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Research Note

uvby photometry of the suspected variable stars 53 Tauri, 68 Tauri, HR 4072, and HR 6096

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Abstract. Strömgren *uvby* photometry of four suspected variable stars is presented. Observations made at the Four College Automated Photoelectric Telescope show that the two mercury–manganese stars 53 Tauri and HR 4072 and the metallic lined star 68 Tauri are non-variable on time scales of a few days to within in the accuracy of the observations. HR 6096, which has been classified as a mild silicon star, is not found to be variable and may be a metal-rich normal B star.

Key words: stars: individual 53 Tau – stars: individual HR 4072 – stars: individual 68 Tau – stars: individual HR 6096 – stars: peculiar A – stars: variable

1. Introduction

During the first two years (September 1990–July 1992) of regular operation of the 0.75-m Four College Automated Photoelectric Telescope on Mt. Hopkins, AZ, I have been engaged in a program of differential photometry of both non-magnetic and magnetic chemically peculiar stars of the upper main sequence. The usual pattern of observing was to obtain the dark count rate and then in each filter the sky-ch-c-v-c-v-c-v-c-ch-sky where sky is a reading of the sky, ch that of the check star, c that of the comparison star, and v that of the variable star. This paper presents results on four stars which have been suspected to be variable in the literature, the mercury–manganese stars 53 Tauri and HR 4072, the metallic-lined star 68 Tauri, and the mild silicon star HR 6096. The observations are given in Table 1 along with means and their standard deviations. No corrections have been made for neutral density filter differences among any stars of each variable, comparison, and check star group.

Whether non-magnetic CP stars are intrinsically variable is still an open question. Particular concerns with published studies include the small amplitudes claimed to be found (of order 0.01 mag), the relative paucity of values (often less than 20), the combination of small data sets taken many years apart, and the lack of information on the stability of the observations which I obtain from check-comparison star measurements. The photometric errors of the mean quoted in this paper are σ_{n-1}.

2. The mercury–manganese stars 53 Tauri and HR 4072

Two suspected low amplitude variable mercury–manganese stars are the spectroscopic binaries 53 Tau (=HR 1339 =HD 27295) and HR 4072 (=HD 89822). For 53 Tau, Winzer (1974) used 51 Tau (=HR 1331=HD 27176) as the comparison star. From 14 measurements he found $\Delta U = 0.863 \pm 0.005$ mag, $\Delta B = 0.483 \pm 0.005$ mag, and $\Delta V = 0.156 \pm 0.003$ mag for which he claimed slight variability with a period of 4.4320 d, close to the binary period of Abt & Snowden (1973) 4.4521 d. Winzer also performed photometry on HR 4072 with HR 4215 (=HD 93427) as the comparison star. For nine observations in one of three runs he found $\Delta U = -1.538 \pm 0.003$ mag, $\Delta B = -1.484 \pm 0.003$ mag, and $\Delta V = -1.466 \pm 0.002$ mag. This star he believed to have been constant.

Catalano & Leone (1991) presented photometry of three HgMn stars including 53 Tau and HR 4072 they claim are variables. For eight measurements of 53 Tau −51 Tau, $\Delta U = 0.863 \pm 0.010$ mag, $\Delta B = 0.483 \pm 0.007$ mag, and $\Delta V = 0.156 \pm 0.006$ mag. The differential magnitudes agree perfectly with Winzer. Combining these observations with those of Winzer, they find a period of 4.428 d with an amplitude of order 0.01 mag. For HR 4072 they used 32 UMa (=HR 4026=HD 88983) and HR 4215 as comparison stars and found a period of 7.5586 d and amplitudes of 0.02 mag or less from 27 observations which yield $\Delta U = -1.239 \pm 0.014$ mag, $\Delta B = -1.018 \pm 0.013$ mag, and $\Delta V = -0.827 \pm 0.010$ mag.

