BULLETIN OF THE ASTRONOMICAL INSTITUTES OF THE NETHERLANDS.

1931 August 11 Volume VI. No. 224.

COMMUNICATIONS FROM THE OBSERVATORY AT LEIDEN.

A new variable star of short period, by *Ejnar Hertzsprung*.

Among the series of plates taken by H. VAN GENT with the Franklin-Adams camera at Johannesburg is one covering a region 10° × 10° with the star Boss 2267 in the centre. By comparison of pairs of these plates in the blinkmicroscope I found the star *C. P. D.* −44°2376, $7^m{\cdot}8$, $8^h9^m58^s{\cdot}9$ −44°11′8 (1875) = H. D. 69213, Fo to be variable. The star was thus noted to be brighter on J. D. 2426306·446 than on J. D. 6273·587.

After my return to Leiden the star was estimated on all the plates available. These estimates were made with the naked eye as there are no good comparison stars near the variable.

Furthermore the estimates are made difficult by the neighbourhood of the star *C. P. D.* −44°2379, $9^m{\cdot}2$, which is at a distance of 1′, or ·3 mm on the plate, only from the variable. The only comparison star used was *C. P. D.* −43°2480, $7^m{\cdot}7$. On all the 268 plates considered fit for the purpose two independent estimates were made of the difference in steps between the variable and the comparison star.

The period was found to be very nearly 1/9 of a day or about 160 min, which period was afterwards independently confirmed by P. TH. OOSTERHOFF, using the same material.

The most pronounced maxima are given in Table 1. A least square solution gave the period to be $^d{\cdot}111574 \pm {}^d{\cdot}000002$ (m. e.). The mean error of a single maximum is $\pm {}^d{\cdot}014$ or 1/8 of the period.

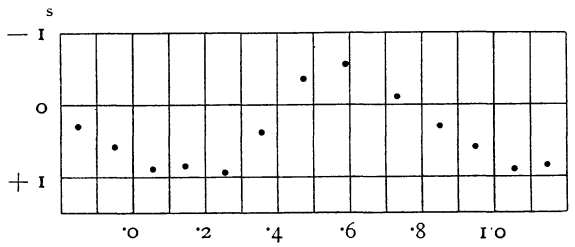
The only variable known to have a shorter period is that announced by H. VAN GENT in *B. A. N.* 214, while the next longer period is that of XX Cygni, viz. $^d{\cdot}135$. These two stars are however much fainter than the present one — about 7 and 5 magnitudes respectively.

The phases were now computed according to the formula

$$\text{phase} = 8{\cdot}96266^{d^{-1}} \text{ (J. D. hel. M. astr. T. Grw.} - 2420000)$$

The 268 observations were then divided into 27 groups of 10 or 9 observations each. Mean values for these groups are given in Table 2 together with mean values for 9 larger groups. The latter mean values are represented graphically in Figure 1. The lightcurve appears to be similar to those of some δ Cephei stars of small range (SU Cas, SZ Tau), the rise in brightness being slightly quicker than the fall.

FIGURE 1.



The total range is $^s{\cdot}16$. The equivalent of this in magnitudes I estimate to be about $^m{\cdot}3$, but this value is subject to revision.

From the differences between two observations following each other in phase the mean error of one observation (mean of two estimates) was found to be $\pm {}^s{\cdot}071$ or ·45 of the total range.

At the two phases ·36 and ·86, differing by half the period, the brightness is the same on the ascending and descending branch of the lightcurve. The mean epoch of the phase ·36 is J. D. hel. M. astr. T. Grw. $2426142^d{\cdot}190$. The maximum occurs about $^d{\cdot}020$ later.

The plates used here were generally exposed for 30 minutes or ·19 of the period. The brightness of the star would allow for exposures of say half a minute instead of half an hour. It will therefore be comparatively easy to obtain a much better lichtcurve than the provisional one presented above.

According to *U. O. C.* 35 the variable has an annual proper motion of $''{\cdot}11$ in the direction 76°. This motion is quite normal for a star with spectrum Fo and of magnitude $7^m{\cdot}0$ (No. 5593 in Magn. of Stars in the Cape Zone Cat. 1900, (London 1927).