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ADDITIONAL PHOTOMETRIC DATA FOR THE X-RAY  
SOURCE TT ARIETIS DURING 1985-1986

As a part of the programme for the study of anti-dwarf novae (or VY Sc1 stars) carried out at the Department of Astronomy of the Bulgarian Academy of Sciences, after the organization of regular photometric observations of KR Aur, in 1985 observations of TT Ari, another member of this group, were initiated. During the past two seasons, besides estimates of the brightness of the star in a standard UBV system (Table I), the behaviour of the object in the night of August 22/23, 1985 was followed for 3 hours (Fig. 1) and a patrol was carried out in the "u" region in the night of November 1/2, 1986 (Fig.2). Photoelectric observations were carried out with the 60 cm telescope of the National Astronomical Observatory Rozhen. Star "c" (see Wenzel et al. 1986) served as comparison star. For transformation of the instrumental u,b,v stellar magnitudes to the standard U,B,V magnitudes the relations

$$\begin{aligned}\Delta V &= \Delta v + 0.105 \Delta (B-V) \\ \Delta (B-V) &= 1.118 \Delta (b-v) + 0.034 \Delta (b-v) \bar{x} \\ \Delta (U-B) &= 0.800 \Delta (u-b) + 0.056 \Delta (u-b) \bar{x}\end{aligned}$$

were used. The integration time was 10s.

Our observations show the following results:

1. During all the nights of the observations the star was in its "active" state. The mean of the resulting points yields the following magnitudes for TT Ari in 1985: U=9.94, B=10.85, V=10.78. For 1986 the mean magnitudes are U=9.76, B=10.67, V=10.78. In 1986 an increase of the average brightness by 0.16 mag in V and 0.18 mag in B and U was found.

2. Our 3 hours of observations were carried out one night after simultaneous X-ray (EXOSAT) and optical observations in the night of August 21/22, 1985. Unfortunately the time interval was not sufficiently long. But three-colour

measurements show a well-expressed maximum. The start and the end of the observations are in the neighbourhood of brightness minima. The wave-shaped variations are  $\sim 0.25$  mag in V and  $\sim 0.32$  mag in B and U. This is in agreement with the results of coordinated observations (see Hudec et al. 1987).

The position of the maximum "C" calculated from the photometric elements given by Wenzel et al. (1986) is plotted in Fig. 1.

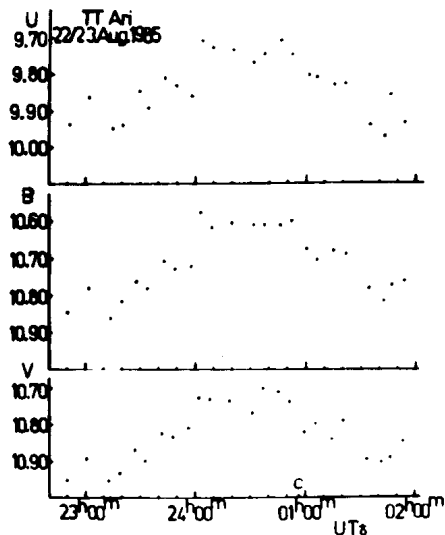


Figure 1

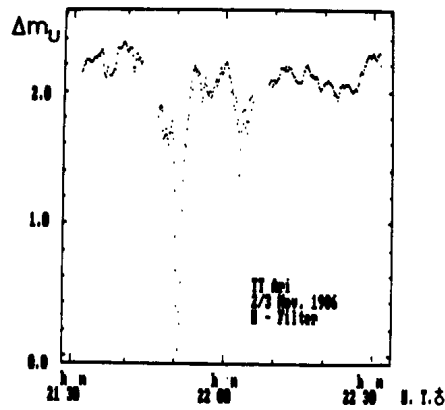


Figure 2

3. Patrol observations during the night of November 2/3, 1986 show quasi-periodic fluctuations with an amplitude up to 0.25 mag and duration up to 3 minutes. The cycle length does not seem to be constant, but varying between 3 and 6 minutes. Observations of Rössiger (1987) carried out a month earlier show quasiperiodic fluctuations of brightness with cycle length between 14 and 21 minutes. Wenzel et al. (1986) found a cycle length of about  $10 \pm 5$  minutes. It seems that the length of the cycle is varying not only during the night but, more essentially, from night to night.