Table 1. *uvby* photometry

HJD	u v-c	u c-ch	v v-c	v c-ch	b v-c	b c-ch	y v-c	y c-ck
53 Tauri								
2448185.7697	-0.590	-0.306	-0.624	0.014	-0.565	0.248	-0.495	0.351
2448191.7845	-0.612	-0.282	-0.641	0.026	-0.581	0.259	-0.505	0.363
2448232.6800	-0.605	-0.290	-0.637	0.026	-0.578	0.254	-0.500	0.364
2448233.6907	-0.570	-0.312	-0.612	0.018	-0.559	0.238	-0.483	0.355
2448236.6834	-0.580	-0.308	-0.620	0.017	-0.566	0.249	-0.492	0.361
2448236.8403	-0.579	-0.309	-0.630	0.018	-0.564	0.249	-0.493	0.354
2448529.8652	-0.619	-0.275	-0.645	0.033	-0.594	0.249	-0.513	0.359
2448532.8626	-0.598	-0.290	-0.636	0.027	-0.582	0.238	-0.501	0.347
2448533.8605	-0.585	-0.294	-0.628	0.025	-0.575	0.240	-0.492	0.348
2448543.8343	-0.575	-0.314	-0.623	0.005	-0.565	0.225	-0.492	0.345
2448545.8924	-0.599	-0.294	-0.635	0.030	-0.577	0.245	-0.500	0.349
2448546.9040	-0.590	-0.304	-0.624	0.016	-0.578	0.230	-0.497	0.351
2448548.9064	-0.576	-0.309	-0.627	0.014	-0.574	0.232	-0.496	0.345
2448562.7649	-0.600	-0.294	-0.637	0.016	-0.587	0.242	-0.507	0.355
2448563.7718	-0.586	-0.304	-0.626	0.022	-0.573	0.233	-0.500	0.353
2448565.7661	-0.580	-0.312	-0.621	0.008	-0.569	0.230	-0.493	0.345
2448566.7606	-0.591	-0.287	-0.619	0.024	-0.562	0.229	-0.482	0.343
2448568.8673	-0.592	-0.297	-0.629	0.018	-0.579	0.236	-0.491	0.339
2448577.9098	-0.598	-0.289	-0.631	0.024	-0.585	0.240	-0.502	0.345
2448581.7193	-0.568	-0.318	-0.628	0.012	-0.571	0.221	-0.491	0.346
2448598.6803	-0.604	-0.285	-0.639	0.024	-0.588	0.243	-0.512	0.357
2448604.6723	-0.582	-0.313	-0.628	0.014	-0.576	0.230	-0.501	0.340
2448605.7808	-0.616	-0.277	-0.642	0.029	-0.590	0.245	-0.508	0.356
2448622.7987	-0.590	-0.299	-0.623	0.013	-0.568	0.229	-0.491	0.343
2448623.7514	-0.614	-0.300	-0.647	0.015	-0.587	0.229	-0.508	0.343
2448681.6251	-0.577	-0.306	-0.627	0.021	-0.570	0.234	-0.493	0.349
mean	-0.592	-0.298	-0.630	0.020	-0.576	0.238	-0.498	0.350
std. dev	0.014	0.012	0.009	0.007	0.009	0.010	0.008	0.007
HR 4072								
2448622.9218	-1.257	2.137	-1.059	1.965	-0.916	1.813	-0.813	1.722
2448630.8842	-1.270	2.153	-1.051	1.971	-0.902	1.823	-0.799	1.733
2448636.8647	-1.251	2.147	-1.047	1.964	-0.913	1.823	-0.808	1.729
2448638.8365	-1.252	2.134	-1.052	1.979	-0.904	1.807	-0.813	1.721
2448645.8990	-1.248	2.131	-1.065	1.977	-0.918	1.819	-0.814	1.722
2448646.8966	-1.240	2.145	-1.047	1.969	-0.907	1.819	-0.801	1.717
2448648.8434	-1.251	2.144	-1.052	1.968	-0.911	1.821	-0.812	1.730
2448649.8457	-1.256	2.135	-1.068	1.969	-0.914	1.815	-0.813	1.727
2448650.8473	-1.264	2.140	-1.064	1.969	-0.901	1.809	-0.818	1.721
2448651.8358	-1.256	2.153	-1.056	1.980	-0.912	1.826	-0.814	1.733
2448681.7852	-1.238	2.136	-1.051	1.973	-0.900	1.820	-0.804	1.722
2448692.8072	-1.255	2.150	-1.053	1.979	-0.903	1.822	-0.798	1.726
2448695.7446	-1.248	2.141	-1.057	1.978	-0.910	1.828	-0.814	1.728
2448696.7333	-1.262	2.152	-1.064	1.983	-0.917	1.831	-0.820	1.738
2448702.7207	-1.249	2.139	-1.056	1.975	-0.904	1.821	-0.814	1.727
2448719.6793	-1.252	2.137	-1.049	1.965	-0.902	1.818	-0.804	1.724
2448721.6796	-1.246	2.147	-1.046	1.977	-0.908	1.824	-0.805	1.724
2448722.6801	-1.242	2.135	-1.047	1.968	-0.898	1.807	-0.806	1.718
2448724.6811	-1.259	2.141	-1.055	1.969	-0.911	1.812	-0.812	1.722
2448725.6817	-1.254	2.136	-1.057	1.968	-0.913	1.814	-0.815	1.713
2448726.6822	-1.249	2.136	-1.057	1.972	-0.905	1.816	-0.807	1.726
2448732.6929	-1.252	2.149	-1.047	1.970	-0.911	1.818	-0.806	1.719
2448733.6685	-1.247	2.145	-1.047	1.971	-0.903	1.817	-0.807	1.725
2448734.6659	-1.248	2.132	-1.054	1.961	-0.911	1.809	-0.811	1.714
mean	-1.252	2.141	-1.054	1.972	-0.908	1.818	-0.809	1.724
std. dev.	0.007	0.007	0.006	0.006	0.006	0.006	0.006	0.006
68 Tauri								
year 1								
2448173.8207	-0.644	-0.826	-0.638	-0.979	-0.550	-0.862	-0.489	-0.759
2448177.8063	-0.645	-0.817	-0.632	-0.984	-0.548	-0.869	-0.486	-0.768
