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**PHOTOMETRY OF STARS IN THE FIELD OF
THE MIRA V418 CASSIOPEIAE**

The variable V418 Cassiopeiae was discovered by Hoffmeister (1966), who noted rapid, nova-like rises to maximum brightness despite its long-period nature. Gessner and Meinunger (1973) determined a period of about 480 days from Sonneberg plate material. More recently, Kaiser and Collins (1991) independently discovered the variable and its rapid brightenings in the course of photographic sky patrols. Their surveys showed one rise in excess of 0.1 magnitudes per day, and a maximum possibly as bright as mag. 10. The two used magnitudes from the Guide Star Catalog (GSC) for their comparison stars. These are well known to have occasionally large zero-point offsets, internal scatter, as well as a significant color term. Thus at the request of Charles Scovil of the American Association of Variable Star Observers, I observed several stars in the field of this variable to provide a comparison sequence for visual observers. The sequence covers the range $10.9 < V < 13.3$, so will be useful when the star is bright.

The Lowell 53cm photometric telescope was used to observe the field on 26 and 28 August 1992 UT. The telescope is fitted with a single-channel photometer containing Strömrgren filters. Six and four standard stars, respectively, were observed on these nights along with the program stars using a 19-arcsec diaphragm. Each observation consisted of a minimum of four 10s integrations on 'star' and two 10s integrations on 'sky', with greater numbers of integrations for fainter stars. All the standard stars are from the lists of Landolt (1983, 1992). The V magnitudes were adopted directly, and $b - y$ colors were determined using same telescope against primary Strömrgren four-color standards with data available up to time of these observations. (The colors have since been improved somewhat.) The data for each night was reduced separately using linear transformations. Atmospheric extinction was measured on one of the nights and the same values were used in the reductions on the other night. Average per star residuals (standard deviation) were ± 0.006 in V and ± 0.002 in $b - y$ on the 26th, and ± 0.004 and ± 0.004 on the 28th.

The standards observed are listed in Table 1 along with the adopted and observed V and $b - y$ colors, and the number of observations 'n'. The mean deviations of the observed averages from the assumed values listed in Table 1 are: $V = 0.000 \pm 0.004$; $b - y = 0.000 \pm 0.002$. The small residuals are mostly due to the small number of standards observed, but are nevertheless indicative of a close match at least to the V system. The faint, red, and reddened stars in this low-latitude field necessitated the use of standards other than the canonical ones defining the four-color system. The main goal was V magnitudes for use of visual observers, so the $b - y$ colors were needed solely to determine the color term in the instrumental V magnitudes, and not for temperatures or other indices ordinarily derived from Strömrgren photometry. Despite the use of three fairly red standards, stars in the program field were redder still, and required (assumed linear) extrapolations of the transformations. In any case, these uncertainties are greatly outweighed by the errors in the program star observations, which are dominated by photon-counting errors.

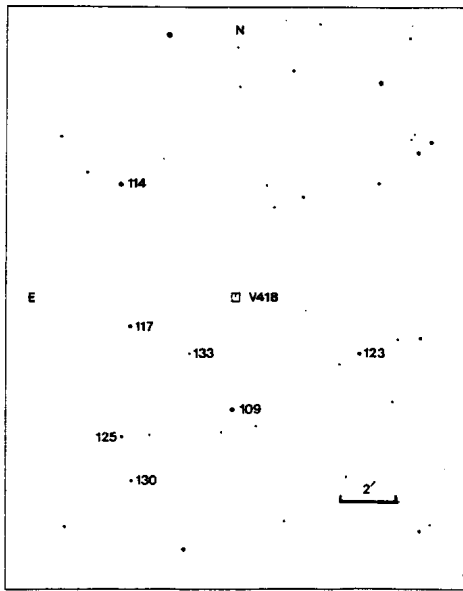


Figure 1. The field of V418 Cas showing stars from the GSC. V magnitudes are indicated to the nearest tenth of a magnitude with the decimal point omitted.

Table 1. Standard Star Observations

Name	V (std)	$b - y$ (std)	V (obs)	$b - y$ (obs)	n
HD 5319	8.046	0.601	8.042	0.602	2
HD 7615	6.693	0.023	6.688	0.026	2
BD-0°0288	8.831	0.711	8.832	0.709	1
HD 215141	9.239	0.962	9.240	0.960	1
HD 218155	6.783	-0.005	6.787	-0.007	3
HD 222732	8.857	0.735	8.861	0.737	1

The results for the V418 Cas field are given in Table 2, listed in order of decreasing brightness. Since all the stars are fainter than mag. 10, none appear in the common star catalogues. Identifications and J2000 positions from the Guide Star Catalog are provided instead. Except for GSC 4034-0841, the stars were observed on only one night. The uncertainties listed in the second line of each entry are thus the rms errors on each batch of integrations; these should be representative of the external uncertainties. Because the stars are fairly faint for the telescope involved and since they were observed on only one night, the data are given to a precision of two decimals instead of three, as is usual for Strömgen photometry.

Table 2. Photometry of stars in the field of V418 Cassiopeiae

Name	RA (2000)	Dec (2000)	V	$b - y$	n
GSC 4034-0775	1 ^h 12 ^m 58 ^s .9	+62°06'56"	10.91	0.44	1
			.03	.03	
GSC 4034-0673	1 13 34.3	+62 15 05	11.39	0.98	1
			.02	.02	
GSC 4034-0841	1 13 31.1	+62 09 56	11.63	0.71	2
			.00	.03	
GSC 4034-0873	1 12 19.4	+62 08 57	12.26	1.12	1
			.03	.04	
GSC 4034-1602	1 13 33.5	+62 05 56	12.53	0.78	1
			.03	.04	
GSC 4034-1203	1 13 30.5	+62 04 21	12.95	0.53	1
			.04	.04	
GSC 4034-1542	1 13 12.5	+62 08 57	13.27	0.68	1
			.04	.06	

For the convenience of observers, a chart based on the GSC is shown in Figure 1. The chart is centered at 1^h12^m58^s+62°11'0" (2000), the approximate location of V418 Cas. There is no precise position for V418 Cas in the literature, nor does the star appear in the GSC. The GSC is incomplete beyond mag. 12 to 13, so the field is much more crowded with stars than the chart suggests. The comparison stars are indicated by their magnitudes rounded to the nearest tenth of a magnitude (decimal point omitted) in the style of visual variable-star charts.

Brian A. SKIFF
 Lowell Observatory
 1400 West Mars Hill Road
 Flagstaff AZ 86001-4499
 USA
 e-mail (Internet): bas@lowell.edu

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