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CURRENT MICROVARIABILITY FOR THE Be STAR ϕ PERSEI

The binary Be star system ϕ Persei has been known to exhibit spectrum and photometric peculiarities. Models of the system have recently been published by Kitchin (1982) and Poeckert (1979) with the latter invoking a possible neutron star or helium core from a previously more massive star for the secondary object. Photometrically, the star has been observed to vary irregularly in V magnitude from 4.03 - 4.11 in a manner connected with shell ejection from the primary's equator. The Second Supplement to the General Catalogue of Variable Stars also gives an approximate period for the variation of 19.5 days, a period seemingly unrelated to the orbital period of nearly 127 days. Other investigators (e.g., Dapergolas et al. 1981) have found general irregularity unrelated to this suggested period.

ϕ Persei was observed on 35 nights from September, 1984 to November, 1985 with the 0.6-m telescope and automated photon-counting photometer (with its uncooled EMI 9924A photomultiplier tube) of the Corralitos Observatory in an effort to examine the suspected 19.5 day variability. Differential BV photometry was done utilizing two comparison stars, 2 Persei and HR 538. Unfortunately, one of these stars (2 Persei) may be variable over the long term as evidenced by published magnitudes in the literature ranging from V = 5.79 (Nicolet, 1978 and Bright Star Catalogue) to 5.70 (Rufener, 1976 and 1981). The most recent values of V = 5.70 and B-V = -0.07 were adopted for 2 Persei. Rufener (1981) gives V = 6.26 for HR 538 and a derived value of B-V = +0.04 was found. The mean ΔV and Δ(B-V) between the two comparison stars was observed to be 0.560 (in V) and 0.109 (in B-V) magnitudes, in good agreement with the magnitude values chosen. Average residuals about these means were 0.008 and 0.007 magnitudes respectively. Extinction and transformations to BV magnitudes were found by observations of standard stars.

When the differential magnitude of ϕ Persei from each of the comparison stars was examined, no large-scale variations were found. Residuals from the mean were calculated and compared to those of the comparison stars with the

following results:

V magnitude

	2 Per - ϕ Per	HR 538 - ϕ Per	2 Per - HR 538
Mean	1.702	2.283	-0.560
Av. residual	.015	.018	.008
B-V magnitude			
Mean	-0.016	0.093	-0.109
Av. Residual	.007	.009	.007

The sizes of the average residuals from the means in V magnitude for each of the comparison stars minus ϕ Persei are approximately twice that for the difference between the comparison stars, leading to the conclusion that variability of only a very low order occurred during the time period ϕ Persei was under observation, with no concurrent color changes. No correlation of this microvariability with orbital phase was found. A mean value of $\bar{V} = 3.988$ and $B-V = -0.054$ for ϕ Persei for 1984-5 was found.

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