV 1924 + 57 von 1983-1990

TAV 2251 + 61 ein Halbregelmäßiger

D. Böhme, Nessa (Mitglied des AKV)

(Eingegangen am 18. Januar 1992)

Dieser Veränderliche wurde 1990 vom britischen Amateurastronomen M. COLLINS entdeckt (1). In der Entdeckungsanzeige wird der Spektraltyp mit M3? gegeben, und es sind weitere Bezeichnungen zur Identifikation genannt (IRAS 22512 + 6100 = IRC + 60374 = DEARBORN 42141).

Der Verfasser beobachtete den Stern auf 245 Rotplatten der Sonneberger Himmelsüberwachung aus den Jahren 1977 bis 1990. Im Bereich zwischen J.D. 244 5800 bis 244 8200 trat ein deutlicher halbregelmäßiger Lichtwechsel mit folgenden Elementen auf:

$$\text{Max.(J.D.)} = 244\,6080 + 570^{d}\,E$$

Die mittlere Amplitude betrug dabei bei den vier beobachteten Zyklen 1.3 mag. Im Zeitraum zwischen J.D. 244 3100 bis 244 5800 war ein abweichender Lichtwechsel wirksam. Es wurden nur zwei relativ helle Maxima festgestellt, die sich durch die Periode von 570^{d} auch nicht annähernd feststellen lassen. Zusammenfassend kann gesagt werden, daß es sich um einen roten Stern mit einem wahrscheinlich halbregelmäßigen Lichtwechsel vom Typ SRb oder SRc und mehreren wirksamen Perioden handelt. Eine weitergehende Untersuchung ist notwendig.

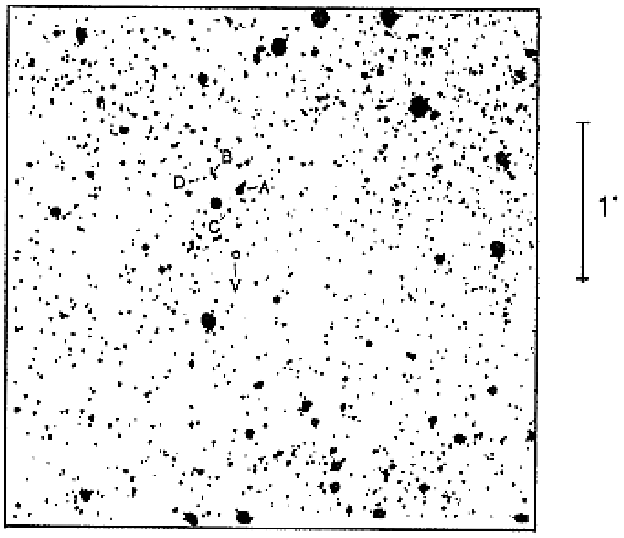
Tabelle 1: Beobachtete Maxima und Minima

Typ	JD	m_{pv}
Max.	244 3840	8.8
Min.	4180	10.9
Max.	4610	9.1
Min.	4890	10.9
Max.	6080	10.0:
Min.	6210	11.1
Max.	6570	9.9:
Min.	6870	11.2
Max.	7180	9.9
Min.	7400	11.5
Max.	7690	9.8
Max.	8360:	--

(Siehe auch Abb. 1 und 2)

Literatur

(1) COLLINS, M., The Astronomer, Vol. **27**, p. 319



RA = $22^h51.^m2$, δ = 61°00' (1950.0)

Abb.1: Umgebungskarte von TAV 2251+61

Vergleichssternhelligkeiten:

A :	$8.^m5$	C :	$10.^m0$
B :	9.7	D :	11.1

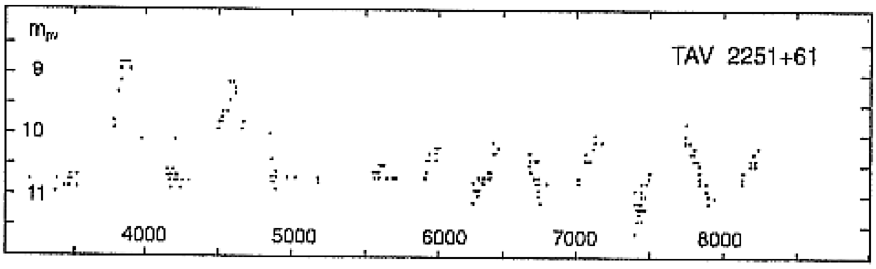


Abb.2: Lichtkurve von TAV 2251+61

MV Lyrae remains in active state

Th. Weber, Sonneberg
(Eingegangen am 5. Oktober 1992)

Abstract
Photographic observations of MV Lyr on Sonneberg plates of 1990 ... 1992 are summarized.

In continuation of the work of FUHRMANN and WENZEL (1990) I measured the star on all suitable plates obtained in the season 1990 ... 1992 with the astrographs "GB" (40/190 cm) and "GC" (40/160 cm). The object remained in it's upper level.

The figure shows the new observations including a few data of FUHRMANN and WENZEL (1990) in order to demonstrate the behaviour since the rise from the last minimum. At the present time it is not clear whether the star will return to quasiperiodic (semiregular) variations as described by WENZEL and FUHRMANN (1983) or ANDRONOV, FUHRMANN and WENZEL (1988).

Acknowledgment
I would like to thank Dr. W. Wenzel for his stimulation and support.

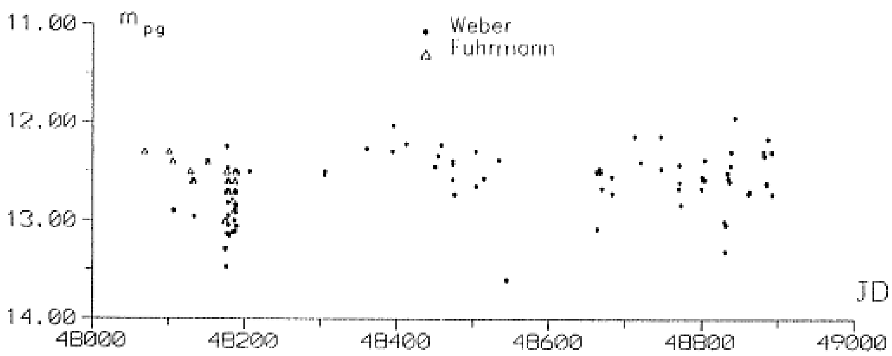


fig. 1: m_{pg}-lightcurve of MV Lyr

References

ANDRONOV, I. L., FUHRMANN, B., WENZEL, W. 1988, Astron. Nachr. **309**, p. 39

FUHRMANN, B., WENZEL, W., 1990, Inf. Bull. Variable Stars No. 3513

WENZEL, W., FUHRMANN, B., 1983, Mitt.Veränderl. Sterne **9**, p. 175

Maxima des RR-Lyrae-Sterns XZ Cygni

H. Berger, Scharfenberg
(Eingegangen am 26. Februar 1992)

Im Herbst 1991 beobachtete ich zum wiederholten Male mit einem 150 mm Newton den Veränderlichen XZ Cygni.

Aufgrund schlechter Witterungsbedingungen konnten aber nur zwei Maxima durchbeobachtet werden.

Max.(hel.)	n	E	B-R
244 8482.3674	13	6291	-0.0310
8567.3105	21	6473	-0.0131

Die (B-R)-Werte unterscheiden sich nur geringfügig von den 1990 ermittelten. Sie basieren wie die vom Vorjahr auf den Elementen von BLASBERG und WENZEL (1988). Es könnte möglich sein, daß die dort gegebene Ausgangsepoche nicht ganz exakt ist und sich daraus die 1990 und 1991 fast gleichen (B-R)-Werte ergeben.

Literatur

BLASBERG, H.-J., WENZEL, W. , 1988 Inf. Bull. Variable Stars 3205

BERGER, H., 1991, Mitt. Veränderl. Sterne **12.5**, p. 86

Beobachtung des Sterns V 2066 Ophiuchi

E. Rudolph, Jena
(Eingegangen am 23. September 1992)

Der Stern wurde auf 178 Platten des Sonneberger Felderplans beobachtet.

Aufgrund der Beobachtungen kann ein halbregelmäßiger Lichtwechsel vermutet werden, wobei offenbar die Minima in der Lichtkurve markanter erscheinen als die Maxima.

Die Periode oder Zyklenlänge beträgt rund 300 bis 400^d.

Eine Verbesserung der Helligkeitsangaben ($12.^m4$ bis $13.^m3$) des Entdeckers C. HOFFMEISTER (Astron. Nachr. **289** (1967), S. 205) habe ich nicht vorgenommen.

Beobachtungsergebnisse des Arbeitskreises "Veränderliche Sterne" (Teil XIX)

Zusammengestellt von H. Busch, Leiter der Zentrale des AKV,
Bruno-H.-Bürgel-Sternwarte Hartha
(Eingegangen am 10. April 1992)

A) Bedeckungssterne

Stern	JD(hel) 244....	E	(B-R)	n	Bemerk.	Beob.
LY Aur	8531.388	+2366	+0.022	85	Nm	Gol
RX Cas	8573.51	1000	+0.32	54 insg.	Nm	Ens
	8557.70	999.5	+0.68		Nm Min.II	Ens
RZ Cas	8514.380	4446	+0.006	10		Rat
	8514.384	4446	+0.010	11		Rcr
CW Cep	8617.942	4853	+0.001	31 insg.	Nm	Ens
	8616.754	4852.5	+0.177		Nm Min.II	Ens
NN Cep	8566.33	1972	- 0.05	70 insg.		Ens
	8565.38	1971.5	+0.03		Min.II	Ens
GO Cyg	8553.465	20373	+0.057	86 insg.	Nm	Ens
	8553.311	20373	+0.262		Nm	Ens
V 367 Cyg	8176.76	580	- 0.78	37 insg.	Nm	Rcr
	8205.18	581.5	- 0.25		Nm Min.II	Rcr
	8177.24	580	- 0.30	66 insg.	Nm	Rat
	8558.49	600.5	- 0.30		Nm Min.II	Rat
u Her	8456.521	20783	- 0.006	48	Nm	Gol
β Lyr	8499.02	905	+0.11	53	Nm	Ens
	8524.91	907	+0.12	44	Nm a)	Gol
Z Vul	8510.3532	2266	- 0.0049	18	pe (B)	Bus
	8537.3577	2277	- 0.0047	18	pe (V)	Bus
SAO 23229	8509.475	153	+0.021	20	b)	Ens

B) Kurzperiodische Pulsationsveränderliche

Stern	JD(hel) 244....	E	(B-R)	n	Bemerk.	Beob.
η Aql	8149.57	+ 1681	+0.98	38	NM	Rcr
	8507.52	1731	+0.10	40	NM	Gol
RT Aur	8572.70	1666	+0.51	40	NM	Gol
	8654.53	1688	+0.32	18		Bgr
TU Cas	8548.575	3199	+0.122	22	NM	Gol
δ Cep	8498.42	1070	+0.03	54	NM	Gol
	8509.39	1072	+0.27	30	NM	Het
	8557.22	1081	- 0.20	28	NM	Rcr
	8686.25	1105	+0.04	31	NM	Rat
X Cyg	8188.31	+ 266	- 0.85	36	NM	Rcr
SU Cyg	8501.263	1352	+0.305	24	NM	Rcr
XZ Cyg	8482.3674	6292	- 0.0311	13	c)	Bgr
	8519.2506	6371	- 0.0110	14		Bgr
	8567.3120	6474	- 0.0116	21		Bgr
ζ Gem	8272.34	442	+0.64	45	NM	Rat
	8616.76	476	- 0.03	34	NM	Gol
T Mon	7946.43	154	- 1.25	22	NM	Rcr
	8271.63	166	- 0.55	29	NM	Rat
DY Peg	8546.9323	55465	+0.0048	133	NM	Bgr
S Sge	8186.61	657	+0.79	57	NM	Rcr
Y Sgr	8533.25	1346	- 0.06	31	NM	Rcr
T Vul	8176.345	1459	- 0.115	64	NM	Rat
	8558.307	1545	+0.397	24	NM	Rcr
SV Vul	8176.02	113	+5.11	67	NM	Rat
	8176.47	113	+5.56	64	NM	Rcr

Erklärungen:

a) nach AA **29**.3

b) nach IBVS 3479

c) nach IBVS 3205

Bis auf Z Vul sind alle Beobachtungen visuelle Elemente, wenn nicht anders vermerkt nach GCVS 1985/87 unter Berücksichtigung von Zusatzgliedern.

C) Mirasterne

Stern	JD(hel) 244....	E	(B-R)	m_V	n	Bem.	Beob.
R And	8505	+13	+49	8.1	13		Rat
	8512	+13	+56	8.1	15		Zis
	8516	+13	+60	8.3	14		Rcr
T And	8605	+20	+31	8.2	15		Bra
	8606	+20	+32	8.1	9		Hin
W And	8651	+13	0	7.5	14		Bra
	8651	+13	0	7.5	12		Hin
	8658	+13	+ 7	7.3	10		Voh
RR And	8642	+16	+ 2	8.8	10		Hin
R Aqr	8625 :	+16	+36 :	5.6	12		Bra
T Aqr	8591	+26	- 24	7.7	10		Bra
R Aql	8512	+18	- 62	5.9	18		Rcr
	8517	+18	- 57	6.0	17		Rat
	8519	+18	- 55	6.1	19		Zis
	8522	+18	- 52	6.2	56		Voh
	8525	+18	- 49	6.1	29		Gol
R Ari	8616	+22	+ 2	8.8	10		Bra
	8619	+22	+ 5	8.6	9		Hin
R Aur	8585	+10	+ 6	8.1	11		Rcr
	8600	+10	+21	8.1	13		Rat
	8602	+10	+23	8.4	29		Voh
	8609	+10	+30	8.1	20		Gol
X Aur	8567	+24	+32	8.6	22		Voh
	8568	+24	+33	8.5	9		Hin
R Boo	8312	+17	- 4	7.6	13		Hin
	8534 :	+18	- 5 :	6.6	6		Rcr
	8540 :	+18	+ 1 :	7.4	20		Voh
S Boo	8499	+16	+51	8.6	13		Zis
	8507	+16	+59	8.6	13		Bra
	8507	+16	+59	8.8	35		Voh
R Cam	8551	+17	- 21	8.6	21		Bra
T Cam	8282	+13	- 3	8.1	10		Hin
	8645	+14	- 13	8.0	12		Hin
X Cam	8402	+26	- 10	8.2	13		Bra
	8555	+27	0	8.4	10		Bra
	8560	+27	+ 5	8.4	16		Hin
R Cas	8368	+ 9	+ 3	5.9	29		Bra
	8372	+ 9	+35	6.0	26		Zis
U Cas	8461	+14	- 41	8.4:	11		Zis
V Cas	8464	+17	- 31	7.8	20		Bra
	8466	+17	- 29	8.0	49		Voh
	8466	+17	- 29	7.9	17		Zis
	8468 :	+17	- 27 :	7.6	9		Rcr
	8475	+17	- 20	7.4	21		Klx
W Cas	8282 :	+10	+17 :	9.0	17		Zis
RV Cas	8637	+13	+12	9.1	9		Hin
T Cep	7948 :	+ 9.46	+99 :	10.4:	23	Min.	Bra
	8146	+10	+88	5.8	43		Bra
	8350 :	+10.46	+113 :	-	15	Min.	Zis

C) Mirasterne (Fortsetzung)

Stern	JD(hel) 244....	E	(B-R)	mv	n	Bem.	Beob.
T Cep	8543	+11	+96	5.4	19		Rat
	8548	+11	+101	5.4	20		Rcr
	8549	+11	+102	5.5	21		Zis
	8550	+11	+103	5.7	68		Gol
	8551	+11	+104	6.1	84		Voh
	8560	+11	+113	5.3	44		Bra
S CrB	8559	+11	- 8	6.2	16		Hin
V CrB	8406	+13	- 6	8.2	25		Bra
R Cyg	8464	+ 9	+31	8.4	15		Zis
	8465	+ 9	+32	8.6	16		Bra
	8468	+ 9	+35	8.3	58		Voh
	8474	+ 9	+41	8.4	16		Gol
	8479 :	+ 9	+46 :	8.0	14		Wit
U Cyg	8244	+ 8	- 20	7.3	18		Zis
	8479	+ 8.52	- 26	10.2	20	Min.	Zis
	8497	+ 8.52	- 8	11.4	57	Min.	Voh
RT Cyg	8394	+20	0	7.3	11		Gol
	8493	+20.56	- 7	12.0	34	Min.	Voh
	8572	+21	- 12	7.4	20		Hin
	8574	+21	- 10	8.15	19		Gol
	8575	+21	- 9	7.5	11		Wit
	8577	+21	- 7	7.7	20		Voh
	8580	+21	- 4	7.7	20		Bra
χ Cyg	8276	+15	+15	5.75	24		Zis
	8282	+15	+ 21	5.5	27		Bra
R Dra	8472	+15	+ 9	7.8	15		Zis
	8473	+15	+10	7.7	21		Gol
	8479	+15	+16	7.6	21		Bra
X Gem	8293	+18	- 15	8.1	9		Hin
S Her	8424	+11	- 10	6.9	23		Gol
	8424	+11	- 10	7.3	9		Zis
	8429	+11	- 5	7.7	39		Voh
	8430	+11	- 4	6.8	17		Bra
T Her	8435	+19	- 6	7.9	24		Voh
	8443	+19	+ 2	8.0	12		Bra
	8444	+19	+ 3	8.1	6		Zis
	8618	+20	+12	8.5	10		Bra
W Her	8390	+12	- 29	8.2	24		Voh
RS Her	8468	+15	- 22	7.5	18		Bra
SS Her	8438 :	+30	+ 8 :	8.9	6		Bra
SY Her	8522	+28	+ 1	8.0	8		Hin
R Leo	8253	+13	+60	5.8	25		Zis
S LMi	8338	+13	+ 6	8.2	11		Hin
R Lyn	8581	+ 9	- 3	7.8	14		Hin
W Lyr	8456	+17	+ 8	8.0	14		Zis
	8459	+17	+11	7.6	41		Voh
	8460	+17	+12	7.0	18		Bra
	8460	+17	+12	7.55	17		Gol
V Mon	8307	+10	- 70	7.4	11		Hin
	8667	+11	- 51	7.4	8		Hin
X Oph	8550 :	+11.47	+49 :	9.4	25	Min.	Klx

C) Mirasterne (Fortsetzung)

Stern	JD(hel) 244....	E	(B-R)	m_V	n	Bem.	Beob.
U Ori	8589	+ 9	+20	6.8	31		Klx
	8590	+ 9	+21	7.3	17		Hin
R Peg	8423 :	+16	- 71 :	7.9	16		Zis
U Per	8567 :	+11	- 22 :	8.3	45		Voh
R Ser	8380	+ 8	+ 8	7.4	17		Zis
R Tri	8573:	+12.56	+ 6 :	-	33	Min.	Voh
R UMa	8292	+ 9	- 16	7.5	18		Hin
	8293	+ 9	- 15	7.3	32		Klx
	8295	+ 9	- 13	7.2	16		Zis
	8297	+ 9	- 11	7.3	20		Bra
	8592 :	+10	- 17 :	-	9		Rat
	8602 :	+10	- 7 :	7.2:	5		Rcr
	8603 :	+10	- 6 :	6.9	10		Zis
	8605	+10	- 4	6.7	20		Hin
	8605	+10	- 4	6.6	43		Klx
	8606	+10	- 3	7.35	26		Gol
	8607	+10	- 2	7.4	37		Voh
	8615	+10	+ 6	7.0	23		Bra
	8615	+10	+ 6	6.8	17		Wit
S UMa	8475	+12	- 13	8.3	23		Bra
	8475	+12	- 13	8.3	22		Gol
	8477	+12	- 11	8.0	17		Zis
	8491	+12	+ 3	7.6	16		Wit
	8500 :	+12	+12 :	8.2	11		Rat
T UMa	8439	+11	- 7	8.7	35		Voh
	8444	+11	- 2	8.5	17		Bra
	8446	+11	0	8.5	13		Zis
	8447	+11	+ 1	8.5	12		Wit
RS UMa	8334	+ 9	+12	8.7	10		Hin
S UMi	8545	+ 8	- 34	8.8	18		Bra
	8550	+ 8	- 29	9.0	52		Voh
	8550 :	+ 8	- 29 :	8.6	13		Zis
	8560	+ 8	- 19	8.8	22		Hin
T UMi	8615	+10	-156	9.1	12		Voh
U UMi	8504:	+ 9.50	- 58 :	11.5:	15	Min.	Zis
	8511	+ 9.50	- 51	11.1	41	Min.	Voh
R Vir	8343	+17	- 5	7.2	9		Hin
R Vul	8455	+21	- 2	8.6	27		Voh
	8456	+21	- 1	8.3	10		Zis
	8459	+21	+ 2	8.3	9		Bra
	8590	+22	- 4	8.4	7		Voh
	8591	+22	- 3	8.0	8		Hin
	8596	+22	+ 2	8.1	9		Bra

Beobachter:

Bra	Branzk, R.	Beerwalde
Bgr	Berger, H.	Scharfenberg
Bus	Busch, H.	Hartha
Ens	Enskonatus, P.	Berlin
Gol	Goldhahn, H.	Lohmen
Het	Hecht, D.	Mügeln
Hin	Hinzpeter, R.	Coswig
Klx	Klix, P.	Sohland
Rat	Rätz, M.	Herges-Hallenberg
Rcr	Rätz, K.	Herges-Hallenberg
Voh	Vohla, F.	Altenburg
Wit	Witt, U.	Berlin
Zis	Zische, E.	Weigsdorf-Köblitz

Optical long-time behaviour of 3C 273 and BL Lac on the basis of the Sonneberg Plate Archive

M. Maisack, Tübingen
P. Kroll, Th. Weber, Sonneberg
(Eingegangen am 2. November 1993)

Abstract
The prominent AGNs 3C 273 and BL Lac were studied on astrographic plates of the Sonneberg Plate Archive. Discrete autocorrelation method and Fourier transform were applied to the light-curves. There are no obvious periodic variations on time-scales longer than one year.

1 Studying AGNs on the Sonneberg Plate Archive

The Sonneberg Plate Archive can be used not only for the study of long–time behaviour of variable stars but also for a number of prominent bright AGNs. These AGNs have received wide attention following the detection of GeV emission by the EGRET instrument on the Arthur Holly Compton Gamma Ray Observatory.

The most prominent of these observations, the flare observed from 3C 279, may indicate that they are all transient events. Optical outbursts should accompany such gamma-ray events if the beaming and synchrotron-self-comtonisation scenarios are correct.

The Sonneberg Plate Archive provides a unique opportunity to study some of these objects and their optical behaviour over a half-a-century-long interval, yielding the opportunity to search for long-term variability and characteric time-scales in these sources.

Using the HEASARC database at NASA/GSFC to determine which AGNs are the brightest in the northern hemisphere, and therefore most suited for such studies, we found two objects which have been studied in the Sonneberg Platte Archive: **BL Lac** and **3C 273**. Two other prominent BL Lac objects were not suitable for this study since nearby bright stars prevented the correct determination of the magnitudes of the AGNs in question.

Long-time lightcurves of these two objects have been published by Angione and Smith, 1985, (**3C 273**) and Webb et al., 1988 (**BL Lac**).

2 Digitisation and brightness determination

For digitising the photographic information of the plates, a made-to-order, time and cost-saving configuration using an 8 bit CCD line scanner (12 bit later on) has been invented and tested in co-operation with the Lehr- und Forschungsbereich Theoretische Astrophysik of Tübingen University.

For the brightness determination special software has been developed by Kroll and Neugebauer (1993). It uses an algorithm of fitting a Gaussian-shaped profile the each star's (galaxy's) imprint. The logarithm of the Gaussian fit volume is strongly correlated with object's magnitude.

The object BL Lac is recorded on about 450 plates (field "2 Lac") of the Field Patrol with a limiting magnitude of about 17^m (pg). Unfortunately the object is located near the edge of the plates, which causes a large uncertainty ($\Delta m \sim 0.2$) of the brightness determination.

The brightest Quasar, 3C 273, has been scanned on Sky Patrol plates (field $13^h, +20°$). The plate limit varies between 13^m and 14^m (pg). Therefore, like BL Lac, 3C 273 is also a faint object near the plate limit. This reduces the accuracy of the magnitude determination ($\Delta m \sim 0.3 \ldots 0.5$).

3 The light-curves

Sonneberg observations of BL Lac are not continuous. There is a large gap between the early 1930s and 1960. One can see that BL Lac was brighter ($m_{pg} \approx 14.5$) in the 1930s than in recent decades ($m_{pg} \approx 16$). The autocorrelation and the discrete Fourier spetrum of BL Lac are shown in Figs. 4 and 6, respectively.

Apart from the structures caused by the gaps at lags of half years, one can see that the autocorrelation is generally positive, which is caused by the diminishing brightness.