During the patrol observations there occurred an unusually deep dip in the brightness ( $\Delta u \sim 2.3$  mag) with the duration of about 10 minutes. For the first 4-5 minutes the star decreased in brightness by 0.7 mag and in the following 2 minutes it decreased further by 1.6 mag. For the next 3 minutes the star reached the brightness typical of the night. Seven minutes later a new dip of the brightness with an amplitude up to 0.8 mag and duration of about

Table I  
Magnitude estimates of TT Arietis

JD 244...	V	B-V	U-B
6264.5431	10.95 $\pm$ 0.01	-0.06 $\pm$ 0.02	-0.91 $\pm$ 0.02
5496	10.83 $\pm$ 0.01	-0.09 $\pm$ 0.01	-0.95 $\pm$ 0.02
6267.5321	10.94 $\pm$ 0.02	-0.11 $\pm$ 0.02	-0.99 $\pm$ 0.02
.5392	10.98 $\pm$ 0.01	-0.16 $\pm$ 0.02	-0.98 $\pm$ 0.02
.5442	11.01 $\pm$ 0.03	-0.05 $\pm$ 0.04	-0.89 $\pm$ 0.02
6289.5531	10.93 $\pm$ 0.01	-0.09 $\pm$ 0.01	-0.94 $\pm$ 0.03
.5590	10.92 $\pm$ 0.01	-0.06 $\pm$ 0.01	-0.89 $\pm$ 0.03
6671.4993	10.78 $\pm$ 0.01	-0.10 $\pm$ 0.02	-0.89 $\pm$ 0.02
.5110	10.72 $\pm$ 0.01	-0.10 $\pm$ 0.02	-0.90 $\pm$ 0.02
6672.5189	10.78 $\pm$ 0.01	-0.11 $\pm$ 0.01	-0.90 $\pm$ 0.01
.5304	10.85 $\pm$ 0.01	-0.14 $\pm$ 0.02	-0.92 $\pm$ 0.01
.5400	10.87 $\pm$ 0.02	-0.08 $\pm$ 0.03	-0.90 $\pm$ 0.02
.5498	10.87 $\pm$ 0.02	-0.05 $\pm$ 0.03	-0.89 $\pm$ 0.02
6697.4112	10.76 $\pm$ 0.03	-0.18 $\pm$ 0.07	-0.95 $\pm$ 0.07
.4147	10.74 $\pm$ 0.03	-0.06 $\pm$ 0.07	-0.98 $\pm$ 0.07
.4181	10.73 $\pm$ 0.03	-0.09 $\pm$ 0.07	-0.95 $\pm$ 0.07
.4187	10.73 $\pm$ 0.03	-0.13 $\pm$ 0.07	-0.95 $\pm$ 0.07
6736.4882	10.71 $\pm$ 0.01	-0.12 $\pm$ 0.02	-0.89 $\pm$ 0.02
.4961	10.75 $\pm$ 0.01	-0.10 $\pm$ 0.02	-0.84 $\pm$ 0.02

10 $\pm$ 3 minutes occurred. It has to be noted that at 21<sup>h</sup> 07<sup>m</sup> (UT), 35 minutes before the deep dip, our observations showed a decrease of the brightness too ( $\Delta u_{\max} \approx 0.8 \text{ mag}$ ,  $\Delta t$ -about 13 minutes). This part of the observations is not plotted in Fig. 2 because, unfortunately, the recording was performed during a period of stabilisation of the parameters of the instrument. A month before our patrol Rössiger (1987) observed also a deep dip in brightness up to 0.9 mag in the "b" region. In our opinion, further patrol observations would be very useful for elucidating the nature of TT Arietis.

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