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THE LIGHT VARIATIONS OF THE HYPERGIANT HR8752 (V509 Cas)

HR8752 is a very luminous G-type supergiant. Its variability both in light and radial velocity has been discussed by Arellano Ferro (1985). According to him these variations are probably due to non-radial pulsations.

More recent photometric data have been published by Halbedel (1986) and by Zsoldos (1986).

We observed this star in 15 nights from July to December 1985 with the 50 cm reflector of the Merate Observatory. During each night 7-10 UB_V differential measurements were taken and grouped into a normal point. The internal standard error of these normal points averages 0.002, 0.003 and 0.004 mag in V, B and U colours respectively.

HR 8761 (V=6.20, B-V=1.50 and U-B=1.53) and HR 8778 (V=6.43, B-V=0.90) were used as comparison stars. The standard deviations of the night to night magnitude differences between the two comparison stars are 0.006, 0.008 and 0.009 mag in V, B-V and U-B respectively.

Transformation into UB_V standard system was secured by the observation of some standard stars. The two comparison stars' UB_V colours so obtained are coincident within 0.01 mag with those published in "The Bright Star Catalogue" (Hoffleit and Jaschek, 1982). The U-B colour of HR 8778 is not reported in that catalogue, the value determined by us is +0.55.

The UB_V magnitudes of HR 8752 so determined are listed in Table I and plotted in Figure 1.

Examining all the published photometry of HR 8752 we can see that the phasing between light and colour curves is changing: in 1980 V and B-V curves were in anti-phase; in 1984 the B-V curve was delayed of about a quarter of a cycle with respect to the V one; in 1985 the two curves were in phase. This fact along with the changing amplitude of the light curve seems to suggest that different processes could be responsible of the variability of HR8752. Very recently Zsoldos (1987) has proposed a preliminary model which try to explain the observed V variations by means of a coupling between pulsation and mass loss.

From our data we see that in 1985 maximum brightness took place at J.D. 2446322 ± 2. The only published U-B data are due to Zsoldos and Olah (1985) and Zsoldos (1986), however they are too scattered with respect to the amplitude of the variations in this colour and therefore they cannot show any clear trend. Our data show that the ascending branch of (U-B) curve was steeper than the descending one in the same way as V and (B-V) curves.

We observe that there is a systematic difference of about 0.03-0.05 mag between Zsoldos' and our (U-B) data. At the moment we are unable to explain it, but it could be connected to the transformations to the standard system, because our standard stars spanned only a limited range in (U-B) colour. For our data the selected standard stars allowed to obtain quite reliable

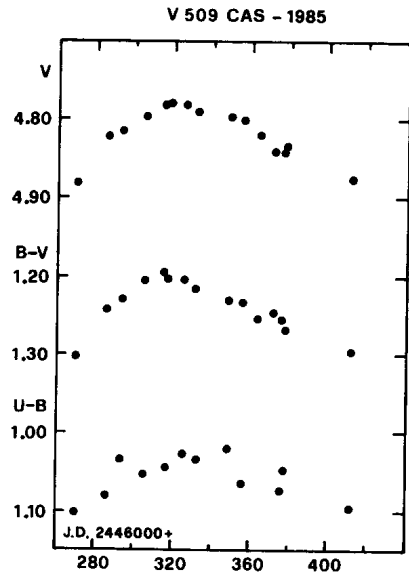


Figure 1

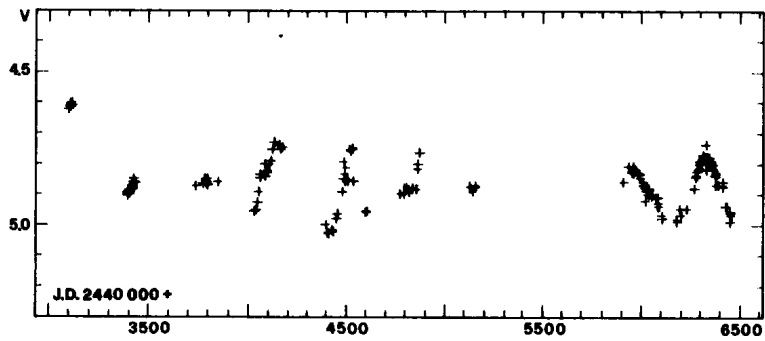


Figure 2

Table I

<i>J.D.</i>	<i>V</i>	<i>B - V</i>	<i>U - B</i>
2446270.45	4.882	+1.304	+1.101
286.48	4.820	+1.242	+1.081
293.53	4.815	+1.228	+1.034
305.52	4.795	+1.204	+1.053
315.42	4.781	+1.197	-
317.44	4.779	+1.201	+1.045
326.51	4.780	+1.207	+1.027
332.39	4.790	+1.214	+1.035
349.31	4.793	+1.227	+1.020
356.33	4.799	+1.231	+1.064
364.44	4.818	+1.253	-
372.30	4.838	+1.246	-
376.47	4.840	+1.254	+1.072
378.28	4.834	+1.268	+1.046
412.31	4.875	+1.296	+1.095

standard *V* and *B-V* colours, but, due to the limited range spanned by the *U-B* colours of the standard stars, that was not the case for this index.

Finally we tried to analyse by means of the least squares power spectrum technique (Antonello et al. 1986) all the existing photometry of HR8752 obtained since 1977 (fig.2). However these data cover too few light cycles and with too many gaps so that is not possible to obtain very significant results. For the present it is only possible to confirm the result yet obtained by Arellano Ferro (1985) and Zsoldos (1986), i.e. the cycles have a characteristic timescale of about 1 year. On the other hand is possible to infer this fact by a mere visual inspection of the light curve. As emphasized by Poretti (1987), a better knowledge of the light curve behaviour could be secured by the collaboration to the monitoring project of some amateur astronomers equipped with photoelectric photometer.

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