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

Number 3021

Konkoly Observatory
Budapest
7 May 1987

*HU ISSN 0374-0676*

# H-ALPHA OBSERVATIONS OF W UMa (BD+56° 1400).

Photoelectric observations of the short period ($0^d.3336$) eclipsing binary system W UMa were carried out during eight clear nights of March 16,17,21, 23,24,25,27 and 29, 1983. H-alpha narrow ( $\lambda_{max}$=6569 A°; HWFH=38 A° ) and H-alpha wide ( $A_{max}$=6583 A°; HWFH= 238 A° ) filters with an unrefrigerated RCA 4509 photomultiplier attached to the 51 cm f/13.5 cassegrain reflector of Biruni Observatory of Shiraz University were used for these observations. The star ( BD+55° 1339 ) served as a comparison star which is frequently used by other investigators of the W UMa system.

The present observations are a continuation of the observations which were carried out through narrow and wide Hβ filters in 1983 (Davan,1985). From H-alpha observations 14 minimum times are obtained using the tracing paper method (Szafraniec,1948), The minima and the ( O-C ) values are calculated according to the light elements:

$$JD(Hel)\ Min\ I = 2444986.3624 + 0^d.33363808 \cdot E$$

given by Hamzaoglu et al. (1982). The minimum times are as follows:

| Date | JD(Hel) | E | (O-C) | Filter |
|---|---|---|---|---|
| March | 2440000. + | | d | |
| 16,17 | 5410.4157 | 1271 | -0.0007 | Hα N |
| 21 | 5415.4178 | 1286 | -0.0032 | " |
| 23 | 5417.4260 | 1292 | +0.0032 | " |
| 24 | 5418.4237 | 1295 | 0.0000 | " |
| 25 | 5419.4246 | 1298 | -0.0001 | " |
| 27 | 5421.4242 | 1304 | -0.0023 | " |
| 29 | 5423.2613 | 1309.5 | -0.0002 | " |
| 16,17 | 5410.4151 | 1271 | -0.0013 | Hα W |
| 21 | 5415.4187 | 1286 | -0.0023 | " |
| 23 | 5417.4228 | 1292 | -0.0000 | " |
| 24 | 5418.4212 | 1295 | -0.0025 | " |
| 25 | 5419.4232 | 1298 | -0.0014 | " |
| 27 | 5421.4245 | 1304 | -0.0020 | " |
| 29 | 5423.2611 | 1309.5 | -0.0004 | " |

From the above minima the following two periods are determined:

Period = 0.33363774 $\pm$ 0.00000113 ; H α N

Period = 0.33363700 $\pm$ 0.00000053 ; H α W

The periods are accurately determined to within 0.10sec and 0.05 sec for H α N and H α W observations, respectively.

The variations of the ( O-C ) values versus number of cycles E are presented in Figure 1. The filled and open dots denote H α N and H α W observations, respectively. The last two dots refer to the secondary minimum observations.

