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"QUASIALGOL" BO Cep

The light curve of the rapid irregular variable star BO Cep with Algol-like sharp non-periodic minima was investigated by Hoffmeister (1949), Zajtseva (1971), Wenzel and Bruckner (1978), Kovalchuk and Pugach (1980), Kardopolov and Shutiomova (1980). A satisfactory period could not be found. The spectral type was determined as F2 (Herbig, 1960). A weak emission in Hα line (EW_λ H_α = 4.6 Å, $V_r H_\alpha$ = -45 km/s) was discovered by Zajtseva and Kolotilov (1973).

Our own observations were made in 1987-1990 on mt. Maidanak using the 0.5 m reflector with UBVR-pulse counting photometer and, besides, on October 20, 1988 with the Byurakan 2.6-m reflector with the UAGS spectrograph with 100 Å/mm dispersion and equipped with an image tube.

The photometric data are given in Table I. They were investigated by a program of Fourier-analysis, dispersion curve analysis and Kurochkin - Jurkevich method. 12 Algol-like weakenings were excluded from the calculations. The light curve folded with the photometric elements $2446364.567+10^d.658$ E for 4 years of observations is plotted in Figure 1. Figure 2 shows that both r.m.s. and the average level of the light curve change from year to year. Moreover, minima typical of eclipsing binaries with the amplitude not less than $0^m.05$ V were observed in 1987 and 1990. Algol-like light weakenings with an amplitude of $< 0^m.5$ V and duration $< 1^d$ occur on an average once per 40 days and are observed near phase 0.0 ± 0.15. Some Algol-like non-periodic minima are observed very close to phase 0.0 . So, minima 2443689.34 and 2443710.31 (Kardopolov, Shutiomova, 1980) indicate $10^d.6558$ period. Algol-like weakenings are comparatively seldom near phase 0.5 ± 0.3 and have lower amplitudes.

The spectrum of BO Cep at 4600-6100 Å on the scale of intensities is given in Figure 3. The spectrum is an average of 3 spectrograms. In accordance with H_β , Fe I, Ca I line intensities the spectral type of BO Cep is F2. The H_β line does not show any emission. There is some probability of finding a weak emission in Mg I doublet 5172, 5179 Å. The Na D line is very wide.

Table I. Photometric data

J.D. 2400000+	n	V_{max}	V_{min}	<V>	δV	<U-B>	<B-V>	<V-R>
46888 - 47173	67	11.53	11.80	11.598	0.026	-0.04	0.54	0.54
47307 - 47549	137	11.47	11.97	11.582	0.024	-0.03	0.54	0.59
47680 - 47887	109	11.51	11.97	11.615	0.027	-0.03	0.55	0.54
48049 - 48234	110	11.58	11.82	11.618	0.024	-0.05	0.55	0.54

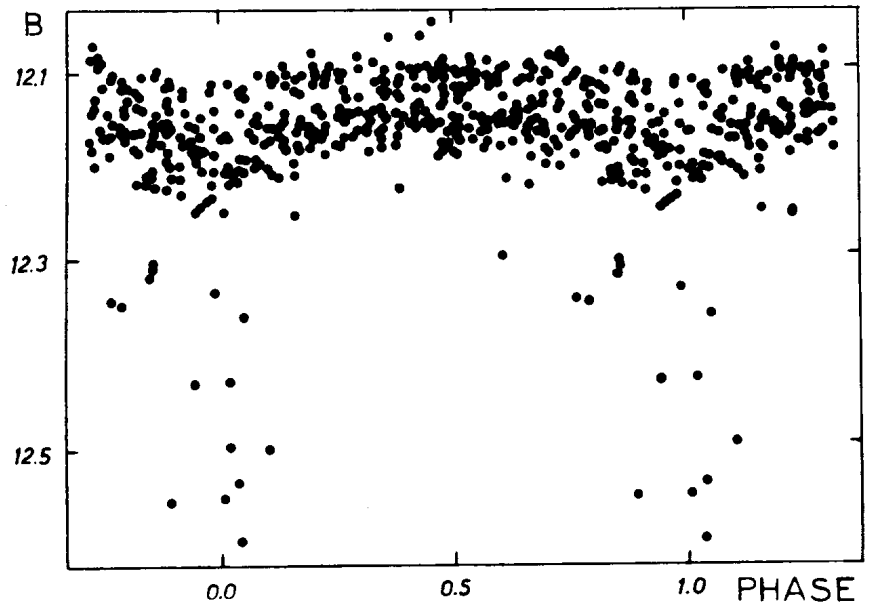

Figure 1. BO Cep summary light curve within 4 years

Wenzel (1977) and Pugach (1981) could ground with sufficient certainty that non-periodic minima occur due to irregular weakenings of the main star by dust fractions. The excess E_{U-B}=-0.05 ÷ -0.1 (Wenzel, Bruckner, 1978) gives some indication that dust is present in BO Cep system.

