

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2359

Konkoly Observatory
Budapest
23 June 1983
HU ISSN 0374-0676

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR UV Cet IN 1982

Photoelectric observations of flare stars have been continued at the National Astronomical Observatory of the Bulgarian Academy of Sciences and the Stephanion Observatory, Greece. In this paper we report about our joint observations of the flare star UV Cet during the autumn of 1982.

The equipment used at the National Astronomical Observatory consists of a 60 cm Cassegrain reflector and a one-channel UBV photometer. A photon counting system with an integration time of 1 sec was used. Details of the photometric equipment at NAO are published by Panov et al. (1982). The transformation of the instrumental ubv system at NAO to the international UBV system for the time under consideration is given by the equations:

$$\begin{aligned}\Delta V &= \Delta v + 0.08 \Delta(b-v) \\ \Delta(B-V) &= 1.12 \Delta(b-v) \\ \Delta(U-B) &= 0.84 \Delta(u-b)\end{aligned}$$

At the Stephanion Observatory the observations were carried out with the 30 inch Cassegrain reflector of the Department of Geodesy and Surveying, University of Thessaloniki, and a Johnson dual channel photoelectric photometer. The transformation of the Stephanion ubv system to the international UBV system for the period under consideration is given by the equations:

$$\begin{aligned}V &= v_0 - 0.011(b-v)_0 + 3.288 \\ B-V &= 0.597 + 1.010(b-v)_0 \\ U-B &= -1.899 + 1.031(u-b)_0\end{aligned}$$

Table I contains, for each night, the monitoring intervals in UT, the colour in which observations were made, the number of flares observed, the standard deviation of random noise fluctuations in mag. for those nights, in which no flare was observed and the total monitoring time. Designation NAO or Steph.O. stands for the National Astronomical Observatory or Stephanion Observatory, respectively.

