

BVRI PHOTOMETRY OF THE S STAR HD 35155

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Abstract. Johnson *BV* and Cousins *RI* differential photometric observations of the eclipsing S star HD 35155 are reported. The four light curves are in phase. There is some evidence that the light curves are not perfectly repeatable with phase.

Key words: stars: carbon, variables, individual: HD 35155 –
techniques: photographic photometry

1. INTRODUCTION

Jorissen, Mayor, Manfroid & Sterken (1992) discovered that the S4,1 star HD 35155 ($V = 6.91$) was an eclipsing S star with a period of 642 days. It had been monitored as part of the Long-Term Photometry of Variables program at ESO (Sterken 1983) which obtained Strömgren *uvby* photometry. Details of the orbital elements are given in Jorissen & Mayor (1992) who used a different, but equivalent value of T (2446778 instead of 2445494). The photometry, when plotted according to orbital phase, shows a great deal of scatter with the phases corresponding to eclipse and transit showing no particular signature. When plotted against time, it shows some brightening, some diminutions and some scatter.

2. BVRI PHOTOMETRY

With the 75 cm Four College Automated Photoelectric Telescope (FCAPT) on Mt. Hopkins, Arizona, I obtained 16 sets of differential Johnson *BV* and Cousins *RI* photometry of HD 35155 during the 1993–94 observing season and 25 sets during 1995–96 (Table 1). The

dark count and then in each filter the following measurements were obtained: *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. The comparison and check stars were HD 36379 (spectral type G0, Hoffleit, Saladyga & Wlasuk 1983) and HD 35536 (= HR 1799, spectral type K5 III) (Hoffleit 1982).

Fig. 1 shows the photometry obtained during the two years of observing. The values for the 1993–94 season are plotted in the left hand column and for the 1995–96 season in the right hand column. Dates HJD 2449346 and 2449988 correspond to orbital phase 0.00. In the region of overlap, the photometric values do not form a smooth curve suggesting that the light curves may not be periodic.

Ake, Johnson & Ameen (1991) presented evidence to show that the variations outside of eclipse are related to the companion interacting with the giant's wind. The amplitudes in *B*, *V*, *R* and *I* are at least 0.18, 0.24, 0.24 and 0.14 mag, respectively. The light curves in different colors are similar. Although the published photometry is somewhat fragmentary (Jorissen et al. 1992, Jorissen & Mayor 1992), HD 35155 behaves as in the left panel which covers 40 days while at other times there are more rapid brightenings and diminutions. More complete photometry of this star is desirable to determine the repeatability and variability of the light curves on different time scales.

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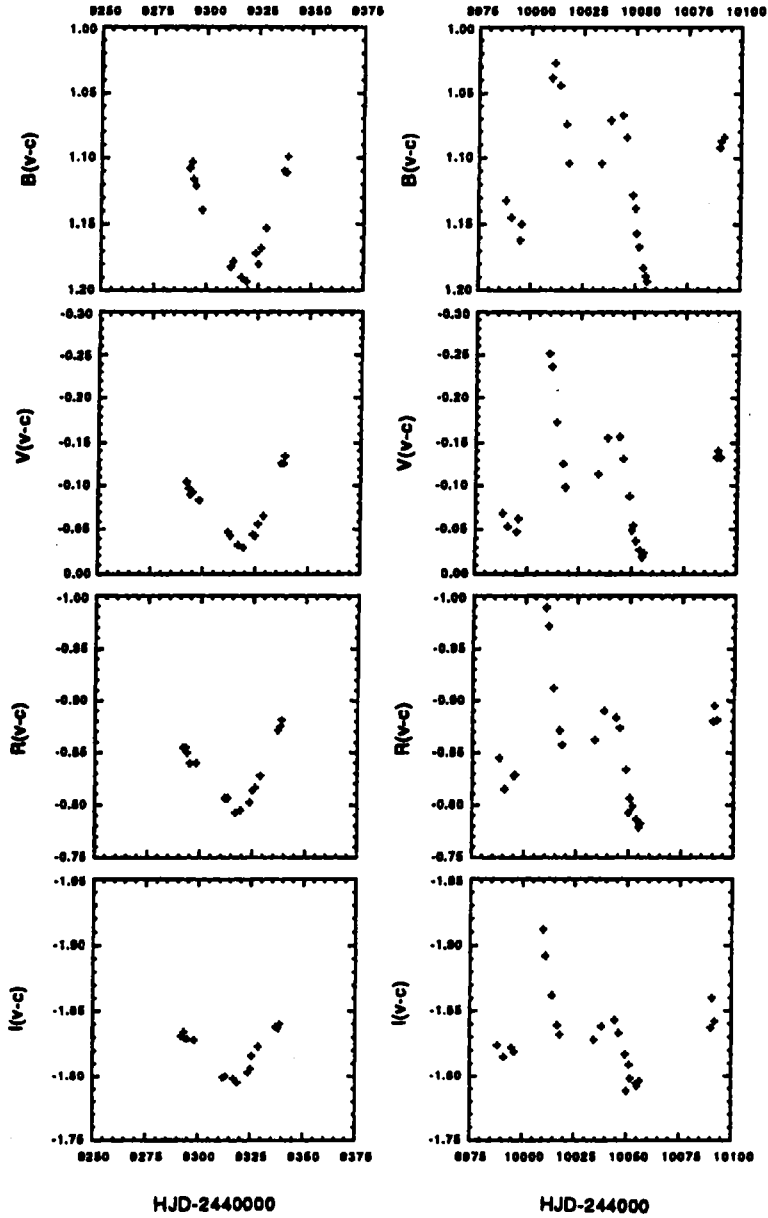


Fig. 1. BVRI differential photometry of HD 35155 obtained with the Four College Automated Photoelectric Telescope. The left panels show the values obtained during the 1993-94 observing season and the right panels show the values from the 1995-96 season. Phase 0.00 occurs at HJDs 2449436 and 2449988.

