are being determined. For 99 Herculis, 55 plates have been taken on 48 nights with the 40-inch Yerkes refractor during the past thirty years. From these plates a parallax of $''066 \pm ''006$ (p.e.) and the mass of the fainter component in terms of the total mass of $.400 \pm .011$ (p.e.) have been determined.

These results agree closely with results obtained recently at the Sproul Observatory. If we combine the latest available data for this system we find that the brighter component of spectral class F8 has an absolute visual magnitude of 4.25 and a mass of .83 that of the sun. This indicates that the brighter component is less luminous and less massive than a star of the same spectral class belonging to the main sequence. For the fainter component no spectrum is available and while its luminosity is still somewhat uncertain its mass corresponds to a dK5 star.

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Edmondson, Frank K. The galactic rotation effect in tenth magnitude K stars.

Radial velocities of 708 tenth magnitude K stars contained in the McCormick proper motion catalogues have been measured. The majority of the observations have been made with the 82-inch McDonald reflector, and the remainder with the Mount Wilson 60-inch. Of these stars 125 have been observed two or more times. Standard stars have been observed frequently in order to check the systematic accuracy of the velocities.

The present paper gives first a preliminary discussion of 372 K stars between galactic latitudes $+30^\circ 57'$ and $-30^\circ 57'$, and between photovisual magnitudes 10.0 and 11.0. Of these 372 stars, 60 are dwarfs and 213 are giants, according to luminosity classifications made by Miss Edith Janssen working under the supervision of Dr. Vyssotsky. Ninety-nine stars are as yet unclassified.

The dwarfs were grouped into 11 normal places, and the giants into 17. Using the unsmoothed normals, separate least-squares solutions were made for solar motion and galactic rotation. The results are shown in Table I, and some of Redman's results are quoted for comparison. It is interesting to note that Redman's giants were no further away than the dwarfs in the present investigation. The negative K-term found by Redman is also found for the giants here, whereas the dwarfs give a positive value.

An absorption of one magnitude per kiloparsec was assumed in estimating the distances, leading to $A = 18.2$ for the giants. R. E. Wilson's discussion gave 17.7 and Vyssotsky's recent value is 19.0.

TABLE I. GALACTIC ROTATION EFFECT FOR K STARS

	Redman D.A.O. vol. 4		Red- man D.A.O. vol. 6	FKE (dwarfs)	FKE (giants)
$\bar{r}$	Sol. 2	Sol. 4	230	200	850
K	-5.9	-5.2	—	+2.9	-5.8
V_0	15.6	(20)	21.5	18.9	20.5
L	(22°)	(22°)	32°	17°	19°
rA	3.8	5.4	1.9	5.6	15.4
l_0	350°	358°	17°	333°	328°

The large velocity dispersion reported at the Madison meeting has been confirmed by the additional data now at hand. Table II gives the results. The dispersions have been computed both with and without the high velocity stars. The figures for all stars, high velocity included, may be compared with the values given at Madison ($\sigma_a = \pm 29.5 \pm 1.7$, $\sigma_b = \pm 27.2 \pm 1.6$, $\sigma_c = \pm 32.1 \pm 2.2$).

The general least-squares solution for the entire group of stars is now being set up, and will be completed as soon as Miss Janssen and Dr. Vyssotsky have finished the luminosity classifications.

TABLE II. VELOCITY DISPERSION FOR TENTH MAGNITUDE K STARS

	a-axis	b-axis	c-axis
Giants	$\pm 29.9 \pm 2.6$ (71)	$\pm 36.3 \pm 5.0$ (29)	$\pm 29.8 \pm 3.2$ (48)
	25.7 2.4 (67)	25.1 3.5 (26)	20.3 2.4 (44)
Dwarfs	$\pm 24.8 \pm 4.5$ (18)	$\pm 31.9 \pm 6.3$ (14)	$\pm 28.4 \pm 3.9$ (30)
			22.0 3.9 (28)
All	$\pm 30.9 \pm 2.2$ (106)	$\pm 28.4 \pm 2.4$ (78)	$\pm 28.5 \pm 2.2$ (91)
	25.2 1.9 (98)	22.4 2.0 (75)	21.5 1.7 (85)

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Eggen, Olin J. Photoelectric magnitudes and colors in the Coma and Hyades clusters.

