

COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS

Number 4216

Konkoly Observatory
Budapest
30 June 1995

HU ISSN 0374 – 0676

uvby β PHOTOMETRY OF STARS OF “ASTROPHYSICAL INTEREST”

In the course of several observing programs, we measured Strömgen-Crawford indices for a number of stars of “astrophysical interest”, mostly suspected or proven variables, but also chemically peculiar objects (e. g. λ Bootis-type). Besides, we also report results for some comparison stars. The results of these observations will be summarized here and brief discussions of individual objects will be given.

Our observations were acquired with the 91 cm telescope at McDonald Observatory (McD) in November, 1994 as well as with the 50 cm telescope at the South African Astronomical Observatory (SAAO) in March, 1995. Integration times never were less than 50 seconds in the different filters, and at least 100 000 counts were collected for each star in each filter. The transformation matrix (similar to Sterken et al. 1993) was calculated by using 10 standard stars for the McD observations, but with 19 standards for the SAAO uvby and with 28 standards for the SAAO β measurements. The rms residual of the transformed standard star data at McD was 0.02, 0.004, 0.007 and 0.015 mag for V , $(b - y)$, m_1 , c_1 , respectively. We obtained residuals of 0.005, 0.004, 0.007, 0.006 and 0.006 mag for V , $(b - y)$, m_1 , c_1 and β measured at SAAO. The larger residuals in the V and c_1 values from McD are attributed to small changes in sky transparency. These values can be taken as an estimate of the errors of the indices of the program stars, which are summarized in Table 1. We also attempted to acquire $H\beta$ data at McD, but they are not usable due to a software problem occurring during the observations. In the following, all program stars are discussed. Unless otherwise noted, the results for variable stars must be treated with caution.

Individual objects:

HD 12389: This star was discovered to be a δ Scuti variable by Schutt (1991). However, its spectral type is A0, suggesting that it is located near the hot border of the instability strip in the HR diagram. Our colors indicate that the star is probably within the instability strip, but since it appears to be somewhat reddened, it would be important to determine its $H\beta$ value.

HD 33957, SAO 51642: Both objects were suspected to be rapid variables by Schutt (1993). They appear to be within the instability strip, but might be reddened. A measurement of the $H\beta$ index is necessary.

HD 81290, HD 83041, HD 109738, BD+36°4917: These are λ Bootis-type stars, and their Strömgen-indices are typical for the group. They will be further discussed by Paunzen et al. (1995). After our observations were obtained, HD 109738 was discovered to be variable with a peak-to-peak amplitude of about 0.03 mag in Strömgen v and with a period of about 45 minutes (Paunzen, private communication).

Table 1. uvby β photometry of the program stars

Star	Observatory	V	$b - y$	m_1	c_1	β
HD 12389	McD	8.006	0.129	0.152	1.050	
HD 33957	McD	9.525	0.149	0.083	1.156	
HD 35685	SAAO	7.278	-0.032	0.140	0.702	2.790
HD 35734	SAAO	9.098	-0.011	0.170	0.886	2.871
BD-12°1174	SAAO	9.816	0.348	0.158	0.412	2.640
SAO 176755	SAAO	10.183	0.288	0.134	0.566	2.706
HD 81290	SAAO	8.858	0.252	0.107	0.639	2.673
HD 83041	SAAO	8.798	0.230	0.104	0.725	2.705
HD 105912	SAAO	6.959	0.286	0.148	0.433	2.668
HD 106384	SAAO	6.563	0.161	0.186	0.807	2.769
HD 106952	SAAO	7.825	0.298	0.151	0.454	2.656
HD 109738	SAAO	8.283	0.165	0.129	0.864	2.778
HD 111828	SAAO					2.633
HD 111829	SAAO	9.480	0.228	0.100	1.000	2.806
HD 147491	SAAO	9.599	0.413	0.153	0.354	2.603
HD 147649	SAAO					2.855
HD 164615	SAAO					2.715
SAO 51642	McD	9.109	0.193	0.134	1.136	
HD 213258	McD	7.684	0.222	0.187	0.659	
HR 8569	McD	6.537	0.030	0.165	1.028	
BD+36°4917	McD	9.790	0.193	0.136	0.908	

HD 106384 is the multiperiodic δ Scuti star FG Vir (e. g. Breger et al., 1995). Since it varies with a dominant frequency of 12.7 cycles per day, the values reported in Table 1 represent averages of two measurements obtained in an interval of one hour, in order to compensate for the light variations of FG Vir.

HD 111828, HD 111829: The latter star is suspected (Mantegazza et al., 1991) to belong to a group of variable stars similar to γ Dor (see Krisciunas & Handler, 1995). However, it is hotter and more evolved than the confirmed γ Dor variables. More observations are necessary. HD 111828 was confused with HD 111829 in the discovery note and is much cooler.

HD 147491, HD 147649: HD 147491 was claimed to be a δ Scuti star (Yao & Tong, 1989). However, it is too cool to belong to these kind of variables, but it shows light modulation of presently unknown nature. The star is more thoroughly discussed by Handler (1995), who presents new time-series photometry using HD 147649 as a comparison star.

HD 164615 is one of the best investigated variables similar to γ Dor. However, a measurement of its $H\beta$ index was not available so far.

HR 8569, HD 213258: The former object is a suspected δ Scuti star reported by Schutt (1991). However, it appears to be outside the hot border of the instability strip. New observations (Zima & Handler, in preparation) do not support variability of HR 8569. HD 213258 was used as comparison star for HR 8569 by Schutt (1991). We note that HD 213258 is inside the instability strip and that our Strömberg indices are consistent with Geneva photometry reported by North & Duquennoy (1991).

HD 35685, HD 35734, BD-12°1174, SAO 176755, HD 105912, HD 106952: All these objects were used as comparison stars during multisite campaigns (Handler et al. 1995a, Méndez et al., in preparation, Handler et al. 1995b, Breger et al., 1995 and in preparation). They are outside the instability strip and thus not likely to be variable.

Acknowledgements: This research was supported by the Austrian Fonds zur Förderung der wissenschaftlichen Forschung under grant S-7309.

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