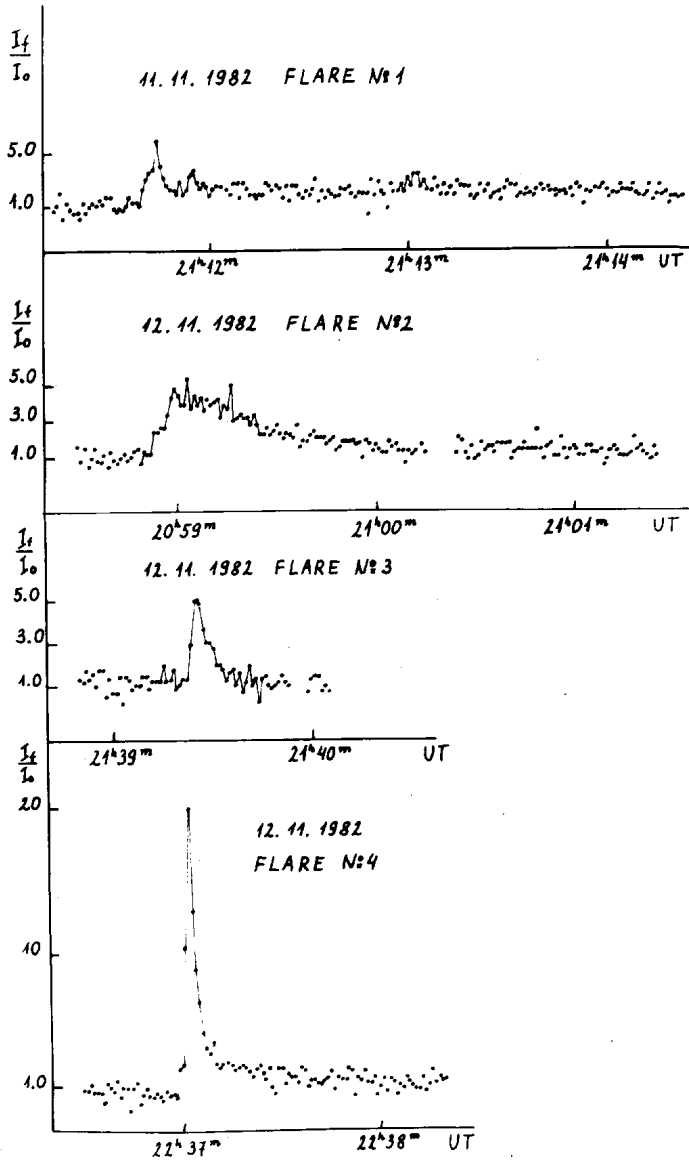
Table I
Flare star UV Cet, 1982

Date	Monitoring intervals (UT)	Total monit.	Number of flares	Colour	NAO/ Steph.O.
1982					
Oct.					
23/24	23 ^h 27 ^m 34 ^s -00 ^h 39 ^m 38 ^s , 00 42 55 -00 57 12 , 00 59 05 -01 21 41 , 01 22 43 -01 30 46 .	1 ^h 57 ^m 00 ^s	1	B	Steph.O.
24/25	22 41 07 -22 53 17 , 22 54 24 -23 33 07 , 23 35 30 -00 48 34 , 00 51 17 -01 13 07 , 01 15 26 -01 23 36 .	2 33 57	1	B	Steph.O.
Nov.					
10	21 27 03 -21 32 25 , 21 35 13 -22 40 08 .	1 10 17	0 $\sigma=0.45$	U	NAO
11	20 37 08 -20 47 18 , 20 47 46 -20 52 39 , 20 53 38 -21 17 32 , 21 18 07 -21 47 58 , 21 48 50 -21 55 51 , 21 56 36 -22 22 19 , 22 22 56 -22 29 18 , 22 30 29 -22 58 12 , 22 59 03 -23 04 56 .	2 21 30	1	U	NAO
12	20 27 20 -22 38 20 , 22 39 56 -23 03 40 .	2 34 44	3	U	NAO
13	20 20 13 -20 47 55 , 20 48 34 -20 55 46 , 20 57 15 -21 37 48 , 21 38 46 -21 49 49 , 21 52 05 -22 25 00 , 22 26 04 -22 43 17 .	2 15 16	4	U	NAO
Total:		12 ^h 52 ^m 44 ^s			

During the total of 8^h21^m47^s monitoring time in "u" colour (NAO) 8 flares were observed. During the total of 4^h30^m57^s monitoring time in "b" colour (Steph.O.) 2 flares were observed. The characteristics of the observed flares are given in Table II. For each flare following characteristics (Andrews et al., 1969) are given:

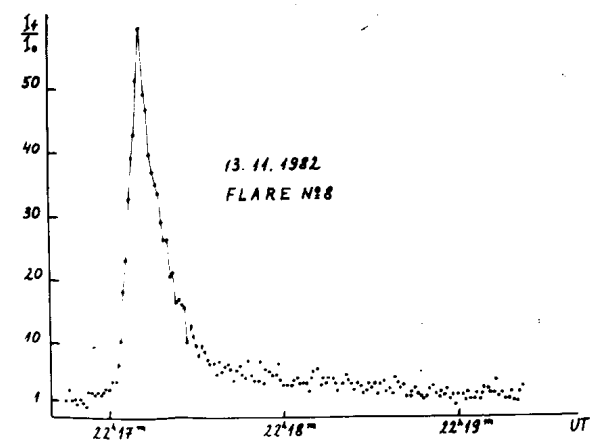
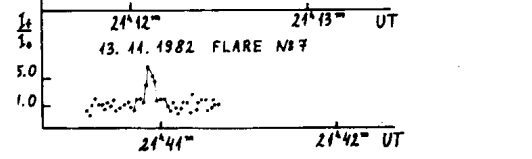
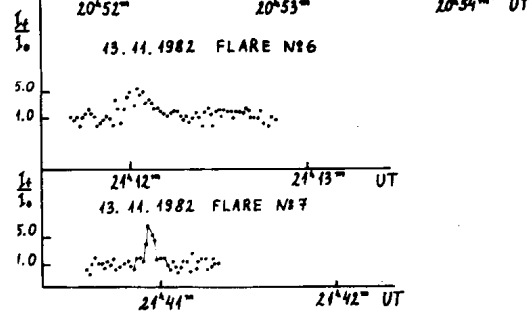
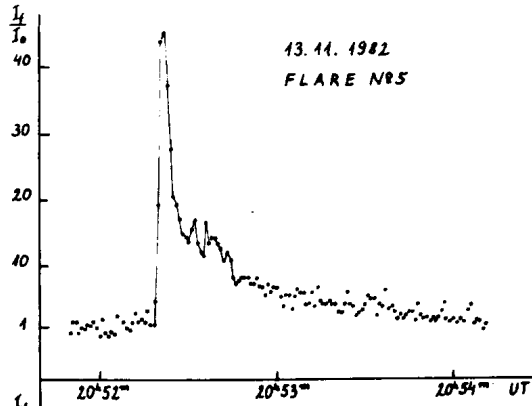
- the date and universal time of maximum,
- the duration before and after maximum (t_b and t_a , respectively),
- the total duration of the flare,
- the value of the ratio I_f/I_o , corresponding to flare maximum, where I_f is the total intensity of the star plus flare less sky background, and I_o is

