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OBSERVATIONS OF HELIUM STARS

At the Prague meeting of Commission 27 (1) I pointed out the similarity in composition between the hot helium stars and the R CrB variables. The compositions of hydrogen-poor stars have been summarized by Hack (2). Furthermore, MV Sgr has a light variation like R CrB and a spectrum like the helium stars BD +10°2179 and HD 124448 (3). These observations suggest that helium stars may vary in a similar manner to R CrB, and that they should be regularly observed.

I present here photoelectric observations of HD 124448, HD 160641 and HD 168476 made with the 24-inch (61 cm.) refractor and 40-inch (1.02 m.) reflector of the Royal Observatory, Cape of Good Hope, and with the 74-inch (1.88 m.) reflector of the Radcliffe Observatory, Pretoria. The 24-inch observations were made in the course of general photometric programmes and the mean results have been published (4,5). A single observation is estimated to have a standard deviation about $\pm 0^{m}.02$. I am grateful to the Officer-in-Charge at the Cape Observatory for permission to quote the individual results.

Observations with the reflectors were made in the course of a photometric programme on blue stars. The results are at present being prepared for publication. All observations were made by the author except those prior to 1963 which were made by Dr. A.J. Wesselink. I am grateful for his permission to quote these. The standard deviation of a reflector observation determined from a large number of observations is $\pm 0^{m}.026$ $\pm 0^{m}.016$ and $\pm 0^{m}.022$ at Radcliffe and $\pm 0^{m}.016$, $\pm 0^{m}.009$ and $\pm 0^{m}.012$ at the Cape in V, B-V and U-B respectively.

The observations are given in Table I transformed to the UBV system as defined by Cousins (6). Mean values of the reflector observations are as follows, giving double weight to the 40-inch results:

	V	B-V	U-B
HD 124448	$9^{m}.99$	$-0^{m}.09$	$-0^{m}.80$
	± 0.014	± 0.013	± 0.018 (s.d.)
HD 160641	9.86	+0.15	-0.85
	± 0.047	± 0.011	± 0.011 (s.f.)
HD 168476	9.30	-0.01	-0.69
	± 0.046	± 0.010	± 0.019 (s.d.)

TABLE I

Date	JD	V	B-V	U-B	$(U-B)_c$	Tel.
HD 124448						
1960 June 6	243 7094	9.98	-0.08	-0.80		74
1961 Mar. 7	7366	10.01	-0.11		1.17	24
Mar. 11	7370	10.01	-0.10		1.17	24
Apr. 24	7414	9.98	-0.08	-0.79		74
May 17	7437	10.01	-0.09	-0.81		74
May 19	7439	9.99	-0.08		1.16	24
June 6	7457	10.02	-0.12		1.16	24
1962 Apr. 29	7784	9.99	-0.08	-0.83		74
1964 Mar. 7	8462	10.00	-0.10	-0.77		74
July 14	8591	10.00	-0.09	-0.82		74
1968 Mar. 19	9935	10.00	-0.11	-0.80		40
Mar. 24	9940	9.98	-0.10	-0.79		40
Mar. 30	9946	9.98	-0.08	-0.79		40
Mar. 31	9947	9.98	-0.08	-0.78		40
Apr. 2	9949	9.97	-0.08	-0.80		40
1969 Apr. 5	244 0317	9.98	-0.09	-0.80		40
Apr. 7	0319	9.98	-0.08	-0.79		40
HD 160641						
1964 May 19	243 8535	9.86	+0.15	-0.84		74
July 14	8591	9.81	+0.15	-0.86		74
Aug. 9	8617	9.82	+0.16	-0.84		74
1968 Mar. 24	9940	9.89	+0.14	-0.84		40
Mar. 30	9946	9.84	+0.14	-0.85		40
Apr. 10	9957	9.90	+0.16	-0.85		40
HD 168476						
1960 Sep. 13	243 7191	9.39	-0.01	-0.66		74
Sep. 18	7196	9.40	-0.02	-0.68		74
1961 Apr. 21	7411	9.31	-0.02	-0.66		74
1963 July 10	8221	9.26	-0.01		1.21	24
July 19	8230	9.33	-0.02		1.19	24
July 26	8237	9.32	-0.02		1.21	24
July 29	8240	9.33	-0.01		1.23	24
July 31	8242	9.33	-0.01		1.21	24
Sep. 9	8282	9.30	+0.01	-0.67		74
Sep. 23	8296	9.26	-0.01	-0.67		74
1964 May 6	8522	9.30	0.00	-0.69		74
May 19	8535	9.33	-0.01	-0.66		74
June 14	8561	9.30	-0.03	-0.68		74
July 14	8591	9.29	-0.01	-0.69		74
Aug. 9	8617	9.30	-0.01	-0.68		74
Sep. 8	8647	9.33	-0.01	-0.68		74
1968 Mar. 24	9940	9.27	-0.03	-0.69		40
Mar. 30	9946	9.27	-0.01	-0.70		40
Mar. 31	9947	9.26	-0.01	-0.71		40
Apr. 10	9957	9.30	0.00	-0.70		40

The errors are the internal standard deviations for each star for an observation of unit weight, determined from the observations themselves. Consequently for the 40-inch observations they should be divided by $\sqrt{2}$.

These results show that no large variations have occurred during the periods of observation. While the magnitude of HD 124448 has remained constant, both HD 160641 and HD 168476 show micro-variation in magnitude but not in colour. HD 160641 is an O star (7) and HD 168476 is suspected of having an extended atmosphere (8). The observations of HD 168476 made in 1960 September were significantly different from the mean. Other stars observed on these two nights do not differ significantly from their means. HD 168476 was observed spectroscopically at the Radcliffe Observatory in 1952 and 1953 (9), and in 1960, 1963 and 1964 (10). No significant changes in magnitude have been noted. A spectroscopic observation in 1969 April also showed no change. Because of the spectroscopic observations earlier in that year, the 1960 photometric observations would not appear to show HD 168476 emerging from a R CrB type minimum. The radial velocity may be variable with a small amplitude but no period has been found.

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