that the vast majority of them are located in obscured regions that can be characterized by the presence of faintly luminous nebulosities, whereas on a plate that covers the region of the North America nebula, and that reaches the fifteenth photographic magnitude, not one star with $H\alpha$ in emission was found.

Star No. 24 observed by Struve¹ without emission lines, appears on two of our plates with fairly strong emission in $H\alpha$. As additional evidence of possible variation in emission features the writer has detected a variation in the intensity of the bright line in star No. 6 of the present list (Table I). Star No. 22 of Struve's list is variable in light with a range of at least 0.5 mag.

TABLE I. STARS WITH $H\alpha$ IN EMISSION

No.	Cordoba Position		Remarks
	R.A.	Dec.	
1	16 ^h 14 ^m 3	-26° 10'	
2	16 15.5	27 26	
3	16 17.8	24 56	1
4	16 18.0	23 0	
5	16 18.5	25 3	1
6	16 18.6	24 4	2
7	16 19.4	24 29	3
8	16 19.5	22 54	
9	16 19.6	24 37	1
10	16 20.0	29 0	
11	16 20.2	23 39	
12	16 20.2	25 48	4
13	16 21.9	25 26	1
14	16 23.5	23 48	
15	16 23.8	26 11	5
16	16 24.0	24 9	
17	16 24.8	24 24	1

Remarks: 1, very faint star; 2, apparent variation in the intensity of $H\alpha$; 3, No. 24 in Struve's list, spectral change; 4, variable as shown by plates taken in 1945; 5, star in a minute cometary nebula.

On an hour Schmidt plate of the larger Sagittarius cloud, centered at $\alpha = 18^h 4^m$, $\delta = -28^\circ$, limiting magnitude 16, fifty-one objects with emission in $H\alpha$ were found. Of these, 5 are doubtful as they could not be checked on another plate having the same limiting magnitude; 12 have a strong continuum; and 34 resemble the spectra of emission nebulae because of the absence of continuum. In this particular region Minkowski⁴ found 17 planetary nebulae, and before him, as far as the writer knows, only three planetaries were known. Probably most of the remaining 14 objects are new planetary nebulae. It seems that some of the planetaries found by Minkowski and some of the probable new emission nebulae are variable.

1. *Ap. J.* **109**, 92, 1949.

2. *Ap. J.* **90**, 387, 1939.

3. *Pub. A. S. P.* **58**, 244, 1946.

4. *Pub. A. S. P.* **58**, 305, 1946; **59**, 257, 1947; **60**, 386, 1948.

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Herrick, Samuel. Tables for nearly parabolic and rectilinear orbits.

The anticipated development of rocket navigation has directed serious attention, for the first time, to rectilinear motion in the two-body problem. These tables give $1 - \cos E$, $\sin E$, and E , with argument $E - \sin E$, thus making it possible to determine position and velocity for the "rectilinear ellipse" by direct interpolation and the following formulae:

$$\begin{aligned} E - \sin E &= M = n(t - T), \\ r &= a(1 - \cos E), \\ r\dot{r} &= a^{\frac{1}{2}} \sin E. \end{aligned} \quad (1)$$

The tables are designed to yield about 7 or 8 significant figures for all values of $E - \sin E$, no matter how small. Parallel tables and formulae are given for the "rectilinear parabola" and the "rectilinear hyperbola."

The tables may be used also for nearly rectilinear ("nearly parabolic") orbits by a procedure which is as simple in theory as it is in practice. For example, Kepler's equation is written in the form:

$$M = (E - \sin E) + (1 - e) \sin E. \quad (2)$$

Since the tables give $\sin E$ with argument $E - \sin E$ it is possible to solve this equation by such a process as that devised by Comrie for Kepler's equation in its ordinary form. Equation (2) has the same advantage for e nearly unity as has the ordinary form for e nearly zero. The latter breaks down, of course, for e nearly unity and E small, because of the limited number of decimal places in ordinary trigonometric tables; but the present tables, used in conjunction with equation (2), always provide enough significant figures, even when $e = 0$.

