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A new faint variable star similar to W Ursae Majoris

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Citation

Hertzsprung, E. (1924). A new faint variable star similar to W Ursae Majoris. *Bulletin Of The Astronomical Institutes Of The Netherlands*, 2, 113. Retrieved from <https://hdl.handle.net/1887/5778>

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Note: To cite this publication please use the final published version (if applicable).

The observations of each star were then arranged according to phase and divided into groups. The mean values found for these groups are given for each of the 7 stars in Table 2 and shown graphically on the accompanying diagrams. The scale of the ordinates used in my previous papers has been doubled, so that one „magnitude” in the arbitrary scale adopted here is equal to 4 tenths of the period on the abscissa. The magnitudes indicated on the diagrams were obtained by adding the following constants to the values of Δm of Tables 1 and 2.

| | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|
| <i>a</i> | <i>b</i> | <i>c</i> | <i>d</i> | <i>e</i> | <i>f</i> | <i>g</i> |
| 11.62 | 13.12 | 11.25 | 13.12 | 10.75 | 12.50 | 10.25 |

The diagrams have been arranged according to the periods of the variables in order to show that these stars are in agreement with the rule pointed out by LUDENDORFF and mentioned in *B. A. N.* 52 (p. 83) with reference to the variable star Harvard 2738. This confirmation is of interest, as the light-curves of these stars were unknown before.

The provisional ephemeris of the epoch, when the variable passes the mean value of its maximum and minimum magnitude on the ascending branch of the lightcurve is given for each star in Table 3 under the heading “asc.”. For convenience the approximate value of the next following epoch of the maximum has also been entered.

TABLE 3.

| star | phase asc. | at max. | asc. | | max. |
|----------|---------------|------------|------------------------------------|------------------------------------|--------|
| | | | J. D. hel. M. T. Grw. 2423800 + | J. D. hel. M. T. Grw. 2423800 + | |
| <i>a</i> | P | P | d | d | d |
| <i>a</i> | .271 | .355 | 15.763 + | 4.91 E | 16.176 |
| <i>b</i> | .654 | .74 | 19.451 + | 5.3 E | 19.907 |
| <i>c</i> | .853 | 1.12 | 18.530 + | 10.0 E | 21.200 |
| <i>d</i> | .195 | .296 | 13.702 + | 6.7 E | 14.379 |
| <i>e</i> | .334 | .48 | 17.342 + | 7.0 E | 18.364 |
| <i>f</i> | .548 | .653 | 25.833 + | 18.0 E | 27.723 |
| <i>g</i> | .877 | .938 | 15.490 + | 4.25 E | 15.750 |

The two variables *b* and *d* are, as far as I know, the faintest hitherto published as being of the δ Cephei type outside the Magellanic Clouds. If they have the same absolute brightness as found in the mean for the naked-eye variables of this type their distance will be of the order of magnitude of 10000 parsecs provided there is no appreciable extinction of light in space.

There is so far no conspicuous relation between period and apparent brightness of the δ Cephei-variables in the region of η Carinae. These variables therefore either do not approximately form one cloud or there is no close relation between period and absolute brightness.

A new faint variable star similar to W Ursae majoris, by *Ejnar Hertzsprung*.

Further examination of the plates taken with the Franklin-Adams 10-inch telescope of the region round η Carinae led to the discovery of a variable star the position of which is $11^{\text{h}} 7^{\text{m}} 36^{\text{s}}.9$, $-56^{\circ} 27'.0$ (1875). The observations are satisfied by a period of $^{\text{d}}.1526$. If the star, as seems likely, is of the eclipsing type, the period is double this or $^{\text{d}}.3052$. The estimates in an arbitrary scale of the variable on 90 plates from 27 different nights are given in Table I. The reductions to the sun applied to the J. D. are those valid for the centre of the plate ($10^{\text{h}} 45^{\text{m}}$, $-59^{\circ}.5$). This approximation is sufficiently accurate for the purpose of the present preliminary note. The phases in fractions of the apparent period have been calculated according to the formula

$$P = 6.552685 \text{ (J. D. hel. M. T. Grw. } - 2420000\text{)}.$$

Out of the 90 plates 70 were taken with an exposure time of half an hour or nearly so, thus covering about .14 of the period. This is a considerable part especially where the change in brightness is quick.

TABLE I.

| J. D. hel. M. T. Grw. 2420000 + | phase 24811 + | Δm | J. D. hel. M. T. Grw. 2420000 + | phase 24811 + | Δm |
|------------------------------------|------------------|------------|------------------------------------|------------------|------------|
| d | P | m | d | P | m |
| 3786.501 | .750 | -.05 | 3813.449 | 177.332 | .25 |
| .534 | .967 | .00 | .462 | .413 | .35 |
| .555 | 1.104 | -.07 | .474 | .495 | .11 |
| 87.526 | 7.469 | .25 | .486 | .577 | .02 |
| 88.476 | 13.693 | -.03 | .499 | .659 | -.02 |
| .497 | .828 | -.05 | .511 | .740 | .10 |
| .530 | 14.043 | .00 | .524 | .822 | -.25 |
| 89.496 | 20.374 | .39 | .536 | .904 | -.02 |
| 90.474 | 26.786 | -.01 | 14.383 | 183.453 | .13 |
| .545 | 27.249 | .18 | .413 | .648 | .03 |
| .565 | .379 | .28 | .440 | .825 | -.10 |
| 91.501 | 33.513 | .05 | .467 | 184.002 | -.11 |
| .520 | .640 | .00 | .493 | .175 | .07 |
| .567 | .948 | -.09 | .514 | .307 | .14 |
| 99.488 | 85.848 | -.12 | .526 | .389 | .23 |
| .509 | .987 | .08 | .538 | .471 | .33 |
| .558 | 86.306 | .17 | .551 | .552 | .07 |
| 3813.374 | 176.840 | -.05 | 15.434 | 190.336 | .25 |
| .402 | 177.022 | -.02 | .462 | .523 | .12 |
| .423 | .161 | .08 | .481 | .649 | .05 |
| .436 | .250 | .13 | 16.461 | 197.068 | -.06 |