of the wings. The velocities as originally determined were found to refer to the cores and these were corrected to refer to the wings. Assuming that the wings originate in the star, one should expect that velocities determined from them would provide more reliable orbital elements.

The velocity-curve thus determined is characterized by the following orbital elements:

$e = 0.0$ $K_1 = 85$ km/sec
$\gamma = 0$ km/sec $a_1 = 2.9 \times 10^6$ km

Estimates of the behavior of the secondary star from plates taken during primary eclipse provide the following elements:

$K_2 = 170$ km/sec $m_1 = 2.9\ M\odot$
$a_2 = 5.8 \times 10^6$ km $m_2 = 1.4\ M\odot$

Fifty-six new spectra, taken in December, 1949, and January, 1950, were measured and examined in the same manner. The velocity-curve determined from them without correction is characterized by an eccentricity of 0.3, decidedly more eccentric than the 1943 data. However, the asymmetries in the $H$ lines are somewhat less conspicuous than in the 1943 plates. Hence the corrected velocity curve does not have zero eccentricity although it is improved. The orbital elements are:

Uncorrected:

$e = 0.3$ $K_1 = 122$ km/sec
$\omega = 30^\circ$ $a_1 = 4 \times 10^6$ km
$\gamma = 13$ km/sec

Corrected:

$e = 0.15$ $K_1 = 85$ km/sec
$\omega = 10^\circ$ $a_1 = 3 \times 10^6$ km
$\gamma = 22$ km/sec

Although it seems that the spectroscopic and the photometric material have been fairly well brought to agreement, it is well to note that our understanding of this system is quite incomplete as is evidenced by the discrepancy between the two sets of spectra discussed.

1. *Ap. J.* **72**, 205, 1930.
2. *Ap. J.* **99**, 222, 1944.
3. *M.N.* **109**, 487, 1949.
4. *Pop. Astr.* **58**, 7, 1950.

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### Hoag, Arthur A. A peculiar object in Serpens.

This object, which appears to be a perfectly symmetrical planetary nebula, was discovered on a 75-minute Jewett Schmidt plate. A perfect halo, 17″ in radius, surrounds a diffuse central image. Its position, $\alpha\ 15^h\ 15^m.0$, $\delta + 21^\circ\ 46'$ (1950), $l\ 358^\circ$, $b + 54^\circ$ (1950), size and nucleus ($\sim 17\ m_{pg}$, C. I. $\sim + 1.0$) are not typical of the planetary nebulae. The halo, which is bluer than the nucleus, does not show in emission on an objective prism plate that records the central object.

As a most conservative alternative one might say that this is a new species among the "pathological" galaxies. Other ring-forming mechanisms such as a diffraction effect[1] or a gravitational lens system[2] are less probable explanations. The mass of the central object, in the latter case, would have to be of the order of $8 \times 10^{11}\ M\odot$.

Since the object is unique, I suggest that a proper identification would be a worthwhile short-term project.

1. Struve, *Ann. Astroph.* **1**, 143, 1938.
2. Zwicky, *Phys. Rev.* **51**, 290, 1937.

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### Huang, Su-Shu. On the Doppler broadening of Fraunhofer lines by turbulence and by multiple interstellar clouds.

Two types of Doppler broadening arise in stellar spectroscopy typified by stellar rotation and thermal broadening. The influence of turbulence on the line profile and on the curve of growth is similar to that of thermal broadening and can be studied in a similar manner. In the present paper an idealized picture of Fraunhofer lines is used to calculate the effect on the lines of a distribution of eddy velocities. Mathematically all these cases lead to a series expansion of the same functions, with different numerical coefficients. As in the case where there is no turbulence the line absorption coefficient in a turbulent gas can be split into two parts: one part referring to the core of a line and one part referring to the wings. It can be shown that the effect of turbulence in the wing becomes negligible as we go outwards; the damping part of the curve of growth is therefore unchanged by its presence.

After a general treatment line profiles and curves of growth have been computed both for the case of a $\delta$-function distribution, which is equivalent to a step function distribution in the line of sight, and for a Gaussian distribution of eddy velocities. Both kinds of profiles and curves of growth are plotted in units of the pure thermal Doppler width for the same values of mean eddy velocity. In the case of the Gaussian distribution of eddy velocities, we can obtain turbulent profiles and curves of growth from the originals