COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS
Number 4497

Konkoly Observatory
Budapest
21 July 1997
HU ISSN 0374 – 0676

MULTIPERIODICITY OF THE δ SCUTI STAR BR CANCRI

BR Cancri (=HD 73175=SAO 97975, also known as KW 45 in Praesepe cluster) was discovered as a δ Scuti star by Breger (1973) on the basis of several-hour-long observations. It pulsates with a period of 0.038±0.005 days. The author found no more data available in the literature. For checking its variability, observations covering a total of ten nights were secured between February 14 and March 30 1997. The observations were carried out by using a three-channel high-speed photometer P45-A attached to a 85cm reflector of Xinglong Station of Beijing Astronomical Observatory, China. The photometer is especially used in WET, the Whole Earth Telescope network (Nather et al., 1990). The comparison star ($RA = 08^{\rm h}38^{\rm m}32\overset{\rm s}{.}17, Dec = 19°27'54\overset{''}{.}5, 2000.0, 10.2V$) used was chosen carefully. No variation was found in its brightness. Furthermore, the constancy of comparison star was independently inspected with another star ($RA = 08^{\rm h}37^{\rm m}38\overset{\rm s}{.}10, Dec = 19°31'06\overset{''}{.}$, 2000.0, 11.5V) in one night. The data were acquired as continuous 10s exposures through Johnson's V filter. The data were corrected for the sky background contribution and the atmospheric extinction. In order to analyze pulsational frequencies, all the measurements were binned into 120s integrations by taking 12-point averages and the times of measurements of BR Cnc were converted into HJD. This way 684 datapoints were obtained. The characteristics of the light curve of BR Cnc is shown schematically in Figure 1 according to the high-time-resolution photoelectric photometry. The brightness variation appears to be multi-periodic.

After the application of consecutive prewhitening procedure and frequency analysis, at least 3 frequencies were resolved through a standard Fourier program Period (Breger 1990). Figure 2 displays the preliminary power spectra of three apparently exhibited

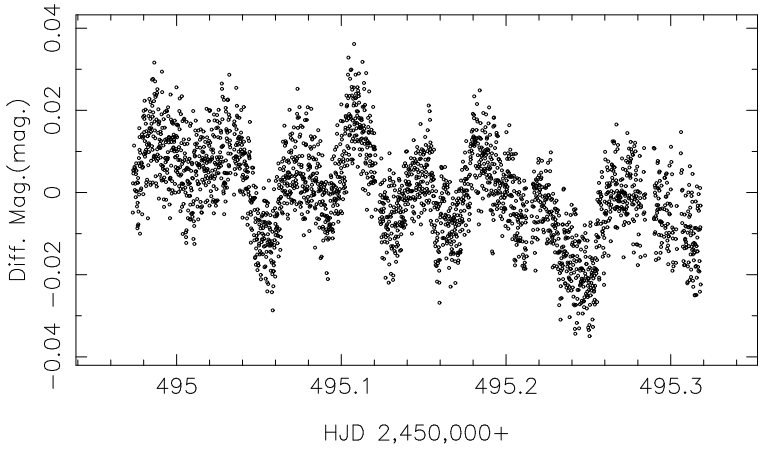

Figure 1. One of the typical high-time-resolution V light curves of BR Cnc observed on February 16 1997. Exposure time of each point is 10s

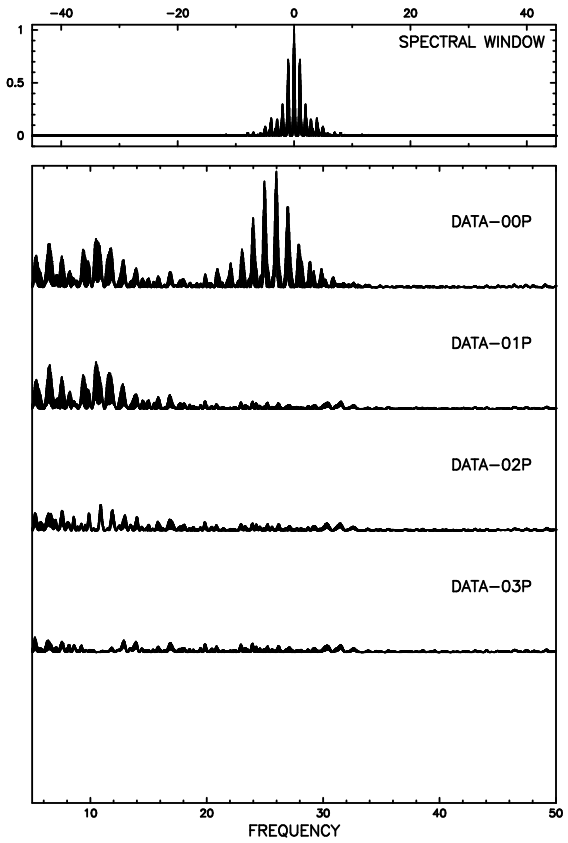

Figure 2. The spectral window (in top panel) and power spectra of three suggested frequencies of BR Cnc. The fundamental frequency 26.0023 c/d is displayed in the second panel; the third and fourth panels correspond to 10.4776 and 10.8994 c/d respectively. Note that different ordinates were used: for the DATA-00P (f_1), ordinate goes up to 1.45×10^{-5} mag from the origin; for DATA-01P (f_2), ordinate goes from 0 to 6.0×10^{-6}; for DATA-02P (f_3), the peak value is just 3.2×10^{-6} power of mag; the bottom panel shows the power of the residuals of the fitting with 3 frequencies above. Abscissa in cycles/day

frequencies: f_1=26.0023, f_2=10.4776 and f_3=10.8994 cycles/day with a standard error of 0.007. The peaks at frequencies f_2 and f_3 could be influenced by a 1 c/d aliasing which can be seen from the spectral window. In view of the relatively short coverage the pulsational nature of this low amplitude δ Sct star deserves further investigation.

I would like to thank Dr. Li Zhiping for valuable suggestion which greatly inspired me in the analysis of the observational data. This research was granted by the National Science Foundation of China.

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