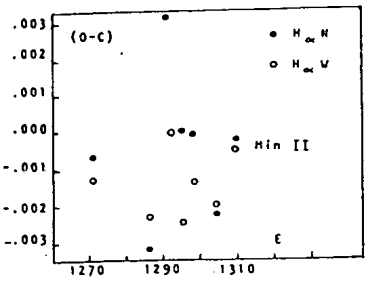


Figure 1

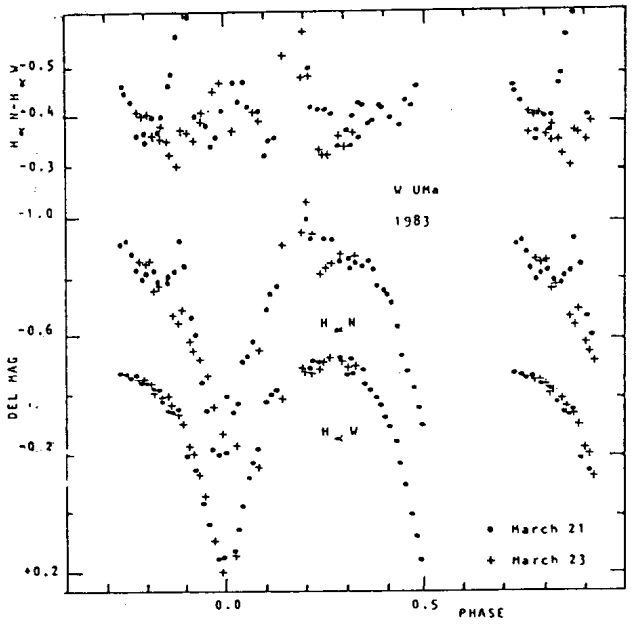


Figure 2

Some investigators found evidences for oscillatory variations in the (O-C) values (Hamzaoglu et al., 1982; Tümer et al., 1980). One can see this oscillatory behaviour among the present (O-C) values. There is a rapid change between the E values of 1285-1300. This is an indication for the intensive activity in the system through March 21 to 25, 1983. This statement will be confirmed if one looks at the light curves of the observations which were obtained on March 21 and 23. There is an increase of light amplitude up to about 0.15 magnitude in H α N but a decrease of about 0.05 magnitude in H α W observations in the phase interval 0.12 - 0.25. While it seemed that any possible light curve wave of W UMa has an amplitude no more than 0.05 mag (Breinhorst, 1971; Rigterink, 1972; Eaton et al., 1980). There are also two other blueing near phases 0.72 and 0.87 in the observation of March 21. The light curves are shown in Figure 2. The filled dots refer to the observation of March 21 and the plus sign indicates the observations of March 23, 1983.

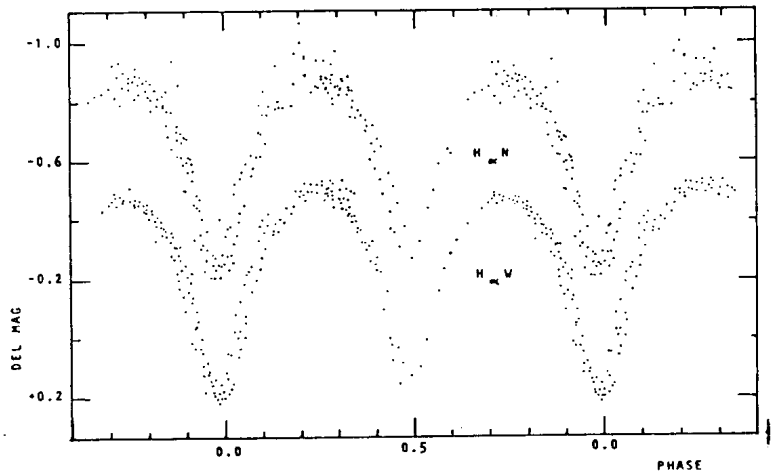


Figure 3

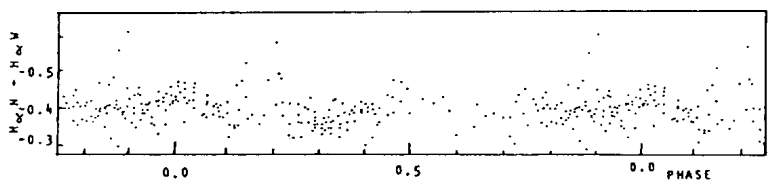


Figure 4

According to the present observations on H - alpha narrow and wide colours one can conclude that the changes both in the (O-C) values and the light amplitudes may be due to mass ejections and/or spot activities in the system. Infrared observations of Shenavrin and Zhukov, (1984) which were carried out in the observational season of 1982 are in good agreement with the present observations. The similarity of the light amplitude changes in both infrared and H-alpha observations also indicates that the sources of activities may have periodic appearances.

A compilation of the light curves, and colour index changes are shown In Figures 3 and 4, respectively.

I would like to offer my sincere gratitudes to Prof. W. Seitter and Dr.H.W. Duerbeck for their hospitality during my stay at the Astronomisches Institut der Universität Münster and to Dr. A. Bruch for his assistance in using computer facilities of the institute.

I would also like to thank Mr. R. Dümmler and Mr.R. Budell for their help. This work is dedicated to V. Karimipour for his competences and talents.

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