

LONG-TERM PHOTOMETRIC MONITORING OF CATAclySMIC VARIABLES: PRELIMINARY RESULTS FOR T CRB, CQ DRA AND GK PER

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ABSTRACT. The preliminary results of the long-term photometric monitoring (LTPM) of cataclysmic variables (CVs) T CrB, CQ Dra and GK Per are presented. All the observational data were obtained in the frame of the international campaigns of the observations of cataclysmic and symbiotic stars.

Key words: Stars: Cataclysmic Variables – T CrB – CQ Dra – GK Per

Although it is impossible to perform detailed studies of the structure of the observed objects while using small telescopes which cannot cope with the HST, NTT and Keck telescopes, for example, the primary comparative advantage of small telescopes is obvious. There is much less problem in obtaining the observational time at some of these smaller instruments at any period of time, so that much more complete coverage of the light behaviour of selected object in various activity stages can be achieved. This is the main goal of our observational campaign (Hric, Urban and Petrik 1996) – a good coverage of the light variations on various time scales as important clues to the nature of the physical processes taking place within as broad sample of CVs as possible. As the first set of main observational targets (out of about 100 objects considered to be suitable for our LTPM), we have selected 3 classical novae (CN), 5 dwarf novae (DN), 2 recurrent novae (RN) and 5 novalike stars (NL). A network of participating telescopes has been created in the frame of our campaign consisting of, at the present, the following ones: three 0.6 m Cassegrain telescopes equipped by single channel pulse-counting photoelectric photometers at the Skalnaté Pleso, Stará Lesná and Hlohovec Observatories in Slovakia, a 0.6 m one equipped by three channel photoelectric photometer at Mt. Suhora Observatory in

Poland, a 1.2 m one equipped by single channel photoelectric photometer at the Kryonerion Observatory in Greece, a 0.8 m one equipped by single channel photoelectric photometer at Tartu Observatory in Estonia, a 0.5 m one equipped by the CCD camera at Baja Observatory in Hungary, a 0.4 m Nasmyth equipped by single channel photoelectric photometer and the CCD camera at Brno Observatory in the Czech Republic, 0.25 m Cassegrain equipped by the CCD camera at an amateur observatory in Beluša, Slovakia. Moreover, there are several groups of amateur visual observers cooperating with our efforts. During the first period of our LTPM activity, we have obtained data for the following stars: V603 Aql, TT Ari, V705 cas (Petřík et al. 1996), Nova Cas 1995, T CrB, CQ Dra, GK Per and V Sge.

The recurrent nova **T CrB** was the first CV which has been studied spectroscopically during its first recorded outburst in May 1866. In contrast with a typical structure of a CV, it consists of a M3 III giant and a hot companion of as yet unclear nature, presumably the white dwarf, in a wide orbit with P_{orb} about 227.5 days. Our photometry covers the time span of over 6 years. Recent brightening of the system, best pronounced in the U colour, amounts to a maximum extreme of all our LTPM of this star (U_{max} around 10.3 mag). While no flickering has been detected in 1993 by Dobryzcka et al. (1996), we have detected an intense flickering in several nights in April 1996, suggesting that the activity of the hot component has increased again (see Figure 1). It seems that the amplitude of the large variations in the LTPM light curve of T CrB are increasing slowly. Does it mean that we are approaching another recurrent nova outburst in this object? On the basis of phase diagrams, it is apparent in all three colours that the minioutbursts are independent

