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PHOTOELECTRIC OBSERVATIONS OF THE 1950 ECLIPSE OF ZETA AURIGAE

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The eclipse of the B-type component in the remarkable binary system ζ Aurigae occured for the last time in 1950 August and September. On this occasion observations were secured with a photoelectric photometer attached to the 24-inch reflecting telescope of the Budapest Observatory. The photoelectric equipment was an R. C. A. multiplier phototube with a d. c. amplifier and with a galvanometer of low sensitivity. The multiplier phototube was presented us by Dr. *H. Shapley*, Director of the Harvard Observatory, at the Zürich meeting of the I. A. U., 1948. The equipment will be described in another paper of this series.

We have succeeded to observe the partial phase at ingress on Aug. 12—13. Unfortunately, just at this crucial phase, the atmospheric conditions were well below the average, at least during the first part of the observations. At the egress on Sept. 20—21. cloudiness prevented observations.

The comparison star was η Aurigae, with spectral type differing widely from the red giant component of ζ Aurigae. But most our observations were secured at such zenith distances, that the use of more distant comparisons (e. g. λ or ϱ Aurigae) seemed to be more unsuitable, because of increasing difficulties in the calculation of extinction, especially in the eastern sky lying above the city.

During the observations the mirror was blended to 12-inch aperture. Filters were also used at the time of minimum resp. maximum light. The filters were Schott BG 12 (blue) and Schott GG 11 (yellow). Combining the observed depths of minimum in different wave-lengths with the scale of *Guthnick*, *Schneller* and *Hachenberg* (Abh. Pr. Akad. Wiss., Jahrgang 1935., Phys.-mat. Kl. Nr. 1), we get as isophotic wave-lengths of the instrument about $\lambda = 4800$ (without filter), $\lambda = 4300$ (blue filter) and $\lambda = 5600$ (yellow filter). These data are in acceptable accordance with direct calculations based upon the transparency-data of the filters, the sensitivity curve of the multiplier phototube and the reflectivity of the mirror (*Strong's* data for »old chem. Ag«, Ap. J. **83**, 401, 1936).

The observations are tabulated below. The magnitude differences in the table are in the sense $\Delta m = m_\zeta - m_\eta$. In the third column each observation represents the simple mean of three galvanometer readings.

THE OBSERVATIONS

Obs. Number	Julian Date (heliocentric) 2433 . . .	Number of Obs.	△m (without filter)	△m (blue)	△m (yellow)	Atmospheric condition
1	*504,565*	*4*	*1,476 ± 0,005*	—	—	good
2	*505,562*	*3*	*1,490 ± 0,006*	—	—	good
3	*506,546*	*2*	*1,576 :*	—	—	cirrus
4	*,594*	*3*	*1,583 ± 0,004*	—	—	moderate
5	*507,559*	*3*	*1,749 ± 0,004*	—	—	excellent
6	*,576*	*1*	—	*2,932*	—	«
7	*,585*	*1*	—	—	*0,809*	«
8	*,595*	*1*	*1,775*	—	—	good
9	*536,627*	*1*	—	—	*0,787*	«
10	*,631*	*1*	—	*2,873*	—	«
11	*,638*	*1*	*1,797*	—	—	«
12	*537,528*	*1*	—	*2,952*	—	excellent
13	*,538*	*1*	—	—	*0,826*	«
14	*,550*	*2*	*1,819 ± 0,001*	—	—	«
15	*558.582*	*2*	*1,500 ± 0,000*	—	—	«
16	*,601*	*1*	—	*2,260*	—	«
17	*,610*	*1*	—	—	*0,699*	«
18	*560,506*	*1*	*1,478*	—	—	good
19	*,519*	*1*	—	—	*0,655*	«
20	*,522*	*1*	—	*2,216*	—	«
21	*700,296*	*3*	*1,503 ± 0,007*	—	—	full moon

From the observations we adopted $\Delta m_{max} = 1{,}489 \pm 0{,}007$ (without filter), as the arithmetical mean of observations nos. 1, 15, 18 and 21. Similarly taking $\Delta m_{min} = 1{,}797 \pm 0{,}013$, as the mean of observations nos. 8, 11, 14, the amplitude will be $0^m_,308$.

After taking *Christie*'s and *Pettit*'s values (P. A. S. P. **60**, 102, 1948) for $D = 30{,}50^d$, and $d = 36{,}80^d$ we can easily calculate from observations no.3 and no.4 the date of the beginning of the ingress, assuming an approximately linear decrease of magnitude (see *Kopal*'s curve in Ap. J. **103**, 315, 1946). We get for the beginning of the ingress J.D.2433506,213 and J.D. 2433506,182 from observations no.3 and no.4, respectively. Giving weights according to the numbers of observations, we conclude, that the beginning of the partial phase was at J.D.2433506,194.

It is interesting to compare this particular result with the various predictions about the 1950 eclipse. Computing the data of the beginning of the ingress from *Wood*'s (A. J. **51,** 53, 1951), or from *Pettit*'s elements, again from *Kron*'s data about the mid-eclipse in 1947—48 (see *Welsh,* J. R. A. S. Canada, **43,** 222, 1949) we find the ingress partial phase occuring later than predicted, the delay being

0,116 day, with *Wood*'s elements,

0,474 day, with *Pettit*'s elements, and

0,374 day, from *Kron*'s epoch of minimum and *Pettit*'s period.

The first of these data, corresponding to *Wood*'s prediction lies rather near the limit of observational accuracy. We may say, therefore, that our observations seem to confirm *Wood*'s elements.

Szabadsághegy, Budapest, August 20, 1951.