2448178.8109	-0.645	-0.821	-0.633	-0.982	-0.546	-0.869	-0.487	-0.760
2448182.8001	-0.643	-0.817	-0.633	-0.981	-0.548	-0.862	-0.485	-0.760
2448183.7931	-0.648	-0.814	-0.636	-0.979	-0.549	-0.866	-0.490	-0.773
2448185.7880	-0.639	-0.816	-0.636	-0.982	-0.552	-0.866	-0.495	-0.760
2448191.8574	-0.643	-0.825	-0.632	-0.984	-0.549	-0.868	-0.491	-0.764
2448193.7605	-0.648	-0.806	-0.643	-0.985	-0.561	-0.866	-0.489	-0.766
2448218.7132	-0.646	-0.804	-0.646	-0.985	-0.559	-0.882	-0.489	-0.773
2448219.7104	-0.651	-0.815	-0.636	-0.981	-0.549	-0.880	-0.482	-0.778
2448232.6878	-0.651	-0.810	-0.642	-0.983	-0.559	-0.869	-0.498	-0.753
2448233.8561	-0.659	-0.810	-0.662	-0.973	-0.560	-0.879	-0.496	-0.789
2448235.8492	-0.652	-0.824	-0.643	-0.988	-0.560	-0.872	-0.498	-0.765
2448236.8482	-0.651	-0.821	-0.648	-0.991	-0.562	-0.874	-0.489	-0.775
2448529.8840	-0.649	-0.828	-0.649	-0.989	-0.564	-0.881	-0.503	-0.772
mean	-0.647	-0.817	-0.640	-0.983	-0.554	-0.871	-0.491	-0.769
std. dev.	0.004	0.007	0.006	0.003	0.006	0.007	0.006	0.007
year 2								
2448531.8571	-0.642	-0.829	-0.638	-0.991	-0.555	-0.888	-0.495	-0.773
2448532.8545	-0.650	-0.828	-0.643	-0.987	-0.559	-0.883	-0.497	-0.772
2448533.8523	-0.649	-0.830	-0.639	-0.987	-0.557	-0.886	-0.497	-0.771
2448534.8526	-0.645	-0.828	-0.642	-0.984	-0.561	-0.884	-0.500	-0.769
2448543.8260	-0.647	-0.824	-0.646	-0.978	-0.560	-0.884	-0.499	-0.769
2448544.8225	-0.644	-0.821	-0.643	-0.984	-0.566	-0.877	-0.499	-0.765
2448545.8218	-0.645	-0.833	-0.642	-0.981	-0.556	-0.884	-0.497	-0.763
2448547.8173	-0.647	-0.808	-0.633	-0.969	-0.555	-0.867	-0.489	-0.754
2448548.8126	-0.624	-0.841	-0.618	-1.005	-0.537	-0.901	-0.474	-0.786
2448549.8093	-0.659	-0.919	-0.657	-1.063	-0.578	-0.936	-0.512	-0.814
2448561.7815	-0.640	-0.826	-0.635	-0.984	-0.555	-0.881	-0.492	-0.770
2448562.7730	-0.653	-0.828	-0.646	-0.991	-0.564	-0.883	-0.501	-0.774

