given by Clemence² only in that the above masses of the disturbing inner planets are used.

The development of the corresponding precessional quantities in powers of the time is

$$\theta = 23^{\circ} 27' 31''.65 \pm .10 \\ - 46''.784 T_1 - 0''.0086 T_1^2 + 0''.00179 T_1^3 \\ \pm .15 \quad \pm .1 \quad \pm .0$$

$$\theta_1 = 23^{\circ} 27' 31''.65 \pm .10 \\ + 0''.0649 T_1^2 - 0''.00772 T_1^3 \\ \pm .1 \quad \pm .0$$

$$p_1 = + 5037''.795 \pm .071 \\ + 0''.4917 T_1 - 0''.00002 T_1^2 \\ \pm .2 \quad \pm .1$$

$$p = + 5025''.540 \pm .070 \\ + 2.2195 T_1 + 0.00048 T_1^2 \\ \pm .18 \quad \pm .1$$

$$\lambda = + 13''.359 \pm .012 \\ - 1.8848 T_1 + 0.00050 T_1^2 \\ \pm .10 \quad \pm .0$$

$$P = 5493''.793 \pm .077 \\ - 0.00364 T_1 \\ \pm .3$$

These results show clearly that the remaining uncertainty in P depends almost entirely on the probable error of the determination of the general precession in longitude. The contribution by the planetary precession to the uncertainty in P has practically disappeared.

The theoretical value for the secular variation of the obliquity remains close to the results of Newcomb and of Clemence. The new results from Eros accentuate the discrepancy between this dynamically derived value and $-47''.14 \pm 0''.08$ derived by H. Spencer Jones⁵ from direct observational methods. The correction of $-0''.43 \pm 0''.11$ obtained from the Eros solution for the obliquity at 1931 corresponds to a secular variation of about $-47''.3 \pm 0''.1$.

1. *A. J.* 55, 112, 1950.

2. *A. J.* 53, 169, 1948.

3. *B. A. N.* 8, 213, 1938.

4. *B. A. N.*, 9, 424, 1943.

5. *Ann. Cape Obs.* 13, Part 3, 58, 1934.

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Roman, Nancy G. Some characteristics of the spectra of F-, G-, and K-type stars.

At the Yerkes Observatory at the present time we are engaged in an extension of the Morgan-Keenan-Kellman system of spectral classification to all northern stars brighter than 5.5 visual magnitude. Although the work has

not been completed, two results seem worthy of attention.

Among the 168 stars studied having HD spectral types F5 to G5, there are 13 F5 giants, 29 G8 giants, 13 K0 giants, and only 12 giants of types F6, F8, G0, G2, and G5. That the scarcity of early G-type giants is real is shown clearly by a plot of colors against absolute magnitudes. Fourteen of the stars show a composite spectrum, usually consisting of a late-type giant and an A- or F-type star. Those with an A-type component are easily recognized by the characteristic appearance of the K-line but those with an F-type component simulate the spectra of normal early G-type giants. Capella, composed of an F6 star and a late G giant, is an excellent example of the latter type of system. The resulting composite spectrum can be distinguished from that of a G2 giant on low dispersion primarily by the strength of the CN. Since late-type giants are numerous and early G-type giants are scarce, a large percentage of the stars classed as early G-type giants are probably binaries with composite spectra.

A number of giant and dwarf stars of types F5 to G5 show systematically weaker lines than other stars in the same position on the H-R diagram. Space velocities based on spectroscopic parallaxes and corrected for a solar motion of 20 km/sec were computed for 85 stars of types F5 to G5. It was found that the speeds of the stars with strong lines show a maximum frequency between 10 and 20 km/sec with no stars having speeds larger than 70 km/sec. On the contrary, the speeds of the 40 stars with weaker lines show only a broad maximum between 30 and 60 km/sec; 8 of these stars have speeds greater than 70 km/sec.

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Seyfert, C. K., J. H. DeWitt and E. M. Lewis. Photoelectric photometry at Vanderbilt University.

A description is given of the operation of the Vanderbilt University stellar photoelectric photometer attached to the DeWitt 12-inch reflecting telescope. A 1P21 photo-multiplier tube and d.c. amplifier designed by Kron are used. The chief sources of troublesome leakage currents and their remedies are outlined in some detail together with a simple method for distinguishing between cell leakage current and dark current. Reduction of dark current is accomplished