4. TRIGONOMETRICAL PARALLAXES OF LB 3303 AND LB 3459

J. CHURMS
Royal Observatory, Cape, South Africa

and

A. D. THACKERAY
Radcliffe Observatory, Pretoria, South Africa

1. LB 3303

Radcliffe spectra [1] of this star in 1961 confirmed Luyten's suspicion on the basis of colour and proper motion that this object is a bright white dwarf. The profile of Hγ was found to be closely similar to that of o_2 Eri B. Hill and Hill [2] have published photometry yielding $V=11.40$. The only known white dwarfs brighter than this are Sirius B, o_2 Eri B, Procyon B, Feige 34 and CD $-38°$ 10980.

A trigonometrical parallax has been determined by one of us (J.C.) at the Royal Observatory, Cape. The result from 28 plates using 5 comparison stars is

Relative $\pi_t = 0''.067 \pm 0.011$ (p.e.)

or following Binnendijk [3]

Absolute $\pi_t = 0''.070 \pm 0.011$

The resulting absolute magnitude is

$$M_v = +10.6 \pm 0.3$$

This result is derived without the systematic correction of $-0''.002$ to Cape parallaxes recommended by Jenkins [4] since Strand [5] has advised against such Yale-Jenkins system of corrections. (If the Yale-Jenkins precepts were followed the derived absolute parallax would become $+0.065 \pm 0.014$.)

The derived M_v $(+10.6)$ makes the star rather luminous for a white dwarf, but the observations are consistent with $M_v = +10.8$, the value for W 485 (with very similar colours) and the hotter object W 1346 (Eggen and Greenstein [6]). The star appears to be 0.8 ± 0.3 brighter than the Eggen-Greenstein [6] mean relation

$$M_v = 11.65 + 0.85\,(U - V)$$

Nevertheless, the parallax provides the final confirmation without doubt that the star is a relatively near white dwarf.

2. LB 3459

This is an extremely blue galactic star superposed on the Large Magellanic Cloud, discovered by Luyten on the basis of its proper motion. Radcliffe spectroscopy [7] confirmed its membership of the galactic foreground and also the variation in its

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spectrum already noted by Miss Cannon although only the first Radcliffe spectrum showed strong He I lines, Mg II 4481 and a peculiarly strong Ca^+ K line which cannot be interstellar. Spectroscopic monitoring has been continued and of 12 Radcliffe spectra taken between 1958 and 1968 all but the first still show weak helium lines.

The light also appears to be constant.

Although the spectrum does not suggest that of a white dwarf, the significant proper motion meant that a measurement of parallax was desirable and it was put on the Cape programme. The result from 27 plates using 5 comparison stars is given below, together with the Binnendijk correction from relative to absolute.

Relative $\pi_t = -0''.013 \pm 0.008$ (p.e.)

Absolute $\pi_t = -0''.010 \pm 0.008$

If we assume that the error of this determination is less than 4 times its probable error, we derive a minimum distance of 45 parsec, and with the Hills [2] photometry, $M_v \leq +7.8$. The star cannot be regarded as a white dwarf on the basis of its spectrum or absolute magnitude. On the other hand the fact that the star exhibits appreciable proper motion as discovered by Luyten sets an upper limit to the luminosity. A newly determined Cape proper motion of $0''.038$, yields a tangential motion T for various assumed distances as set out in Table I.

TABLE I

r (parsec)	M_v	T (km/s)	z (parsec)
45	7.8	8.3	24
180	4.8	33	96
360	3.3	66	192
720	1.8	132	384

With a small radial velocity (certainly less than 50 km/sec) we can say that

$$+1.8 < M_v \leqslant +7.8$$

Thus LB 3459 appears to be an unusual object lying between the hot subdwarfs and the white dwarfs. He II 4686 appears weakly in absorption on some Radcliffe spectra and thus a revised classification 'OBp' is perhaps appropriate.

Table II summarises information about the two stars. Successive columns give (1) star designation from various catalogues, (2) galactic coordinates, (3) V, B−V, U−B from the Hills' photometry, (4) Spectral classification and derived M_v, (5) Trigonometrical parallax from this determination, (6) newly determined Cape proper motion (by J.C.), (7) previously published (CPC 50) proper motion.

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TABLE II

Star	l^{II} b^{II}	V B − V U − B	Sp	π_t M_v	(p.e.)	Relative $\mu\alpha$ $\mu\delta$	(p.e.)	CPC50 $\mu\alpha$ $\mu\delta$
LB 3303 − 69°177 EG 21	286.2 − 43.7	11.40 + 0.05 − 0.55	DA	+ 0″.070 + 10.6	(0.011) (0.3)	+ 0″.038 − 0.104	(0.004) (0.004)	
LB 3459 − 69°389 269696 (HDE)	280.5 − 32.2	11.13 − 0.27 − 1.10	OBp p	− 0″.010 $\leqslant$ + 7.8	(0.008)	− 0″.008 + 0.038	(0.004) (0.004)	− 0.002 (0.004) + 0.044 (0.004)

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