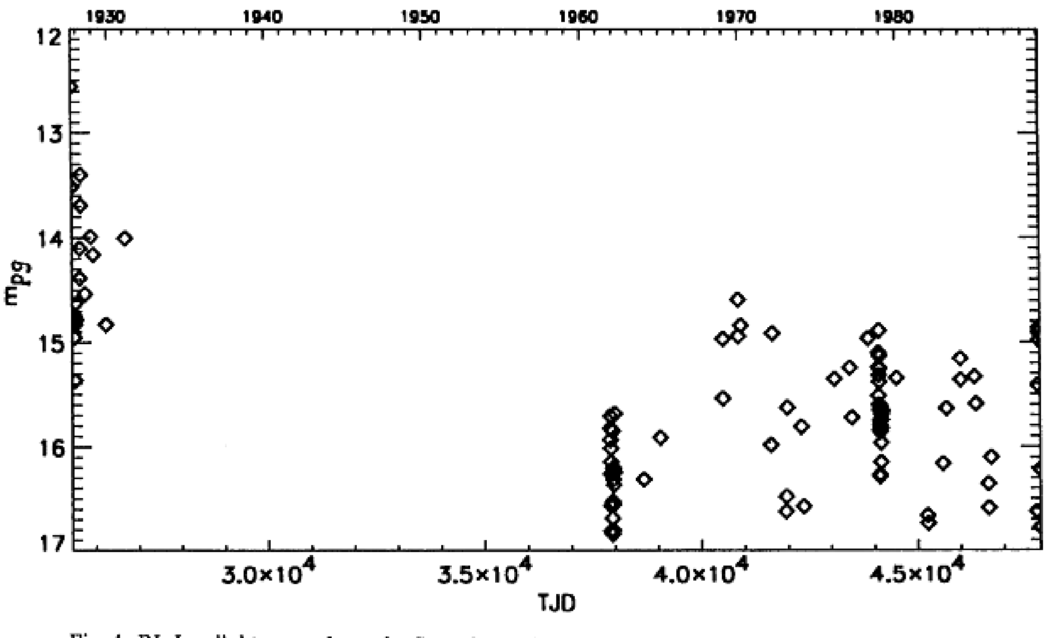


Fig. 1: BL Lac light-curve from the Sonneberg plates

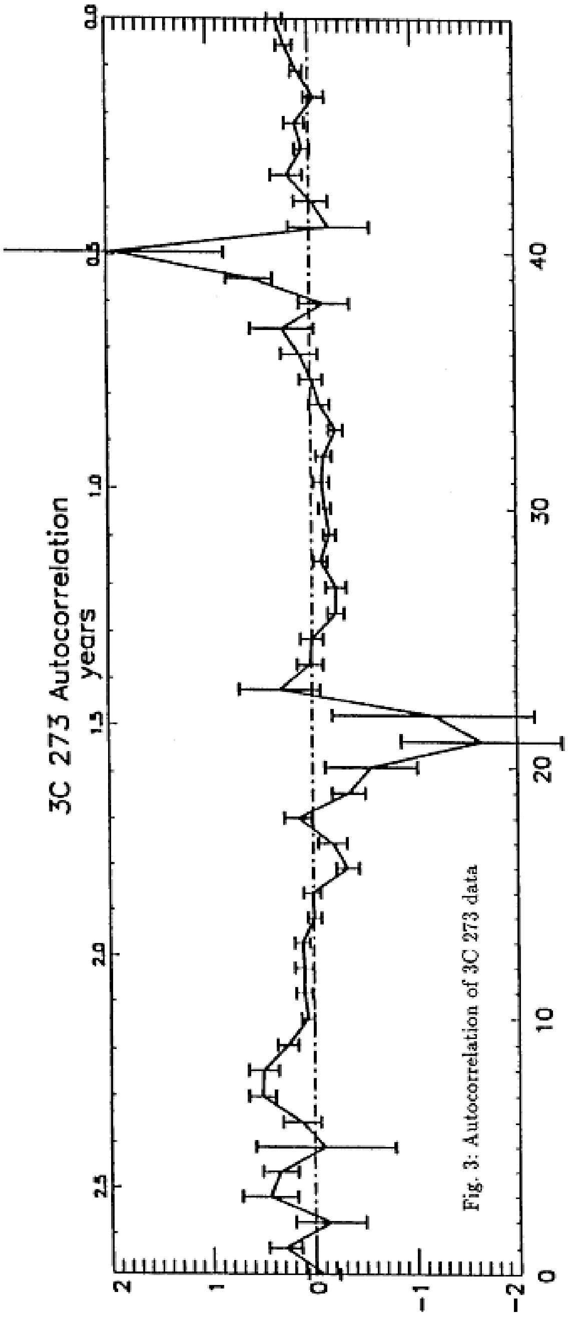


Fig. 3: Autocorrelation of 3C 273 data

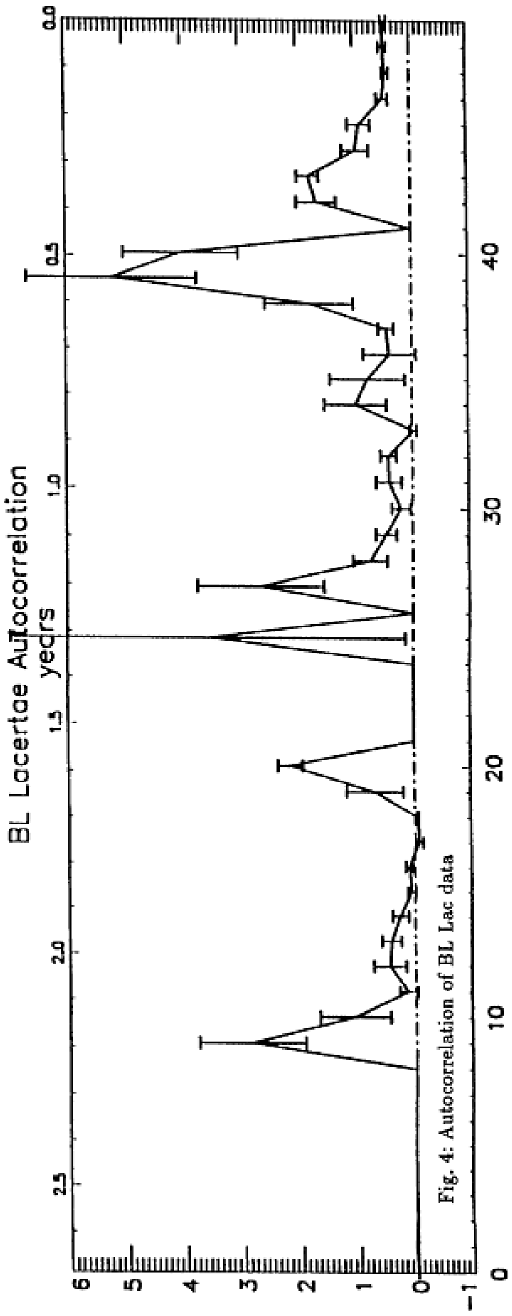


Fig. 4: Autocorrelation of BL Lac data

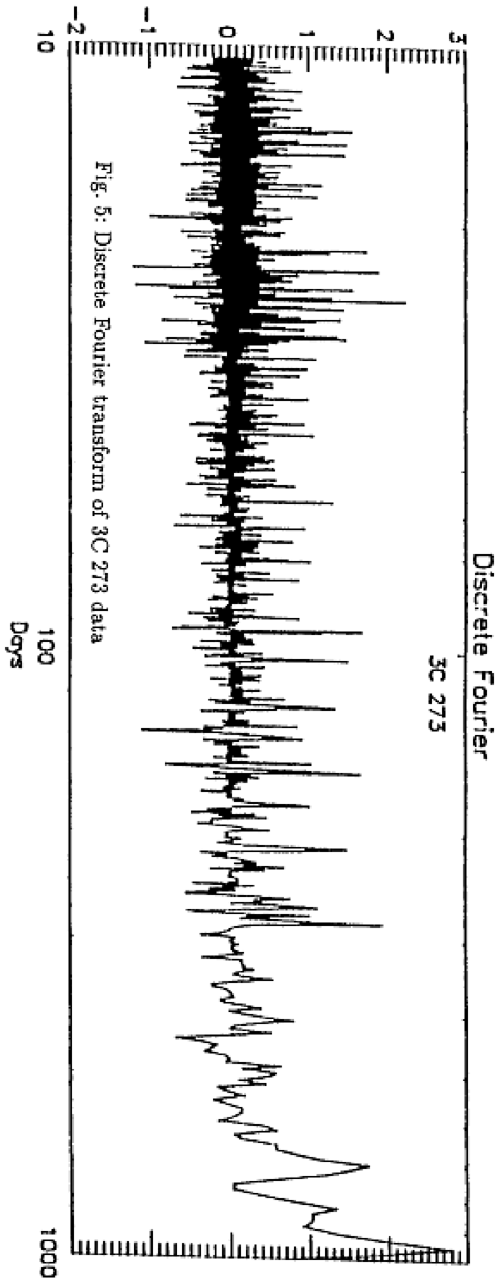


Fig. 5: Discrete Fourier transform of 3C 273 data

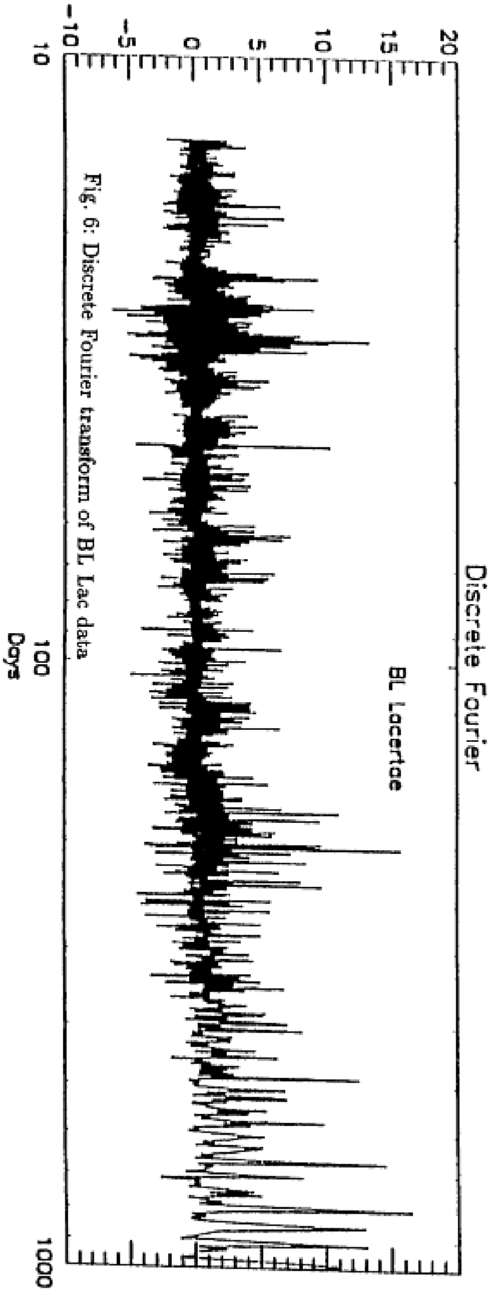


Fig. 6: Discrete Fourier transform of BL Lac data

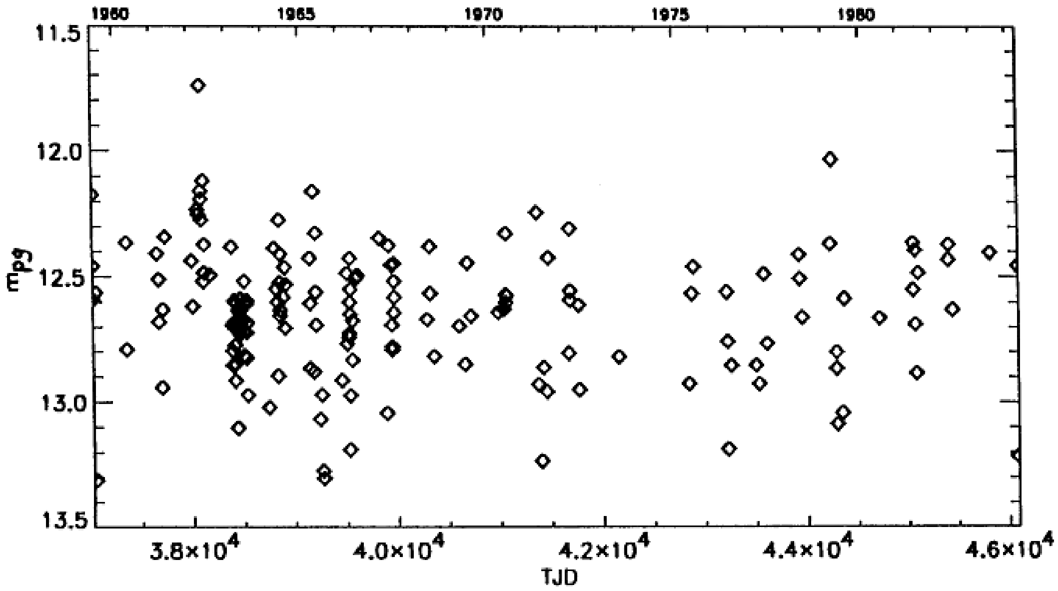


Fig. 2: 3C 273 light-curve from the Sonneberg plates

3C 273, observed since the 1960s, does not show a trend in brightness. A linear fit gives a nominal decrease of 2×10^{-3}/yr, which is below the accuracy of the measurements.

The autocorrelation and discrete Fourier transform are shown in Fig. 3 and 5. They show no evidence of a characteristic time-scale in this source.

4 Data analysis

The data we have collected are not evenly spaced in time. This is mostly due to the constraints one has in observing celestial objects in general, especially the times of year a source is visible, and of course weather.

We have therefore applied timing analysis techniques developed for unevenly sampled data:

First, we used the discrete autocorrelation method of Edelson and Krolik (1988) to search for typical variability time-scales not directly evident from the data. The results are shown in the figs. There are maxima in the curves (in both sources) at lags of $(N+1) \times 0.5$ years, caused by data gaps due to the non-observability of the sources at half-year intervals. Other than that, no characteristic time-scale stands out.

Second, are used a discrete Fourier transform method described in PRESS and RYBICKI (1989). The results of this method show no characteristic time-scale other than at a period of ≈ 30 days. This is caused by the fact that observations were preferentially performed during new moon. The peaks at ≈ 25 days in BL Lac may be beat frequencies.

One can see in the long- time light-curves displayed in Figs. 1 and 2 that there are no obvious periodic variations on time-scales longer than one year. Generally, the variability of these two sources is more of a short-time-scale nature, as can be seen from the large scatter in individual closely spaced (in time) groups of data points. This is confirmed by the application of the structure function (SIMONETTI, CORDES and HEESCHEN, 1985, not displayed on this paper).

Acknowledgement

This paper was presented as a poster contribution at the Spring meeting of the "Astronomische Gesellschaft" in 1993.

We thank Prof. Hanns Ruder of Tübingen University for his generious support of the scanning activities at the Sonneberg Observatory.

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Cycle length of the cataclysmic variable AK Cancri

W. Wenzel, Sonneberg

(Eingegangen am 24. August 1993)

Abstract
From photographic observations a cycle of about 100 days is deduced which is much smaller than can be guessed from the star's amplitude of 6.5 mag.

In view of the apparently different results given in the literature concerning the spectral peculiarities in minimum, the location of the star image, and the statistics of brightness data, I investigated the object on plates of the Sonneberg 140/700 mm Triplet astrograph (F) and found 5 eruptions (Wenzel, 1993). This material can now be supplemented by data of 5 additional maxima which I found by inspecting several hundred Sonneberg Sky Patrol exposures (SHÜ) taken from 1956 to 1992 mainly by H. Huth and B. Fuhrmann. 172 of these plates reach $13^{\mathrm{m}}5$ without showing the variable.

Thus the following list can be set up of the total of the eruptions observed photographically:

1930 Dec. 23	$13^{\mathrm{m}}6$ pg	F	
1931 Mrch.8	12.8	,,	
13	13.5	,,	
15	13.5:	,,	
1931 Dec. 10	13.4	,,	
1932 Dec. 4	12.8	,,	
1962 Nov. 3	12.5	SHÜ	
1964 Feb. 13	13.0	,,	
14	13.1	,,	
1967 Feb. 14	13.3	F, SHÜ	
1972 Dec. 25	12.8	SHÜ	
28	13.5:	,,	73 Jan. 2 invisible [$13^{\mathrm{m}}5$
1988 Mrch.9	12.8:	,,	plate of moderate quality
1989 Nov. 30	13.0	,,	
Dec. 1	12.5	,,	

Applying the formulae of Wenzel and Richter (1986) or Richter (1986) to the homogeneous series of the F plates of March 1928 to April 1934 we get three independent estimates of the mean cycle length:

$C_1 = \frac{\lambda}{n} \cdot f \cdot t = \frac{0.9}{6} \cdot 0.3 \cdot 6.0a = 99d$

$C_2 \gtrsim \frac{L \cdot N}{n} = \frac{7 \cdot 65}{6} d = 76d$

$C_3 = \frac{t}{S} = \frac{6.0}{12 \cdot 1.5} a = 122d$

The meaning of the symbols is (see References) :

$\frac{n}{\lambda}$ - true number of eruptions during time $f \cdot t$,
n - observed number of plates during outbursts,
t - whole time interval of observations irrespective of seasonal gaps,
f - fraction of the year covered by plates,
N - whole number of inspected plates,
L - average length of outbursts,
S - average number of outbursts per year, reduced for seasonal gaps.

As a rough guess of the mean cycle length we obtain C ≈ 100 d, and this value should be regarded as an upper limit, since also at times of good seasonal visibility it is quite possible to miss eruptions because of moonlight, cloudy weather, or low maximum brightness.

The amplitude of the eruptions is approximately 6.5 mag (WENZEL, 1993) and consequently much larger than can be derived from one of the currently assumed Kukarkin-Parenago relationships (e. g. RICHTER, 1986, or RICHTER and BRÄUER, 1989), from which follows a value of lgC ≈ 3.

The result is in accordance with the supposition of SZKODY and HOWELL (1991; 1992) who stated that high galactic latitude cataclysmic variables "have a lower luminosity than their galactic plane counterparts" and therefore "larger outburst amplitudes than normal dwarf novae".

This work has been supported by funds of the German Bundesministerium für Forschung und Technologie under contract no. 05-2S052A.

Postscriptum: After having finished this paper I got aware of the investigation of HOWELL et al. (1990) where they called for a confirmation of this star as a cataclysmic variable. These authors also traced the deviating spectroscopic results of WILLIAMS (1983) to a misidentification.

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Remarks on the poorly-known eruptive variables V699 Ophiuchi and V630 Cassiopeiae

W. Wenzel, Sonneberg
(Eingegangen am 19. Oktober 1993)

Abstract
Negative observations of the two stars on Sonneberg photographic plates are reported.

V699 Oph

There should be no doubt about the reality of an eruptive variability ($13^{m}8$...[$16^{m}0$ (pg)) of this star shown on Harvard plates, because WALKER and OLMSTED (1958) confirmed, by these same plates, the findings of the discoverer BOYCE (1942) and gave an identification chart. HOWELL et al. (1990), however, "measured a number of stars on (their) CCD frames near the marked position but found no evidence of variability in any of them during (their) 1.2-hour time series". By the latter authors a classification "as a low amplitude blue object ($14^{m}2$...$16^{m}2$)" is ascribed to WALKER and OLMSTED (l. c.), but in the quoted paper of these investigators a remark like that cannot be found. Also the cycle length given in the GCVS 1985 ($32^{d}1$:) must be regarded as unfounded, as it is obviously based on the maximum brightness (of one eruption ?) published by BOYCE (l. c.), the "minimum" magnitude of one of the POSS stars at the given position (see also VOGT, 1980), and the Kukarkin-Parenago relationship for U Geminorum stars.

I checked about 100 good-quality Sonneberg Sky Patrol plates of the years 1962 to 1965 (threshold 13^{m} to $14^{m}5$) and could not find any trace of the star. Thus its nature can only be cleared up by further deep observation.

V630 Cas

HONEYCUTT et al. (1993) observed a 3 months outburst with an amplitude of > 2 mag ([$16^{m}5$...$14^{m}5$) during a 86 nights CCD series of 1991 July to 1993 May. This happened by an incredibly lucky chance, ore else, eruptions of this kind are much more frequent than has hitherto been assumed for this star: Only one maximum, namely a high one ($17^{m}1$...$12^{m}3$) by the discoverer WHITNEY (1973), had been reported before the investigation of HONEYCUTT et al.

The region of the object was investigated by ZSCHOCKE (1973; star erroneously numbered as OV25 instead of OV29) on 354 plates of the Sonneberg Sky Patrol taken by H. HUTH in the years 1956 to 1972, and by E. SPLITTGERBER (1990) on 346 plates gained from 1972 to 1989 with the same instruments by H. HUTH and B. FUHRMANN. The treshold of the plates is between 13^{m} and 14^{m}. No eruption could be detected with certainty. SPLITTGERBER reports on faint traces of the star on exposures of 1982, but he himself questioned their reality on account of their faintness near the threshold.

My thanks are due to Dr. H. Duerbeck, who directed my attention to the preprint of the paper of HONEYCUTT et al.

This work has been supported by funds of the German Bundesministerium für Forschung und Technologie under contract no. 05-2S052A.

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A new eclipsing variable S 10 931 in Lyra

W. Wenzel, Th. Weber, P. Kroll, Sonneberg
(Eingegangen am 4. November 1993)

Abstract
Elements, mean light-curve, and magnitudes of comparison stars are given.

When blinking a pair of Sonneberg 400/1600 mm astrograph plates in the course of the search for an optical counterpart of the BATSE gamma-ray burst source 92 08 04 (19^h53^m UT burst time) (Greiner, 1993) a new eclipsing star has been detected at the position of

$$\alpha = 19^h04^m54^s,\ \delta = +45°37'.1\ (1950.0).$$

The brightness of the object was determined on about 550 exposures taken with the astrographs 400/1600 mm and 400/1900 mm in the years 1962 to 1993 mainly by L. Meinunger and G. A. Richter. An evaluation of the data by the period finding method of Schwarzenberg-Czerny (1989) (analysis of variance) yielded the following elements:

$$\text{Min.(hel.)} = 244\,5578.335 + 2^d.01522 \cdot E.$$

The mean light-curve (Fig. 1) consists of average points deduced by collecting the original observations in phase intervals of 0.05 p each.

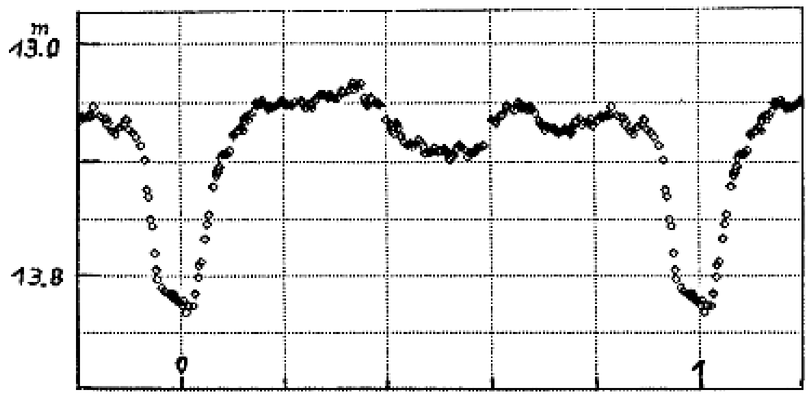
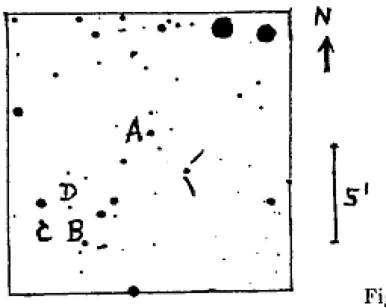


Fig. 1: The mean light-curve of S 10 931



A = $12\overset{\mathrm{m}}{.}66$ pg
B = $13\overset{\mathrm{m}}{.}16$ pg
C = $13\overset{\mathrm{m}}{.}87$ pg
D = $14\overset{\mathrm{m}}{.}63$ pg

Fig. 2: Comparison stars and finding chart

The amplitude of variability amounts to 0.7 mag ($13\overset{\mathrm{m}}{.}15 \ldots 13\overset{\mathrm{m}}{.}85$ (pg)) for the primary minimum and 0.2 mag for the secondary one. The comparison stars (Fig. 2) were linked to the Mt. Wilson system of Selected Area 38.

Part of this work was supported by funds of the German Bundesministerium für Forschung und Technologie under contract no. 05-5S0414.

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Photographic observations of MV Lyrae in 1993

Th. Weber, Sonneberg
(Eingegangen am 9. November 1993)

Abstract
Observations of MV Lyrae on blue-sensitive plates are given.

In complementing the series of observations I measured the star on plates obtained with the 400/1600 mm astrograph of Sonneberg Observatory.

