to revise many of our present ideas including, of course, the sharp division established by Baade as regards the space distribution in galaxies of Populations I and II.

*Tacubaya and Tonantzintla Observatories,
México.*

Hawkins, Gerald S., Hemenway, Curtis L. and Whipple, Fred L. The Harvard radio-meteor program.

Harvard College Observatory, in conjunction with the Lincoln Laboratory of M.I.T., is embarking on an extensive program for the study of meteors by radar methods. A megawatt transmitter and six receiving stations are being set up in southern Massachusetts to be operated during the International Geophysical Year. The antennae will be broadside arrays each containing approximately 100 dipoles tuned to 32 megacycles and phased to radiate or receive at an elevation of 45° in an easterly direction. The experiment will give information on the radiant, velocity, and deceleration, of individual meteors down to 12th magnitude. In this way accurate orbits will be obtained for both sporadic and stream meteors. With the help of an electronic computer it is hoped to obtain 10,000 accurate orbits, from which we can determine the gross distribution of sporadic orbits and the structure of meteor streams. The orbital distribution will give the rate of meteor influx to the earth's surface as a function of time and location. Echo characteristics will give information on the diffusion of the trail and winds in the upper atmosphere. In addition the echo amplitude will be measured at six points along a meteor trail giving a direct measure of the ionization curve of individual meteors. It is anticipated that these curves will permit the fragmentation process to be studied for radio meteors, which, together with orbital data, should extend our knowledge of the origin of these particles.

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Heard, John F. and Morton, Donald C. Spectrographic orbits for the eclipsing variables V451 Oph, V805 Aql and V548 Cyg.

V451 Oph ($m_p=7.9-8.5$, Ao), V805 Aql ($m_p=7.8-8.5$, A2) and V548 Cyg ($m_p=8.9-9.7$, Ao) are three Algol-type eclipsing variables which have been recently investigated photometrically at Capodimonte, Naples, the first by the late Prof. Colacevich (1953), the other two by Fresa (1954,

1953). From spectrograms of dispersion 33 Å/mm taken at the David Dunlap Observatory, spectrographic orbits have now been computed for all three of these binaries. Double lines were measured for V451 Oph and V805 Aql, single lines for V548 Cyg.

V451 Oph. The lines in this Ao-type spectrum are much broadened, and the two components are resolved only for the stronger lines and only near maximum velocity. Accordingly, zero eccentricity was assumed (Colacevich's photometric orbit gave $e=0.025$) and the least-squares solution was made only for γ , K_1 and K_2 with the following results (errors are mean errors):

$$\begin{array}{ll} P=2^d1965962 \text{ (Colacevich)} & \gamma = -14.7 \pm 2.0 \text{ km/sec} \\ e=0 & K_1 = 121.1 \pm 3.3 \\ T_0 \text{ (asc. node)} = \text{JD } 2454164.950 & K_2 = 145.7 \pm 3.3 \end{array}$$

V805 Aql. Measurable lines are fairly numerous for the primary spectrum, but the secondary spectrum is so weak that a few lines could be measured only near maximum velocity. A least-squares solution was computed for five unknowns for the primary, and a separate solution was made for K_2 for the secondary. The following were the results:

$$\begin{array}{ll} P=2^d408230 \text{ (Fresa)} & \gamma = -37.6 \pm 0.7 \text{ km/sec} \\ e=0.018 \pm 0.002 & K_1 = 106.2 \pm 0.9 \\ \omega = 37^\circ \pm 38^\circ & K_2 = 130.5 \pm 5.7 \\ T_0 = \text{JD } 2427927.232 \pm 0.004 \end{array}$$

There is no significant conflict between these elements and the photometric elements given by Fresa (1954). Epochs for this star and for V548 Cyg are from Sterne (1941).

V548 Cyg. The lines are broad and only the strongest are measurable. Lines of the secondary were not seen with certainty. A least-squares solution for the primary gave the following results:

$$\begin{array}{ll} P=1^d805257 \text{ (Fresa)} & \omega = 94^\circ \pm 18^\circ \\ e=0.11 \pm 0.03 & \gamma = -22.4 \pm 2.2 \text{ km/sec} \\ T_0 = \text{JD } 2434297.889 \pm 0.010 & K = 66.7 \pm 1.9 \end{array}$$

Fresa's unpublished photometric orbit gives $e = 0.111$ and $\omega = 320^\circ$. It is difficult to reconcile the asymmetry of the times of the eclipses shown in Fresa's light curve (1953) with the shape of our velocity curve.

For V451 Cyg and V805 Aql we have combined our data with those given by the referenced photometric elements to get masses m , radii r , reduced bolometric magnitudes $[M = M_{\text{bol}} + \log (Te/5200)]$ and effective temperature of the secondary stars Te_2 , as follows: