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ASTRONOMY AND ASTROPHYSICS

Long-term monitoring of active stars

VIII. UBV(RI) photometry collected in February 1992

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Abstract. As a part of an extensive program focusing on the global properties and evolution of active stars, high-precision $UBV(RI)_c$ photometry of 31 selected stars, collected at the European Southern Observatory over the 14-29 February 1992 interval, is presented. Significant evolution of the light curves, period variations and evidence for long-term variability of the global degree of spottedness are found. Some spectral classifications are revised and the inferred photometric parallaxes are compared, whenever possible, with the values measured by the Hipparcos satellite. Flare events were detected for the star HD 16157 = CC Eri, EXO 055609-3804.4 = TY Col and HD 119285 = V851 Cen. Optical variability was discovered for the Pop II binary HD 89499. These observations contribute to the establishment of a time-extended photometric database which can give important clues on topics such as the stability of spotted areas, differential rotation, solar-like cycles and the correlation between inhomogeneities at different atmospheric levels.

Key words: stars: activity – stars: flare – stars: late-type – stars: variables – stars: population II – stars: pre-main sequence

Table 2. Mean atmospheric extinction coefficients for La Silla site, obtained over the 14-29 February 1992 period

	U	B	V	R	I
Mag/airmass	.538	.308	.203	.165	.118

Table 1. Comparison (c) and check (ck) stars for each program star (v), standard deviations (σ) for the v-c and ck-c V-band differential magnitudes for each series of N nights, peak-to-peak (ΔV) amplitude of the V-band light curve and period (P) of variability

Program star (v)		(c)	(ck)	σ (v-c)	σ (ck-c)	N	ΔV (mag.)	P (days)
HD 16157	= CC Eri	HD 16371	HD 16591	25	5	10	.06	1.56145
HD 17084	= UX For	HD 16975	HD 17322	12	6	8	.04	0.957
HD 26354	= AG Dor	HD 26779	HD 27274	11	4	9	.04	2.533
HD 32918	= YY Men	HD 33763	HD 33747	47	6	15	.13	9.75
1E 0505-0527	= EZ Eri	HD 33725	HD 34673	23	4	13	.08	9.08
HD 293857		HD 33725	HD 34673	4	4	10	.01	–
HD 34802	= YZ Men	HD 34297	HD 33563	50	4	15	.16	19.310
EXO 0527-3329	= UX Col	SAO 195800	HD 35528	15	4	13	.05	2.29
HD 36705	= AB Dor	HD 35230	HD 36316	28	5	12	.09	0.51479
EXO 0532-0510	= V 1321 Ori	HD 36235	HD 36003	111	4	13	.32	5.6
HD 39917	= SZ Pic	HD 39901	HD 39962	41	5	11	.11	4.905
EXO 0556-3804	= TY Col	HD 40865	HD 39601	32	6	13	.10	3.62
HD 61245	= V 344 Pup	HD 61390	HD 62061	21	3	12	.08	11.761
HD 81410	= IL Hya	HD 81904	HD 80991	75	5	15	.22	12.86833
HD 82558	= LQ Hya	HD 82508	HD 82447	36	4	14	.12	1.61
HD 86005	= LZ Vel	HD 86034	HD 85849	15	3	9	.04	44.57
HD 89499		HD 88351	HD 91682	9	5	13	.03	5.574
HD 98712	= SZ Crt	HD 97977	HD 98251	8	8	12	.03	11.58
SAO 202618	= V 858 Cen	HD 100912	HD 101679	49	5	14	.15	1.04303
HD 101309	= V 829 Cen	HD 101679	HD 101614	30	5	15	.09	11.65
HD 102077	= V 838 Cen	HD 102076	HD 102202	12	3	9	.04	1.848
HD 106225	= HU Vir	HD 105796	HD 106270	57	3	15	.18	10.424
HD 116544	= IN Vir	HD 117635	HD 118330	69	4	15	.21	8.40
HD 119285	= V 851 Cen	HD 119164	HD 119076	5	5	13	.02	12.05
HD 127535	= V 841 Cen	HD 128227	HD 128618	40	5	13	.12	5.929
HD 136905	= GX Lib	HD 136480	HD 137241	32	3	12	.12	11.134
HD 139084	= V 343 Nor	HD 139070	HD 138363	71	3	14	.19	4.32
SAO 121177		HD 141272	HD 140345	4	7	2	.01	–
HD 154338	= V 991 Sco	HD 326583	HD 154312	16	7	10	.05	3.27
HD 155555	= V 824 Ara	HD 156427	HD 154577	11	7	10	.04	1.71
HD 158394/5	= V 1017 Sco	HD 157750	HD 158619	2	3	9	.01	–

Table 3. V magnitude and colors for the c and ck stars derived from standard stars. Errors are of the order of 0.01 magnitudes. The symbol ":" denotes errors of the order of 0.02 magnitudes

c or ck	V	U-B	B-V	V-R_c	V-I_c	c or ck	V	U-B	B-V	V-R_c	V-I_c
HD 16371	8.09	0.55:	0.90	0.48	0.93	HD 88351	6.59	0.54:	0.92	0.50	0.97
HD 16591	7.22	0.67:	0.94	0.51	0.96	HD 91682	8.51	0.26:	0.69	0.39	0.73
HD 16975	5.98	0.65	0.92	0.47	0.90	HD 97977	8.84	1.63:	1.42	0.75	1.43
HD 17322	7.63	0.04	0.58	0.33	0.65	HD 98251	9.20	1.44:	1.30	0.69	1.30
HD 26779	8.58	1.26:	1.23	0.64	1.20	HD 100912	8.63	0.43	0.93	0.51	1.00
HD 27274	7.64	1.11:	1.12	0.69	1.23	HD 101614	6.85	0.00:	0.58	0.34	0.65
HD 33563	7.54	-.04:	0.48	0.30	0.59	HD 101679	8.11	0.79:	1.09	0.59	1.14
HD 33725	8.04	0.42	0.80	0.44	0.84	HD 102076	7.11	0.77	1.01	0.52	0.98
HD 33747	8.75	0.72:	0.99	0.52	1.01	HD 102202	8.86	0.19	0.68	0.39	0.73
HD 33763	8.37	0.50:	0.89	0.49	0.94	HD 105796	8.06	0.94:	1.07	0.55	1.03
HD 34297	7.33	0.07:	0.65	0.38	0.74	HD 106270	7.58	0.29:	0.74	0.40	0.76
HD 34673	7.77	0.91	1.04	0.63	1.21	HD 117635	7.32	0.32:	0.78	0.46	0.86
HD 35230	7.58	0.47	0.88	0.48	0.93	HD 118330	7.04	-.01:	0.53	0.32	0.61
HD 35528	6.81	0.89:	1.06	0.53	0.99	HD 119076	6.87	0.87	1.16	0.60	1.14
SAO 195800	9.18	0.36:	0.85	0.47	0.91	HD 119164	7.20	1.14	1.28	0.64	1.22
HD 36003	7.64	1.13:	1.13	0.69	1.25	HD 128227	8.33	0.81	1.07	0.57	1.10
HD 36235	9.43	-.04:	0.52	0.31	0.61	HD 128618	8.03	1.61:	1.46	0.77	1.47
HD 36316	7.95	1.74:	1.46	0.78	1.51	HD 136480	7.35	1.11	1.16	0.60	1.15
HD 39601	8.18	0.28:	0.78	0.44	0.86	HD 137241	7.35	1.09	1.14	0.58	1.10
HD 39901	6.55	1.62:	1.36	0.71	1.32	HD 138363	7.12	0.94	1.13	0.61	1.15
HD 40865	8.64	0.05:	0.61	0.37	0.71	HD 139070	8.70	0.80	1.11	0.60	1.15
HD 61390	7.92	0.72	1.01	0.53	1.03	HD 140345	8.18	0.11:	0.63	0.35	0.68
HD 62061	7.51	0.08	0.60	0.33	0.65	HD 151272	7.44	0.41:	0.81	0.45	0.84
HD 80991	8.51	0.83:	1.04	0.54	1.02	HD 326583	9.52	0.10:	0.63	0.35	0.69
HD 81904	8.02	0.72:	0.98	0.51	0.98	HD 154312	7.98	0.02:	0.53	0.31	0.61
HD 82477	6.11	1.18	1.19	0.61	1.17	HD 154577	7.40	0.56:	0.88	0.53	0.99
HD 82508	7.58	0.35	0.71	0.40	0.80	HD 156427	7.41	1.69:	1.49	0.81	1.55
HD 85849	8.52	1.06:	1.14	0.58	1.11	HD 157750	8.03	0.17:	0.67	0.37	0.70
HD 86034	7.90	1.33:	1.26	0.63	1.20	HD 158619	6.41	1.26:	1.19	0.60	1.11

Table 4. Maximum luminosity (V_m) and corresponding colors measured for the program stars, inferred spectral classification (Spectral Type), distance range measured by the Hipparcos satellite (D_H), photometric distance inferred from the adopted spectral classification (d_{ph}) and V-band maximum luminosity ever observed (V_{max})