Table 1 (continued)

HJD	u v-c	u c-ch	v v-c	v c-ch	b v-c	b c-ch	y v-c	y c-ck
68 Tauri (year 2 continued)								
2448563.7799	-0.644	-0.812	-0.643	-0.976	-0.563	-0.869	-0.500	-0.760
2448564.7743	-0.644	-0.825	-0.643	-0.986	-0.560	-0.881	-0.498	-0.770
2448565.7742	-0.646	-0.824	-0.647	-0.982	-0.566	-0.883	-0.506	-0.764
2448566.7686	-0.643	-0.821	-0.638	-0.985	-0.559	-0.880	-0.496	-0.766
2448567.8742	-0.646	-0.817	-0.642	-0.973	-0.561	-0.868	-0.497	-0.760
2448568.8754	-0.647	-0.828	-0.642	-0.984	-0.565	-0.882	-0.502	-0.768
2448577.9179	-0.654	-0.819	-0.648	-0.987	-0.569	-0.877	-0.510	-0.765
2448578.7358	-0.632	-0.830	-0.629	-0.983	-0.550	-0.884	-0.484	-0.772
2448581.7274	-0.653	-0.809	-0.640	-0.982	-0.564	-0.878	-0.500	-0.779
2448583.7234	-0.658	-0.812	-0.655	-0.978	-0.573	-0.868	-0.509	-0.759
2448590.7108	-0.656	-0.821	-0.652	-0.978	-0.577	-0.869	-0.513	-0.754
2448598.6885	-0.644	-0.831	-0.642	-0.996	-0.561	-0.887	-0.499	-0.780
2448604.7808	-0.653	-0.828	-0.648	-0.995	-0.569	-0.881	-0.508	-0.774
2448605.7890	-0.642	-0.830	-0.638	-0.988	-0.557	-0.881	-0.500	-0.764
2448636.7608	-0.646	-0.822	-0.644	-0.978	-0.561	-0.879	-0.502	-0.774
2448638.7449	-0.652	-0.822	-0.649	-0.980	-0.569	-0.892	-0.514	-0.761
2448639.7484	-0.653	-0.816	-0.649	-0.980	-0.568	-0.870	-0.507	-0.763
2448640.6998	-0.643	-0.837	-0.643	-0.987	-0.559	-0.884	-0.497	-0.772
mean	-0.647	-0.824	-0.643	-0.984	-0.562	-0.880	-0.501	-0.768
std. dev.	0.006	0.007	0.005	0.006	0.006	0.006	0.007	0.006
both years								
mean	-0.647	-0.822	-0.642	-0.984	-0.560	-0.877	-0.497	-0.767
std. dev.	0.005	0.008	0.006	0.005	0.007	0.008	0.008	0.007
HR 6096								
year 1								
2448271.0550	-0.213	-0.984	-0.104	-1.251	...	...	...	...
2448272.0522	-0.227	-0.970	-0.099	-1.258	...	...	...	...
2448273.0496	-0.222	-0.985	-0.100	-1.256	...	...	...	...
2448281.0284	-0.227	-0.979	-0.105	-1.256	...	...	...	...
2448285.0177	-0.222	-0.987	-0.102	-1.262	...	...	...	...
2448308.0212	-0.222	-0.976	-0.097	-1.256	...	...	...	...
2448309.1088	-0.221	-0.983	-0.104	-1.239	...	...	...	...
2448318.9898	-0.220	-0.981	-0.099	-1.255	...	...	...	...
2448320.9860	-0.220	-0.981	-0.099	-1.280	...	...	...	...
2448322.9800	-0.220	-1.009	-0.101	-1.256	...	...	...	...
2448329.9608	-0.220	-0.980	-0.101	-1.252	...	...	...	...
2448332.9526	-0.222	-0.974	-0.104	-1.255	...	...	...	...
2448338.9245	-0.254	-0.938	-0.162	-1.193	-0.088	-1.010	-0.035	-0.934
2448346.8981	-0.221	-0.972	-0.099	-1.249	-0.050	-1.045	-0.006	-0.938
2448348.8926	-0.221	-0.977	-0.099	-1.254	-0.053	-1.048	-0.015	-0.936
2448350.8872	-0.217	-1.036	-0.100	-1.290	-0.055	-1.047	-0.004	-0.945
2448351.8849	-0.219	-1.006	-0.101	-1.271	-0.051	-1.063	-0.008	-0.962
2448352.8819	-0.190	-0.942	-0.060	-1.236	-0.019	-1.029	0.025	-0.938
2448353.8792	-0.223	-0.982	-0.104	-1.248	-0.057	-1.045	-0.015	-0.942