Photoelectric magnitudes and colors of stars in the Hyades and Coma Berenices clusters have been determined with the Washburn Observatory photomultiplier photometer and recorder. Three control stars, representing the extreme values of the colors of all stars measured, were observed periodically during each run on the clusters, and the extinction factors for both color and magnitude were interpolated for each star from these observed values. Both the colors and

the magnitudes were reduced to outside the earth's atmosphere. The colors, after a zero point correction, are on the international system and the magnitudes were reduced to international photographic magnitudes by comparison with the north polar sequence. Only some 50 stars of the 150 odd assigned to the Hyades cluster were observed; the observing season being one of the poorest of recent years at Madison. All stars brighter than photographic magnitude 10 and assigned to the cluster in Coma Berenices were observed as were many of the field stars.

Since the distance of the Coma cluster is large in comparison with its extent, any dispersion in a color-magnitude array must be due to errors in the magnitudes and colors and/or to a real dispersion in luminosity for a given color. Previous color-magnitude, and spectrum-magnitude (Russell diagrams) arrays for this and other clusters have shown considerable dispersion. The arrays from the new magnitude and color determinations show almost no detectable dispersion in the main sequence.

The color-*apparent* magnitude array for the Hyades members shows a dispersion of as much as 0.5 mag. for a given color. However, since the Hyades are only some 40 parsecs distant, this dispersion is to be expected from the differential in the distances of the members. When the individual magnitudes are reduced to absolute values using the parallax obtained from well determined proper motion and radial velocity data, this dispersion disappears. Moreover, a new feature becomes evident, that is, a splitting of the main sequence at about absolute photographic magnitude +3.0. This previously undetected branch of the magnitude-color array rises somewhat more steeply than the main sequence, and from known spectral types it consists of giant A stars, the most luminous in the Hyades being θ^2 Tauri. Furthermore, the lower portion of this new branch contains the metallic-line stars. The spectra of these stars are characterized by both giant and dwarf features. The single, metallic-line star in the Coma cluster, 17 Comae B, falls in the same position on the cluster-diagram as do the metallic-line stars of the Hyades cluster. The Coma cluster also contains a nearly horizontal branch (i.e., nearly constant absolute magnitude) which crosses the main sequence near zero color index. This branch contains such peculiar stars as 14 Comae ("shell star"?), 21 Comae ("composite"?), and 17 Comae A ("spectrum variable"). The spectrum

variable 17 Comae A lies on a portion of this branch which is to the left (bluer) than the main sequence.

Colors and magnitudes of a few members of the Ursa Major cluster have also been obtained. These include 78 Virginis ("spectrum variable") which fits on the horizontal branch of the cluster-diagram to the left of the main sequence as described above for 17 Comae A. Also, the metallic-line star 41 Virginis in the Ursa Major cluster falls on the vertical branch of the diagram where the metallic-line stars in the Hyades and Coma clusters appear. The yellow giant, 52 Herculis, in the Ursa Major cluster coincides in color and magnitude with the 4 yellow giants in the Hyades. Other members of the Ursa Major cluster fall on the main sequence as defined by the Hyades stars.

In addition to presenting the possibility of determining the absolute magnitude of a star to the nearest 0.05 mag. from the color alone, these diagrams promise to be useful in studying more distant stellar clusters. The presence of the splitting in the main sequence should provide a means of eliminating the effects of absorption from cluster distances without recourse to spectral types. Also, when all of the members of a moving cluster, such as the Hyades or the Ursa Major cluster, have been observed, it will be possible to use the color-magnitude relation in additional condition equations for determining the convergent of the cluster and ultimately for correcting the proper motions of the cluster members.

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Research program on the light of the night sky and photometric observations of the night sky from aircraft.

The program on the light of the night sky at the United States Naval Ordnance Test Station is for research in the physics of the upper atmosphere. The following are included in the project: (1) Spectrographic studies of the upper atmosphere, and (2) Photometric observations leading to a determination of the height to emitting layers or clouds and a study of change of intensity with magnetic latitude.

A ground observing station has been established about thirty air miles north of the Michelson Laboratory on Cactus Peak, elevation 5300 feet, latitude N $36^{\circ} 05'$ and longitude W $117^{\circ} 49'$. Many of the ground observations reported by