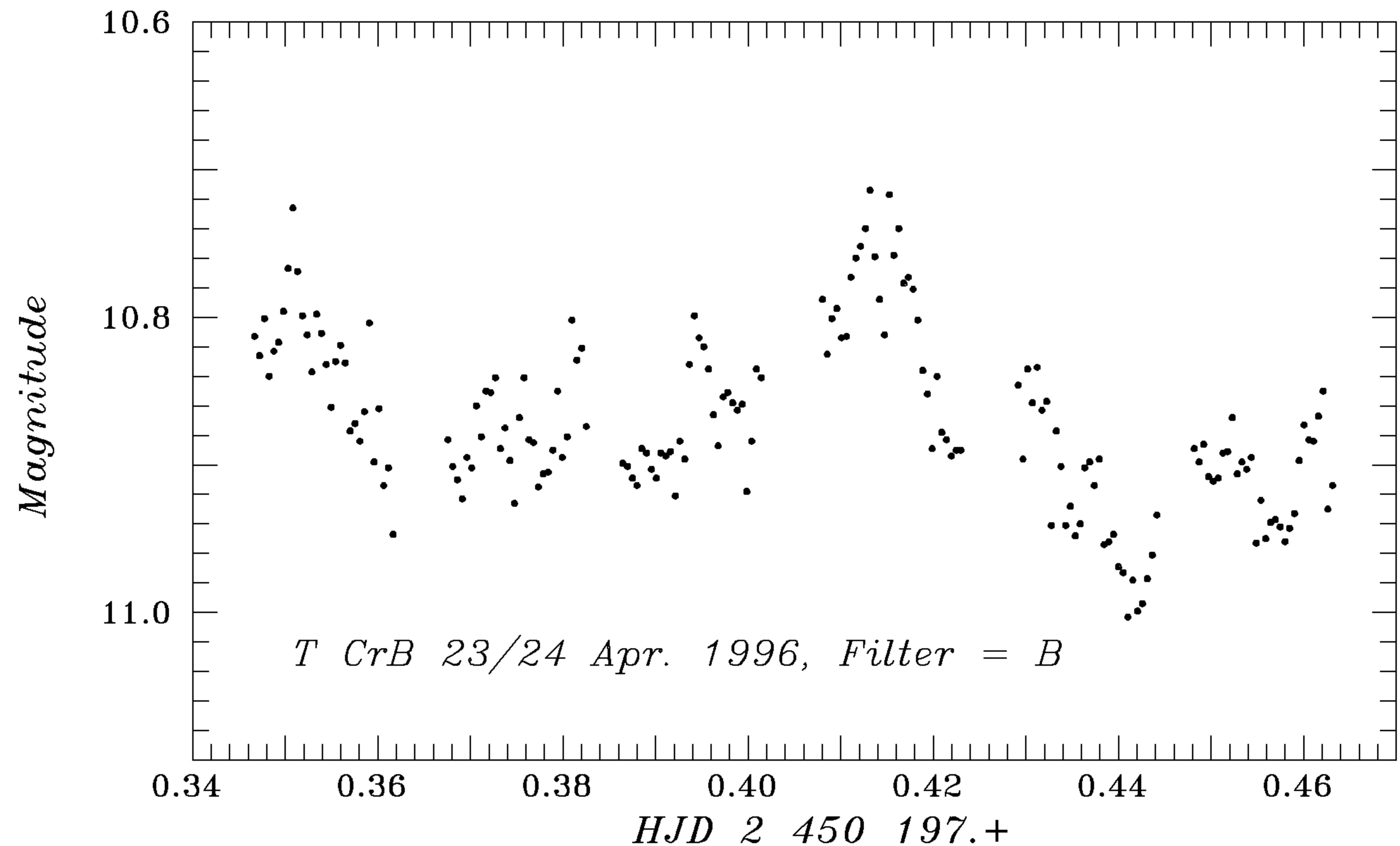


Figure 1. An example of the long run in the B band.

on the phase of the 227.5 days orbital cycle.

Another CV with strange behaviour is the triple system **CQ Dra** (= 4 Dra). The bright (m_v about 5 mag) M3 III star and a hot UV source component in a wide orbit of about 1703 days resemble a symbiotic binary (red giant + hot companion). It seems on the basis of the UV data that the hot companion itself is a close binary system with probable orbital period of about 4 hours (Reimers et al. 1988). Our data for CQ Dra now cover the time interval of over 7.3 years (more than a full orbital cycle of the wide system). We have detected neither the rapid light variations (flickering) nor any periodicity similar to the 4 hr UV period in our observational runs (with an accuracy to about 0.03 mag in the U colour). Thus we can conclude that, unfortunately, there is no definite evidence in the optical supporting the CV nature of the hot companion as yet (see also Urban et al. 1996).

The last CV of our programme we would like to mention is the classical nova **GK Per**. Its nova outburst has occurred in 1901 and the system has exhibited a series of a dwarf nova-like outbursts of lesser extent since then. These smaller outbursts have occurred with an approximate period of about 3 years during the last decades. We have observed the most recent DN-like outburst of this star (Feb-Apr 1996) photoelectrically and also with the use of the CCD cameras in V, R

and I colours. The brightness level increased towards the longer wavelengths from V to I. This phenomenon is probably caused by the extended dust envelope existing in this system.

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