The images of the star were digitized and measured with the method described by KROLL and NEUGEBAUER (1993).

The observations, which were obtained in linking to the sequence of comparison stars given by WENZEL and FUHRMANN (1983), are listed in the table:

J.D.	m_{pg}	J.D.	m_{pg}
244 8503.365	12.61	244 8882.296	12.59
8504.366	12.63	8883.308	12.61
8514.415	12.75	8886.359	12.51
8534.323	12.59	8887.332	12.53
8544.331	12.55	8893.308	12.63
8682.628	12.56	8912.310	12.50
8683.559	12.51	8915.308	12.51
8692.602	12.92	9062.530	12.53
8712.440	12.92	9071.517	12.48
8720.539	12.70	9119.473	12.56
8746.470	12.66	9123.434	12.11
8747.429	12.62	9124.444	12.63
8762.395	12.63	9125.495	12.47
8763.420	11.80	9127.444	12.62
8766.424	12.69	9131.468	12.54
8767.401	12.64	9132.440	12.58
8773.519	12.58	9154.404	12.60
8844.531	12.63		

show the object in its upper level.

The star has not yet (Fig. 1) returned to the quasiperiodic state described by WENZEL and FUHRMANN (1983) and ANDRONOW, FUHRMANN and WENZEL (1988).

Acknowledgement

I should like to thank P. Kroll from Sonneberg Observatory for supervising the digital measurement techniques.

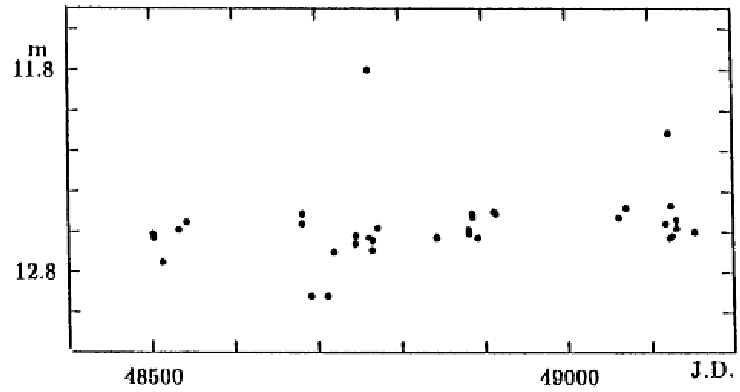

Fig. 1: Photographic observations of MV Lyrae in 1993

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Beobachtungen von V88, V89, V99, V102, V122, V136, V164, V168 und 11 BSS-Kandidaten im Kugelhaufen M3

I. Meinunger, Sonneberg

(Eingangen am 30. Juli 1993)

Einleitende Bemerkungen siehe 1983, Mitt. Veränderl. Sterne, **10**, p. 31 und 1985, **10**, p. 123. Als Vergleichsstern diente auch I-I-51 aus 1970, Astrophys. J. **162**, p. 843.

V88

Der RRc-Stern V88 befindet sich in Kernnähe von M3 und war durch störende Nachbarsterne schwer zu beobachten. Aus den Saisonlichtkurven von 1963 bis 1978 (mit P(Szeidl)=0^{d}2985092 und der Ausgangsepoche 2438914.469) ist die Tendenz des sich verringernden Periodenwertes weiterhin - wie in 1965, Mitt. Sternw. Budapest 5, No. 58, p. 255 - erkennbar.
Folgende Erhellungen wurden beobachtet:

J.D.		E	B - R	Bereich
243 8118.395	-	2667	+0^{d}050	U
8878.372	-	121	+0.023	U
8881.366	-	111	+0.032	U
8901.400	-	44	+0.065	U
8914.469		0	0.000	B
9180.470	+	891	+0.029	U
244 0624.622	+	5729	−0.006	U
0648.510	+	5809	+0.001	B
0676.584	+	5903	+0.015	U
0679.525	+	5913	−0.029	V
0682.578	+	5923	+0.039	U
1421.414	+	8398	+0.065	U
1771.436	+	9571	−0.065	B
1772.400	+	9574	+0.004	B
2122.567	+	10747	+0.020	B
2898.366	+	13346	−0.007	V

V89

Im Zeitraum von 1963 bis 1978 ist aus den Beobachtungen dieses RRab-Sternes keine Periodenänderung erkennbar. Der Veränderliche war wegen Kernnähe teilweise nur mit Mühe zu schätzen. Die Saisonlichtkurven wurden mit P(SZEIDL) = $0^{d}5484779$ und dem Ausgangsmaximum bei 243 8843.531 abgeleitet.
Beobachtete Erhellungen :

J. D.		E	B - R	Bereich
243 8134.418	-	1293	$+0^{d}069$	r
8415.725	-	780	+0.007	o.F.
8496.407	-	633	+0.062	r
8501.359	-	624	+0.078	r
8553.457	-	529	+0.071	V
8831.469	-	22	+0.005	V
8843.531		0	0.000	U
8853.413	+	18	+0.009	i
8881.366	+	69	-0.010	U
8882.529	+	71	+0.056	V
8910.435	+	122	-0.010	U
8932.462	+	162	+0.078	B
9266.427	+	771	+0.019	r
244 1389.591	+	4642	+0.026	B
2131.596	+	5995	-0.060	B
2453.592	+	6582	-0.021	r
2480.472	+	6631	-0.016	r
2837.588	+	7282	+0.041	B
2897.368	+	7391	+0.037	V

V99

Die Beobachtung von V99 (wahrscheinlicher RR-Lyrae-Stern mit einem Periodenwert von etwa einem halben Tag) im U, B, V, r, i - Bereich war nur auf etwa 150 Tautenburger Platten im Zeitraum von 1963 bis 1978 möglich. Es konnten vorläufig lediglich folgende unsichere Erhellungen festgestellt werden:

J. D.	Bereich	J. D.	Bereich
243 8801.637	r	243 8902.462	U
8830.577	U	9266.427	r
8831.484	V	244 2477.570	V
8832.653	V	2453.592	r
8843.531	U	2480.472	r
8881.366	U		

V102

Für die Beobachtung von V102 stand nur eine eingeschränkte Plattenzahl von etwa 150 Tautenburger Schmidtplatten zur Verfügung. Aus der Verteilung der Beobachtungen könnte auf eine eventuell vorliegende Variabilität geringer Amplitude geschlossen werden. Durch die Gewinnung weiterer Aufnahmen mit dem Tautenburger Schmidtspiegel wird eine Klärung hinsichtlich Helligkeitsänderungen in absehbarer Zeit angestrebt.

V122

Dieser Veränderliche war schwer zu beobachten wegen Kernnähe, sowie der in unmittelbarer Nachbarschaft liegenden Sterne: X 40 und ein konstanter Stern. Die Periode beträgt nach GREENSTEIN, J.L., (1935, Astr. Nachr. 257, No. 6164) P = 0^d5017. Auf den zur Zeit der Bearbeitung zugänglichen Platten (etwa 150 im U, B, V, r, i - Bereich) konnten lediglich Erhellungen um 243 8878.448 (U), 8881.366 (U) und 9309.410 (V) festgestellt werden.

Inwieweit die hier beobachteten Erhellungen auch dem Einfluß des Veränderlichen X 40 (KHOLOPOV, P.N., Var. Stars, p. 313) zuzuschreiben sind, sollen zukünftige Aufnahmen mit dem Tautenburger Teleskop aufklären.

V136

Dieser RR-Lyrae-Stern nach KADLA, Z.I. und GERASHCHENKO, A.N., (1982, Isw. Glav. Astr. Obs. Pulkowo No. 199, p. 86) war auf den etwa 150 zur Zeit in Sonneberg zur Verfügung stehenden Tautenburger Schmidtplatten im Zeitraum von 1963 bis 1978 wegen Kernnähe und störender Nachbarsterne schwer zu beobachten. Zweifelsfreie Erhellungen konnten nicht beobachtet werden. Zum Beispiel : 243 8817.517 (U); 8851.579 (i); 8881.366 (U).

V164

Der Veränderliche war wegen seiner Lage im Kern von M3 sehr schwer zu beobachten. Unsichere Erhellungen wurden um 243 8881.366 (U); 9587.582 (B); 244 2122.567 (B) festgestellt.

V168 und 11 BSS-Kandidaten

V168 befindet sich im Kernbereich von M3 und war daher auf den Tautenburger Schmidtaufnahmen - die nicht für die Beobachtung von Sternen in Kugelhaufenkernen gedacht waren - schwer zu beobachten.

Folgende unsichere Erhellungen von V168 wurden festgestellt: 243 8473.634 (B); 8493.456 (B); 8914.428 (U); 9309.430 (V) und 244 0418.429 (B).

Mit der Periode von GREENSTEIN (0^d3770) und der Epoche Max. = 242 4647.617 (GREENSTEIN, J.L., 1935, Astr. Nachr. 257, No. 6164) ließen sich die hier beobachteten Erhellungen nur teilweise darstellen.

Die wenigen Platten mit Kerneinsicht erreichten nicht die erforderlichen Reichweiten für eine mitbeabsichtigte Beobachtung von 11 der isoliertesten BSS (Blue Straggler Stars) - Kandidaten aus BOLTE, M., HESSER, J.E., STETSON, P.B., 1993, Astrophys. J., 408, L 89 - L 92, Plate L 7.

Bemerkungen zu FV Del

I. Meinunger, Sonneberg
(Eingegangen am 7. November 1993)

Nach einer brieflichen Mitteilung vom Mai 1992 fand Schmidt, E.G. (University of Nebraska - Lincoln) im Rahmen von Beobachtungen der im GCVS als konstant klassifizierten Sterne (Schmidt, E. G., et al., 1992, Publ. Astr. Soc. Pac. **104**, p. 906) zwei Fälle von Veränderlichen größerer Amplitude, die sich in unmittelbarer Nachbarschaft von FV Del und FP Gem befinden.

Im Falle von FV Del : 9″ südlich und 46″ östlich, identifiziert auf der Umgebungskarte in Mitt. Veränderl. Sterne Sonneberg Nr. 308.

Es ist von Interesse, ob die hier genannten Fälle möglicherweise auch zu den wenigen bekannten Pulsationssternen gehören, die ihre Pulsationen starten und stoppen können über Perioden von Dekaden.

Nach der Beobachtung des von Schmidt korrigierten FV Del auf etwa 200 A - Platten (170/1200 mm) von 1928 bis 1969 und 210 Astrographenplatten (400/1600 mm und 400/1900 mm) von 1940 bis 1993 hat man den Eindruck, daß der Entdecker (Hoffmeister, C., 1949, Erg. Astr. Nachr. **12**, p. 1) irrtümlich den als "FV Del" beobachteten konstanten Nachbarstern (Meinunger, L., 1980, Veröff. Sternw. Sonneberg, **3**, p. 197) als den eigentlichen Veränderlichen FV Del markierte.

Die Verteilung der hier gewonnenen Beobachtungen zeigt Merkmale eines RV-Tauri-Sternes : Aus Reihenaufnahmen von Astrographenplatten deutet sich um 243 8330 ein relativ spitzes Minimum an, während um 243 8290 ein weniger tiefes und flacheres Minimum zu beobachten ist. Auch um 243 0610 zeigen Reihenaufnahmen ein ausgeprägtes Minimum, bei 244 6645 und 9213 wurden "tiefe" Minima festgestellt. Auf A - Platten wurden zu folgenden Zeiten helligkeitsschwache Beobachtungen gemacht: 243 3155, 3500, 4958, 6815.

Anmerkungen zu NSV 7814

M. E. Baldwin, Butlerville, M. Dahm, Bremen
(Eingegangen am 8. November 1993)

Abstract
NSV 7814 was observed on blue-sensitive Sky Patrol plates and also visually. The suspected variable is found to be constant within the limit of accuracy.

Beim Erstellen einer Vergleichssternsequenz für SS Her mit einem visuellen Photometer vermutete Graff, K., (1921, Astr., Nachr. **213**, p. 176) daß NSV 7814 = CSV 101596 = Zi 1256 vielleicht veränderlich in den Grenzen $11^{m}_{.}0 \ldots 11^{m}_{.}8$ sein könnte.

Böhme, S., (1937, Astr. Nachr., **261**, p. 437) fand NSV 7814 auf 32 Ernostarplatten konstant bei $12\overset{\rm m}{.}5$ (pg). Da NSV 7814 auf der Umgebungskarte von SS Her der AAVSO verzeichnet ist, liegen Daten in diversen AAVSO-Reports und AFOEV-Bulletins vor. Die Helligkeit schwankte nach diesen Qellen in den Grenzen $10\overset{\rm m}{.}4 \ldots 11\overset{\rm m}{.}9$(v). Aufgrund eigener visueller Beobachtungen vermuteten Predom, C. und DeMartino, R., (1991, AAVSO **20**, p. 250) einen kurzperiodischen Bedeckungslichtwechsel mit einer Amplitude von 1 mag.

Daraufhin beobachtete M.E. Baldwin den Stern im Frühjahr 1992 visuell, während M. Dahm NSV 7814 unabhängig auf blauempfindlichen Platten der Sonneberger Himmelsüberwachung bearbei - tete.Beide fanden im Rahmen der Schätzgenauigkeit konstante Helligkeit. Auch eine Untersuchung der Daten von C. Predom und R. DeMartino mit einem Periodensuchprogramm führte zu keinem Ergebnis. Der von C. Predom und R. DeMartino angezeigte Lichtwechsel wird wahrscheinlich durch die Benutzung unterschiedlicher Vergleichssterne und die Kombination der visuellen Daten zweier Beobachter verursacht.

Es sei hier angemerkt, daß die AAVSO-Karte von SS Her zu viele Vergleichssterne ähnlicher Helligkeit enthält, deren unterschiedliche Auswahl zu einer erheblichen Streuung der Helligkeitsschätzungen führt. Vermutlich ist dies zusammen mit dem spätem Spektraltyp des Sterns die Ursache der immer wieder vermuteten Veränderlichkeit.

Note on the extremely red carbon star PQ Cephei

M. Dahm, Bremen

(Eingegangen am 24. August 1993)

The variability of PQ Cep was discovered by Morgenroth, O., (1933, Astr. Nachr., **250**, p. 75). It is a carbon star with a spectral type of C6.3e after Stephenson, C.B., (1989, Warner Swasey Publ. **3** ,no. 2). Kizla, J. and Paupers, O., (1985, Issled. Solntsa i Krasn. Zvezd, Riga **23**, p.38) did some BVR-photometry and found an exceptionally large color index of B - V = $6\overset{\rm m}{.}0$. We investigated PQ Cep on the plates of the Sonneberg Sky Patrol of the years 1988 to 1992. PQ Cep is a Mira-type variable with a period of roughly 425 d and a range from $7\overset{\rm m}{.}5 \ldots 12\overset{\rm m}{.}0$ (pg).
Some further work will be done later.

The author wishes to thank the staff of Sternwarte Sonneberg and especially Dr. W. Wenzel for their support.

Der Lichtwechsel von TAV 0042+53

E. Rudolph, Jena
(Eingegangen am 15. Januar 1993)

Den Stern IRAS 00422+5310, dessen Veränderlichkeit von COLLINS, M., (1991, The Astronomer, **28**, no. 332, Nova/Supernova Patrol Report 7/91, Stern TAV 0042+53) entdeckt wurde, habe ich auf 300 Platten RP1 + Filter GG14 der Sonneberger Himmelsüberwachung geschätzt. Es wurden die Vergleichssterne der genannten Literatur benutzt.

Der Veränderliche ist offensichtlich halbregelmäßig mit wellenförmigen Lichtwechsel, wobei die Aufstiege zum Maximum rascher (in etwa 100 d) erfolgen als die anschließenden Abstiege (> 250 d). Die Zyklenlänge betrug 420 d in den Jahren 1971 bis 1986 und 456 d ab 1988. In der Zeit des für 1987 zu erwartenden Maximums herrschte wahrscheinlich eine Störung des Lichtwechsels; der Stern befand sich dabei über 100 d in mittlerer Helligkeit. In den Jahren 1964 bis 1967 wurden keine Maxima beobachtet. Ob dies ein durch die Verteilung der Beobachtungen bedingter Zufall ist, kann nicht entschieden werden. Gesamtamplitude: $9^{m}\!.6 \ldots 12^{m}\!.5$ (pg).

Beobachtung von LD 171

E. Rudolph, Jena
(Eingegangen am 5. Oktober 1993)

Der Stern wurde von DAHLMARK in den IBVS No. 3855 als neuentdeckter novaähnlicher Stern angegeben. Wobei nur eine Erhellung 244 6945 beobachtet wurde.
Laut DAHLMARK konnten von 1967 bis 1982 keine weiteren Erhellungen beobachtet werden.

Ich habe den Stern auf 237 Platten der Sonneberger Kameras 170/1200 mm und 400/1600 mm aus den Jahren 1941 bis 1990 bearbeitet. Es konnten bei der Bearbeitung keine weiteren Erhellungen des Sterns beobachtet werden.

Exact position and finding chart of MO Puppis

P. Kroll, Sonneberg

(Eingegangen am 20. Juli 1993)

MO Puppis was discovered by HOFFMEISTER, C., (1949, Astr. Abh. Erg. Astr. Nachr. **12**, p. 1). HOFFMEISTER reported a position derived from the BD-charts (see HOFFMEISTER, C., 1957, Mitt. Veränderl. Sterne, No. 296; GESSNER, H. ,1966, Sonn. Veröff. Veränderl. Sterne, **7**, p. 65). This position can also be found in the last edition of the GCVS.
M. E. BALDWIN from AAVSO reported (private communication) that the position given in the GCVS might be erroneous because he was not able to find the star and to match the finding chart (HOFFMEISTER, C., 1957, Mitt. Veränderl. Sterne, No. 296) with the region around that position.

Using the original log book datas and the discovery plates of HOFFMEISTER it was possible to find that the position given is wrong by almost one degree in declination - presumably a misprint.
Using a CCD line scanner (KROLL, P. and NEUGEBAUER, P., 1993, Astron. Astrophys. **273**, p. 341) I measured the exact position of MO Puppis according to PPM reference stars:

$7^h30^m50^s.1 \quad -12°02'53'' \quad (2000.0)$

Since the finding chart in Mitt. Veränderl. Sterne, No. 296 contains only a few stars, I give a larger finding chart below:

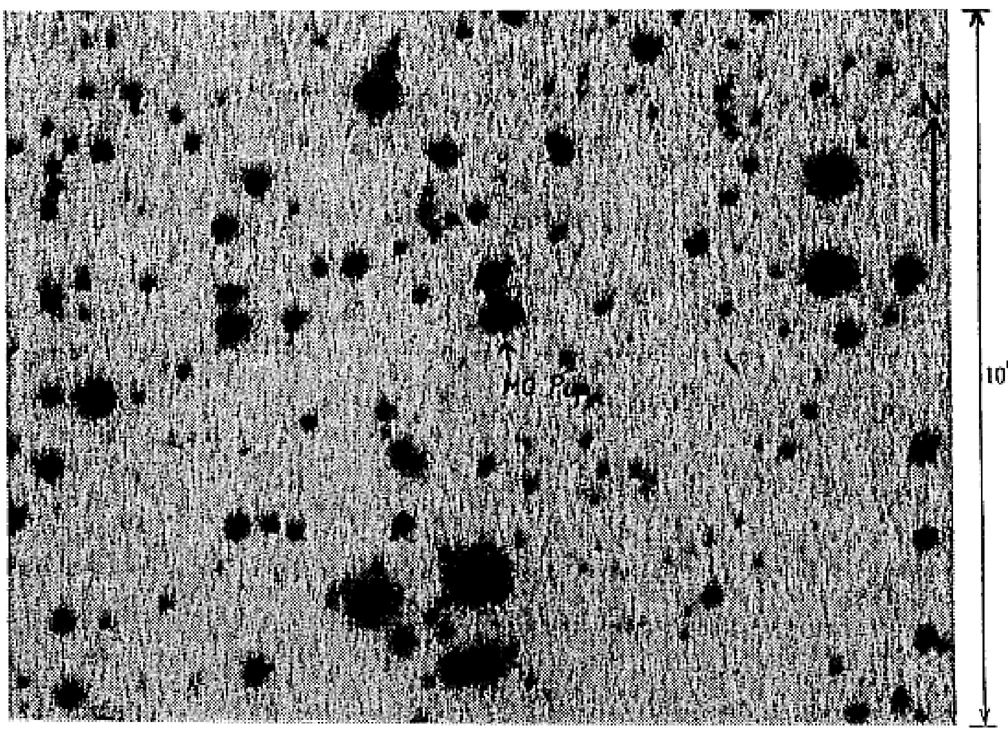

Fig. 1: Exact position of MO Puppis

Search for optical variability in the error box of the soft gamma-ray repeater 1806 - 20

R. Hudec, Ondřejov
(Eingegangen am 14. Februar 1994)

Abstract
The error box of SGR (soft gamma ray repeater) 1806-20=GRBS (gamma ray burst source) 790107 has been searched for optical flares using archival plate material obtained in the time interval 1963-1975 at the southern stations of the Bamberg Observatory. The position of the burster was covered on 132 plates representing 130 hours of exposure time. One object exhibiting optical variability was found. The position of this object was further analysed on 434 Harvard College Observatory plates with no indication of any further outburst. The possible nature of the detected object as well as the possible relation to the SGR 1806-20 are discussed.

key words: Gamma ray burst sources: Soft gamma-ray repeaters, Optical transients.

1. Introduction

The gamma-ray burst source GRBS 790107 = SGR 1808-20, first detected on January 7, 1979 (Mazets et al., 1981; Laros et al., 1986), repeated approximately 100 times during the time interval from 1978 August 13 to 1986 June 27. Most repetitions occurred in late 1983 where ~ 30 events occured within 2 weeks (Laros et al., 1987). The outbursts occur in clusters with time intervals ranging approximately from an hour to a month with little evidence for any other pattern of the repetitions.

The separation between events can range from seconds to years, with little correlation between separation and event intensity. The observed range in gamma-ray intensity is greater than a factor of 30 (Laros et al., 1987). The energy spectra of this source are harder than those of X-ray bursters, but softer than those of typical gamma-ray bursters (Atteia et al., 1987). The time histories are usually short ($\leq$ 128 ms) with rise and fall times as fast as ~ 10 ms.

This intense burster activity, unlike anything previously observed from a high-energy source, increases the probability of getting time-correlated observations in different spectral ranges. The source belongs to a hypothetical small class of GRBS found in high density stellar fields, having soft spectra and being of repeating nature.

According to several theories (i.e. London, 1984; Rappaport and Joss, 1985; Melia, Rappaport and Joss, 1986; Melia, 1988; Epstein, 1985; Woosley, 1984; Hartmann, Woosley and Arons, 1987, 1988) optical events may accompany the emission of gamma ray bursts. Some of these theories give specific predictions about the phenomenology of the optical events, e. g. in respect to time profile, intensity, polarization, delay relative to GRB-event.

In the particular case of SGR 1806-20, a study by HARTMANN et al., 1987 predicts that optical flashes should be relatively weak due to the lower temperature. Nevertheless, we believe that the unique character of this source justifies a search, using data from all wavelength bands.

The error ellipse has a surface area of 430 arcmin^2 (ATTEIA et al., 1987) and is centered at $\alpha = 18^h05^m38^s$, $\delta = -20°20'40''$ (1950.0). It is only $\sim 10°$ from the Galactic centre (almost all of this distance being in galactic longitude). The region is densely populated and contains stars of up to 7th magnitude.

Consequently, the search for a quiescent optical companion is difficult. Moreover, the object may be highly obscured if it is more distant than 5 kpc. With comparatively less difficulty, the error box can be searched for a flaring optical companion, i. e. for light changes of stars and for new objects. Here I report the results a such a search. The observational material is a set of 132 plates from the Bamberg Observatory (University of Nürnberg-Erlangen, F.R.G.). All were taken before the period of known GRB-activity.

2. Results of search

The investigated plates were exposed during the years 1963-1975 mainly by R. KNIGGE at the southern stations (South Africa and New Zealand) of the Bamberg Observatory. Several astrographs and cameras were used, namely the 10 inch aperture Metcalf, 3 inch aperture Ross, and 7.1 cm aperture Zeiss camera.

The limiting magnitude for stars is in the range 11^m - 14^m and that expected for a 1-second flash 4^m - 7^m. Approximately 75 % of the plates exhibit limiting magnitude 13^m - 14^m for stars, corresponding to 6^m - 7^m for a 1-second flash. The total exposure time is 130 hours. The search for light changes inside and near the error box was carried out using a Zeiss blink-microscope.