Table 1. BVRI Photometry of HD 35155

Heliocentric Julian Date	v-c	B ch-c	v-c	V ch-c	v-c	R ch-c	v-c	I ch-c
2449291.9952	1.108	0.377	-0.104	1.365	-0.855	1.852	-1.831	2.311
2449292.8493	1.103	0.367	-0.097	1.364	-0.855	1.854	-1.834	2.314
2449293.8632	1.116	0.362	-0.090	1.347	-0.849	1.843	-1.829	2.308
2449294.9111	1.121	0.350	-0.093	1.353	-0.840	1.842	-1.829	2.312
2449297.9577	1.139	0.352	-0.083	1.350	-0.839	1.843	-1.828	2.307
2449311.9411	1.182	0.367	-0.047	1.364	-0.806	1.850	-1.799	2.318
2449312.9371	1.178	0.361	-0.043	1.353	-0.806	1.844	-1.800	2.309
2449316.9331	1.190	0.358	-0.033	1.352	-0.792	1.842	-1.798	2.309
2449318.9246	1.193	0.362	-0.030	1.358	-0.795	1.848	-1.795	2.310
2449323.9043	1.172	0.355	-0.044	1.351	-0.802	1.842	-1.803	2.299
2449324.9120	1.180	0.353	-0.043	1.349	-0.813	1.842	-1.806	2.305
2449325.9086	1.168	0.362	-0.056	1.360	-0.816	1.848	-1.816	2.309
2449328.9006	1.153	0.356	-0.066	1.345	-0.827	1.842	-1.823	2.308
2449336.8741	1.110	0.353	-0.125	1.348	-0.871	1.836	-1.838	2.305
2449337.8739	1.111	0.355	-0.126	1.348	-0.874	1.840	-1.837	2.306
2449338.8693	1.099	0.359	-0.135	1.355	-0.881	1.843	-1.840	2.306
1993-94								
average	1.145	0.359	-0.076	1.354	-0.833	1.844	-1.819	2.308
std. dev.	0.035	0.007	0.035	0.006	0.030	0.005	0.016	0.004
2449987.9244	1.132	0.360	-0.069	1.342	-0.844	1.828	-1.824	2.295
2449990.9186	1.145	0.368	-0.054	1.348	-0.815	1.851	-1.815	2.310
2449994.9044	1.162	0.356	-0.048	1.345	-0.827	1.844	-1.822	2.310
2449995.9200	1.150	0.368	-0.063	1.355	-0.828	1.849	-1.819	2.313
2450010.0307	1.038	0.369	-0.252	1.369	-0.988	1.866	-1.912	2.343
2450011.0295	1.027	0.375	-0.237	1.361	-0.971	1.858	-1.892	2.326
2450014.0211	1.044	0.359	-0.174	1.346	-0.912	1.841	-1.862	2.314
2450017.0050	1.074	0.354	-0.126	1.350	-0.871	1.842	-1.839	2.310
2450017.9932	1.104	0.355	-0.099	1.358	-0.857	1.847	-1.832	2.314
2450033.9677	1.104	0.356	-0.114	1.350	-0.862	1.841	-1.828	2.304
2450037.9572	1.071	0.360	-0.155	1.360	-0.890	1.844	-1.838	2.305
2450043.9291	1.067	0.361	-0.157	1.357	-0.883	1.843	-1.843	2.314
2450045.9255	1.084	0.370	-0.131	1.358	-0.873	1.853	-1.833	2.316
2450048.9301	1.128	0.360	-0.088	1.353	-0.833	1.843	-1.817	2.312
2450049.9220	1.138	0.379	-0.049	1.363	-0.792	1.838	-1.788	2.318
2450050.9216	1.157	0.366	-0.055	1.365	-0.806	1.843	-1.809	2.313
2450051.9231	1.167	0.362	-0.037	1.354	-0.798	1.842	-1.798	2.308
2450053.9168	1.183	0.354	-0.026	1.350	-0.786	1.844	-1.794	2.310
2450054.9029	1.189	0.366	-0.019	1.355	-0.778	1.841	-1.792	2.304
2450055.9018	1.193	0.362	-0.023	1.360	-0.782	1.846	-1.796	2.314
2450089.7095	1.092	0.357	-0.133	1.351	-0.880	1.846	-1.837	2.316
2450090.7065	1.087	0.323	-0.141	1.346	-0.894	1.839	-1.860	2.320
2450091.7029	1.084	0.347	-0.133	1.341	-0.881	1.838	-1.842	2.309
1995-96								
average	1.114	0.360	-0.104	1.354	-0.854	1.845	-1.830	2.313
std. dev.	0.050	0.011	0.065	0.007	0.056	0.007	0.031	0.009