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PHOTOELECTRIC OBSERVATIONS OF R CrB

The irregular variable, R CrB, prototype of its class, was observed photoelectrically on nine nights in the Spring of 1980. A total of 35 differential magnitudes were obtained, with four each night except the last night when only three were obtained. All observations were made on the 20cm f-15 Cassegrain telescope at the Fairborn Observatory. Each measurement of the variable was bracketed by measurements of the comparison star HD 141352. A TRS-80 microcomputer was used to log the data and provide preliminary on-line reduction.

The raw differential magnitudes were corrected for differential extinction and transformed to the V of the standard UBV system, and heliocentric corrections were made to the Julian dates. These reductions were made on a TRS-80 computer using a program adopted from one written by D. S. Hall. The transformation to standard V was based on 36 observations of the close pair 27 and 28 LMi in V and B which provided an epsilon of 0.027. An average nightly extinction of 0.25 was assumed. The comparison star V was taken as  $7.^m45$ , and its B-V as  $0.^m44$  as provided by Fernie (1980). The B-V value of the variable was taken as 0.80 based on data from Fernie, Sherwood, and DuPuy (1972). The reduced observations are given in Table I.

Table I

| JD <sub>0</sub> 244+ | V    | JD <sub>0</sub> 244+ | V    | JD <sub>0</sub> 244+ | V    |
|----------------------|------|----------------------|------|----------------------|------|
| 4348.730             | 5.87 | 4364.683             | 5.84 | 4368.633             | 5.79 |
| 4348.734             | 5.88 | 4364.687             | 5.83 | 4368.636             | 5.76 |
| 4348.738             | 5.88 | 4364.692             | 5.81 | 4368.639             | 5.74 |
| 4348.742             | 5.91 | 4364.693             | 5.83 | 4368.643             | 5.75 |
| 4351.708             | 5.88 | 4365.657             | 5.91 | 4369.670             | 5.79 |
| 4351.713             | 5.89 | 4365.661             | 5.86 | 4369.673             | 5.82 |
| 4351.717             | 5.88 | 4365.666             | 5.89 | 4369.675             | 5.79 |
| 4351.721             | 5.87 | 4365.669             | 5.87 | 4369.679             | 5.78 |
| 4363.648             | 5.82 | 4367.655             | 5.73 | 4394.607             | 5.81 |
| 4363.653             | 5.83 | 4367.658             | 5.71 | 4394.610             | 5.82 |
| 4363.657             | 5.77 | 4367.661             | 5.71 | 4394.613             | 5.86 |
| 4363.662             | 5.79 | 4367.664             | 5.74 |                      |      |

The mean magnitudes and standard deviations for each nights observations were calculated as shown in Table II.

Table II  
Nightly means and standard deviations

| JD <sub>0</sub> 244+ | Mean V | SD   | JD <sub>0</sub> 244+ | Mean V | SD   |
|----------------------|--------|------|----------------------|--------|------|
| 4348                 | 5.89   | .019 | 4367                 | 5.72   | .020 |
| 4351                 | 5.88   | .019 | 4368                 | 5.76   | .019 |
| 4363                 | 5.80   | .026 | 4369                 | 5.80   | .025 |
| 4364                 | 5.83   | .023 | 4394                 | 5.83   | .029 |
| 4365                 | 5.88   | .025 |                      |        |      |

These are plotted versus JD in Figure 1..

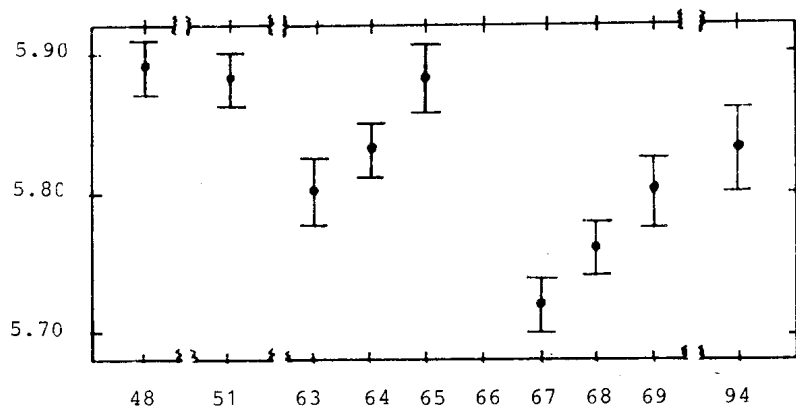


Figure 1: R CrB V Magnitude Vs. JD. (24443+)

The variations shown were in all likelihood due primarily to variations in R CrB itself, although uncorrected variations in the equipment and atmospheric conditions cannot be ruled out entirely as causative factors. The apparent "saw tooth" pattern from JD (244+) 4363 to 4369 may only be coincidental, but it could represent a characteristic of the fine structure of the luminosity variations of this type of star.

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References;

- Fernie, J. D., 1980 (private communication).  
Fernie, J. D., Sherwood, V., and DuPuy, D. L., 1972, *AJ*, 172, 383.