Because of the lack of simultaneously exposed plates, it was not possible to fulfill the 5th of five criteria set up by HUDEC et al., (1987a) for images to be reliable optical counterparts of GRBS. However, I found one object which meet the remaining four criteria. It lies close to but outside the 3σ error box:

A new star-like image was found on plate SUD 3775 taken on 1964 April 20 between 1h 17m and 2h 17m UT. The position $\alpha = 18^h05^m31^s \pm 2s$, $\delta = -21°49'.7 \pm 0.5$ (1950.0) is very close to that of an m $\sim$ 13.5 star (Figs. 1 and 2). The magnitude of the object was determined by iris photometry to be $m_{pg} = 12.4$ using the SA 158 comparison sequence. The shape of the image does not differ from that of the surrounding stars (Fig. 3). No similar object was found on the following exposures, taken 1964 May 12 and 1964 June 6. The image does not represent an obvious plate fault. The object was analysed by GREINER, 1991 by reflected light microscopy (GREINER, WENZEL and DEGEL, 1990) and it was found that (i) it exhibits a silver mountain above the emulsion surface like real star images and (ii) the appearance of the OT image on the glass/emulsion boundary shows no difference if compared with stars of similar brightness. The plate is of very good quality with no other additional objects.

The position of the object was checked also on 434 plates corresponding to $\sim$ 450 hours of exposure taken by the Harvard College Observatory during the time period 1929-1988. The limiting magnitude of investigated plates was typically 13^m...15^m, i. e. the outbursts with the brightness analogous to the OT 1964 ($m_{pg} \sim 12.4$) should be recorded. However, no other outbursts were revealed from the given position. The $13^m\!.5$ star was checked for possible light variations on $\sim$ 200 plates representing $\sim$ 250 hours of observation with negative result: no brightness changes exceeding $\sim$ 0.3 mag were revealed. Thus the brightening seems not to be belonging to a variable or flare star of a classical type.

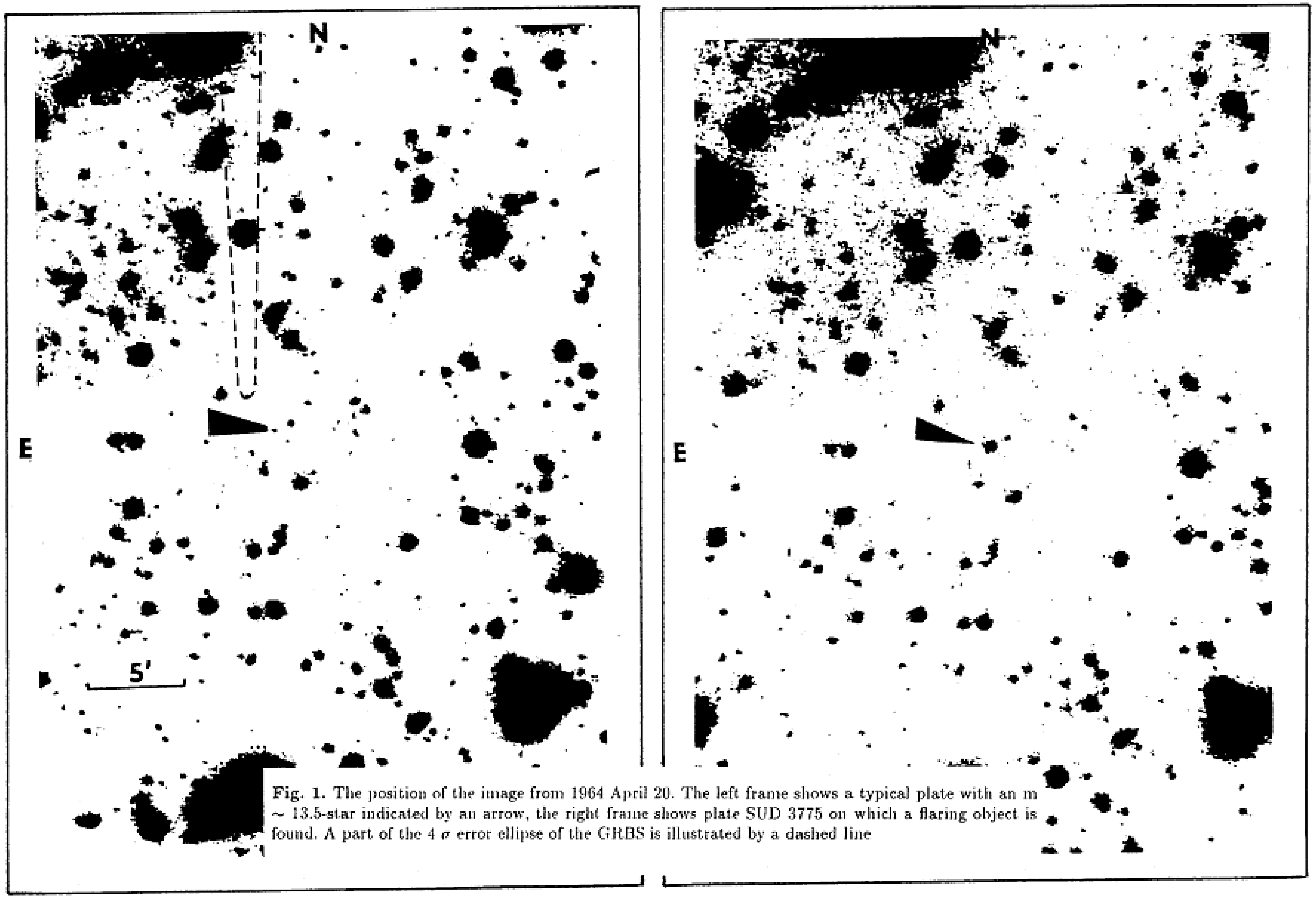

Fig. 1. The position of the image from 1964 April 20. The left frame shows a typical plate with an m ~ 13.5-star indicated by an arrow, the right frame shows plate SUD 3775 on which a flaring object is found. A part of the 4 σ error ellipse of the GRBS is illustrated by a dashed line

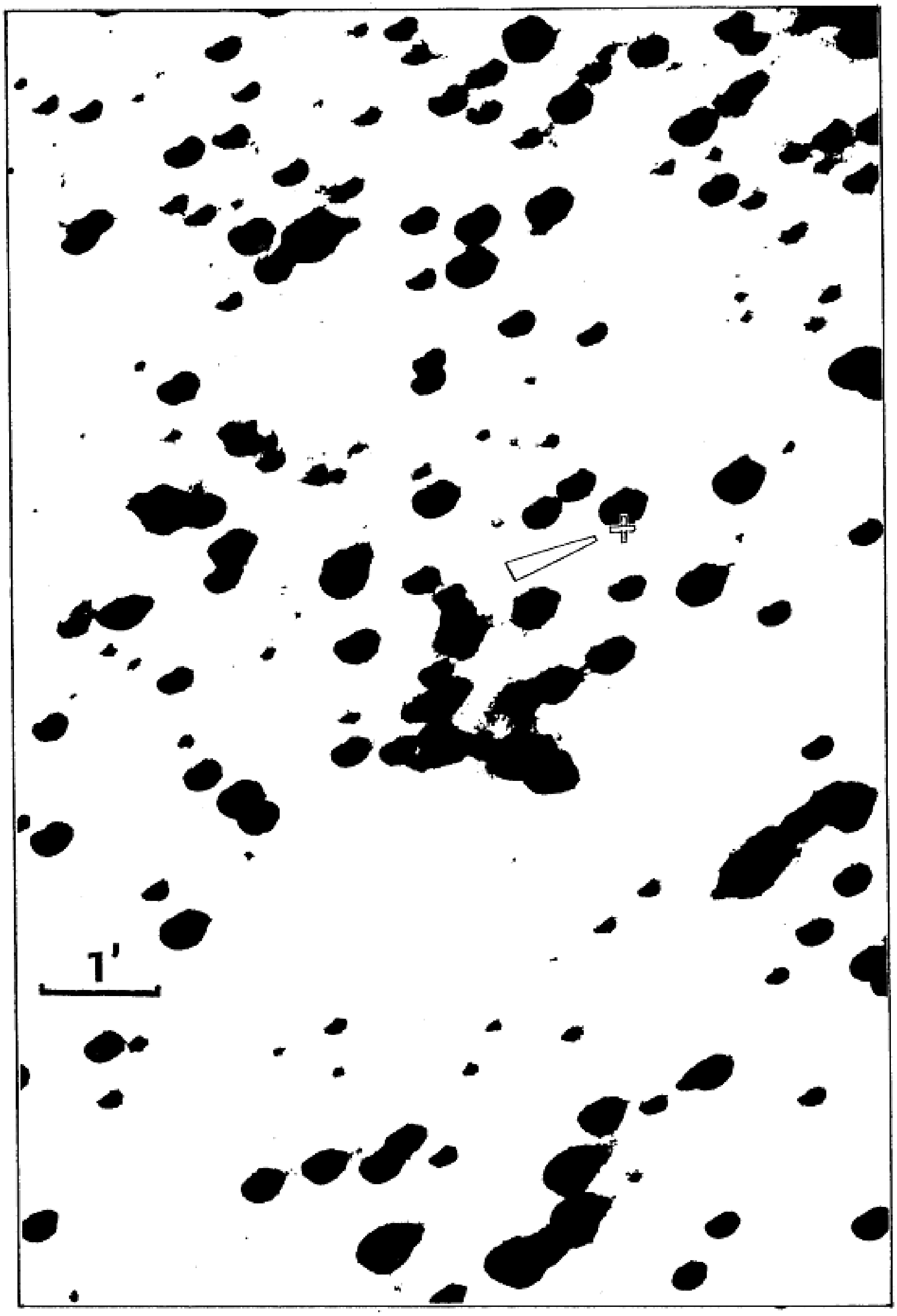

Fig. 2. A more precise localization of the image on the enlargement of the POSS red print (1964 April 20 object is top right). The 90% confidence error circle is illustrated by a cross giving the centre, the size of the cross corresponds to the diameter of the circle. Negligible proper motion of the object is assumed

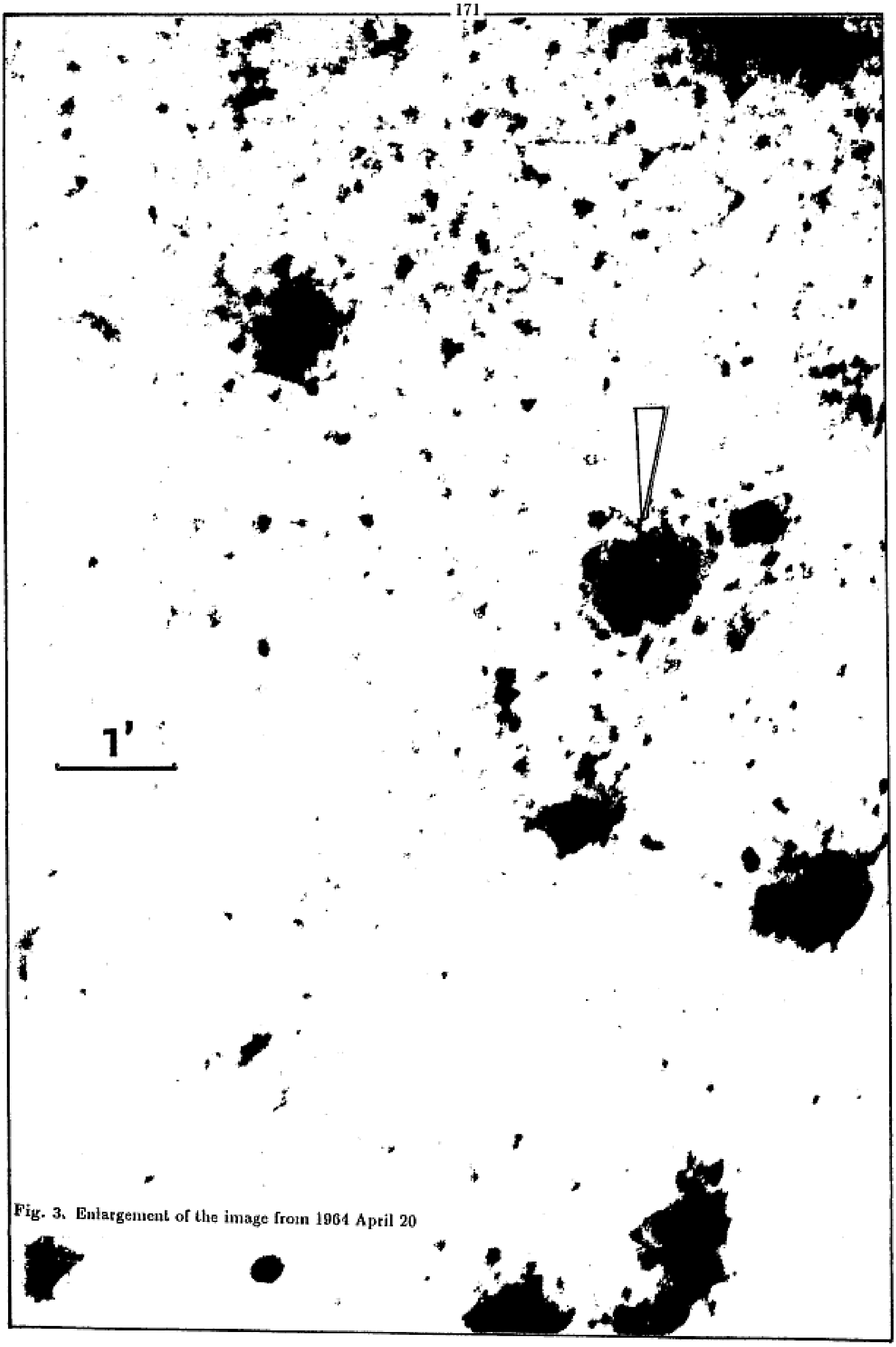

Fig. 3. Enlargement of the image from 1964 April 20

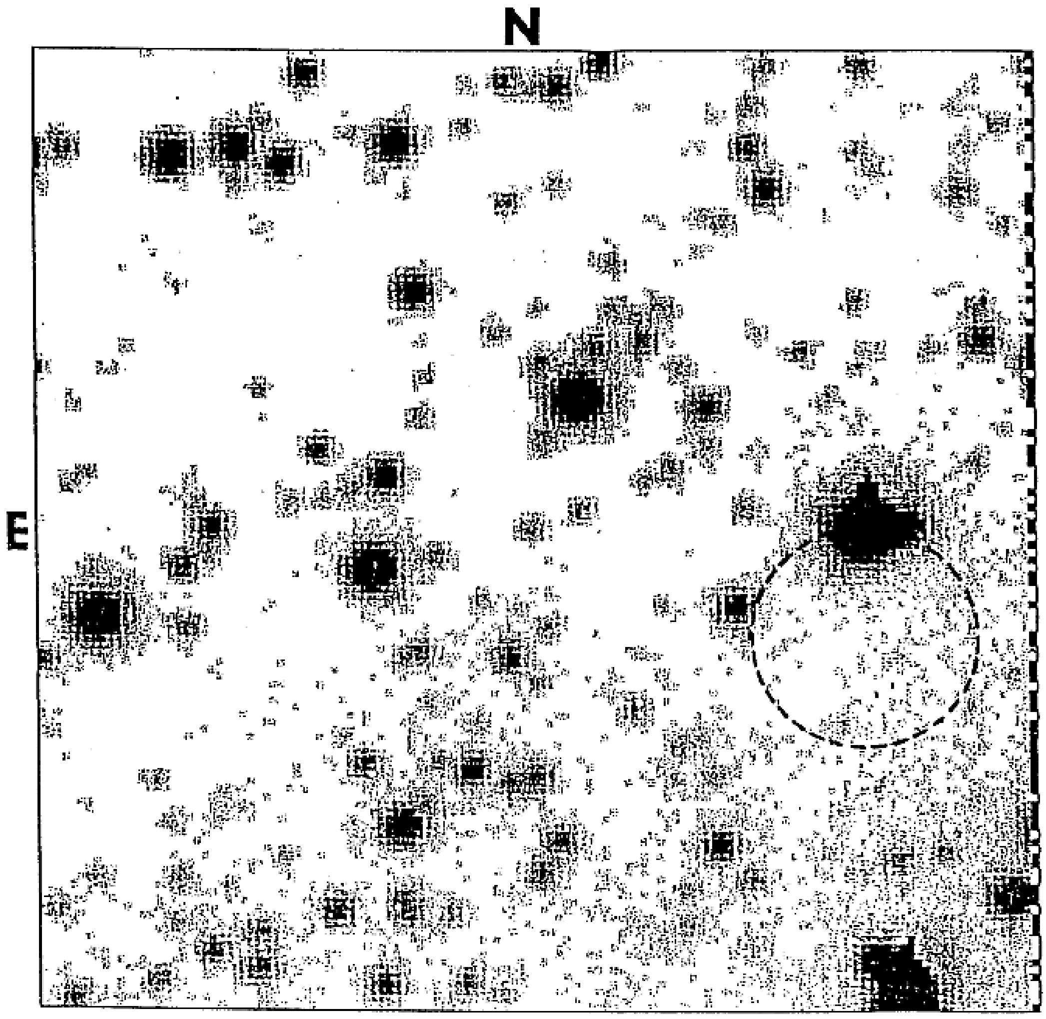

Fig. 4. Close-up of the CCD image of the transient-position (unfiltered), 1.2 × 1.2 $arcmin^2$. Error box of optical candidate is indicated. The radius of the error circle plotted in this figure is smaller than the quoted absolute error in the position of the optical transient because of different accuracy of methods used for the determination of absolute and relative positions

3. Discussion

One optically variable object was found close to the error box of the SGR. The image satisfy four of five criteria for reliable optical counterparts of GRBS, namely that the shape and the profile of the images cannot be distinguished from those of stars, that the images are found close to the error circle and are at least 0.5 mag brighter than the plate's limiting magnitude.

The fifth condition (presence on 2 plates) cannot be fulfilled since no simultaneously exposed plates are available. As a consequence we cannot entirely rule out the possibility that the object is due to a plate fault or an event in the earth's atmosphere or near space. On the other hand, the possibility of this is extremely low: the image does not show any difference from real star images not only in transmitted but also in reflected light (GREINER, 1991) and the number of orbiting satellites was low in 1964. The position of the image as given above is close to but outside the 3 σ error box. The image is almost on the boundary of the 4 σ error ellipse and fully inside of the 5 σ ellipse.

The error circle of the image (as illustrated on Fig. 2) contains no star image visible on the POSS prints, but an m $\sim$ 13.5 star was found on the edge. This star exhibits no unusual colors (based on an investigation on the POSS prints) and shows no other indication of variability (based on the investigation on 566 Bamberg and Harvard plates). The exact position of the object is illustrated in Fig. 2 on the POSS print frame.

The limiting magnitude for a 1-second flash was estimated as $\sim 6^m\!.5$ (pg) for the plate discussed here. The brightness of the object, also assuming 1 second duration, is $\sim 5^m\!.5$ (pg).

The recorded gamma-ray fluencies (above 30 keV) of SGR 1806-20 scatter between ~ 6 and $\sim 43 \times 10^{-7}$ ergcm^{-2} and their durations range from ≤ 16 ms to 200 ms (ATTEIA et al., 1987). Consequently, the E_γ/E_{opt} ratio of the 1964 April 20 event, if genuine, is between 15 and 105 (for 1 sec flash) or between 24 and 170 (for 0.1 sec flash). All these values are considerably higher than those previously reported for other (also unverified) optical flashes (e. g. SCHAEFER, 1981; SCHAEFER et al., 1984; HUDEC, 1986; HUDEC et al., 1987b; MOSKALENKO et al., 1989).

The image does not coincide with any known asteroid as listed by SUBBOTIN, 1963. The position and time were also checked by B. MARSDEN, 1992 and no coincidence with any known minor planet, numbered or unnumbered, could be found. However, the alternative explanation as an emulsion defect cannot be entirely ruled out. The deduced rate of background events is consistent with that obtained in similar studies of other GRBS positions (HUDEC et al., 1987b). A more detailed study of star-like plate faults is published by GREINER et al., 1987, who found ~ 1.4 such images brighter or equal 1^m above the plate background in a laboratory test on an astronomical plate of the ORWO ZU2 type with an area of 140 cm^2.

For the size of the plates as well as for the size of the error box investigated here, (~ 1500 *arcmin*^{2}) it represents a probability of 1.4×10^{-3} for the appearance of equal or brighter star-like faults in or close to our error box. Thus we arrive at 0.2 objects for 132 plates investigated, i.e. less than found.

This difference is hardly significant, however the experience shows that the rate of occurrence of star-like emulsion faults on the emulsions used at the Bamberg Observatory (Gevaert 67 A50) is significantly (at least 3 times) lower than the rate on the ORWO emulsions, hence the real probability a plate fault of 1 mag or more above the plate fog to be located in the investigated area is below 10%.

The detection of a possible optical candidate does not contradict the result of GREINER et al., 1990 who find no optical image on a plate taken simultaneously with GRB 19810508 which is considered to belong to SGR 1806-20: (i) the available patrol plate is of a poor quality, having limit of $12^m\!.9$, just above the magnitude of the candidate described here (ii) it is not entirely excluded that GRB 19810508 belongs, in fact, to another source (iii) the limit of the ratio L_γ/L_{opt} found by GREINER et al., 1990 is still comparable with the range of this ratio we deduced for our candidate.

The CCD imaging observations of the field of the possible optical transient were conducted by H. PEDERSEN from the European Southern Observatory, La Silla, on 16 March 1987, UTC 00:00:44 to 00:11:35. The 3.6-m telescope was used with the Faint Object Spectrograph and Camera (EFOSC). This included a high resolution RCA CCD detector, type SID 006 EX, used in a 2 by 2 binned mode. The effective pixel size was 30 μm, corresponding to 0.675 arcseconds. Three images were obtained, one B exposure (120 seconds), one R exposure (60 seconds), and one unfiltered (60 seconds, see Fig. 4). The two latter exposures represent approximately similar effective wavelengths. The night was slightly cloudy, for which reason it was impossible to deduce any reliable magnitudes for the candidate objects.

We found 4 star images in or at the edge of the error box. All objects were faint ($m \geq 20$), the only exception being the formerly mentioned $m \sim 13.5$ star at the edge of the optical error box. The star shows no remarkable colors, nevertheless, detailed analysis (spectrum, variability) is needed for this object as well as for another stars found within the optical error box.

4. Conclusions

The optical image detected on April 20, 1964, close to the error box of the SGR 1806-20, seems not to be caused by :

(i) asteroid: negative results of searches for coincidences with both numbered and unnumbered minor planets

(ii) double exposure: no analogous images on the plate

(iii) aircraft flash: no analogous images on the plate

(iv) satellite glint: plate taken close to the local midnight, no analogous images on the plate, low number of satellites in 1964

(v) classical variable star: no other brightenings revealed on 566 plates taken by Bamberg and Harvard Observatories. One alternative explanation cannot be entirely ruled out:

(vi) emulsion defect, but seems to be very improbable owing to the results of reflected light microscopy indicating no difference from usuall star images.

On the other hand, the reality of the detected image as a genuine astrophysical object cannot be definitely confirmed due to the lack of simultaneously taken plate and/or detection of more flares from this position. Despite of this, we strongly suggest the 4 stars found inside of the error box of this candidate to be analysed in more detail.

The relation of the detected image and SGR 1806-20 remains open. If it is assumed these that the objects are related, then the corresponding L_γ/L_{opt} ratio is between 24 and 170 (for 0.1 sec duration of the optical flash and the detected range of the gamma ray fluencies of the SGR).

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Pulsational Variation in the northern R CrB star XX Camelopardalis

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(Eingegangen am 15. Februar 1994)

Abstract
Photoelectric BV observations of the bright, northern R CrB star XX Camelopardalis are reported. They suggest that this star, which has only one reported major fading since 1898 of 94 days duration and 1.7 m_{pg} amplitude, also exhibits the pulsational behaviour common to R CrB type variables. During the 1991/92 season, the pulsation was characterized by a cycle length of $26^d.1 \pm 1^d.9$ and an amplitude of $0^m.18$(b).

1. Introduction

The star HD 25878=BD+52°771 = XX Camelopardalis (1950.0: $04^h04^m46^s$, $+53°13'.8$) is the second brightest known R CrB star of the northern sky after the prototype of this class of variables, R Corona Borealis. Although spectroscopic investigations prove the close relationship between these two stars (e.g. BIDELMAN (1948)), some degree of difference has been noted.

One very obvious difference concerns the relative scarcity of the typical fadings in brightness for XX Cam. While R CrB is known for major dimmings at a mean rate of about three per decade, only one such event has ever been reported over a time span of almost 100 years (since 1898; see YUIN (1948) and AAVSO reports). This minimum took place in 1939/40 and is characterized by an almost symmetric fading of 94 days duration (JD 242 9586 to JD 242 9680, YUIN (1948)) and an amplitude of 1.7 m_{pg}.

A second important difference between XX Cam and other R CrB variables was reported by RAO, ASHOK and KULKARNI (1980). They found that XX Cam does not show an infrared excess, contrary to expectations. Furthermore, the same authors found that the typical light variations in normal brightness, thought to be due to pulsational instabilities, were lacking in XX Cam. They based this conclusion on the observations in UBV by FERNIE, SHERWOOD and DUPUY (1972), LANDOLT (1968, 1973) and RAO et al. (1980).

