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PHOTOELECTRIC BVI$_C$ OBSERVATIONS AND NEW ELEMENTS FOR THE RR LYRAE STAR SU Col

SU Col was included in our program of photoelectric observations for Cepheids because it is classified in GCVS-IV as a type II Cepheid with a period of P = 21.55 days. We observed the star at CTIO in September and October 1996 using the 0.6–m reflector. A total of 75 BVI_c measurements were obtained (Table 1), the accuracy of the individual data being near $\pm 0\overset{m}{.}01$ in all filters.

As observations were accumulated it became clear that SU Col is not a Cepheid. Gessner (1985) suggested previously that SU Col is an RR Lyrae star with the elements:

$$\text{Max JD}_{hel} = 2428763.655 + 0.487361 \times \text{E}.$$

Those elements are used in Figure 1 for plotting our new observations. The data indicate that SU Col is indeed an RR Lyrae variable and that the amplitude of the light curve is at present $0\overset{m}{.}77$ in V, $0\overset{m}{.}29$ in $B-V$ and $0\overset{m}{.}33$ in $V-I_c$, while the epoch of maximum light is JD 2450363.870 $\pm$0.005.

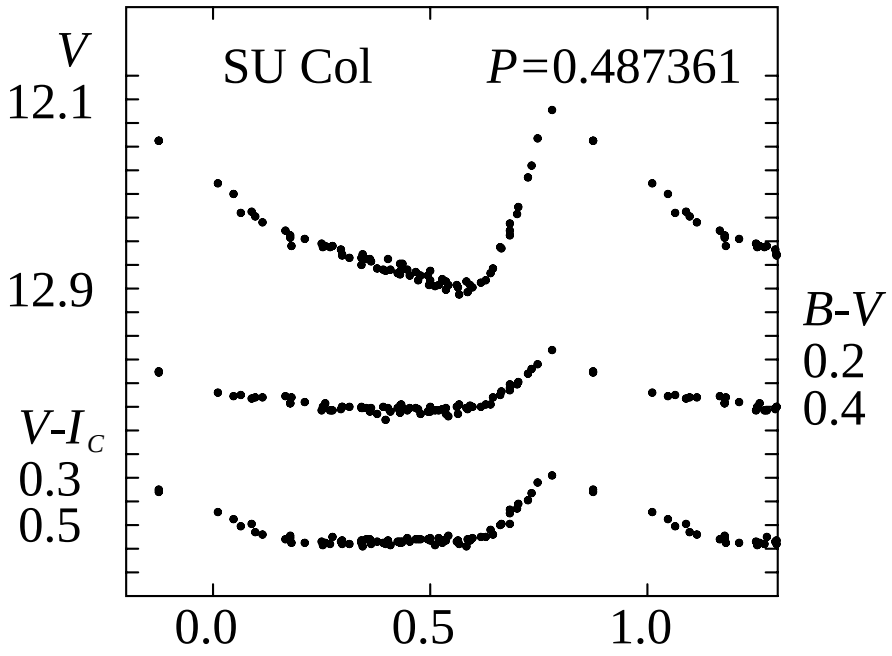

Figure 1

Table 1

JD_{hel} 2450300+	V	$B-V$	$V-I_c$	JD_{hel} 2450300+	V	$B-V$	$V-I_c$
51.7380	12.266	0.249	0.350	61.7894	12.859	0.399	0.562
52.7967	12.493	0.352	0.472	61.8065	12.864	0.427	0.562
53.6872	12.268	0.255	0.356	61.8341	12.878	0.393	0.564
54.7276	12.446	0.335	0.444	61.8595	12.807	0.357	0.536
54.7705	12.588	0.358	0.529	61.8785	12.647	0.319	0.449
55.7282	12.573	0.347	0.501	62.6872	12.795	0.403	0.574
55.7856	12.711	0.358	0.574	62.7051	12.806	0.425	0.568
57.6904	12.570	0.361	0.495	62.7201	12.812	0.418	0.581
57.7278	12.647	0.352	0.560	62.7278	12.830	0.401	0.570
57.7492	12.683	0.377	0.571	62.7408	12.837	0.402	0.567
57.7693	12.702	0.414	0.567	62.7478	12.822	0.402	0.560
57.7805	12.714	0.411	0.547	62.7613	12.840	0.416	0.560
57.7899	12.730	0.409	0.566	62.7743	12.878	0.414	0.554
57.8005	12.761	0.398	0.576	62.7838	12.876	0.436	0.544
57.8131	12.763	0.398	0.564	62.7947	12.889	0.426	0.562
57.8435	12.766	0.404	0.561	62.8109	12.888	0.398	0.551
57.8590	12.786	0.403	0.566	62.8205	12.866	0.398	0.545
58.6772	12.615	0.359	0.535	62.8323	12.827	0.389	0.519
58.7077	12.676	0.384	0.552	62.8428	12.718	0.347	0.496
58.7475	12.714	0.382	0.575	62.8535	12.668	0.300	0.490
58.7524	12.717	0.412	0.579	62.8618	12.577	0.301	0.425
58.7888	12.748	0.401	0.587	62.8775	12.372	0.237	0.365
58.8315	12.790	0.393	0.575	63.6884	12.819	0.452	0.578
58.8659	12.818	0.418	0.553	63.7045	12.835	0.422	0.570
59.6831	12.667	0.383	0.544	63.7256	12.856	0.410	0.556
59.7200	12.719	0.397	0.584	63.7381	12.880	0.411	0.560
59.7409	12.749	0.397	0.564	63.7443	12.881	0.415	0.582
59.7685	12.766	0.401	0.557	63.7564	12.900	0.404	0.559
59.7736	12.777	0.400	0.580	63.7717	12.920	0.389	0.580
59.8069	12.810	0.390	0.572	63.7809	12.906	0.408	0.556
59.8541	12.854	0.405	0.573	63.8017	12.859	0.390	0.545
59.8696	12.877	0.395	0.569	63.8181	12.721	0.333	0.490
59.8806	12.864	0.403	0.587	63.8287	12.618	0.326	0.433
61.6903	12.757	0.395	0.581	63.8379	12.548	0.292	0.408
61.7222	12.768	0.416	0.559	63.8484	12.423	0.259	0.391
61.7362	12.816	0.394	0.577	63.8588	12.257	0.218	0.319
61.7631	12.814	0.414	0.552	63.8752	12.140	0.157	0.288
61.7792	12.842	0.425	0.557				

