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A FLARE-LIKE EVENT ON THE LIGHT CURVE OF V351 Ori

As a part of our on-going program of UBV photometry of antifiare stars (Pugach, 1975) we have observed a flare-like episode of V351 Ori (BD +0<sup>o</sup>1170, Sp A7 III) in four colours. All observations were obtained at the observing station "Terskol" of Main Astronomical Observatory of the Academy of Sciences of the USSR, using the 0.5m reflecting telescope and a single-channel automatic photon-counting photometer with a PEM-79 uncooled photomultiplier tube.

The comparison star was BD +0<sup>o</sup>1171 and the check star was BD-0<sup>o</sup>1067. The magnitudes of the variable star in the UBV-bands in normal brightness are as follows:

$$U = 9.^m58, \quad B = 9.^m30, \quad V = 8.^m98, \quad R = 8.^m57$$

The flare-like episode occurred on September 29, 1982 when the star was in a deep minimum - in the BVR-bands the increase of brightness appeared to begin, while in U-filter the brightness of the variable further decreased. From the beginning of the observations on this night and up to the beginning of the flare, the brightness of the variable in the UBV-bands increased by 0.<sup>m</sup>095, 0.<sup>m</sup>200, and 0.<sup>m</sup>320 respectively. At the same time, the decrease of brightness in the U-band was 0.<sup>m</sup>175. Figure 1 shows the flare-like episode in the UBV-bands relative to the light curve without flare. Symbol "+" indicates the moments of the comparison star observations, and symbol "++" indicates the moments of the observations of the check+comparison stars. The flare duration at half peak light appears to be 30 minutes.

Conventionally, the flare consists of three parts:

- a. a small pre-flare brightness increase with amplitudes increasing through infrared,
- b. the main-part of the flare - its amplitude is practically the same in the BVR-bands,
- c. a much less intense tail appears after the main-part of the flare (this tail is especially well visible in the BVR-bands).

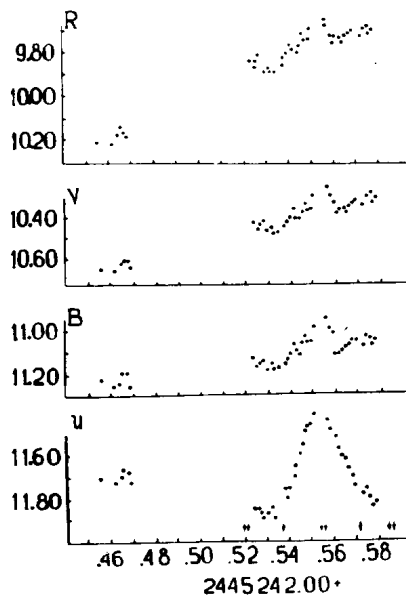


Figure 1

Furthermore, the main-part of the flare in the BVR-bands is a superposition of a few narrow, sequent sharp mini-flares unresolved in time. However, the thin structure of the main-part of the flare in ultraviolet is not observed, and the main-part and the tail are masked by much more significant brightness increase of the variable with an amplitude up to  $0.5^m$ , in addition the moment of peak flare luminosity precedes the moment of brightness maximum in BVR-bands by 4 min.

No optical flares have been previously found in photometric observations of antiflare stars with the exception of only one case: Pugach's (1975) observations of the variable star RZ Psc (G8-K0) showed a flare with two sharp peaks, a small pre-flare increase of brightness, a sharp forward front and a gradual decrease. The flare was observed, when the variable was in a deep minimum, and the observations were obtained in a mode of continual measuring through B filter. The flare amplitude was  $0.9^m$ .

As for the flare activity of A and B stars, the information about it is very scanty - the total number of such cases does not exceed ten (Bakos, 1970, Page and Page, 1970, Andrews, 1964, Kunkei, 1975).

The energy characteristics of the flare observed were calculated by assuming the Planck's energy distribution in the spectrum of the variable star with  $T_{\text{eff}} = 9000^{\circ}\text{K}$  and with a due accounting of the width of the instrumental UBVR system bands. They are as follows:

Filter	The total flare energy $\times 10^{-35}$ erg	<u>Flare</u> Base	Peak flare luminosity $\times 10^{-33}$ erg sec $^{-1}$
U	8.38	0.250	1.470
B	6.49	0.069	3.132
V	10.39	0.065	5.179
R	8.19	0.072	3.685

where the third column gives the ratio of the flare's luminosity to the luminosity of the quiet star over the same period of time. The ratios of energy magnitudes radiated by the variable star in each band are as follows:

$$E_U : E_B : E_V : E_R = 1.29 : 1.00 : 1.60 : 1.26$$

At the end it should be noted that the observations of the variable obtained within the period from JD 2445242.426 to JD 2445242.516 in a mode of continual measuring through a blue filter showed the presence of a periodic component in the light variation with a period of 320<sup>s</sup> and an amplitude up to 0.<sup>m</sup>15.

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