

THE RADIAL VELOCITY OF 60 SERPENTIS

HELMUT A. ABT AND SAUL G. LEVY

Kitt Peak National Observatory*

Received 25 August 1971

Coudé measures of this K0 III star do not confirm the published evidence that it is a single-lined spectroscopic binary with a period of three days.

Key words: spectroscopic binary — radial velocity

60 Serpentis (HR 6935 = Boss 4678) is a K0 III star (Roman 1952) that has tentatively been identified (Christie 1933) as a single-lined spectroscopic binary with a period of 3^d1558 and a circular orbit. Not only is so short a period very unlikely for a giant but this star is one of only two known giants that violate the rule (unpublished) that all giants in binaries with periods less than 100 days have extremely strong Ca II emission lines; the other exception is 1 Gem-inorum. These facts led us to question its duplicity.

The unpublished radial velocities used by Christie in deriving the tentative orbital elements were obtained from the Hale Observatories; they will be published later but are summarized here. The 49 observations of 36 \AA/mm reciprocal dispersion obtained between 1916 and 1932 gave a mean of $+27.2 \pm 3.2$ (p.e. per spectrum) km/sec and a mean internal probable error of ± 0.7 km/sec from multiple measures of 24 spectra. The former probable error is not excessive for Cassegrain spectra of a sharp-lined constant-velocity star. Plotting the individual measures with phase in a 3^d1558 period showed no systematic variation, although a fortuitous combination of normal points gave Christie a seemingly real variation.

We obtained 17 coudé spectra of 13 \AA/mm reciprocal dispersion with the 84-inch telescope during an interval of two years. Measures with a Grant comparator of eight relatively unblended spectral lines ($\lambda\lambda 4250.1, 4250.8, 4254, 4274, 4415, 4466, 4476, \text{ and } 4494$) per spectrum are listed in Table I.

*Operated by the Association of Universities for Research in Astronomy, Inc., under contract with the National Science Foundation.

TABLE I
MEASURED VELOCITIES OF 60 SERPENTIS

Helio. JD 2400000+	Radial Velocity and Probable Error (km/sec)
340.952	$+27.9 \pm 0.24$
341.960	29.1 .23
342.902	30.8 .46
370.873	29.7 .29
372.790	30.9 .29
373.928	31.1 .22
374.794	30.0 .35
406.766	29.8 .17
464.664	29.6 .23
486.601	30.7 .31
496.633	30.6 .39
518.560	28.1 .40
695.992	27.9 .17
752.905	29.2 .25
783.840	30.7 .31
845.642	29.4 0.31
1168.851	31.2 ± 1.02

The present velocities do not confirm the proposed orbital elements for the following reasons. (1) The measured range of 3.3 km/sec is much smaller than the proposed range of 7.1 km/sec even though all phases in a 3^d1558 cycle are well

represented. (2) A plot of the velocities against phase in the proposed period shows no systematic variation. (3) The mean external probable error of ± 0.74 km/sec exceeds the mean internal probable error of ± 0.33 km/sec by the factor of two usually obtained for constant-velocity stars. However, even if the rms difference between those errors is attributed to circular binary motion, the resultant amplitude of 1.3 km/sec is far smaller than the proposed amplitude of 3.55 km/sec.

We conclude that there is no convincing evidence for the duplicity of 60 Serpentis with an

amplitude greater than 1.3 km/sec and any period shorter than several years. Therefore the lack of strong Ca II emission lines is not surprising.

We thank Miss Louise G. Lowen for providing Dr. Christie's measures and calculations.

REFERENCES

- Christie, W. H. 1933, *Pub. A.S.P.* 45, 190.
Roman, N. G. 1952, *Ap. J.* 116, 122.