$MaxJD_{hel}$ 2400000+	Uncertainty	E	O−C
28763.659	±0.01	−44321	0.001
28783.636	±0.03	−44280	−0.003
28785.643	±0.03	−44276	0.054
28787.597	±0.03	−44272	0.059
28848.458	±0.03	−44147	0.000
28849.519	±0.03	−44145	0.086
28874.342	±0.03	−44094	0.054
28891.357	±0.03	−44059	0.012
28893.327	±0.03	−44055	0.032
28930.325	±0.01	−43979	−0.009
28933.314	±0.03	−43973	0.056
34303.488	±0.03	−32954	0.027
34325.437	±0.03	−32909	0.045
38374.403	±0.03	−24601	0.037
38377.379	±0.03	−24595	0.089
38697.521	±0.03	−23938	0.037
38785.291	±0.03	−23758	0.082
39150.286	±0.03	−23009	0.046
39409.570	±0.03	−22477	0.055
39410.558	±0.03	−22475	0.068
50363.870	±0.05	0	0.000

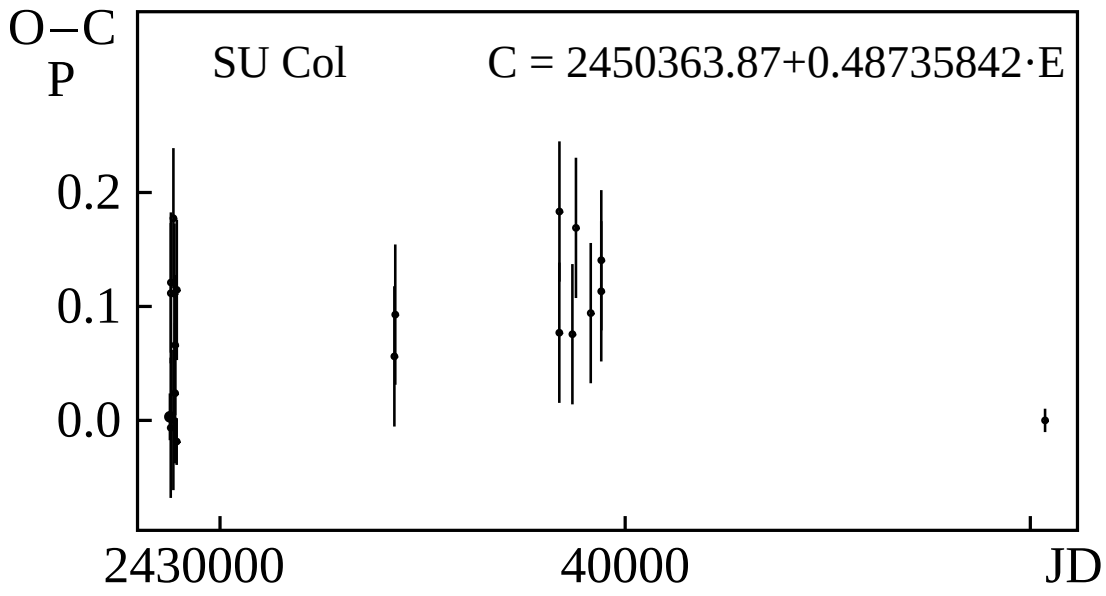

Figure 2

The slight offset in phase of the light curve in Figure 1 implies that Gessner's elements do not satisfy our observations. In order to derive a more reliable period, we searched Gessner's data for times near maximum photographic brightness and combined the epochs with the present results. Two epochs taken from Gessner's data appear to lie very close to true light maximum since the star was brighter at those times than at others. Those epochs were assigned an uncertainty of $\pm 0\overset{d}{.}01$, while the remaining 20 instants near maximum photographic brightness published by Gessner (1985) were assigned an uncertainty of $\pm 0\overset{d}{.}03$ (Table 2). The latter appear to be displaced slightly towards the declining light portion of the light curve, and result in the somewhat skewed distribution of data points in the O−C diagram (Figure 2). A linear least squares analysis of the resulting O−C data (with weights inversely proportional to the squares of the associated uncertainties) gave the following improved ephemeris:

$$\begin{aligned} \text{Max JD}_{hel} = 2450363.870 &+ 0.48735842 \times \text{E.} \\ \pm 0.002 \quad &\pm 0.00000011 \end{aligned}$$

The new elements were used to calculate the O−C values listed in Table 2.

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