We suggest that BO Cep is a binary with the orbital plane inclination $i \sim 5^{o}$ and the period of rotation P=10.658. The invisible component is surrounded by a nonstable dust shell with radius changing within its Roche lobe. The shell increasing leads to a partial eclipse. The reflection (phase) effect is essential. Sharp non-periodic minima occur when the dust

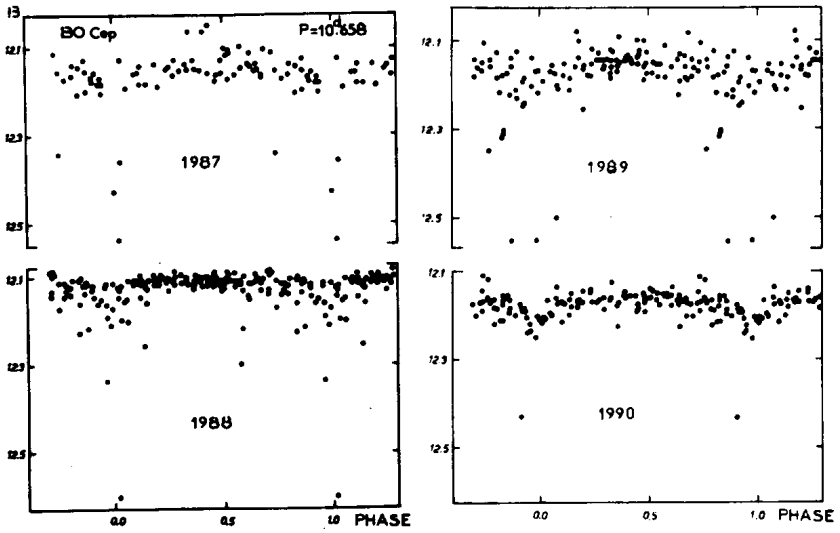

Figure 2. Light curve of BO Cep for each year

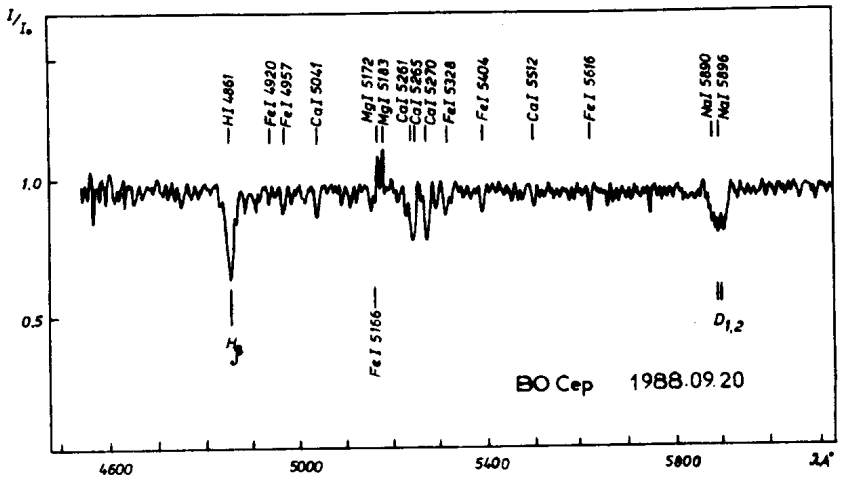

Figure 3. Spectrum of BO Cep at 4600–6100 Å

fragments leave the shell through the inner Lagrangian point, rush to the main star and cause the darkening near its photosphere. A weak variable Hα emission can be influenced by the accretion.

RZ Psc shows a similar light curve with $13^{d}.78$ period. We offer to call such systems "quasialgols".

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