The above-mentioned differences led KILKENNY, MARANG and MENZIES (1988) to call stars of the XX Cam type "inactive R CrB stars". Contrary to RAO et al. (1980), they pointed out that the photometry of FERNIE, SHERWOOD and DUPUY (1972)" ... suggests a variation of at least 0.15 mag...". In order to clarify the question of variability at normal brightness, we decided to observe XX Cam photoelectrically during the 1991/92 season. Some additional photometry was also obtained in the following seasons.

2. Observations

The differential photoelectric BV observations reported here were secured with the 35 cm Schmidt-Cassegrain reflector at the R. Szafranice observatory in Metzerlen, Switzerland. The telescope is equipped with a commercial photon counting photoelectric photometer of the "Starlight-1" type. The photometer contains a EMI 9924A photomultiplier tube, which along with the standard Schott UBV glass filters yields an instrumental system very close to the standard Johnson system.

Every observation presented in Table 1 consists of six integrations of 10 seconds each relative to the primary comparison star HD 25602 = BD+53°732 (V = 6^{m}31, B-V = 0^{m}99). Table 1 contains instrumental differential magnitudes. Since the comparison star is close both in position as well as in colour to XX Cam, no correction for differential extinction was deemed necessary, considering the attempted goal of the observations. Occasional checks of the brightness of the primary comparison star HD 25602 against the check star BD+52°772 did show HD 25602 to be constant to within the observational accuracy.

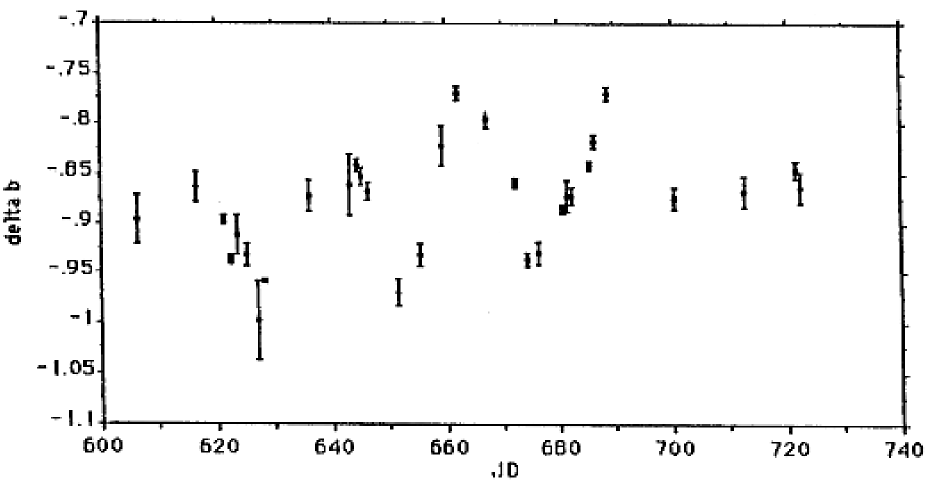

Fig. 1. Light curve of XX Cam in the instrumental blue system relative to the primary comparison star HD 25602

In Fig. 1, we show the differential light curve of XX Cam in the instrumental b system in the well covered time interval between JD 244 8600 and 244 8730. During this time span, a distinct cyclic variation with an amplitude of about 0^{m}18(b) and a cycle of close to 26 days length can be distinguished. In addition, a slight increase in the mean brightness seems to be present. Furthermore, the b-v colour varies synchronously with the brightness, with bluer colours at the brighter phases, as expected for pulsational behaviour. In the following seasons, for which the coverage of the light curve is much less complete due to unfavorable weather conditions, the pulsation seemed to continue, apparently with a smaller amplitude.

Table 1. Differential BV observations of XX Cam

JD_{hel} - 2400000	Δ b		Δ v		Δ b - Δ v	
48329.36	+0.890	± 0.005	+1.03	± 0.01	-0.14	± 0.01
48332.33	+0.88	± 0.01	+1.00	± 0.01	-0.12	± 0.01
48355.37	+0.81	± 0.04	+0.94	± 0.04	-0.13	± 0.03
48356.38	+0.84	± 0.01	+0.94	± 0.01	-0.10	± 0.01
48359.37	+0.88	± 0.01	+0.98	± 0.01	-0.10	± 0.01
48362.36	+0.89	± 0.01	+0.98	± 0.01	-0.10	± 0.01
48588.35	+0.935	± 0.005	+1.040	± 0.006	-0.105	± 0.005
48606.36	+0.90	± 0.02	+1.03	± 0.03	-0.10	± 0.02
48616.34	+0.86	± 0.02	+0.97	± 0.02	-0.11	± 0.01
48621.22	+0.896	± 0.005	+1.033	± 0.007	-0.137	± 0.005
48622.22	+0.937	± 0.005	+1.061	± 0.006	-0.124	± 0.005
48623.48	+0.91	± 0.02	+1.01	± 0.02	-0.10	± 0.02
48625.29	+0.931	± 0.011	+1.044	± 0.014	-0.133	± 0.010
48627.25	+1.00	± 0.04	+1.05	± 0.04	-0.05	± 0.04
48628.29	+0.959	± 0.003	+1.061	± 0.007	-0.102	± 0.004
48636.32	+0.87	± 0.02	+0.98	± 0.02	-0.11	± 0.02
48643.23	+0.86	± 0.03	+0.95	± 0.02	-0.09	± 0.02
48644.37	+0.842	± 0.006	+0.973	± 0.012	-0.131	± 0.008
48645.33	+0.852	± 0.008	+0.994	± 0.03	-0.142	± 0.015
48646.36	+0.868	± 0.009	+0.966	± 0.012	-0.098	± 0.010
48651.41	+0.97	± 0.01	+1.05	± 0.02	-0.08	± 0.01
48655.32	+0.93	± 0.01	+1.06	± 0.02	-0.13	± 0.01
48659.27	+0.82	± 0.02	+0.98	± 0.01	-0.15	± 0.01
48662.26	+0.770	± 0.007	+0.913	± 0.015	-0.143	± 0.010
48667.27	+0.796	± 0.009	+0.928	± 0.006	-0.132	± 0.007
48672.27	+0.860	± 0.004	+0.976	± 0.007	-0.116	± 0.005
48674.32	+0.936	± 0.006	+1.029	± 0.006	-0.087	± 0.005
48676.33	+0.929	± 0.010	+1.029	± 0.004	-0.100	± 0.006
48680.46	+0.886	± 0.005	+1.012	± 0.009	-0.126	± 0.006
48681.42	+0.873	± 0.016	+1.008	± 0.011	-0.135	± 0.010
48682.35	+0.873	± 0.009	+0.982	± 0.007	-0.109	± 0.007
48685.29	+0.841	± 0.004	+0.954	± 0.019	-0.113	± 0.010
48686.30	+0.819	± 0.007	+0.969	± 0.002	-0.150	± 0.004
48688.32	+0.770	± 0.007	+0.955	± 0.010	-0.185	± 0.008
48700.32	+0.874	± 0.010	+0.979	± 0.008	-0.105	± 0.008
48712.33	+0.869	± 0.015	+0.995	± 0.008	-0.126	± 0.010
48721.36	+0.846	± 0.009	+0.977	± 0.009	-0.131	± 0.008
48722.37	+0.865	± 0.015	+1.005	± 0.004	-0.140	± 0.007
48734.36	+0.970	± 0.016	+1.052	± 0.005	-0.082	± 0.010
48839.48	+0.90	± 0.02	+0.97	± 0.02	-0.07	± 0.02
48840.43	+0.876	± 0.010	+1.003	± 0.010	-0.127	± 0.008
48843.49	+0.843	± 0.011	+0.971	± 0.009	-0.128	± 0.009
48850.46	+0.951	± 0.005	+1.037	± 0.011	-0.114	± 0.007
48859.50	+0.883	± 0.007	+0.987	± 0.015	-0.095	± 0.010
48862.48	+0.90	± 0.02	+1.02	± 0.01	-0.12	± 0.01
48879.35	+0.87	± 0.02	+0.94	± 0.02	-0.07	± 0.02
48882.42	+0.87	± 0.02	+1.00	± 0.02	-0.13	± 0.02
48883.46	+0.85	± 0.02	+0.98	± 0.02	-0.13	± 0.01
48904.45	+0.84	± 0.02	+0.98	± 0.01	-0.14	± 0.02

Table 1. continued

JD_{hel} - 2400000	Δ b		Δ v		Δ b - Δ v	
48934.29	+0.79	± 0.01	+0.99	± 0.03	-0.20	± 0.02
48950.25	+0.884	± 0.015	+1.001	± 0.012	-0.117	± 0.010
48986.28	+0.881	± 0.008	+1.014	± 0.011	-0.133	± 0.009
48987.35	+0.88	± 0.02	+1.02	± 0.02	-0.14	± 0.02
48991.30	+0.98	± 0.02	+1.11	± 0.02	-0.13	± 0.02
48992.25	+0.948	± 0.014	+1.065	± 0.010	-0.117	± 0.010
49005.34	+0.891	± 0.003	+1.022	± 0.010	-0.131	± 0.005
49020.30	+0.91	± 0.03	+1.05	± 0.01	-0.14	± 0.02
49024.35	+0.90	± 0.02	+1.03	± 0.01	-0.13	± 0.01
49037.39	+0.918	± 0.010	+1.047	± 0.008	-0.129	± 0.008
49060.37	+0.869	± 0.005	+1.011	± 0.010	-0.142	± 0.007
49061.40	+0.87	± 0.02	+1.00	± 0.01	-0.13	± 0.01
49066.34	+0.85	± 0.02	+1.01	± 0.01	-0.16	± 0.01
49076.33	+0.88	± 0.02	+0.98	± 0.03	-0.09	± 0.02

We have attempted to determine the period of pulsation from the data shown in Fig. 1 with different methods. This is rather difficult owing to the secular brightening as well as the fact that the primary variation seems to be only quasi-periodic. We get the best fit with a period value of 26.1 days with an estimated error of ±1.9 days.

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Note on the long-term photometric behaviour of the Helium white dwarf binary CR Boo

W.Wenzel, Sonneberg
(Eingegangen am 10. März 1994)

Abstract
CR Boo shows eruptions which remind one of the outbursts of dwarf novae.

CR Bootis (PG 1346+082) belongs to the small group of presumable interacting twin degenerate systems and is believed to consist of a low mass He white dwarf which loses mass to a second white dwarf via an optically thick accretion disk.

The only attempt thus far to investigate the long-term light-curve of the star has been of WOOD et al. (1987). Their evalution of Harvard Meteor Program films of 1952 to 1957 yielded the statistical result that the variable was faint (below a certain comparison star) on roughly 26% of the films and that a cycle length of 4 to 5 days might be hidden in the data.

I tried to complement these data by checking a sample of Sonneberg Sky Patrol plates. On 47 of 180 far-reaching exposures of the years 1957 to 1969, mainly taken by H. HUTH, the star was invisible and definitely fainter than 14^m5 pg; the object was visible, changing between 14^m0 and 14^m8, in 48 cases, and on the remaining plates never as bright as 14^m0.

In this context one should note that there might be a small systematic difference between our magnitudes (derived from Harvard Selected Area 105 and reduced to the Mt. Wilson international pg system, see Fig. 1) and the photometric system of WOOD et al. (l. c.), not to mention the provisional character of their photographic estimates.

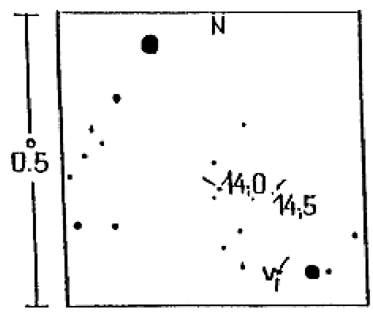

Fig. 1: Finding chart

The results are as follows:

- The star mimics a dwarf nova with frequent outbursts.
- The duration of the 20 eruptions observed varies between < 3 and ≥ 10 days.
- During the outbursts there are secondary fluctuations of several tenths of a magnitude.
- In view of the average duration of an eruption (5 days) and the sun gaps (of about 270 days) our data statistically lead to a mean cycle length of $C \approx 20$ days (WENZEL and RICHTER), 1985, RICHTER, 1986).
- With an amplitude of $A \approx 3.5$ mag the outbursts even fit into a modern Kukarkin-Parenago relationship A-lg C of dwarf novae (e. g. RICHTER and BRÄUER, 1989).

Of these findings, only the statement on the cycle length disagrees with the result of WOOD et al. (l. c.) of their, admittedly crude, photographic film estimates.
There are two major conclusions in view of this long-term behaviour:

- Among faint "dwarf novae" classified solely on the basis of the light-curve might be an unknown number of white dwarf binaries similar to CR Boo.
- According to our present knowledge each of the four variables, which sometimes were supposed to be white dwarf binaries, shows completely different photometric characteristics:

AM CVn - no long-term changes,
V 803 Cen - minima of R CrB type,
GP Com - activity of 0.6 mag at most (poorly known),
CR Boo - outbursts similar to dwarf novae.

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Checking SAO 194835

W. Wenzel, Sonneberg
(Eingegangen am 17. Mai 1994)

C. HENSHAW (1994 a, b) noticed a strong short-termed enhancement of the image of the G8III star SAO 194835 on one of his colourslide film exposures. I inspected the star on 85 patrol exposures of the Sonneberg collection, of 1936 to 1938 and 1952/1953. Comparison with SAO 194816 and SAO 194812 did not reveal any variability stronger than the usual photographic dispersion.

I thank the German Bundesministerium für Forschung und Technologie for funds under contract no. 05 - 2S052A.

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On a possible period change of the cataclysmic variable BH Lyncis

W. Wenzel, Sonneberg
(Eingegangen am 7. Juni 1994)

Abstract
A period change of unknown character is indicated by the results of three night series of CCD photometry.

BH Lyn was among the test objects when we checked the performance of a CCD camera EEV CCD02-06-1-206 of Wright Instruments Ltd, which had been newly istalled at the prime focus of the Sonneberg 60/180 cm Cassegrain telescope I.

Three night series of repeated exposures in integral light, provisionally reduced by MIDAS programmes, yielded two primary minima and one structure, which we tentatively explain as a secondary eclipse (Fig. 1):

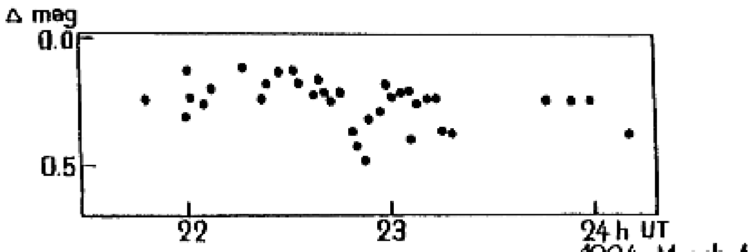

Fig. 1. Supposed secondary minimum

Using the ephemeris of DHILLON et al. (1992),

$$C \equiv \text{Min. (hel.)} = 244\ 7180.3360 + 0^{d}.15587507 \cdot E,$$

we arrive at the following O – C values:

O(hel.)	E	O - C	
244 9416.454	+14345.5	+0^{d}.012	(secondary minimum)
9422.454	+14384	+0.010	
9442.560	+14513	+0.008	

The secondary minimum is provisionally supposed to lie at phase 0^{P}.5. Its existence in red light seems to me certain, though DHILLON et al. (l. c.) took for granted that flickering is responsible for its appearance in their R band light-curve. Its possible shift towards phase ≈ 0^{P}.45 in connection with the same behaviour of the H and HeI emission line light-curves was not discussed by those authors and will not be commented on here.

An "improvement" of the period by +0.010/14384 days = +0.000000695 days is indicated by the best-covered minimum of ours (Fig. 2) and the average of our O - C data, with the date of the initial minimum left unaltered.

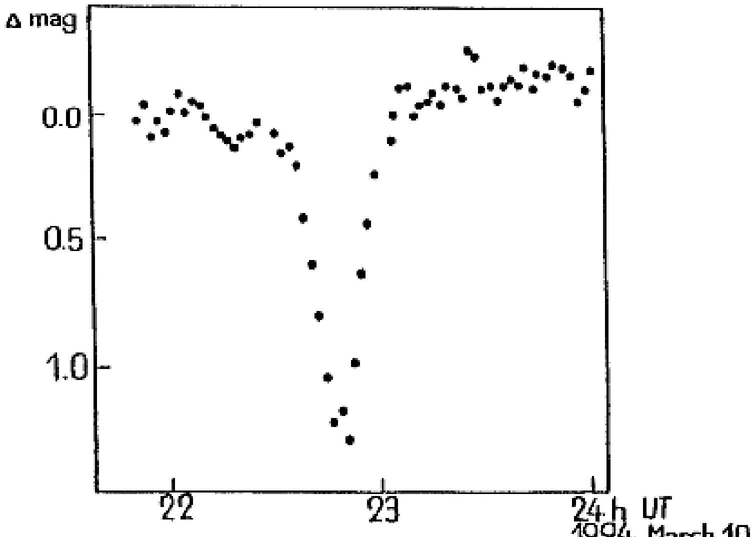

Fig. 2. Primary Minimum

This yields an unreasonable high deviation of more than 1 hour from ANDRONOV's et al. (1989) earliest averaged Sonneberg minimum of their list at HJD 243 8893.4036 (E = -53164). We are therefore compelled to assume a period change to have occured since then, but we cannot describe details of it.

I thank my colleagues W. Heymann, P. Kroll, R. Luthardt, L. Rose, and our guest student R. Schwarz for installing the device, making it run, and observing. I am further indebted to the German Bundesministerium für Forschung und Technologie for funds under contract no. 05-2S052A.

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Archival Observations of the dwarf nova CU Velorum

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(Eingegangen am 30. März 1994)

Abstract
By observations on Sonneberg archival plates a further eruption was found.

CU Velorum is a dwarf nova discovered by HOFFMEISTER (1949), which has been continuously observed by amateur astronomers (AAVSO and VSS New Zeeland). From 1954 to 1976, 49 maxima were found with intervals between 76.3 d and 519 d (BATESON, 1977). Showing both normal outbursts and superoutbursts, the object is a member of the SU Ursae Maioris subclass.

By examination of 19 plates from 1937/38 and 17 exposures from 1952/53, two eruptions could be found, the first of which is the discovery maximum found by HOFFMEISTER:

1. 3. Febr. 1938 JD 242 8933 $m_{pg} = 12.38$
2. 18. Oct. 1952 JD 243 4303 $m_{pg} = 12.18$

The small number of these observations does not allow us to specify the kind of the two maxima.

References

Hoffmeister, C., 1949, Erg. Astr. Nachr. **12**, no. 1
Bateson, F.M., 1977, R.A.S. New Zealand VVS Publ. **5**, no. 1

Beobachtung von FP Geminorum

I. Meinunger, Sonneberg

(Eingegangen am 25. April 1994)

Auf Anregung von E.G. SCHMIDT (University of Nebraska-Lincoln, briefliche Mitteilung vom 24. August 1993) wurde FP Gem auf etwa 1000 Aufnahmen des Sonneberger Plattenarchivs beobachtet.

Der Fall FP Gem bezüglich irrtümlicher Markierung (KUROCHKIN, N.E., 1948, Perem. Zvezdy, **6**, p. 94) dürfte ähnlich dem von FV Del in Mitt. Veränd. Sterne, Sonneberg, **12**, p. 163 beschriebenen Sachverhalt sein: Der auf der Umgebungskarte (KUROCHKIN, 1948) als Veränderlicher angezeigte Stern erwies sich als konstant (MEINUNGER, L., 1966, Mitt. Veränd. Sterne, Sonneberg, **3**, p. 143), während der 54″ Nord und 54″ Ost davon befindliche Stern der eigentliche Veränderliche FP Gem ist.

Die von E.G. SCHMIDT et al., (1992, Pub. Astr. Soc. Pac. **104**, p. 908) auf Grund ihrer zu geringen Anzahl von CCD-Beobachtungen im Zeitraum von 244 8575 bis 8610 und 244 8675 bis 8720 diskutierte Möglichkeit, daß FP Gem ein Mira-Stern sein könnte, scheidet nach den vorliegenden Beobachtungen aus, wegen der zu geringen Amplitude ($\approx$ 0.5 mag) und Periode (Größenordnung ...40....50 Tage). In der CCD-Beobachtungslücke von 244 8610 bis 8680 ist FP Gem auf Platten der Sonneberger Himmelsüberwachung (Tessar-Kameras) von 8644.308 bis 8651.322 lichtschwach. Eine Aufnahme in der CCD-Lücke mit dem großen Astrografen (GC: 1400/1600 mm) zum Zeitpunkt 244 8632.499 zeigt FP Gem in Maximalhelligkeit.

Im CCD-Beobachtungszeitraum von 244 8680 bis 8690 wurde auf den Aufnahmen der Sonneberger Himmelsüberwachung erwartungsgemäß das CCD-synchrone Helligkeitsmaximum und der anschließende Helligkeitsabfall beobachtet.

Die Analyse der Verteilung der Beobachtungen im Zeitraum von 1941 bis 1993 ($\sim$ 670 Aufnahmen der Himmelsüberwachung (Tessar-Kameras), $\sim$ 230 Astrographenplatten (GA/GC: 400/1600 mm; GB: 400/2000 mm), $\sim$ 100 A-Platten (170/1200 mm)) führt zu dem Ergebnis, daß FP Gem ein δ – Cephei – Stern sein kann mit einer Periode in der Größenordnung von ...40...50 Tagen. Wegen der Unsicherheit bezüglich der Lage der Minima war eine genauere Periodenbestimmung nicht möglich.
Lichtschwache Beobachtungen bzw. Minima wurden zu folgenden Zeiten festgestellt: 243 0780.300(GA), 2911.458(A), 2944.416(A), 3740.368(A), 4663.549(Te1), 5047.568(Te1), 8373.665(GC), 9443.599(GC), 9527.340(Te3), 9913.437(GC), 244 6059.612(GC), 8188. 533(GC), 8646.397(Te3), 8982.375(Te3).

Beobachtungen von drei roten Veränderlichen auf Sonneberger Platten

E. Rudolf, Jena

(Eingegangen am 6. Juni 1994)

EO Dra

Der Stern wurde von M. COLLINS im Nova/Supernova Report 5, 1990 als Objekt mit der Bezeichnung NSV 10 701 in seiner Veränderlichkeit bestätigt. Inzwischen hat der Stern die endgültige Bezeichnung EO Draconis erhalten.

Ich habe den Stern auf 422 Blauplatten der Sonneberger Schmidtkamera (500/700/1720mm) aus den Jahren 1982 – 1991 beobachtet (Fig. 1, Seite 187) und konnte einen Mirastern mit einer Periode von 390 Tagen feststellen; Amplitude $\geq$ 3 mag.

Der Stern konnte auch mit der IRAS – Quelle 18196 + 5030 identifiziert werden.

TASV 1913 + 25

Der Stern wurde von M. COLLINS als Stern der Spektralklasse C als veränderlich bestätigt.

Ich habe den Stern auf 369 Rotplatten der Sonneberger Himmelsüberwachung (RP1 + Filter GG 14) beobachtet (Fig. 2, Seite 187).

TASV 1913 + 25 ist ein Halbregelmäßiger mit zunehmender Zyklenlänge von 360 Tagen (JD 38000...41600) über 384 Tage (JD 42800...45000) auf 400 Tage (JD 45600...49300). An den Übergangsstellen sind jeweils Störungen, so ist das bei 41050 erwartete Minimum nicht eingetreten. Die Amplitude beträgt $\approx$ 1 mag.

Der Veränderliche wurde mit der IRAS Quelle 19131 + 2507 identifiziert.

TASV 0365 + 34

Der Stern wurde von DAHLMARK in den IBVS Nr. 3855 als neuentdeckter unregelmäßiger Veränderlicher angezeigt.

Ich habe den Stern auf 315 Platten der Sonneberger Himmelsüberwachung aus den Jahren 1963 bis 1993 beobachtet und kann einen langsamen unregelmäßigen Lichtwechsel mit kleiner Amplitude ($\approx$ 0.5 mag) bestätigen.

Die Zeitskalen deutlicher Änderungen liegen bei 200 bis 1000 Tagen.