2448355.8740	-0.223	-0.975	-0.102	-1.251	-0.057	-1.044	-0.019	-0.940
2448356.8719	-0.216	-0.978	-0.095	-1.249	-0.049	-1.047	-0.007	-0.936
2448357.8692	-0.214	-0.975	-0.099	-1.256	-0.053	-1.045	-0.009	-0.943
2448359.8640	-0.219	-0.972	-0.101	-1.255	-0.054	-1.045	-0.016	-0.933
2448360.8602	-0.220	-0.973	-0.100	-1.255	-0.054	-1.047	-0.013	-0.947
2448361.8582	-0.222	-0.980	-0.100	-1.253	-0.055	-1.046	-0.014	-0.941
2448364.8488	-0.214	-0.985	-0.098	-1.258	-0.052	-1.048	-0.014	-0.944
2448366.8452	-0.217	-0.972	-0.102	-1.248	-0.052	-1.044	-0.013	-0.937
2448389.8239	-0.222	-0.972	-0.098	-1.257	-0.052	-1.047	-0.013	-0.939
mean	-0.220	-0.979	-0.100	-1.255	-0.053	-1.046	-0.013	-0.940
std. dev.	0.003	0.008	0.002	0.007	0.002	0.001	0.004	0.004
year 2								
2448679.9736	-0.218	-0.966	-0.100	-1.244	-0.055	-1.042	-0.013	-0.933
2448680.9714	-0.224	-0.982	-0.103	-1.245	-0.055	-1.052	-0.024	-0.933
2448681.9344	-0.221	-0.976	-0.106	-1.240	-0.059	-1.039	-0.016	-0.930
2448692.9054	-0.220	-0.963	-0.101	-1.233	-0.050	-1.034	-0.016	-0.916
2448695.8974	-0.223	-0.970	-0.097	-1.251	-0.057	-1.048	-0.012	-0.938
2448696.8948	-0.223	-0.974	-0.108	-1.241	-0.052	-1.041	-0.022	-0.928
2448702.8790	-0.215	-0.978	-0.102	-1.248	-0.048	-1.049	-0.002	-0.953
2448705.8710	-0.228	-0.961	-0.102	-1.243	-0.054	-1.040	-0.016	-0.927
2448718.8838	-0.221	-0.977	-0.102	-1.247	-0.052	-1.049	-0.015	-0.937
2448721.8765	-0.223	-0.967	-0.107	-1.243	-0.064	-1.039	-0.024	-0.924
2448722.8723	-0.224	-0.972	-0.106	-1.245	-0.059	-1.040	-0.022	-0.930
2448724.8681	-0.221	-0.971	-0.100	-1.251	-0.053	-1.049	-0.016	-0.932
2448726.9492	-0.239	-0.957	-0.117	-1.224	-0.065	-1.027	-0.025	-0.918
2448732.8394	-0.215	-0.977	-0.089	-1.251	-0.049	-1.047	-0.009	-0.941
2448733.8636	-0.213	-0.970	-0.098	-1.237	-0.048	-1.045	-0.010	-0.929
2448734.8763	-0.222	-0.966	-0.101	-1.248	-0.056	-1.042	-0.016	-0.934
2448736.9184	-0.231	-0.964	-0.105	-1.248	-0.061	-1.040	-0.016	-0.938
2448738.8713	-0.219	-0.977	-0.097	-1.246	-0.050	-1.038	-0.018	-0.929
2448739.9074	-0.227	-0.970	-0.107	-1.245	-0.056	-1.048	-0.022	-0.937
2448740.8611	-0.221	-0.970	-0.101	-1.248	-0.054	-1.038	-0.018	-0.931
2448741.8589	-0.212	-0.976	-0.097	-1.253	-0.047	-1.047	-0.009	-0.941
2448749.7968	-0.225	-0.971	-0.099	-1.243	-0.057	-1.042	-0.014	-0.936
2448750.7951	-0.217	-0.972	-0.099	-1.247	-0.052	-1.045	-0.009	-0.934
2448751.7490	-0.222	-0.961	-0.101	-1.225	-0.044	-1.035	-0.020	-0.920
2448755.7826	-0.220	-0.963	-0.096	-1.247	-0.049	-1.044	-0.009	-0.937
2448759.7711	-0.208	-0.977	-0.089	-1.249	-0.037	-1.050	0.013	-0.947
mean	-0.221	-0.970	-0.101	-1.244	-0.053	-1.043	-0.015	-0.933
std. dev.	0.006	0.006	0.006	0.007	0.006	0.006	0.008	0.008
both years								
mean	-0.221	-0.972	-0.101	-1.247	-0.053	-1.044	-0.014	-0.935
std. dev.	0.005	0.006	0.005	0.008	0.005	0.005	0.007	0.008