Since the tables can also be used for ordinary parabolas, though not so conveniently as Barker's tables when the argument lies within the range of the latter, they have the advantage of universality. Other tables for "nearly parabolic" orbits cannot, of course, handle rectilinear ones.

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Hossack, W. R. and F. S. Hogg. White dwarfs and short-period light variations.

The purpose of this work was to examine white dwarf stars for possible short-period light changes. Probability considerations and eclipsing binary statistics indicate an expected period for white dwarf stars of the order of only a few minutes.

There seemed to be no record of any extensive search for this type of variation. In the current program, ten white dwarfs were examined for short-period light variations.

The 19-inch reflector at the Dunlap Observatory was used, with the aim of obtaining about a four-hour continuous run of exposures, the exposure time being as short as possible for the magnitude of the star involved. A trail of images was obtained on each plate. Focal images were used because of the faintness of the stars. Image intensities relative to comparison stars were measured with a photoelectric microphotometer. The stars employed, and corresponding exposure times, were: 40 Eri B (15 sec); A.C. 82.3818, A.C. 73.8031, A.C. 70.8247, Wolf 1346 (30 sec); Ross 137, Ross 640 (60 sec); Ross 808, L997-21 and L.D.S. 749 B (120 sec). The average standard deviation corresponding to a two-minute exposure was 0.09 mag. This error is contributed to by short-period seeing fluctuations, uneven color extinction, and by the faintness of the images. No periodic variations were found, although work is not yet fully complete in one case.

In future work, a larger telescope should be used, color corrections made, and possibly photoelectric observations substituted for photographic. Even negative results, if sufficiently plentiful, will allow conclusions as to the occurrence of binaries amongst white dwarf stars. Any positive results would, of course, provide new data for examining the physical properties of these stars.

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Johnson, Harold L. An electronic plate-measuring machine.

A semi-automatic electronic measuring machine for making measures of the positions of spectral lines on spectrograms has been constructed in a preliminary form. The machine offers several advantages over the older methods of spectrogram measurement. These are: (1) the near-elimination of eye-strain and fatigue; (2) the elimination of personal equation; (3) increased speed of measurement; and (4) increased precision.

The first two points have been obtained by making the machine almost completely automatic—the operator has only to select the spectral lines to be measured and to indicate to the machine, by pushing a button, when it is to make a measure. The machine then scans the line and

determines its position as midway between two equal intensity points on the line profile. The reading of the calibrated screw head is then recorded automatically on photographic film.

The probable error of a single machine-made setting on a line is very small in comparison with the line width and a single setting is as good as several. The speed of measurement has therefore been increased severalfold; spectrograms of the B star, μ Cephei, on which only the hydrogen lines $H\beta$, $H\gamma$, $H\delta$, and $H\epsilon$ were used, have been measured at the rate of eight per hour.

The precision of measurement has not been appreciably increased over that obtainable from the most careful visual measures, since the primary source of error in each method is the grain of the photographic plate. It is to be expected, however, that the precision obtainable from the machine will be independent of the operator and possible operator fatigue and will therefore be appreciably greater than the precision of the average run of visual measures. This will be especially so in the measurement of the wide hydrogen lines of the early-type stars, for which the machine was designed and will be most useful.

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Kron, Gerald E. A peculiarity of a dwarf Me binary star.

Two accurate photoelectric light curves have been obtained for the dwarf Me eclipsing variable YY Geminorum. One light curve, obtained in 1948, was made in visual light; the other, obtained in 1949, was made in infra-red light. A fragmentary infra-red curve was obtained in 1948, and a fragmentary visual curve for 1949.

The light curves show a conspicuous secondary variation apparently not caused by the eclipse phenomenon. This secondary variation depends upon both time and wave length; that is, the amplitude is greater in the shorter wave length, and the amplitude was greater in 1948 than in 1949. The shape of the secondary variation is nearly sinusoidal, particularly in 1949.

The most apparent logical explanation for the phenomenon lies in a hypothesis that the surfaces of the two stars composing the YY Geminorum system are not uniformly illuminated. As the two components rotate with the orbital motion, the lack of surface uniformity causes a secondary variation of light, synchronous with the orbital rotation.