UV Cet (NAO)

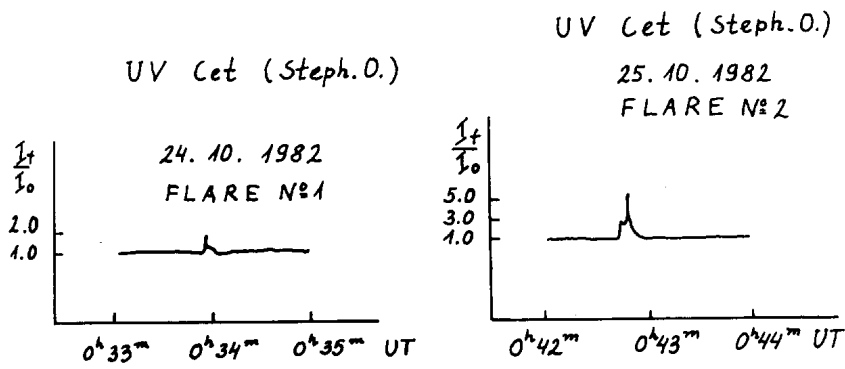


Figures 1 - 4

UV Cet (NAO)



Figures 5-8



Figures 9-10

Table II
Characteristics of the flares observed

Flare No.	Date 1982	U.T. max	t_b min	t_a min	Duration min	I_f/I_0 max	Δm mag	σ mag	P min	Air mass
October, Stephanion Observatory										
1	24 ^d 0 ^h 33 ^m 55 ^s		0.02	0.2	0.2	1.73	0.59	0.2	0.07	2.563
2	25 0 42 50		0.12	0.3	0.4	5.40	1.83	0.36	0.88	2.760
November, NAO										
1	11 ^d 21 ^h 11 ^m 44 ^s		0.07	3.3	3.4	5.98	1.94	0.44	3.6	2.032
2	12 20 59 03		0.22	5.0	5.2	5.35	1.82	0.41	4.5	2.015
3	12 21 39 25		0.05	0.25	0.3	5.0	1.75	0.38	0.7	2.122
4	12 22 37 02		0.07	2.0	2.1	19.87	3.25	0.51	3.0	2.510
5	13 20 52 22		0.07	2.6	2.7	44.83	4.13	0.63	16.9	2.011
6	13 21 12 02		0.12	1.0	1.1	5.48	1.85	0.63	2.3	2.048
7	13 21 40 56		0.03	0.4	0.4	6.78	2.08	0.63	0.5	2.145
8	13 22 17 11		0.3	3.8	4.1	59.77	4.44	0.67	21.1	2.367

the quiet state intensity less sky background,

e. the increase of star's brightness in magnitudes at flare maximum

$$\Delta m = 2.5 \log(I_f/I_0)$$

f. the standard deviation of random noise fluctuations in mag

$$\sigma(\text{mag}) = 2.5 \log\left(\frac{I_0 + \sigma}{I_0}\right),$$

g. the integrated intensity of the flare over its total duration

$$p = \int (I_f - I_0)/I_0 dt,$$

h. the air mass.

The light curves of the observed flares in colours "u" (NAO) and "b" (Steph.O.) are shown in Figures 1-10.

The observations reported in this paper are part of the joint research project under the title "Study of variable stars", carried out by the Department of Astronomy with National Astronomical Observatory, Bulgarian Academy of Sciences, and the Department of Geodesy and Surveying (former Department of Geodetic Astronomy), University of Thessaloniki, Greece. This project is part of the Program for Scientific and Technical Co-operation between Bulgaria and Greece. The authors would like to express their gratitude to the relevant authorities of the respective countries for their support.

K.P. PANOV

Department of Astronomy with
National Astronomical Observatory
Bulgarian Academy of Sciences
Sofia 1000, 7th November Str. No 1
Bulgaria

G. ASTERIADIS

L.N. MAVRIDIS

Department of Geodesy and Surveying
University of Thessaloniki
Thessaloniki, Greece

References:

- Andrews, A.D., Chugainov, P.F., Gershberg, R.E., and Oskanian, V.S. 1969, I.B.V.S. No. 326
Panov, K.P., Pamukchiev, I.Ch., Christov, P.P., Petkov, D.I., Notev, P.T., Kotsev, N.G., 1982, Comptes rendus of the Bulgarian Acad. of Sciences, 35, No. 6, 717