By comparison 26 Four College APT observations of 53 Tau were made using HR 1375 (=HD 27742) as the comparison star and 51 Tau as the check star. The similarity of the rms value of the v-c and c-ch data for each filter in Table 1 is not suggestive of variability. For HR 4072, 24 observations were made with 32 UMa as the comparison star and HD 93427 as the check star. Again the observations given in Table 1 are not indicative of variability.

As the suspected variability is of low amplitude, an analysis was made using the Scargle periodogram (Scargle 1982; Horne & Baliunas 1986) of one typical color of each set of observations. The B data of Winzer and of Catalano & Leone were studied as were the y data from the Four College APT. Since no set of data exhibited any frequencies whose power S/N ratio exceeded that needed for 1% significance, both 53 Tau and HR 4072 are constant to within the errors of the photometry. It is also desirable to observe other HgMn stars, such as α And and HD 3322 for which there are claims in the literatures concerning their variability as well as additional observations of 53 Tau and HR 4072 to place further limitations on their variability.

3. The metallic-lined star 68 Tauri

Winzer (1974) noted that 68 Tauri (=HR 1389=HD 27962) which is a prototype hot metallic-lined star and blue straggler belonging to the Hyades was probably constant to better than 0.01 mag based the results of a single observing run. From observations taken on 11 nights over 20 d he found relative to 64 Tau (=HR 1380=HD 27819) $\Delta U = -0.663 \pm 0.003$ mag, $\Delta B = -0.606 \pm 0.003$ mag, and $\Delta V = -0.507 \pm 0.002$ mag. Kuvshinov et al. (1976) using the same comparison star and observations over some 700 d found this star to be variable with a period of 57.25 d. Catalano & Leone (1989) using these data sets and their own observations (not included in their paper) found a period of 21.2637 d with an amplitude in U of about 0.01 mag. Kuvshinov et al. (1976) found for 68 Tau-64 Tau $\Delta U = -0.669 \pm 0.005$ mag, $\Delta B = -0.621 \pm 0.004$ mag, and $\Delta V = -0.523 \pm 0.003$ mag. Their 22 observations were taken before those of Winzer. Their standard deviations do not suggest variability, but between the two sets of observations the magnitude differences between 68 Tau and 64 Tau changed. From these sets of observations which do not include a second comparison or check star, it is hard to know whether 68 Tau or 64 Tau is possibly variable over on a long time period.

Four College APT observations of 68 Tau were made over a two year period using 64 Tauri as the comparison star and 80 Tau (=HR 1422=HD 28485) as the check star. In Table 1 the mean and standard deviations are given for year 1 and 2 as well as for the entire set of observations. The variable-comparison star data is probably not indicative of short term variability although the b and y yearly means show differences similar to that between the two sets of UBV data. The standard deviations of the variable-check star data are usually slightly larger than those for the comparison-check star data. This may reflect in part that on the sky the variable and comparison are relatively close together relative to the check star. Also during the observing period the extinction changed due to a major volcanic eruption.

For both UBV data sets, the B photometry was subjected to a periodogram analysis as was the v FCAPT data. Again the maximum power was about one-half of that required for 1% significance. This indicates that on a short term basis 68 Tau is constant to within the errors of the observations. But the shifts in the mean magnitude differences seen in different data sets between 68 Tau and 64 Tau, although of order 0.01 mag, still need to be more carefully checked.

4. HR 6096, a possible mild silicon star

Cowley et al. (1969) and Cowley (1979) classified HR 6096 (=HD 147550) as a Si: peculiar A star. van den Heuvel (1971) examined this star for a magnetic field with a Zeeman analyzer at the Lick Observatory coudé spectrograph. On his four spectrograms the measured magnetic field was smaller than two probable errors which meant there was no indication of the presence of a magnetic field in this star. However, he found that this star was a spectroscopic binary. There was no evidence for spectroscopic variability. Bonsack (1974) included this star in his spectrum variation survey. He also did not detect any variability and did not confirm any silicon excess. Optical region spectrophotometry (Adelman 1982) indicates at best a low level of variability and of peculiarity. In particular none of the broad continuum features are present. Examination of Mt. Wilson Observatory 4.3 Å mm^{-1} spectra suggests that this star is slightly metal rich. McAlister et al. (1987) were unable to resolve the components with speckle interferometry using the 3.6 m CFH telescope.

During the first year of operation of the Four College APT 12 *uvby* and 12 *uv* observations of HR 6096 were made compared with 26 *uvby* observations during the second year. HR 6041 (=HD 145788) was the comparison star and σ Ser (=HR 6093=HD 147449) the check star. The photometry is not suggestive of variability for HR 6096. There is a suggestion that the check star might be as there are order 0.005 mag differences in the check-comparison yearly values but not in the variable-comparison values. For consistency the v data were subjected to a periodogram analysis which again indicated constancy. Rather than being a mild Ap star HR 6096 may well be a metal-rich normal B star. An elemental abundance analysis may help establish to what class this star belongs.

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