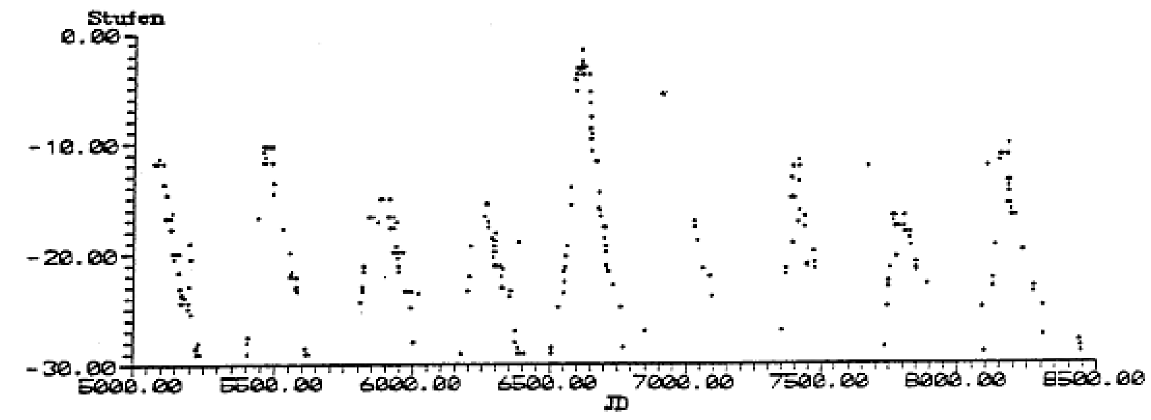

Fig. 1. Lichtkurve von EO Dra im Zeitraum von 1982 – 1991

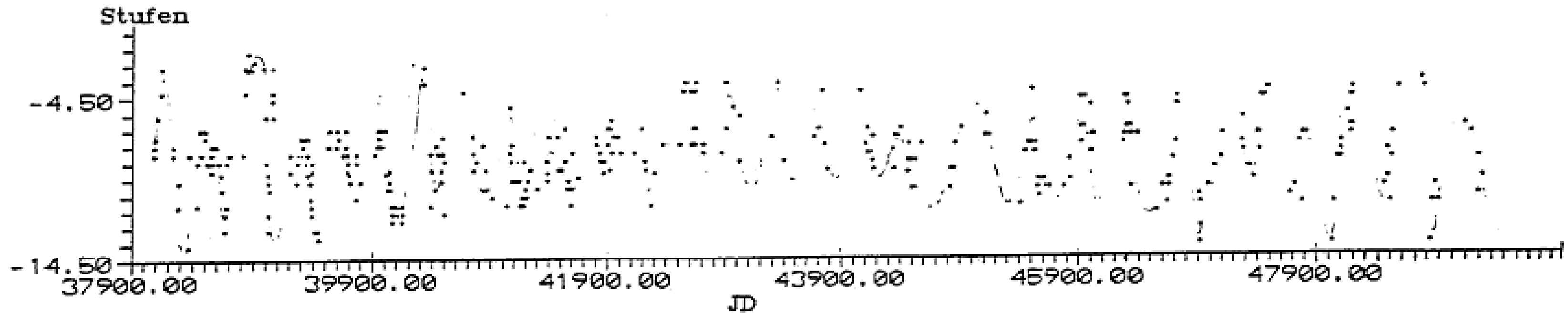

Fig. 2. Lichtkurve von TASV 1913 + 25

WW Vulpeculae - photographic magnitudes for 1929 - 1992

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(Eingegangen am 23. Dezember 1993)

Recently, FRIEDEMANN et al. (1993a) investigated the light variations of WW Vul, an evolutionarily young variable of type Isa. A conspicuous feature of its light-curve is the irregularily occuring Algol-like minima with amplitudes up to 1.5 mag. For a number of these minima UBV and UBVR observations have been collected from several authors (for references see FRIEDEMANN et al. (1993a)). Primarily based on these multi-colour photoelectric data we concluded that the Algol-like minima of WW Vul are readily explained by a model which incorporates a cloudy dust envelope around the star.

Besides our study of individual Algol-like minima by means of photoelectric data we tried to collect as many photometric data as possible for an investigation of the long-time behaviour of WW Vul. For references to published data used by us see FRIEDEMANN et al. (1993a). In addition to these data sets we made use of the plate collections at Bamberg and Sonneberg observatories. Brightness estimates (C. F. and H.-G. R. at Bamberg and J. H. at Sonneberg) mainly on Sky Patrol plates enlarge the data base for the last 60 years considerably. For our brightness estimates the sequence of comparison stars published by RÖSSIGER and WENZEL (1972) was used.

For the brightness estimates carried out on Sky Patrol plates of the Sonneberg archive plates taken for two different fields have been used. The location of the variable in each field is quite different. Nevertheless, comparison of magnitudes derived from the two fields shows no systematic differences. Apart from the Sky Patrol plates a number of other ones obtained for special purposes have been included, too. In Tables 1, 2, and 3 the separate data sets obtained from the Bamberg and Sonneberg plate collections are arranged according to the Julian date. Double entries for the same dates are for plates which have been obtained simultaneously by two cameras. Uncertain values are indicated by colons and upper limits by L.

The uncertainties of our magnitudes contained in Tables 1 and 2 consist of the error of the estimate amounting to about $\Delta m \approx \pm 0.15$ mag as well as of local fluctuations of the sensitivity of the emulsions and should not exceed $\Delta m_{tot} \approx \pm 0.3$ mag in general.

In order to incorporate the different data sets into a total light-curve we used linear brightness transformations for each of them when a sufficient number of coinciding measurements were available. If one denotes the photographic brightness of the variable estimated on Sonneberg Sky Patrol plates with m_S and the other data sets with m_Y, then the conversion of the data is done by the equation

$$m_Y = a m_S + b$$

The values of the constants a and b were calculated by least squares fits and are presented in Table 4.

Table 1. Photometric data from Bamberg plate archive

JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}
25536.279	10.91 :	26243.352	11.19	26868.503	10.91	27280.440	11.14	27685.415	10.69	28425.396	10.69	29070.492	10.97	29516.390	10.47
25687.629	10.97	26266.297	11.14	26869.487	10.97 :	27281.458	11.30 :	27993.481	10.69	28460.292	10.69	29078.449	10.69	29606.253	10.58
25738.506	11.14 :	26306.275	10.94	26886.489	10.97	27295.360	11.19	28007.424	10.58	28635.604	10.69 :	29080.470	11.08	36813.342	11.30
25759.459	11.19	26413.564	11.57	26893.531	10.91	27302.384	11.45 :	28009.474	10.69	28668.544	10.97	29102.446	10.91	36814.372	11.86
25792.401	11.30	26415.565	11.45 :	26899.447	10.91 :	27303.377	11.86 :	28016.467	10.69	28698.442	10.97	29107.433	10.91	36816.331	11.86
25804.404	11.35	26439.644	10.95 :	26899.469	10.69 :	27303.399	10.97	28074.292	10.69	28717.500	10.47	29134.386	10.69	36817.331	11.86 :
25830.419	10.94	26440.633	11.12 :	26899.490	10.94	27303.399	11.30	28074.316	10.91	28747.440	10.69	29158.324	10.69	36818.333	11.86 :
25850.324	10.91	26445.622	11.14	26899.512	10.91	27305.376	10.91	28074.316	10.91	28751.428	10.69	29161.324	10.69	36819.342	11.67
25920.247	10.94	26451.597	11.57	26915.465	10.69	27310.419	11.30	28108.251	10.91	28757.466	10.91	29166.339	10.69	36820.337	11.49
25937.228	12.01 :	26481.541	11.30	26924.369	10.97	27312.407	11.08	28108.251	10.69	28693.457	10.91	29168.354	10.58	36833.302	11.49
26087.557	10.91	26505.494	11.97	26929.366	11.71 :	27326.356	11.08	28309.528	10.69	28778.387	10.69	29170.360	10.69	36840.299	11.86
26089.506	10.69	26514.524	10.69	26929.378	11.86	27366.267	11.08 :	28315.479	10.58	28783.405	10.69	29187.282	10.69	36841.294	12.27 :
26133.458	10.91	26546.510	10.91	26955.390	10.69	27386.272	11.30	28335.506	10.69 :	28804.333	10.97	29194.294	10.69	36842.288	11.95
26134.412	10.69	26587.333	10.58	26956.386	10.69	27573.544	10.69	28338.483	10.97 :	28834.167	11.08	29195.268	10.91	36843.288	12.12
26145.428	10.69	26631.258	10.97	27210.547	10.69	27573.544	10.91	28362.458	11.19	28954.665	10.69	29216.224	10.91	36844.285	11.49
26157.505	10.91	26648.310	10.69	27277.423	11.49 :	27597.508	10.91	28391.428	10.94	28965.656	10.97	29341.615	11.44 :	36845.285	11.49 :
26159.433	10.91	26677.272	11.19	27277.445	11.19	27604.522	10.91	28396.422	10.69	28984.612	10.91	29359.444	10.91	37109.490	10.91
26161.402	10.91	26833.549	10.69	27277.445	10.91	27625.407	10.69	28397.401	10.69	28991.595	10.94	29374.531	10.91	37134.458	11.30
26190.481	10.69	26863.502	11.08	27278.432	11.49	27635.471	10.91	28398.432	10.58	29014.590	10.91	29486.430	10.69	37137.460	11.49
26206.403	10.94	26863.519	11.30	27278.432	11.30	27635.492	10.91	28404.433	10.69	29025.524	10.69	29493.455	10.69	37145.452	11.67
26213.396	11.97	26863.528	11.14	27280.419	11.30 :	27667.488	10.58	28407.444	10.91	29050.445	11.08	29507.524	10.97	37160.423	11.14
26216.404	11.30	26868.498	11.08	27280.440	11.30	27667.488	10.69	28423.404	10.58	29054.484	10.97	29515.391	10.47		

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Table 2. Photometric data from Sonneberg sky patrol plates

JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}
29164.500	10.64	31621.500	10.69	32446.374	10.94	32998.622	11.14	33241.244	10.69	33569.352	10.78	33894.347	10.94	34215.448	11.72
29375.500	10.64	31645.470	10.64	32448.329	10.91	33005.583	11.14	33389.589	10.91 :	33570.311	10.64	33895.405	10.69	34216.445	11.72
29424.500	10.64	31647.493	10.69	32467.289	10.64	33023.339	10.64	33417.531	10.94	33570.345	10.80 :	33896.370	10.64	34220.434	11.72
29438.500	10.64	31649.443	10.64 :	32470.287	10.64	33027.592	11.14	33418.504	10.99 :	33586.258	10.80 :	33896.402	10.69	34221.446	11.67
29452.500	10.64	31652.461	10.64 :	32471.338	10.78	33030.567	11.20 :	33421.528	10.91 :	33749.590	10.74	33897.395	10.69	34224.470	11.67
29453.500	10.64	31654.509	10.69	32478.321	10.69 :	33039.549	11.14	33424.530	10.94	33762.493	10.94	33914.297	10.64	34225.463	11.72
29457.500	10.64	31671.453	10.69	32617.651	10.91	33084.465	10.69	33444.494	11.14	33768.547	10.69	33914.328	10.69	34239.392	11.67
29486.500	10.78	31810.300	11.30	32625.642	10.99 :	33088.507	10.94	33445.499	11.04 :	33798.509	10.74	33915.306	10.69	34244.383	11.58
29492.500	10.94	31999.490	11.30	32658.598	10.69	33094.501	10.91	33452.503	11.04	33811.515	10.64	33917.310	10.64	34248.378	11.67
29493.500	10.78	32061.456	10.64 :	32709.496	10.78	33094.501	10.94	33476.506	10.91 :	33812.514	10.69 :	33922.334	10.64	34249.355	11.58
29375.568	10.64	32110.275	10.94	32710.500	10.59 :	33100.502	10.94	33478.475	11.14	33827.489	10.64	33924.336	10.69	34250.423	11.30
29705.625	10.78	32112.312	10.99 :	32761.406	11.48	33101.501	10.80	33479.463	10.78	33828.495	10.69 :	33925.309	10.64	34250.456	11.67
29844.508	10.69	32118.264	10.74	32763.465	11.04	33118.462	10.94	33483.475	11.14	33829.423	10.64	33940.262	10.69	34251.368	11.30
30313.277	11.78	32118.298	10.78	32770.463	11.14	33125.474	10.69	33502.429	10.97	33830.485	10.69 :	33947.265	10.69	34253.375	11.67
30319.236	11.78 :	32291.587	11.30 :	32775.413	10.94 :	33126.536	10.94	33503.426	10.78	33831.465	10.64	33949.289	10.74	34271.356	11.11
30465.600	11.67	32297.548	10.94 :	32776.457	11.04	33130.492	10.94	33504.414	11.14	33834.493	10.69 :	34099.606	11.20	34272.313	11.30
30496.531	10.91	32319.534	10.91	32791.364	10.78 :	33149.395	11.14	33507.394	11.14	33835.460	10.69 :	34121.573	11.64	34272.351	11.14
30547.486	10.91	32349.496	10.94	32794.398	10.78 :	33149.446	11.19	33508.446	10.94	33838.467	10.64	34131.567	11.64	34296.274	10.91
30608.375	10.91	32382.477	10.94	32795.401	10.78 :	33150.453	11.14	33509.419	10.97	33840.447	10.69 :	34132.568	11.52	34298.345	10.94
30656.500	10.69	32388.435	10.94	32803.390	11.14	33153.431	11.86 :	33512.463	10.91	33855.410	10.80	34150.518	11.52	34304.276	10.94
31263.491	10.94	32390.496	10.91	32805.401	10.94	33159.422	11.08	33514.419	11.14	33856.443	10.69 :	34152.492	11.14	34452.634	10.94
31291.497	10.94	32411.434	10.91	32822.349	10.91 :	33185.335	10.94	33515.446	11.11	33858.430	10.80	34190.495	11.11	34454.632	11.58
31326.500	11.86 :	32413.429	10.99	32823.321	10.91	33185.335	10.94	33536.376	10.94	33864.439	11.08	34191.467	11.22	34457.631	11.44
31326.500	12.12	32415.415	10.78	32826.346	10.69 :	33204.308	10.78	33537.377	10.97	33865.422	10.69	34192.500	11.30	34459.631	11.30
31327.368	10.97	32416.470	10.99	32827.339	10.94	33205.283	11.48	33538.355	10.94	33870.412	10.91	34193.486	11.22	34480.597	10.94
31327.391	11.10	32419.427	10.91	32828.353	10.91 :	33208.304	10.78 :	33539.400	10.94	33885.393	10.69	34194.455	11.30	34485.600	11.08
31584.536	10.91	32439.389	10.78	32830.306	10.91	33210.293	10.69	33558.297	10.97	33887.373	10.69	34195.462	11.58	34487.575	10.78
31588.535	10.70	32442.376	10.91	32831.330	10.91 :	33210.293	10.69	33559.322	10.94	33888.380	10.91	34208.413	11.30	34488.558	10.69
31610.492	10.64	32444.334	10.91	32834.379	10.78 :	33212.319	10.94	33568.309	10.80 :	33891.384	10.69	34210.414	11.30	34535.506	10.69
31615.500	10.78	32445.353	10.78	32883.238	10.91 :	33239.253	10.69	33569.306	10.64	33892.401	10.94	34211.417	11.58	34565.477	10.78

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Table 2. continued

JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}
34567.465	10.64	34662.312	10.80	34991.360	10.69	35312.464	11.75	35691.413	10.99	35938.602	12.12	36133.284	10.91	36453.454	11.14
34569.479	10.91	34662.348	10.97	35009.358	10.69	35314.434	11.30	35691.437	11.14	35959.574	12.26 :	36135.329	10.94	36453.479	11.20
34580.427	10.91	34663.301	10.64	35013.343	10.74	35330.382	10.91	35691.444	10.99	35960.537	12.12	36137.291	11.11	36454.418	11.20
34597.466	10.91	34663.333	10.91	35019.339	10.69	35331.433	10.94	35691.480	10.99	35960.572	12.17	36160.239	10.94	36456.402	11.20
34598.397	10.91	34664.311	10.78	35048.294	10.78	35335.451	10.80	35691.526	10.99	35984.532	11.30 :	36164.247	10.94	36457.375	11.08
34599.411	10.64 :	34665.314	10.78	35063.240	10.91	35342.409	10.94	35694.446	10.99	35985.508	11.30	36307.603	10.91	36458.403	11.08
34599.440	10.69	34678.273	10.69	35068.218	10.91	35343.367	10.80	35694.486	10.99	35988.530	11.67	36318.488	10.91	36459.416	11.20
34600.406	10.69	34683.293	10.64	35068.244	10.78	35344.435	10.80 :	35694.522	10.99	35991.525	11.30	36343.534	10.91	36460.328	11.20
34601.442	10.74	34706.217	10.69	35196.627	10.78	35359.350	10.78	35695.438	10.94	35996.479	11.67	36348.456	11.48	36461.400	11.20
34602.401	10.78	34707.213	10.80	35197.622	10.74	35362.360	10.78 :	35695.466	10.99	36010.481	11.08	36369.509	12.12	36480.327	11.20
34603.399	10.69	34709.222	10.69 :	35218.566	11.07	35364.422	12.12 :	35698.444	11.58	36015.476	11.30 :	36370.509	12.12	36482.317	10.94
34604.439	10.91	34710.224	10.64	35220.553	11.11	35372.328	11.86 :	35700.441	11.14	36018.475	11.58	36372.510	12.12	36484.392	10.94
34607.401	10.69	34714.219	10.80	35223.492	10.94	35372.357	11.86 :	35700.462	11.14	36019.447	11.58	36378.487	11.14	36485.343	11.58
34608.421	10.91	34716.215	10.69 :	35223.527	11.14	35389.282	11.05 :	35700.497	11.14	36023.465	11.30	36378.513	11.20	36487.372	10.94
34609.431	10.69	34810.638	11.86	35224.585	11.11	35389.317	11.30 :	35701.491	11.58	36024.447	11.30	36394.494	11.20	36495.416	11.30 :
34622.379	10.91	34811.653	11.52 :	35226.502	11.67	35391.294	11.86 :	35716.412	11.58	36024.476	11.30	36395.468	11.14	36539.226	11.14
34623.374	10.91	34843.613	10.97	35226.552	10.94	35394.332	11.10	35717.353	11.50 :	36052.448	12.03	36396.494	11.20	36541.224	11.58
34626.363	10.91	34862.513	10.74	35240.456	10.94	35419.267	11.10 :	35718.402	11.50 :	36053.425	11.30	36397.490	11.14	36542.263	11.14
34627.362	10.91	34872.547	10.80	35243.500	10.94	35550.652	10.69	35719.483	11.92 :	36054.448	11.30	36399.476	11.20	36648.660	11.30
34628.392	10.91	34890.459	10.78	35244.515	10.94	35551.627	10.69	35721.355	11.44	36070.420	11.30 :	36403.500	11.20	36658.633	10.94
34629.360	10.91	34899.470	11.19	35246.488	10.94	35599.542	10.69	35722.389	11.14	36072.413	11.99	36404.506	11.14	36672.617	11.58
34630.357	10.91	34922.453	10.78	35252.488	10.91	35601.562	10.91	35725.424	11.14	36073.397	11.99	36423.413	11.14 :	36689.585	11.58 :
34631.383	10.91	34952.442	10.78	35253.507	10.91	35609.539	10.91	35742.303	11.14	36073.426	11.72 :	36426.457	11.14	36698.574	11.58 :
34635.386	10.91	34957.410	10.91	35254.501	10.69	35658.457	10.78	35747.362	11.30	36074.443	11.93	36433.445	11.20	36704.542	11.44 :
34636.354	10.74	34958.438	10.91	35275.500	10.69	35661.478	10.64	35748.340	11.72	36085.463	11.44	36434.418	11.14	36722.490	11.86
34651.313	11.44	34962.415	10.94	35276.501	10.64	35663.474	10.69	35757.374	11.07	36102.380	11.44	36434.447	11.20	36723.483	11.72
34652.328	10.91	34986.374	10.94	35277.507	10.78	35664.465	10.91	35778.290	11.64	36108.359	11.48 :	36436.497	11.20	36724.534	11.9 L
34653.331	11.05 :	34987.381	10.78	35302.442	12.20 :	35667.460	10.91	35779.287	11.72	36112.400	11.44	36451.385	11.20	36734.508	11.86
34654.321	10.91	34988.396	10.94	35305.476	12.40 :	35668.456	10.64	35802.222	11.72	36127.320	10.91	36452.369	11.08	36754.485	11.9 L
34660.306	10.94	34990.403	10.94	35306.445	12.54	35685.399	10.94	35934.613	11.86	36130.275	10.94	36453.340	11.20	36757.519	11.86

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Table 2. continued

JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}
36763.420	11.86	36893.238	12.03	37166.447	10.94	37559.365	11.44	37938.405	10.94	38348.268	10.69	38680.309	10.94	39060.292	10.69
36764.510	11.86	36895.278	11.72	37166.469	10.94	37575.345	11.30	37939.359	10.94	38370.242	10.69	38697.266	10.94	39081.228	10.69
36780.430	11.86 :	36896.273	12.03	37169.394	10.80	37578.376	11.30	37942.392	11.09	38373.219	10.69	38709.265	10.94	39088.226	10.94
36788.418	11.72	36899.236	11.86 :	37169.415	10.94	37587.348	11.14	37946.447	11.05	38412.701	10.80 :	38739.276	10.94	39184.667	10.94
36790.450	11.72	36904.231	11.30	37171.388	10.69	37603.344	11.05	37958.363	11.05	38439.673	10.94	38817.639	10.69	39204.599	11.86
36808.407	12.03 :	37017.646	11.64	37171.420	10.94	37615.297	11.94	37960.291	11.05	38439.673	10.80	38830.663	11.22	39205.632	11.64
36808.428	11.86	37027.614	11.64 :	37172.434	11.20 :	37659.233	11.17	37962.275	10.94 :	38440.659	10.94	38832.625	11.14 :	39238.575	10.69
36810.403	11.99 :	37028.618	11.64 :	37173.415	10.78	37668.240	10.94	37972.313	10.94	38463.642	10.69	38849.614	10.69	39256.494	10.80
36810.425	11.86	37045.568	11.22 :	37174.455	11.20 :	37731.669	10.94	38085.668	10.80	38472.634	10.94	38853.620	10.69	39262.531	10.64
36813.434	11.72	37079.521	11.22 :	37188.350	11.20 :	37737.660	10.94	38088.658	10.69	38495.566	10.80	38882.532	10.94	39270.468	10.94
36814.378	11.58	37080.528	11.22	37189.348	10.91	37788.555	10.94	38092.656	10.69	38501.565	10.69	38901.501	10.94	39288.478	12.17
36815.395	11.58	37081.532	11.14 :	37190.378	11.11 :	37812.480	10.94	38112.612	10.69	38503.584	10.80	38932.468	10.94	39299.489	11.72
36815.438	11.64	37082.527	11.11	37191.358	10.91	37818.516	10.94	38140.548	10.69	38525.528	10.80	38935.457	10.80	39317.426	10.69
36816.427	11.58	37086.527	10.97 :	37193.359	10.91	37821.492	10.94	38142.576	10.69	38530.524	10.69	38937.483	10.80	39331.452	10.94
36817.390	11.58	37088.495	10.97 :	37194.393	11.11 :	37824.467	10.94	38146.558	10.69	38551.476	10.94	38941.479	10.94	39349.410	10.69
36820.406	11.64	37088.527	11.11	37202.378	10.94	37839.458	10.94	38171.538	10.80	38555.494	10.94	38977.446	10.80	39351.424	10.80
36821.472	11.64	37089.497	10.97 :	37231.403	11.07 :	37841.475	10.94	38197.453	10.80	38559.484	10.94	38990.361	10.94	39355.398	10.69
36822.427	11.64	37089.529	11.11	37232.283	10.94	37854.464	10.94	38204.466	10.80	38583.469	10.94	38996.392	10.94	39378.330	10.80
36836.354	11.64	37101.482	11.11	37247.265	11.11 :	37870.428	11.05 :	38225.454	10.69	38591.494	10.94	39007.424	10.54	39380.341	10.65
36837.356	11.64	37103.474	11.14 :	37384.635	11.14	37872.464	11.05	38226.451	10.69	38613.444	11.10	39021.358	10.94	39385.351	10.94
36839.363	11.86	37105.500	11.14	37403.601	11.22	37874.444	11.05	38233.456	10.69	38616.472	11.10	39024.367	10.94	39388.342	10.94
36840.354	11.86	37107.510	11.11	37434.523	11.86 :	37877.512	11.05	38237.498	10.80	38620.394	11.10 :	39026.326	10.94	39389.346	10.94
36841.350	11.75	37108.507	10.97	37470.453	11.86	37878.490	11.05	38239.435	10.69	38623.439	10.94 :	39028.299	10.94	39391.406	10.94
36842.355	11.75	37109.512	11.11 :	37513.457	11.30	37885.474	10.94	38281.342	10.69	38638.360	10.94	39034.334	11.14	39406.300	10.94
36845.376	11.86 :	37111.504	11.11	37517.435	10.94	37886.456	11.05	38284.378	10.80	38641.382	10.94	39051.282	10.94	39416.308	10.94
36846.331	11.86	37112.508	11.11	37525.380	10.97 :	37903.391	11.14	38287.378	10.94	38650.379	10.94	39054.295	10.80	39440.256	11.22
36847.340	11.86	37116.458	11.11	37543.372	11.58	37907.401	11.44	38289.414	10.80	38664.311	11.14	39055.319	10.69	39443.238	11.22
36848.376	12.12	37134.532	11.30	37545.356	11.58	37908.385	12.03	38311.313	10.69	38669.340	11.19	39057.283	10.80	39527.681	11.14
36849.349	12.17	37140.451	11.30 :	37546.381	11.58	37910.419	11.14	38319.292	10.69	38671.319	11.58	39058.311	10.80	39533.664	11.86 :
36876.269	11.93	37145.451	11.30	37556.402	11.44	37911.391	11.22	38322.342	10.80	38674.316	11.14	39059.259	10.69	39536.666	11.22

