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**EVIDENCE FOR THE VARIABILITY OF HD 5210:
A COMPARISON STAR FOR HD 5303**

We wish to alert photometric observers of the southern RS CVn system HD 5303 that the frequently used comparison star HD 5210 may be a variable. This suspicion arises from photometry we carried out on HD 5303 in the period 1983 September to December as part of an international programme. We made 77 measurements in B and V relative to HD 5499 and 63 relative to HD 5210. On two nights, HD 6446 was also included as a comparison star in V.

The usual observing cycle was HD 5499 → sky → HD 5303 → sky → HD 5210 → sky → HD 5303 → sky → HD 5499 → etc.

We found that $V_{HD\ 5499} - V_{HD\ 6446}$ on these two nights was 0.526 ± 0.005 , in agreement with our earlier finding of 0.529 ± 0.008 (Coates et al, 1983). However the average nightly magnitude differences $V_{HD\ 5499} - V_{HD\ 5210}$ vary by up to 0.05 magnitude, from 2.00 to 2.05, which is significantly greater than our usual observational uncertainties.

This raises the possibility that one or both of HD 5499 and HD 5210 may be variable. We therefore re-examined our earlier data on HD 5303, which included HD 5499 (Coates et al, 1983). In that paper we concluded from 250 measurements in V taken over 16 months that HD 5499 did not vary by more than 0.008 magnitude, which is strong evidence for the constancy of this star. At that time we did however conclude that $V_{HD\ 5499}$ is 6.65, rather than 6.69 as given by Cousins et al, 1966. This was because our measured magnitude differences between HD 5499, HD 6446 and HD 661 were consistent if the values given by Cousins et al:

$$V_{HD\ 6446} = 7.18$$

$$V_{HD\ 661} = 6.63 \text{ or } 6.64$$

were correct, but $V_{HD\ 5499}$ were 6.65 rather than 6.69.

We have now looked for other photometric results on these

stars, and have found the following:

HD 5499

$v = 6.69$ (Eggen, 1976)

$v = 6.685$ (Rucinski, 1983)

Table I

HJD	$V_{HD\ 5210} - V_{HD\ 5499}$	$B_{HD\ 5210} - B_{HD\ 5499}$
2440000+		
5590.187	2.003	1.628
.207	1.999	1.625
.230	1.998	1.621
.245	1.998	1.620
.258	1.999	1.621
5592.125	1.999	-
5593.162	1.997	1.619
.175	1.997	1.621
.190	2.003	1.628
.205	2.006	1.625
.218	2.008	1.628
.232	2.004	1.626
.245	2.005	1.630
.258	2.001	1.626
.266	1.995	1.613
5604.170	2.000	1.614
.183	2.007	1.623
.194	2.011	1.629
.206	2.010	1.627
.220	2.012	1.626
.235	2.023	1.636
.251	2.034	1.645
.266	2.036	1.643
5609.164	2.010	1.627
.176	2.017	1.625
.189	2.026	1.628
.201	2.027	1.631
.216	2.025	
5613.169	2.031	1.630
.182	2.059	1.653
.196	2.053	1.653
.209	2.025	1.640
.225	2.025	1.644
.241	2.022	1.642
.255	2.007	1.628
5616.194	2.005	1.626
.224	2.019	1.638
.244	2.014	1.630
5617.200	2.046	1.667
.216	2.052	1.673
5650.027	2.019	1.627

HD 6446

$v = 7.22$ (Eggen, 1976)

HD 5210

$v = 8.691$ (Rucinski, 1983)

$v = 8.71$ (Collier et al, 1981)

$v = 8.72$ (Collier, private communication)

On all this evidence, $v_{HD\ 5499}$ is probably constant at 6.69, $v_{HD\ 6446}$ is 7.22, $v_{HD\ 661}$ is 6.67, and $v_{HD\ 5210}$ may vary between about 8.69 and 8.74. After eliminating all even slightly doubtful data (due to possible cloud, interference by the moon, etc.) from our measurements of $v_{HD\ 5499}$ and $v_{HD\ 5210}$ we still find convincing evidence for variations up to 0.05 magnitude.

We have searched the differences $v_{HD\ 5210} - v_{HD\ 5499}$ and $B_{HD\ 5210} - B_{HD\ 5499}$ for periodicities by producing light curves for selected periods. There is weak evidence for eclipses in HD 5210 at a period of about 1.44 days, but this is not convincing. With these data other frequencies are possible. We shall carry out photometry later this year to try and resolve this problem. We give our data for the magnitude differences HD 5210 - HD 5499 in the table.

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