Sawyer, Helen B. Lengths of cluster-type periods in Messier 22 and other globular clusters.

During the past year the writer has investigated the variables in the large, bright globular cluster in Sagittarius, Messier 22. Earlier work on this cluster had been done by Bailey, Shapley, and Miss Swope. Eight new variables have been found, so that the number known in the cluster is now 25. Of these, 18 have proved to be cluster type, one a long-period variable, one a long-period Cepheid, and one apparently an RV Tauri star with period of 88 days.

This rather thorough investigation of the periods of the variables has revealed a curious fact. The distribution of the cluster-type periods is about the most remarkable of the thirteen clusters containing substantial numbers of cluster-type variables with known periods. In Messier 22, the cluster-type periods fall into two separate groups with periods around one-third of a day, and two-thirds of a day. There are no variables in the cluster with periods around half a day. No cluster-type period is found in the interval 0.44 to 0.61 day. This is the most frequent interval for galactic cluster-type periods. It is also the interval in which periods, if they exist, are most readily determined.

Bailey in 1919 pointed out a similar gap in the cluster Messier 15, but the gap is even more pronounced in Messier 22. A comparison of the frequency curves of the thirteen globular clusters in which there are seven or more cluster-type periods known, shows that four exhibit this double maximum. These are Messier 53, ω Centauri, Messier 22, and Messier 15. In all these cases, the two maxima occur at one-third of a day and two-thirds of a day. Where the maximum frequency falls close to half a day, as it does for the other clusters, only a slight secondary maximum or none at all is present. A priori there is no reason why a maximum at two-thirds of a day should be associated with a second maximum at one-third. But from the existing data it appears that the presence of many variables with periods between 0.45 and 0.55 day is incompatible with the presence of many other cluster-type variables whose periods differ by more than 0.05 day from these amounts.

The maximum frequency of the cluster-type periods is not correlated with any obvious characteristic of the clusters such as galactic latitude or longitude, declination, or number of long-period Cepheids. It would nevertheless appear to be of some significance for theories of stellar variability

or origin of globular clusters. There is a suggestion that a cluster with pronounced single maximum may have a later integrated spectral type than the others.

The complete papers will appear in publications of the David Dunlap Observatory.

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Underhill, Anne B. and William Petrie. The stark effect of helium in some B-type stars.

Measures of equivalent widths for the *HeI* diffuse series lines in the spectra of three giant and three dwarf type stars have been obtained. A decided weakening of $\lambda 5876$ and $\lambda 6678$ in the spectra of dwarfs relative to giants is observed. This weakening supports the cycle proposed by Foster and Douglas to explain the anomalous absorption in dwarf stars near $\lambda 4471$ and $\lambda 4922$. The explanations suggested by Struve and Goldberg to account for this anomalous absorption both seem unsatisfactory since a weakening of $\lambda 5876$ and $\lambda 6678$ in dwarf stars is not inferred from their work.

A calculation is carried out showing that the amount of leakage from the 4d to 4f levels suggested by Foster and Douglas is sufficient to account for the observed weakening of the 2p-3d lines.

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van de Kamp, Peter. Parallax and peculiar orbital motion of nearby stars.

The conventional short-range parallax determinations are generally not suitable for the study of peculiar orbital motions, nor affected by them. On the other hand, intensive long-range series of astrometric photographs will lead to more accurate parallax values only if existing peculiar orbital motion is taken into account. Thus the discovery of variable proper motion for a star should be considered an initial handicap toward further improvement in the parallax, which cannot fully be overcome until a simultaneous solution for parallax and orbital motion can be made.

The problem of separating the barycentric proper motion, the annual parallax motion and the star's orbital motion is complicated by the hour angle restrictions of the long-focus photographic technique. At most, six months observations are available each year on the retrograde half of the parallax orbit around opposition.