Table 2. continued

JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}
39538.674	11.43	40007.487	10.69	40469.364	10.91	41166.460	12.03	41839.458	12.02	42658.355	10.69	43723.437	12.23	44822.405	12.38
39557.477	10.94	40023.460	10.58	40471.372	10.80	41180.399	11.22	41860.466	11.86 :	42711.269	11.58	43748.386	12.06	44846.382	11.86
39593.554	11.04	40025.446	10.69	40473.355	10.94	41182.401	11.30	41900.423	12.12 :	42713.273	11.58	43776.341	11.30	44851.358	11.93
39596.571	10.97	40030.468	10.94	40476.401	10.69	41193.398	11.43	41921.384	11.86 :	42840.627	11.20 :	43955.574	10.69	44871.359	11.48 :
39611.528	10.91	40037.449	10.94	40478.340	10.69	41208.385	11.51	41927.389	11.86	42866.562	11.20 :	44051.457	11.11	44901.264	10.91
39616.534	11.17	40039.473	10.94	40483.385	10.69	41214.384	11.58	41930.397	11.30 :	42891.526	11.20	44101.412	10.78	44923.222	10.69
39619.540	11.11	40062.465	10.94	40484.406	10.80	41217.352	11.58	41948.353	11.11	42897.542	11.20	44106.385	10.78	45052.601	10.69
39621.500	11.04	40067.451	10.69	40500.298	10.69	41241.351	11.30	41983.247	11.30	42900.549	11.30	44113.373	10.69	45104.509	11.64
39648.472	11.99	40069.420	10.94	40501.269	10.66	41248.278	11.43	42127.569	11.58	42948.440	11.20	44115.403	10.91	45116.508	10.78
39670.462	11.17	40088.383	10.80	40507.317	10.69 :	41300.211	11.22	42152.519	11.58	42955.466	11.58 :	44117.439	10.97	45141.479	10.78
39672.432	11.22	40097.357	10.94	40509.314	10.91 :	41369.672	11.07	42186.516	11.30	42959.445	11.20	44142.361	10.78	45163.410	10.78
39678.465	11.17	40127.340	10.94	40531.278	10.91 :	41390.583	10.99	42215.469	10.92	42961.449	11.20	44143.338	10.97	45165.438	10.94
39682.445	11.30	40145.303	10.94	40656.615	10.80	41391.596	10.99	42219.468	11.22	42988.446	10.91 :	44157.274	10.97	45203.392	11.14
39684.447	11.22	40149.281	11.08	40738.514	10.69	41395.608	11.11	42224.486	11.14	43014.396	11.07	44162.314	10.97	45223.339	10.78
39702.429	11.11	40151.326	11.10	40740.473	10.91	41443.515	10.91	42244.453	11.19	43016.415	11.20	44170.294	10.97	45229.347	10.78
39709.476	11.11	40152.283	11.10	40745.441	10.69	41477.467	11.11	42275.389	12.12	43045.374	10.99	44343.544	10.91	45235.361	10.99
39711.411	10.99	40171.236	11.05	40749.466	10.69	41482.472	11.17	42302.393	11.86 :	43250.585	10.91	44346.554	10.69	45280.231	10.78
39758.293	10.83	40321.564	11.08	40775.456	10.69	41512.438	11.64	42367.272	11.58	43275.488	10.99	44371.521	10.69	45406.620	10.69
39760.309	10.83	40359.538	11.11	40825.393	10.69	41536.429	11.22	42534.478	11.11	43288.506	11.11	44374.528	10.69	45441.553	10.91
39763.320	10.94	40381.474	11.17	40828.397	10.69	41539.436	11.22	42546.497	11.17	43308.489	10.99 :	44397.496	10.78	45464.524	10.69
39792.268	10.69	40383.466	11.17	40854.336	10.69	41567.376	11.71	42596.440	11.17	43337.456	10.97 :	44427.460	10.69	45489.478	10.69
39913.673	10.80	40385.495	11.11	40859.354	10.69	41573.363	12.17	42600.461	11.17	43346.426	10.99	44458.394	10.98	45493.474	10.69
39940.615	10.94 :	40390.469	11.05	40914.231	11.07	41593.308	12.31	42602.451	11.17	43393.380	12.00 :	44461.420	10.91	45518.443	10.78
39942.591	10.94	40417.447	11.07	41039.564	11.11 :	41595.313	12.31	42609.475	11.86 :	43482.224	11.58	44465.381	10.99	45524.461	10.69
39945.616	10.94	40419.434	11.07	41059.508	11.93 :	41597.316	12.31	42627.436	11.23	43579.615	12.00 :	44467.418	11.11	45527.435	10.69
39964.516	10.78	40426.440	10.66	41060.530	11.93 :	41599.283	12.12	42629.434	11.44	43606.578	10.99	44486.367	10.99 :	45546.373	10.69
39965.534	10.69	40441.399	10.66	41070.514	12.38	41601.301	12.07	42632.415	11.05	43608.574	11.11	44499.373	11.20 :	45556.414	10.69
39968.522	10.69	40444.420	10.66	41071.549	11.99 :	41647.220	11.11	42634.422	10.91	43660.493	11.44	44523.295	11.58	45561.391	10.69
39975.551	10.94	40452.419	10.69	41134.428	11.07	41798.519	10.99	42637.381	10.83	43700.451	11.30 :	44571.224	11.14	45583.367	10.69
39994.492	10.69	40467.331	10.78	41155.459	10.91	41830.503	11.11	42638.414	10.91	43715.389	11.86 :	44749.488	10.91	45648.256	10.78

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Table 2. continued

JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}
45671.226	10.69	46200.552	10.80	46321.381	11.14	46613.462	10.80	46705.346	10.69	46977.454	11.22	47331.467	11.05	47413.351	10.91
45674.227	10.69	46260.456	10.69	46321.417	11.11	46641.429	10.69	46706.300	10.69	46977.489	11.14	47331.504	11.04	47414.353	10.94
45770.637	10.78	46260.482	10.69	46327.346	12.38	46641.429	10.69	46706.300	10.69	46982.466	10.89	47332.488	11.09	47414.390	10.78
45815.568	10.91	46264.433	10.69	46327.382	12.38	46642.427	10.80	46707.310	10.80	47029.387	12.12	47332.488	11.04	47415.350	10.80
45816.542	10.91	46264.462	10.69	46328.345	12.17	46642.427	10.91	46707.310	10.69	47029.432	12.23	47353.498	10.94	47415.350	10.78
45822.533	10.69	46266.457	10.80	46328.384	12.38	46644.416	10.80	46708.315	10.69	47030.400	12.38	47353.498	10.91	47418.349	10.69
45871.477	10.69	46270.467	10.80	46351.335	12.38	46644.416	10.80	46708.315	10.69	47030.442	12.23	47365.492	10.94	47420.305	10.80
45902.441	10.69	46270.467	10.94	46351.361	12.38	46645.426	10.69	46709.306	10.80	47039.383	11.44	47365.492	11.04	47420.342	10.78
45903.462	10.69	46271.429	10.80	46352.279	12.38	46645.426	10.69	46709.306	10.78	47039.383	11.64	47366.440	11.30	47436.281	10.86
45907.472	10.69	46271.459	10.80	46352.312	12.38	46646.433	10.69	46711.293	10.78	47059.363	11.30	47366.476	11.52	47436.281	10.91
45911.422	10.69	46272.463	10.80	46354.274	12.17	46646.472	10.80	46713.325	10.69	47059.363	11.11	47368.476	11.30	47437.279	10.80 :
45912.417	10.69	46272.503	10.80	46355.304	12.17	46648.425	10.80	46713.325	10.69	47060.341	11.22	47368.476	11.52	47437.316	10.80
45913.420	10.78	46287.426	10.80	46358.319	12.17	46648.425	10.69	46763.272	10.69	47060.378	11.09	47380.445	11.44	47438.283	10.78 :
45916.416	10.69	46287.426	10.80	46358.319	12.17	46649.426	10.80	46764.222	10.69	47061.363	11.14	47381.425	11.44	47438.322	10.91
45935.376	10.69	46288.404	10.69	46373.229	11.22	46649.465	10.80	46764.265	10.69	47061.363	11.07	47386.444	11.22	47445.270	10.69
45936.394	10.69	46288.434	10.80	46373.256	11.17	46650.430	10.91	46908.532	10.69	47087.260	11.30	47387.417	11.44	47445.307	10.78
45940.391	10.69	46289.399	10.80	46374.240	11.22	46650.430	10.69	46909.545	10.80	47087.297	11.07	47387.458	11.44	47449.269	10.80
45946.415	10.69	46289.441	10.91	46374.268	11.44	46651.433	10.91	46910.542	10.69	47088.299	11.14	47387.458	11.14	47449.269	10.78
45990.288	10.69	46291.407	11.05	46385.240	11.22	46651.433	10.91	46914.531	10.69	47088.299	11.07	47388.361	11.30	47469.281	10.69
45991.285	10.69	46291.407	10.99	46385.240	11.44	46679.361	10.94	46915.544	10.69	47089.262	11.14	47388.405	11.44	47469.281	10.69
46000.287	10.97	46292.402	11.22	46386.227	11.22	46679.361	10.81	46917.531	10.69	47095.262	11.14	47391.358	11.44	47470.240	10.69
46001.271	10.97	46292.432	11.04	46386.255	11.44	46683.351	10.80	46939.522	10.94	47263.562	11.58	47391.394	11.44	47470.240	10.69
46002.262	11.11	46296.434	11.04	46405.214	11.44	46685.410	10.78	46941.516	11.05	47265.517	11.58	47392.404	11.44	47471.249	10.69
46018.220	11.20	46298.409	11.14 :	46405.214	11.44	46697.296	10.91	46941.516	10.78	47271.535	11.14	47392.404	11.14	47471.249	10.69
46019.224	11.11	46298.409	11.04	46552.543	11.14	46702.288	10.94	46975.415	11.14	47294.538	11.14	47411.353	10.94	47473.229	10.69
46173.561	11.22	46299.420	10.94	46591.516	10.94	46702.325	10.91	46975.415	11.58	47294.538	10.99	47411.353	11.07	47473.266	10.69
46173.561	10.91	46318.370	10.94	46591.516	10.91	46704.318	10.94	46975.490	11.14	47325.499	11.05	47412.351	10.69	47475.250	10.69
46175.538	11.14	46318.370	10.91	46592.488	10.94	46704.318	10.99	46975.490	11.52	47325.499	10.91	47412.389	10.91	47475.250	10.69
46200.521	10.69	46320.331	11.14	46592.519	10.94	46705.315	10.94	46976.454	11.22	47329.503	11.05	47412.501	10.91	47673.472	10.94
46200.521	10.69	46320.367	11.11	46613.462	10.94	46705.315	10.78	46976.454	11.57	47329.503	11.04	47413.351	10.80	47706.458	10.94

Table 2. continued

JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}
47706.458	10.78 :	47795.369	11.04	48069.491	11.14	48148.318	10.78	48184.284	10.91	48476.408	10.78	48559.242	10.78	48803.468	11.22
47714.482	11.72	47803.309	10.99	48092.448	11.10	48149.343	10.94	48186.258	10.96	48480.434	10.91	48562.280	10.78	48804.468	11.11 :
47714.482	11.64	47804.309	10.94	48092.448	11.04 :	48149.343	10.78	48186.289	10.78	48480.434	11.78	48562.280	10.69	48829.422	11.14
47715.459	11.64	47804.309	10.99	48093.467	10.78	48151.338	10.78	48187.255	10.69	48481.368	10.91	48591.218	10.69	48830.437	11.19
47719.465	11.58 :	47805.309	11.14	48095.437	10.94	48151.338	10.78	48188.269	10.78	48501.328	10.91	48592.216	10.69	48830.478	11.14
47719.502	11.72	47805.309	10.99	48095.467	10.78	48156.340	10.94 :	48188.269	10.78	48502.329	10.69	48593.216	10.69	48832.397	11.19
47720.478	11.98 :	47848.222	10.69	48096.475	10.78	48156.340	10.78	48205.258	10.78	48502.352	10.78	48686.620	10.69	48833.416	11.22
47720.478	11.64	47848.222	11.04	48097.443	10.91	48174.279	10.94	48232.215	10.91	48503.365	10.78	48691.606	10.69 :	48834.428	11.19
47744.409	10.94	47849.227	10.99	48098.442	10.94	48174.279	11.04	48353.535	10.94 :	48503.365	10.69	48746.542	11.10	48834.428	10.69
47744.442	10.91	47860.226	10.99	48099.440	10.94 :	48175.272	10.94	48385.517	10.91	48503.435	10.78	48746.542	11.10	48839.443	10.69
47748.408	10.69 :	47861.215	10.99	48099.440	11.04	48175.306	11.04	48385.517	10.69	48504.356	10.69	48747.549	11.05	48840.456	10.91
47769.383	10.94	47862.235	11.04	48100.422	10.94	48176.265	10.94	48409.425	10.78	48504.356	10.78	48748.549	11.22	48857.388	10.78
47769.383	11.04	48030.516	10.94 :	48100.452	10.94 :	48176.301	10.94	48413.431	10.78	48504.427	10.69	48767.488	10.69	48862.347	10.91
47770.368	10.94	48030.516	11.04	48101.399	10.94	48176.301	10.91	48413.462	10.78	48512.349	10.91 :	48769.490	10.69	48862.384	10.91
47770.398	11.04	48032.482	11.10	48103.407	10.94	48177.294	10.94	48446.492	10.91	48512.378	10.78	48770.519	10.78	48863.340	10.91
47776.351	10.94	48032.515	11.07 :	48103.437	10.94	48177.294	10.91	48446.492	10.69	48513.347	10.78	48771.491	10.78	48863.376	10.91
47776.351	10.99	48032.546	11.10 :	48103.437	11.04	48178.263	10.94	48449.457	10.78	48514.355	10.69	48771.519	10.78	49098.442	11.04
47777.356	10.80	48038.521	11.14	48105.453	10.91	48178.294	10.94	48449.488	10.69	48514.379	10.91	48773.517	11.07		
47777.356	10.99	48038.521	11.07 :	48105.453	10.91	48178.294	10.91	48458.478	10.94	48534.324	10.69	48800.462	11.30	30613.396	11.9 L
47778.357	10.94	48039.483	11.10 :	48116.367	11.10 :	48179.263	10.94	48474.465	10.78	48537.294	10.69	48800.497	11.64	33152.442	11.9 L
47778.357	10.99	48039.508	11.10	48116.367	10.78	48179.290	10.94	48474.465	10.78	48537.389	10.69	48801.501	11.72	33154.405	11.9 L
47790.296	10.94	48039.508	11.07 :	48127.383	10.78	48180.281	10.94	48475.469	10.78	48539.290	10.69	48801.501	11.44	35302.439	11.3 L
47792.322	10.94	48041.493	11.10	48132.480	10.69	48180.281	10.94	48475.469	10.78	48541.292	10.69	48802.509	11.64	36805.406	11.9 L
47792.322	10.99	48068.478	11.14	48133.469	10.94	48184.257	10.69 :	48475.506	10.78	48557.249	10.78	48802.509	11.30	36807.385	11.9 L
47795.369	11.14 :	48068.504	11.07 :	48148.318	10.94	48184.284	10.69	48476.408	10.78	48558.241	10.78	48803.468	11.64		

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Table 3. Photometric data from Sonneberg miscellaneous fields

JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}
29460.490	10.94	30463.591	10.94	30791.644	11.11	31314.418	10.69 :	31739.401	10.99	33917.323	10.69	35068.236	10.94	35371.304	12.38
29783.511	10.99	30464.542	11.30	30793.653	11.17	31316.451	10.78 :	31969.505	11.14	33922.325	10.69	35070.266	10.78	35372.342	11.64 :
29785.470	10.69	30466.593	11.30	30819.612	10.94	31322.456	11.22	31974.498	11.22 :	33924.305	10.69	35187.584	11.58 :	35373.311	12.38
29789.486	10.99	30498.534	10.94	30848.560	10.94	31324.385	11.22 :	33152.442	11.9 L	33925.304	10.69	35196.594	10.63 :	35389.279	11.30 :
29846.391	10.69	30499.511	10.91	30852.557	11.17	31327.474	10.99	33154.405	11.9 L	33927.372	10.69	35216.511	10.94	35390.288	11.86
29846.437	10.78	30515.463	10.69	30857.553	10.94	31344.381	11.07	33768.548	11.04	33950.384	10.69	35218.524	11.10	35391.299	11.64
29847.392	10.83	30517.476	10.91 :	30904.485	10.94	31345.372	11.11	33773.545	10.78	33977.265	10.69	35220.522	11.10	35392.321	11.58
29851.492	10.91	30520.456	10.91 :	30935.494	11.17	31352.419	11.04 :	33797.492	10.69	34810.654	11.93 :	35222.495	11.22	35394.360	11.52
29851.525	10.69	30531.502	10.99	30937.490	11.17	31370.277	10.91	33800.505	10.91	34857.501	10.91 :	35223.470	11.22	35397.288	10.91
29873.412	10.99	30545.453	10.94	30944.483	10.94	31556.569	10.78 :	33827.457	10.94	34859.504	10.91	35226.545	10.94 :	35399.328	10.94
29877.395	10.69	30585.424	10.94	30973.432	10.94	31585.532	10.69	33829.445	10.69	34860.509	10.78	35240.456	10.78 :	35400.324	19.78
29903.405	11.17 :	30587.423	10.94	30990.362	10.94	31589.494	10.69	33834.454	10.69	34862.527	10.78	35243.455	10.94	35419.237	11.14
29907.368	10.78	30593.514	11.72 :	30999.372	10.94	31606.498	10.78	33835.447	10.69	34863.527	10.97 :	35246.465	10.94	35550.595	10.69
29931.296	10.69	30603.337	12.0 L	31001.364	10.94	31645.467	10.78 :	33840.507	10.69	34890.486	11.04	35253.458	10.69	35571.580	11.04
30173.500	10.91	30606.407	11.08 :	31003.414	10.94	31650.463	10.69	33856.405	10.69	34899.463	11.20 :	35276.452	10.69	35599.537	10.69
30199.438	10.78	30613.390	11.9 L	31015.325	10.94	31673.453	10.78 :	33858.474	10.69	34952.458	11.14	35283.457	10.69	35600.508	10.78
30227.449	11.14 :	30613.427	12.03	31022.325	11.07 :	31700.406	11.30 :	33870.144	10.78	34957.396	11.07	35297.603	10.69	35601.507	10.94
30234.372	10.94	30614.426	12.03 :	31028.324	10.99	31701.340	11.30 :	33887.507	11.05	34959.408	10.97	35302.439	11.30	35605.549	10.69
30254.313	11.91	30619.390	11.17	31074.228	10.94	31702.435	11.30 :	33889.348	10.69	34961.389	10.78	35306.473	12.38 :	36805.406	11.9 L
30259.398	10.99	30636.293	10.94	31229.522	10.78	31704.392	10.99 :	33894.379	10.78	34987.350	11.05 :	35332.386	11.14 :	36807.385	11.9 L
30261.338	10.91	30638.359	10.91	31254.475	11.04 :	31706.412	10.91 :	33895.360	10.69	34988.354	10.69	35341.451	10.69	39888.482	10.78
30264.385	10.91	30645.339	10.91	31262.467	10.91	31709.561	10.91 :	33897.388	10.69	34990.368	10.69	35342.368	10.78		
30289.368	11.11	30674.335	10.94	31291.480	11.30 :	31712.377	10.91 :	33912.328	10.69	34991.375	10.69	35369.330	12.12		
30315.237	10.69	30704.278	10.91	31296.447	10.99 :	31736.390	10.91	33915.336	10.69	35009.358	10.69	35370.376	12.38		

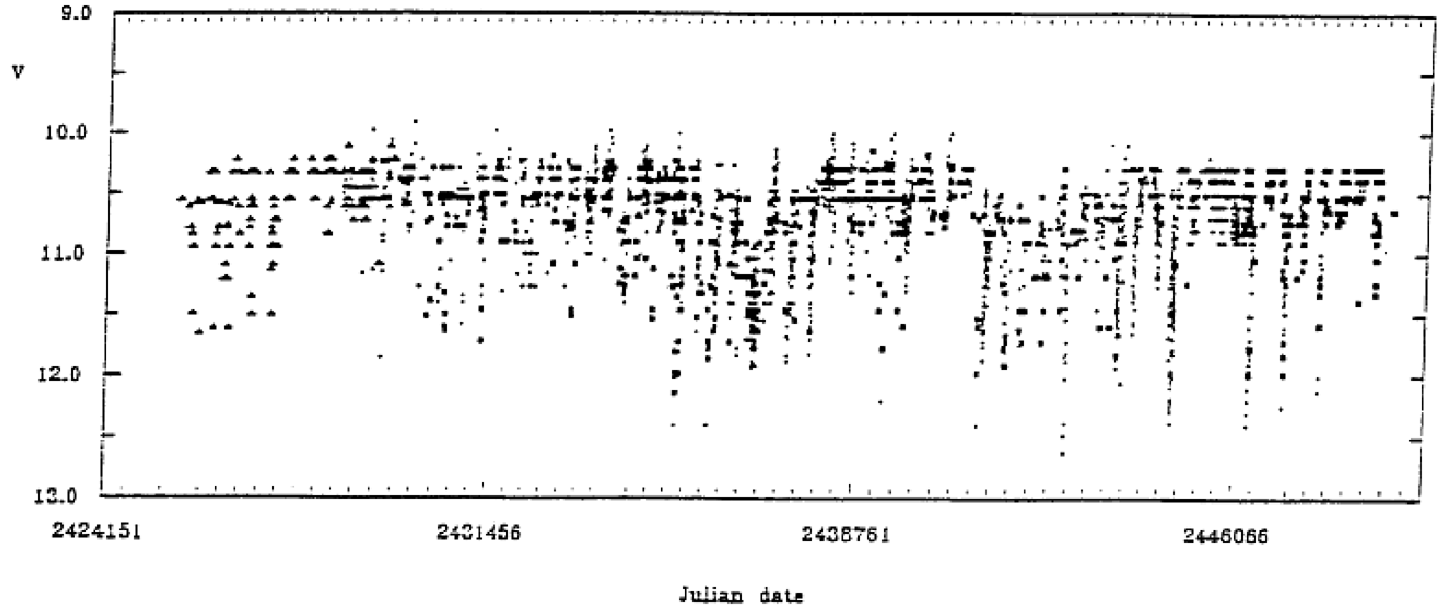

Fig. 1. Long-term behaviour of the light-curve of WW Vul. The different symbols have the following meaning: triangles–Bamberg plate archive; squares–Sonneberg plate archive; dots–data from different authors

Table 4. Conversion of the photometric data

Y (Authors)		a	b
Tsesevich and Dragomiretskaja (1975)			
"	"(Tessar)	0.57	5.106
"	"(Zeiss-Triplett)	1.392	-4.07
"	"(Uran 12)	1.266	-2.66
"	"(Uran 9)	1.093	-0.606
Kardopolov and Filip'ev (1985)		1.009	-0.132
Zaytseva (1983)		1.171	-1.936

The light-curve of WW Vul shown in Fig. 1 combines all photometric data available for 1929 up to now. The V magnitudes have been computed in two steps: First the original photographic magnitudes m_{pg} were transformed to B magnitudes by using equation (8) in the paper by Ažusienis (1965) and in a second step into V magnitudes by adding the intrinsic colour index $(B-V)_0 = -0.02$ of the star and a mean colour excess E(B - V) = 0.34. The light variations seem to consist of at least two different components: (i) longer lasting wavelike variations with a small amplitude and (ii) aperiodically occurring short-lived Algol-like minima with amplitudes up to 1.5 mag. This rough characterization agrees with an earlier description of light-curve given by Rössiger and Wenzel (1972). For further details concerning the explanation of the light variations of WW Vul see Friedemann et al. (1993 a, b).

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RZ Piscium - photographic magnitudes from 1928 to 1992

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(Eingegangen am 15. April 1994)

RZ Psc belongs to the group of evolutionary young variables of type Isb. A conspicuous feature of its light-curve is the irregularily occuring Algol-like minima with amplitudes up to $\Delta V \approx 2.5$ mag. For a number of these minima UBV observations have been obtained by KARDOPOLOV et al. (1990), ZAYTSEVA (1985), and WENZEL (1993). Additionally to these data there are brightness estimates on photographic plates carried out by TSESEVICH (1956) and WENZEL (1956).

