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S ERIDANI - A DELTA SCUTI VARIABLE

S Eridani (= 64 Eridani = HR 1611 = HD 32045) was noted by Millis (1967) as a variable of unknown type. Leung (1970) included this star in his list of known δ Scuti variables but this classification has been questioned by Valtier (1972) who remarked that there was no evidence of periodicity in Millis' limited data. S Eridani is included in the 1974 supplement to the GCVS as a possible δ Scuti type star with a visual light range of 0.02 magnitudes and a spectral type F0 IV; no period is given. Eggen (1979) includes this star in his list of Ultra Short Period Cepheids while Breger (1979) omits it from his δ Scuti list.

We felt that fresh observations of S Eridani may help establish what type of variable it is and assign a period to it. Using the 40cm reflector at Siding Spring Observatory we observed S Eridani on the 30th November 1981. Two nearby standard stars, HR 1661 (= HD 32996) an A0 type star, and HR 1665 (= HD 33093) an F8 star, were chosen. All three stars were measured in the V band of the standard UBVRI system through a large range of air mass so that the differential measurements of magnitude could be corrected accurately for atmospheric extinction.

Figure 1 illustrates the light curve of S Eridani for the observing run and the constancy of the standard stars during this time.

Crawford et al. (1970) made uvbyβ measurements of S Eridani and derived the following indices: b-y = 0.171; m_1 = 0.169; c_1 = 1.002 and β = 2.754. Trigonometric parallax has been measured for this star and reddening can be considered negligible. Using the measured c_1 and b-y indices, the absolute magnitude, M_V, was calculated to be 0.8. Measured parallax (0.015") for S Eridani places the star at about 67 parsecs. Though errors in trigonometric parallax measurement at this distance are large, it is worth noting that from the known parallax, M_V is calculated to be 0.7.

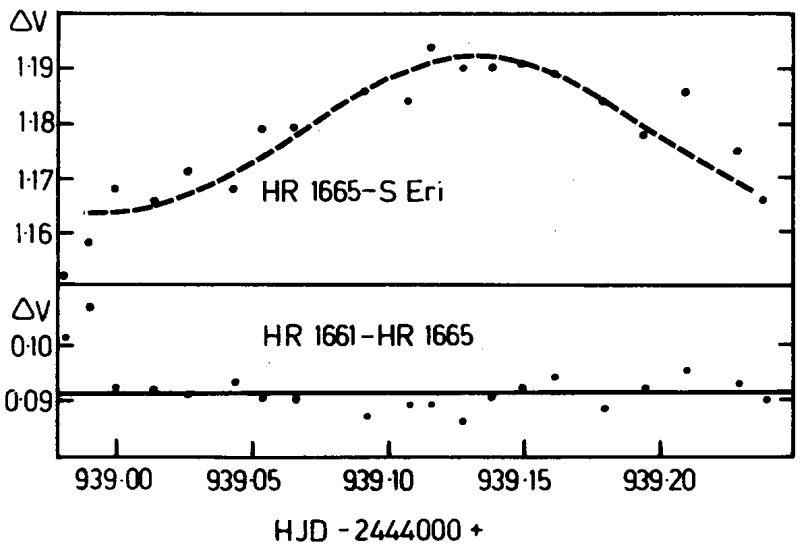

Figure 1

From our data (see figure 1) S Eridani appears to have a longer period than most small amplitude δ Scuti stars. Estimation of a period from a single night's data can be hazardous, but using Fourier techniques we suggest that this star has a fundamental period of 0.273 days and a visual light range of 0.025 magnitudes.

If we use the following formula derived for δ Scuti stars and Dwarf Cepheids, (Fernie, 1964) :

$$M_v = -1.5 - 2.50 \log P + 3.50 (B-V)$$

and substitute into it our estimation of the period and the known B-V index of 0.27, (Cousins and Stoy, 1962), we calculate $M_v = 0.8$ in agreement with values stated earlier.

The calculated metallicity ($\Delta m_1 = 0.026$) suggests that S Eridani is slightly metal-deficient, in accord with the majority of δ Scuti stars. From the available date we conclude that S Eridani is probably a small amplitude, longer period δ Scuti star. Derived absolute magnitude and measured b-y (or B-V) colour index place this star at the high luminosity end of the δ Scuti instability region.

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