Program Star		V_m	U-B	B-V	V-R_c	V-I_c	Spectral Type	D_H	d_{ph}	V_{max}
HD 16157	= CC Eri	8.81	1.10	1.36	0.88	1.86	K7 V + M3 V	11.4 - 11.6	11.5	8.70
HD 17084	= UX For	8.05	0.23	0.75	0.44	0.89	G6 V + K3 V	39 - 42	39	7.95
HD 26354	= AG Dor	8.55	0.63	0.91	0.54	1.03	K1 V + K5 V	34 - 36	35	8.55
HD 32918	= YY Men	7.99	0.69	1.06	0.59	1.14	K1 III	247 - 355	219	7.93
1E 0505-0527	= EZ Eri	10.21	0.51	0.92	0.51	1.01	K2 IV + G2 V		290	10.17
HD 293857		9.26	0.21	0.72	0.42	0.82	G6-G9 V	31 - 213	52-63	9.26
HD 34802	= YZ Men	7.70	0.82	1.07	0.61	1.16	K1 III	162 - 201	185	7.52
EXO 0527-3329	= UX Col	10.55	0.80	1.07	0.64	1.23	K3/5 PMS		>43	10.53
HD 36705	= AB Dor	6.84	0.39	0.83	0.49	0.96	K0 V	14.8 - 15.1	14.9	6.75
EXO 0532-0510	= V1321 Ori	10.51	0.80	1.24	0.73	1.42	K3 wTTS		500	10.51
HD 39917	= SZ Pic	7.85	0.31	0.81	0.47	0.91	K0 IV/III + G3 IV/III	172 - 224	190	7.81
EXO 0556-3804	= TY Col	9.56	0.16	0.68	0.42	0.82	G5 V (PMS ?)		>83	9.53
HD 61245	= V344 Pup	6.86	0.82	1.04	0.56	1.05	K1 IV/III	105 - 119	102	6.85
HD 81410	= IL Hya	7.28	0.73	1.02	0.57	1.08	K1 III/IV + ?	108 - 133	119	7.20
HD 82558	= LQ Hya	7.80	0.57	0.90	0.53	1.02	K2 V	18.0 - 18.7	18.5	7.77
HD 86005	= LZ Vel	7.19	0.99	1.31	0.70	1.34	K4 III/II + K1 III/II	$\geq$ 650	$\geq$ 315	7.18
HD 89499		8.70	-.04	0.73	0.47	0.95	G-K IV ?	104 - 122	101-165	8.60
HD 98712	= SZ Crt	8.61	1.16	1.33	0.84	1.67	K7 V + M2/3 V	12.9 - 13.5	12.3	8.59
SAO 202618	= V858 Cen	10.50	0.53	0.90	0.54	1.05	K1 V/IV + M5:V		94	10.50
HD 101309	= V829 Cen	7.86	0.47	0.93	0.54	1.05	K1 IV + G5 V	110 - 135	127	7.82
HD 102077	= V838 Cen	8.95	0.55	0.92	0.56	1.08	K0/1 V + K5 V	44 - 55	42	8.85
HD 106225	= HU Vir	8.69	0.62	1.00	0.58	1.14	K1 IV + ?	108 - 148	170	8.55
HD 116544	= IN Vir	9.08	1.04	1.16	0.65	1.22	K3/4 IV/V	97 - 136	89	9.08
HD 119285	= V851 Cen	7.68	0.80	1.07	0.61	1.20	K3 IV/V	69 - 85	45	7.62
HD 127535	= V841 Cen	8.50	0.81	1.08	0.61	1.18	K3 IV/V	30 - 55	65	8.41
HD 136905	= GX Lib	7.30	0.72	1.03	0.57	1.10	K2 IV + ?	87 - 105	105	7.27
HD 139084	= V343 Nor	7.99	0.36	0.81	0.47	0.91	K0 PMS	38 - 42	>26	7.98
SAO 121177		9.15	0.40	0.84	0.50	0.96	G9/K0 V + K7 V	45 - 52	48	9.11
HD 154338	= V991 Sco	9.69	0.19	0.68	0.39	0.76	G4/5 PMS	>27	>91	9.67
HD 155555	= V825 Ara	6.83	0.36	0.81	0.48	0.91	G7 PMS + K0 PMS	30.7 - 32.2	33	6.63
HD 158394/5	= V1017 Sco	8.38	0.42	0.83	0.59	1.22	K3 III + A5 V	207 - 402	358	8.23