For the interpretation of the irregular light variations a model first applied to the related variables SV Cep and WW Vul (see e. g. FRIEDEMANN et al. 1993) seems to be suited. This model presumes a clumpy circumstellar dust shell around the stars mentioned. A number of individual dust clouds occasionally crossing the line of sight towards the star cause the Algol-like minima. This hypothesis gives a natural explanation for both the variety of the minima and their irregular occurrence. Contrary to SV Cep and WW Vul the attempt failed to identify RZ Psc with an IRAS point source. This identification would give a strong additional hint of the presence of heated dust grains in the presumed circumstellar shell around the K0 IV star. However, calculations of the radiative transfer in a circumstellar dust shell fitting the few existing NIR data of RZ Psc revealed that the amounts of the infrared fluxes are below the detection limits of the four passbands of the IRAS satellite (see FRIEDEMANN et al. 1994). The non-detection of the dust emission seems to be the result of the low luminosity of the K0 IV star rather than an argument against the existence of a circumstellar dust shell around RZ Psc.

Besides our study of individual Algol-like minima by means of photoelectric data (see FRIEDEMANN et al. 1994) we tried to collect as many photometric data as possible for an investigation of the long-time behaviour of RZ Psc. For this aim one of us (J. H.) carried out brightness estimates on Sky Patrol plates of the archive of Sonneberg observatory. The comparison stars used are marked with letters in the identification chart (Fig. 1). Their B-magnitudes listed in Table 1 have been taken from PUGACH and KOVALCHUK (1983) and WENZEL (1993).

In Table 2 the data set obtained from the Sonneberg plate collection approximately corresponds to B-magnitudes and is arranged according to the Julian date. Double entries for the same dates are for plates which were obtained simultaneously with two cameras. Uncertain values are indicated by colons and upper limits by L.

The uncertainties in the magnitudes contained in Table 2 consist of the error of the estimate amounting to about $\Delta m \approx \pm 0.10$ mag as well as local fluctuations of the sensitivity of the emulsions and should not exceed $\Delta m_{tot} \approx \pm 0.3$ mag in general.

For the presentation of a total light-curve we transformed our B-magnitudes into V-magnitudes by adding a mean colour index $(B-V) = 0.76$ mag of the variable in maximum light resulting from photoelectric measurements by KARDOPOLOV et al. (1980), ZAYTSEVA (1985), and WENZEL (1993). Furthermore, the identification of two of the comparison stars used by TSESEVICH (1956) with corresponding ones in our sequence enabled us to convert approximately his relative steps into the magnitude scale.

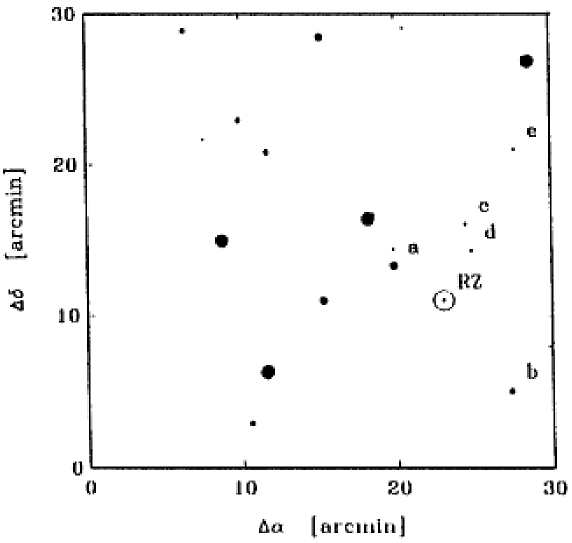

Fig. 1. Identification chart for RZ Psc. The scales on the axes are given in relative units. North is at the top, and east to the left. Two of our comparison stars – a and d – correspond to a and b of TSESEVICH's (1956) sequence.

Table 1. B-magnitudes of the comparison stars

Star	B	Reference
a	11.38	Wenzel(1993)
b	12.13	Wenzel(1993)
c	12.44	Pugach and Kovalchuk (1983)
d	13.07	Pugach and Kovalchuk (1983)
e	13.26	Wenzel(1993)

The light-curve of RZ Psc shown in Fig. 2 combines all photometric data available from 1928 up to 1992. The prominent feature in it is the aperiodically occuring Algol-like minima with amplitudes up to $\Delta V \approx 2.5$ mag interupting the nearly constant normal light at $V \approx 11^{m}5$. Altogether 84 minima could be recognized. The statistics of their durations revealed that 64 % of them last less than 6 days. Detailed studies show that minima lasting longer than about 10 days are mostly caused by gaps in the observational data. The distribution of the minima over the whole period seems to be not uniform. A discrete Fourier analysis of the whole data set gave no evidence of periodic light changes. This result contradicts earlier findings of periods (see e. g. KARDOPOLOV et al. 1980 and ZAYTSEVA, 1985) based on smaller data sets covering shorter time intervals. There are indications of occasionally appearing short-lived brightenings with amplitudes amounting to a few tenths of a magnitude. This rough characterization of the light-curve agrees with earlier descriptions given by WENZEL (1972, 1989).

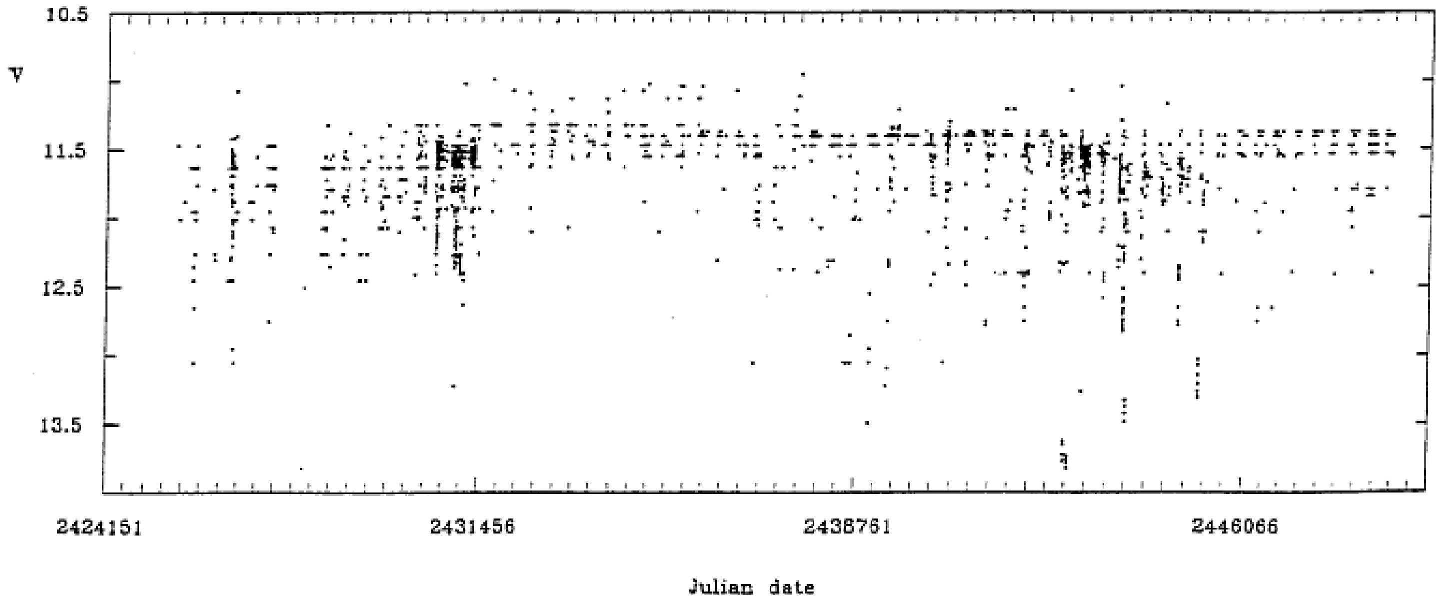

Fig. 2. Total light-curve for RZ Psc. B-magnitude from estimates on photographic plates have been converted into V-magnitudes

Table 2: Photometric data from sky patrol plates

JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}
25510.501	12.28	26661.394	12.82	30261.498	12.28	32882.363	12.13	33921.510	12.13 :	34660.412	12.36	35375.481	12.28	36086.582	12.28
25561.349	12.82	26683.273	12.76	30264.450	12.44 :	32885.387	12.13	33923.454	12.36	34662.492	12.69	35390.428	12.21	36102.488	12.18
25650.267	12.69	26949.592	12.69	30267.530	12.44	32889.354	12.13	33925.435	12.19	34664.417	12.13	35391.435	12.13 :	36108.474	13.12
25809.527	12.44	26980.493	12.82	30321.327	12.21	32907.295	11.38 :	33927.459	12.34	34665.474	12.32	35392.421	12.32	36113.519	12.21
25811.535	12.44 :	26986.421	12.69	30367.225	12.44	32911.321	12.18	33929.516	12.21	34682.349	12.28	35394.438	11.85	36130.416	12.18
25828.561	12.76	27061.243	12.36	30373.262	12.36	32942.269	12.13	33947.422	12.19	34683.397	12.28	35397.394	12.34	36200.410	12.60
25834.574	13.16	27062.234	12.57	30374.374	12.36	32946.277	12.13	33950.374	12.38	34709.330	11.83	35399.449	12.36	36227.317	12.21
25837.533	13.26	27309.568	12.57	30376.265	12.25	33160.517	12.18	34220.512	11.88	34714.285	12.36	35400.408	12.36	36434.538	11.88
25856.463	12.82	27311.560	12.28	30378.217	12.57	33178.456	12.13	34249.459	12.13	34718.333	12.28	35401.451	12.21	36452.337	12.21
25857.528	13.07	27315.599	12.76	30721.337	12.60	33185.442	12.13	34251.475	12.44	34748.288	12.36	35509.267	12.21	36459.541	12.21
25858.484	13.86 L	27341.518	13.56	31001.478	12.44 :	33187.449	12.13	34252.515	12.13	34768.258	12.21	35691.542	12.76	36482.431	12.21
25859.514	13.46	27367.434	12.57	31028.444	12.18	33189.455	12.14 :	34253.492	12.13	34958.524	12.91	35695.543	12.34	36485.486	12.21
25862.499	12.76	27369.433	12.44	31076.226	12.60	33205.385	12.25	34272.494	12.13	34986.506	12.28	35698.547	11.94	36486.483	12.28
25864.499	12.82	27394.388	12.60	32092.469	11.88	33212.404	11.94	34298.435	12.21	34987.488	12.36	35700.542	12.13	36486.522	12.18
25885.424	12.44	27395.345	12.91	32172.341	12.28	33242.340	12.21	34334.384	12.21	34990.518	12.21 :	35719.576	11.94	36541.367	12.21
25885.508	12.57	27398.247	12.60	32175.408	12.34	33302.287	12.13	34392.290	12.13	35018.461	12.21	35731.537	12.21	36597.283	12.36
25890.500	12.28 :	29489.436	12.57	32178.347	12.28	33509.524	12.21	34599.526	12.21	35047.425	12.28	35747.458	12.18 :	36598.289	12.36
26213.526	12.60	29493.500	12.69	32441.478	12.13	33514.526	12.21	34601.550	12.21	35048.401	12.28	35748.426	12.28	36599.285	12.28
26221.588	12.60	29497.490	12.36	32445.483	12.18	33538.463	12.36	34603.505	12.13	35067.335	12.25	35757.482	11.85	36602.287	12.34
26246.386	13.07	29500.524	12.57	32449.428	11.93 :	33566.399	12.34	34605.494	11.88	35070.322	11.94	35758.484	12.21	36627.287	12.28
26250.429	13.11	29642.265	12.44 :	32469.500	12.91	33568.445	12.25	34607.510	12.28	35128.260	12.28	35778.442	12.18	36788.525	12.28 :
26544.524	12.57	29877.542	12.69	32471.422	12.34	33569.446	12.13	34608.563	12.21	35304.526	11.94	35781.390	12.21	36807.450	12.21
26568.511	12.57	29906.353	12.44	32472.472	12.28	33645.258	12.25	34609.539	12.21	35306.531	12.36	35801.338	12.21	36810.533	12.36
26594.459	12.82	29957.441	12.18	32478.444	12.02	33653.298	12.28	34626.507	12.28	35314.527	12.13	35802.325	12.21	36814.547	12.36
26627.449	13.76:	30201.538	12.69	32480.490	12.13	33682.259	12.13	34627.505	12.28	35362.480	11.85	35814.348	12.21	36816.554	12.36
26629.494	12.69	30228.494	12.82	32803.516	12.13	33858.537	12.28	34629.466	12.13	35369.482	12.44	35814.375	12.21	36820.533	13.86
26630.498	12.69	30234.372	12.36	32805.513	12.44 :	33888.484	12.28	34636.460	12.28	35370.486	12.34	35838.260	12.21	36822.554	12.34
26651.421	13.86 L	30254.385	12.18	32806.521	12.13	33894.508	11.94	34652.417	12.21	35371.497	12.28	35868.271	12.18	36823.468	12.60
26654.297	12.44	30258.447	12.34	32823.406	12.36	33915.477	12.04	34653.438	12.28	35372.476	12.36	36073.543	12.36	36823.510	12.21
26656.349	12.21	30259.486	12.18	32827.468	12.28	33917.440	12.13	34654.428	12.13 :	35373.472	12.21	36075.550	12.21	36823.553	12.21

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Table 2: continued

JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}
36823.595	12.21	37582.506	12.13	37958.449	12.18	38399.284	12.21	39056.430	12.28	39682.514	12.21	40419.513	12.21	40981.301	12.21
36841.478	12.76	37582.549	12.13	37960.421	12.21	38406.290	12.36	39057.432	12.21	39684.516	12.21	40441.488	12.28	41166.543	12.18
36842.454	12.82	37582.591	12.02	37964.426	12.21	38410.297	12.28	39059.438	12.21	39689.535	12.60	40444.514	13.86 L	41182.491	12.21
36847.467	12.36	37587.475	12.02	37970.413	12.18	38412.288	12.21	39060.416	12.21	39760.374	12.28	40452.569	12.74 :	41215.456	12.21
36849.476	12.28	37615.424	12.13	37973.388	12.18	38594.531	13.86	39063.425	12.28	39764.485	12.28	40457.517	12.18	41217.456	12.18
36893.347	12.36	37642.000	11.92	37993.415	12.21	38613.534	12.28	39081.318	12.28 :	39765.427	12.21	40471.497	12.82	41225.549	12.21
36896.228	12.57	37659.298	11.92	37993.484	12.21	38616.559	12.36	39088.412	12.21	39775.488	12.28	40475.528	12.28	41241.440	12.21
36896.271	12.69	37668.353	12.21	38002.431	12.21	38641.513	12.21	39144.277	12.28	39792.358	12.28	40476.491	12.34	41248.478	13.56 :
36896.313	12.76	37694.262	11.76	38034.238	12.21	38643.552	12.28	39146.301	12.60	39801.463	12.21	40477.516	12.69	41300.297	12.36
36896.356	12.82	37732.282	12.28 :	38044.280	13.20	38652.507	12.28	39331.534	12.21	39802.430	12.21	40478.501	12.34	41322.259	12.21
36896.390	12.86	37871.546	12.28 :	38050.270	12.21	38671.451	13.66 :	39349.479	14.03	39803.457	12.28	40484.496	12.19 :	41333.264	12.36
36904.359	12.34	37876.554	12.21	38086.280	12.74 :	38673.465	13.86 :	39351.513	12.21	39819.406	12.28	40485.526	12.21	41335.288	12.18
37173.542	12.69	37877.553	12.24 :	38233.544	13.16	38680.433	12.28	39359.528	12.28	39827.319	12.21	40500.388	12.21 :	41357.266	12.28 :
37193.486	12.57	37878.554	12.18 :	38239.526	13.12	38697.394	12.82	39378.399	12.28	39852.288	12.21	40501.472	12.28	41361.265	12.28 :
37205.517	12.44	37885.539	12.21	38255.528	12.28 :	38708.367	12.28	39380.460	12.36	39904.261	12.21	40504.426	12.21	41536.515	12.21
37207.508	12.82	37886.540	12.21	38268.543	12.28	38709.415	12.28	39385.441	13.56 :	40066.533	12.18	40507.440	12.18	41567.483	12.18
37233.444	12.13	37889.535	12.21	38272.544	12.28	38739.336	12.60	39386.497	13.12	40069.510	12.28	40509.440	12.21	41573.453	12.36
37286.326	12.21	37903.520	12.28	38284.492	12.28	38977.534	12.21	39388.491	13.12	40088.452	12.28	40513.435	12.21	41593.417	12.02
37316.297	12.88 :	37904.528	12.28	38287.511	12.21	38996.483	12.21 :	39389.465	13.16	40127.460	12.91	40531.366	13.15	41595.424	12.21
37318.285	13.18	37906.554	12.82	38288.531	12.21	39023.533	12.21	39390.509	13.12	40148.476	12.21	40532.367	12.60	41597.422	12.21
37345.276	12.44 :	37907.530	12.28	38290.533	12.21	39024.456	12.28	39391.496	12.76	40149.460	12.21	40624.265	12.21 :	41599.462	12.18
37545.442	12.23 :	37909.563	12.21	38291.501	12.21	39026.475	13.36 :	39406.369	12.28	40150.406	12.21	40825.494	12.21	41601.410	12.21
37559.492	12.44	37911.510	12.18 :	38318.451	12.28	39027.431	13.86	39413.528	12.60	40151.413	12.21	40828.487	12.28	41602.437	12.82
37561.547	12.21	37932.422	12.18	38322.471	12.65	39028.469	13.76 :	39414.444	12.21	40152.408	12.21	40836.513	12.57	41605.432	13.21
37575.462	13.18	37933.503	12.18	38325.410	13.12	39029.522	13.76 :	39436.336	12.21	40188.500	12.28	40839.478	12.21	41623.453	12.76 :
37578.503	12.21	37935.485	12.18	38327.433	12.28	39037.568	12.28	39443.363	12.21	40202.287	12.57	40854.426	13.15	41647.292	12.76
37582.337	12.13	37939.486	12.18	38348.384	12.28	39038.475	12.21	39466.433	12.69	40204.328	12.36	40859.465	12.18	41677.271	12.21
37582.379	12.13	37942.479	12.21	38370.334	12.21	39051.350	12.28	39500.314	12.21	40239.281	12.36	40914.327	12.21	41682.268	12.69
37582.422	12.13	37944.449	12.21	38373.338	12.21	39054.405	12.21	39527.253	12.21	40258.252	13.37 :	40917.396	12.18	41717.274	12.02
37582.464	12.02	37946.522	12.28	38385.409	12.21	39055.438	12.28	39531.253	12.02	40261.264	13.22 L	40966.269	12.21	41900.510	12.36

Table 2: continued

JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}
41921.472	13.21 :	42685.388	12.21	44200.340	13.21	45673.318	12.28	46387.373	12.34	46825.242	12.36 :	47776.442	12.21	48184.435	12.21
41929.474	12.69	42713.362	13.15	44220.302	12.65	45674.361	12.21	46405.355	12.18	46826.244	12.76 :	47776.532	12.21	48186.350	12.74 :
41930.486	12.91	42716.433	12.21	44458.483	12.28	45676.315	12.28	46469.260	12.70 :	47029.524	13.20	47803.369	12.21	48187.349	12.76
41932.536	12.23 :	42740.291	12.34	44461.530	12.28	45911.535	12.69	46474.266	12.28	47039.494	12.60	47803.499	12.21	48187.483	12.76
41948.462	12.28	42756.404	12.34	44499.467	12.36	45935.466	12.34	46646.556	13.46 :	47060.448	12.36	47804.400	12.28	48188.360	12.60
41959.455	13.21	42806.277	11.88	44523.378	12.69	45940.523	12.28 :	46648.542	12.18	47071.561	12.18	47804.491	12.28	48188.453	12.60
41961.457	12.21 :	42988.535	12.25	44571.298	12.69	45946.531	12.18	46648.542	12.18	47087.372	12.21	47805.400	12.34	48189.413	12.60
41982.385	13.56 :	43014.508	12.21	44577.360	11.98 :	46000.389	12.34	46649.544	12.28	47088.409	12.34	47805.492	12.34	48220.424	12.21
41983.343	13.46 :	43016.526	12.34	44631.277	12.28	46002.403	12.36	46651.543	12.21	47099.503	12.21	47849.288	12.28	48232.317	12.34
41984.403	12.21	43045.486	12.34 :	44634.258	12.91	46003.413	12.36	46651.543	12.21	47126.408	12.21	47850.370	12.60 :	48233.307	12.21
41988.424	12.18	43189.269	12.28	44822.517	12.21	46004.428	12.18	46679.517	12.21	47139.261	12.18	47851.424	12.60	48271.279	12.18
42005.292	12.28 :	43401.521	12.91 :	44846.494	12.34	46006.451	12.34	46683.446	12.21	47152.323	12.18	47856.377	12.18 :	48272.277	12.60
42009.335	12.21	43431.441	12.14 :	44851.481	13.46 :	46019.335	12.21	46702.389	12.36	47174.269	12.34	47860.317	12.60	48273.267	12.57
42036.290	13.22 L	43436.481	12.82	44853.455	12.18	46034.493	12.36	46704.479	12.21	47391.471	12.21	47860.410	12.60	48274.273	12.60
42095.260	12.33 :	43482.319	12.21	44983.265	12.28	46059.333	12.36	46705.469	12.21	47392.517	12.21	47861.288	13.37 :	48275.247	12.18
42251.512	12.21 :	43776.410	12.21	44985.266	12.28	46084.287	12.21	46706.417	12.21	47411.465	12.18	47862.326	12.18	48289.252	12.18
42275.482	12.18	43790.471	12.28	45204.517	12.21	46260.528	12.28	46707.410	12.18	47412.464	12.18	47862.451	12.18	48290.250	12.18
42302.482	12.21	43792.490	12.18	45211.519	12.18	46271.519	12.34	46707.537	12.28 :	47413.463	12.28 :	47863.337	12.18	48503.433	12.60
42303.478	12.28	43848.407	12.44 :	45229.468	12.34	46296.517	12.76	46708.410	12.18	47413.539	12.21	48100.512	12.28 :	48503.459	12.60 :
42358.349	12.18	43861.164	12.91	45238.489	12.28	46320.437	12.18	46708.505	12.18	47414.470	12.21	48148.425	12.33 :	48504.427	12.28 :
42365.453	12.21	43893.264	12.91	45268.437	12.91	46321.490	12.18	46713.419	12.34	47415.462	12.18	48149.429	12.76	48512.447	12.18
42369.290	12.21	44115.491	12.76	45336.223	12.91	46327.458	12.21	46713.517	12.34	47438.394	12.34	48151.430	12.34 :	48512.494	12.18
42428.254	12.36	44117.528	12.60	45534.517	12.36	46328.469	12.18	46737.468	12.34	47469.391	12.18	48151.491	12.18	48513.415	12.34
42448.249	12.70	44129.390	12.36	45556.532	12.21	46351.422	12.36	46741.424	12.21	47470.357	12.21	48176.390	12.18 :	48513.486	12.65 :
42609.522	12.18	44143.446	12.60	45561.516	12.34	46355.390	12.91	46741.424	12.21	47471.361	12.21	48177.381	12.28	48514.426	12.21
42629.506	12.21 :	44166.437	12.21	45583.481	12.60	46359.425	13.56 :	46762.400	12.21	47554.286	12.18	48177.440	12.64 :	48537.365	12.18 :
42632.537	12.18	44169.398	12.18	45647.472	12.28	46359.467	13.56 :	46763.351	12.21	47744.503	12.34	48179.380	12.18 :	48537.435	12.34
42634.535	12.21	44170.471	12.28	45648.385	12.28	46360.483	13.46 :	46763.397	12.21	47769.474	12.34	48179.474	12.28 :	48539.440	12.34
42638.522	12.21	44172.418	12.21	45650.456	13.22 L	46374.329	12.34	46770.383	12.34	47769.536	12.28	48180.373	12.60	48540.407	12.60 :
42658.493	12.21	44173.412	12.34	45651.432	12.36	46385.345	12.21	46823.247	12.18 :	47770.458	12.18	48184.374	12.18 :	48540.453	12.65

Table 2: continued

JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}	JD (24...)	m_{pg}
48558.310	12.65 :	48592.358	12.60	48619.224	12.18	48646.248	12.28 :	48839.533	12.28	48863.449	12.21	48893.402	12.21	48974.378	12.36
48559.312	12.34	48593.262	12.28 :	48619.251	12.21	48647.257	12.28	48862.458	12.60	48887.410	12.34	48893.517	12.18	48982.264	12.34
48590.378	12.34	48600.299	12.21 :	48644.240	12.28 :	48653.267	12.34 :	48862.574	12.18	48888.466	12.34	48916.444	12.34	48982.301	12.34
48591.299	12.65	48601.326	12.18	48645.249	12.28 :	48653.291	12.21	48862.574	12.18	48892.412	12.34	48927.435	12.21	48983.236	12.21:
48592.285	13.21														

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