Rev. Mexicana Astron. Astrof., **14**, 435 (1987)

THE LUMINOSITIES OF THE BINARY CEPHEIDS SU CYG, SU CAS AND W SGR

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ABSTRACT. IUE low dispersion spectra can be used to determine the absolute magnitudes of the Cepheid and a blue main sequence companion in two ways. The companion/standard star flux ratio can be combined with an absolute magnitude-spectral type calibration to provide a distance modulus to the system. In the fitting procedure used here a grid of standards was set up by interpolating between the spectra of representative standard stars. The absolute magnitudes derived in this way are listed in Table I as row A corrected to mean light <M> and corrected for the effect of the companion on the measured V magnitude.

The second method is to fit the flux in the 2000-3200 A region to comparison stars for both the Cepheid and the hot companion. A normalized comparison spectrum from the short wavelength region is adopted and subtracted from the composite Cepheid spectrum. The normalization between the remaining Cepheid spectrum and a nonvariable supergiant spectrum provides the magnitude difference between the Cepheid and the hot companion. This magnitude difference must be combined with the absolute magnitude of the blue companion to derive the absolute magnitude of the Cepheid, which is listed in row B of Table I.

Also included in the table are the absolute magnitudes as computed from 3 period-luminosity-color relations (Sandage and Tammann 1969, Ap. J., 157, 683; Caldwell 1983, Observatory, 103, 244; and Schmidt 1984, Ap. J. 285, 501). SU Cyg and W Sgr are both more luminous than the Sandage and Tammann and Caldwell result. However, we estimate that the uncertainty for a single determination is at least $0^m.2$, and consequently the agreement is reasonable. We find no suggestion of the lower luminosity of the Schmidt calibration.

TABLE I. Absolute Magnitudes $<M_V>$

	SU Cyg	SU Cas	W Sgr
A	-3.5	-3.4	-4.2
B	-3.6	-3.3	-4.1
Sandage & Tammann	-3.23	-2.19 (-2.72 O)	-3.89
Caldwell	-3.13	-2.31 (-2.90 O)	-3.96
Schmidt	-2.98	-1.96 (2.55 O)	-3.85

SU Cas has been suspected of being an overtone pulsator. The absolute magnitude derived from the companion is in better agreement with overtone pulsation (denoted O in the table) than fundamental pulsation.

Key words: STARS-BINARY -- STARS-CEPHEID

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