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Visual estimates of the variable star of W U Ma type 44i Boo B
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the curve might also have been extrapolated in a somewhat different way.

We infer from the diagram that the average peculiar velocity in one component of the extragalactic nebulae is probably of the order of ± 80 km/sec. It seems quite improbable that the true average would be much higher; the result may well have been over-estimated, as no account has been taken of the errors of measurement and the errors in the adopted solar motion and distance effect ¹⁾.

The increase of the residuals toward the larger distances is at least for the greater part due to the uncertainty in the distances and the resulting uncertainty in the corrections Lr . Column 3 of Table 3 gives the relative weights, p_2 , with which velocities of nebulae at various distances should be combined in a solution for solar motion, etc. These weights are equal to 190 squared divided by the square of the average residuals as read from the curve. Column 2 shows the weights, p_1 , derived from a preliminary solution. These were used in making the solution given in the first section. The differences between p_1 and p_2 are negligible except for the first 3 or 4 lines. It was not thought worth while to make new solutions, with p_2 instead of p_1 , as only three groups of nebulae and one single nebula are near enough to be appreciably affected by the change.

The last column of the table shows the mean error in the logarithms of the adopted distances, as derived from the graph. The results in the second and third

¹⁾ That even for the brightest nebulae the errors of measurement may not be negligible is shown by HUMASON's recent results for the Andromeda nebula and for N. G. C. 221, viz. -220 and -185 km/sec, whereas the values from older determinations, by various observatories are -315 and -300 km/sec respectively.

lines are uncertain. The errors in the distances are found to be considerably larger than those derived in *B. A. N.* No. 185 from a comparison of the distances as derived from magnitudes and from diameters. It remains possible that part of the increase in the residuals is due to a real increase of the peculiar velocities with the distance but at present it seems most plausible to throw it all on the accidental errors in the distances.

TABLE 3.

r	p_1	p_2	m. e. in $\log r$
0	2.34	5.66	—
1	2.04	5.02	± 0.11 ::
2	1.77	2.99	$\pm .15$:
3	1.37	1.61	$\pm .17$
4	1.00	1.00	$\pm .17$
6	0.48	0.46	$\pm .18$
8	0.27	0.26	$\pm .18$
10	0.17	0.17	$\pm .18$
15	0.08	0.08	$\pm .18$
20	0.04	0.04	$\pm .18$
25	0.03	0.03	$\pm .18$
40	0.01	0.01	$\pm .18$

3. In order to see whether the computed factor with which the recession increases with distance is the same in different parts of the sky the nebulae may suitably be divided into two groups: those south of the galactic plane and those north of it. Assuming the solar velocity as found in solution (A) I find from the 13 objects south of the galactic plane $L = +142$ km/sec. A. ± 21 (m. e.) The whole material gave $+140$ km/sec. A.; L is thus found to be practically the same for northern and southern nebulae, that is for two regions of the sky which are separated by about 120° .

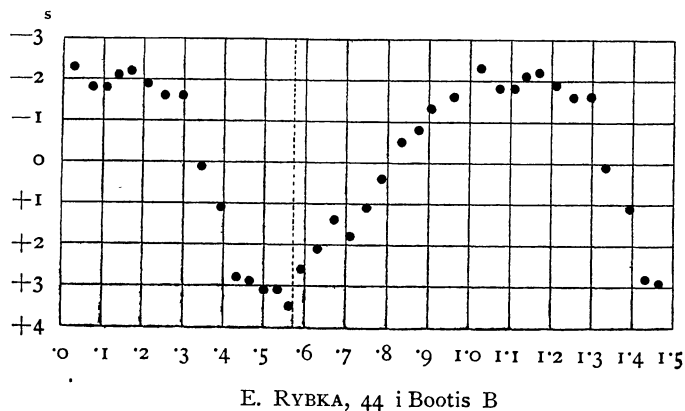
Visual estimates of the variable star of W UMa-type 44 i Bootis B, by *E. Rybka*.

Studies based on photographic photometry of 44 i Boo B were published by J. SCHILT (*Ap. J.* 64, 215; 1926) and G. P. KUIPER (*B. A. N.* 165).

The present note contains the results derived from 426 visual estimates of this variable made in 1930 from Febr. 19 to June 17 with the visual 266 mm. refractor of the Leiden Observatory.

On Prof. HERTSPRUNG's suggestion a very coarse grating, consisting of strips 22.9 mm broad, separated by free spaces 19.3 mm wide, was placed in front of the objective. Using this grating the difference in magnitude between the central image and the diffraction images of the first order is $m.86$, while the separation of the latter from the former is $2''.7$ for a

visual effective wavelength of 5500 Å. At the time of the observations the actual distance between the central images of the two components was 2".9. The two images to be compared, viz. the central image of the fainter and one of the diffraction images of the brighter component, were therefore at nearly the same distance from the central image of the brighter component. With the grating used these two images were equal somewhere between maximum and minimum of the variable. The estimates which were made on an arbitrary scale of steps, may therefore still be used with some confidence for the determination of fairly accurate epochs of minimum.



No colouring of the diffraction images was noted. The magnifying power used was 238.

The 426 estimates obtained were arranged according to phase, computed by the formula:

$$\text{phase} = 7.46806257 \text{ (J. D. hel. M. astr. T. Grw.} \\ - 2426000),$$

putting the period equal to one half of that found by KUIPER (*B. A. N.* 165, 35), thus making no difference between even and odd minima. The 25 normal points,

given in the table and represented graphically on the diagram, were computed from 18 or 17 estimates each.

Normal points.

Number of estimates	Mean Phase	steps	Number of estimates	Mean Phase	steps
18	P .0286	s - 2.3	17	P .5336	s + 3.1
17	.0709	- 1.8	17	.5614	+ 3.5
17	.1093	- 1.8	17	.5910	+ 2.6
17	.1385	- 2.1	17	.6303	+ 2.1
17	.1705	- 2.2	17	.6711	+ 1.4
17	.2102	- 1.9	17	.7095	+ 1.8
17	.2514	- 1.6	17	.7500	+ 1.1
17	.2986	- 1.6	17	.7878	+ 0.4
17	.3443	+ 0.1	17	.8348	- 0.5
17	.3943	+ 1.1	17	.8748	- 0.8
17	.4333	+ 2.8	17	.9070	- 1.3
17	.4671	+ 2.9	17	.9612	- 1.6
17	.5006	+ 3.1			

A smooth curve was drawn through the normal points thus obtained and the brightness read off in 100 places separated by .01 of the period. From these values the phase of minimum was derived in the way described in *B. A. N.* 147 and 166 and thus found to be P.5712. The corresponding mean epoch of minimum is

$$\text{J. D. hel. M. astr. T. Grw. } 2426069.3046^d$$

giving a difference with KUIPER's elements (*l. c.*) of $O - C = +^d.0081$.

On account of the closing up of the visual pair, photographic investigation of 44 i Boo B is going to be more and more difficult in the next years to come. The method used here may at least offer the possibility of keeping count of the number of epochs elapsed until later on the separation between the visual components is again wide enough for photographic comparison between them.