THE REGION OF THE DOUBLE CLUSTER IN PERSEUS

By W. P. Bidelman

Spectral class and absolute magnitude determinations have been made of all early-type stars brighter than photographic magnitude 8.5 in a region of six degrees diameter surrounding the double cluster in Perseus. Distance moduli derived from this work and the colors of Stebbins, Whitford, and Huffer indicate that the well-known grouping of c-stars in this region should be considered a part of the double cluster, as these stars are at approximately the same distance as h and χ Persei.

Color excesses derived from photoelectric colors and the new spectral class determinations show, in agreement with earlier studies, a decided increase of selective absorption across this region, in the sense that χ Persei is considerably redder than h Persei. New long exposure photographs indicate that the total absorption increases more or less uniformly toward the galactic circle. There would thus seem to be no reason to attribute the relative faintness of χ Persei, as found by Miss Fish-mish, to a difference in distance of the clusters.

The dynamical implications of this extended cluster of super-giants, which is of a considerably greater diameter than that usually attributed to the clusters, will undoubtedly be of interest.

DYNAMICAL FRICTION

By S. Chandrasekhar

It is shown in this paper that the fluctuating force acting on a star due to its neighbors can be analyzed into two parts: a part which is purely random and a part which represents a systematic deceleration. This second part is proportional to the velocity of the star and acts against the direction of motion. From general considerations it can be shown that the coefficient of dynamical friction $\beta = 1/\tau_R$ where $\tau_R$ denotes the time of relaxation of the system.

As evidence for the operation of dynamical friction the rate of escape of stars from galactic clusters is evaluated first ignoring the dynamical friction term and second including it. When we ignore dynamical friction it is found that the rate of escape is so great that the mean life of galactic clusters is only of the order of $10^8$ years. On the other hand, if dynamical friction is included the mean lives are extended to $5 \times 10^9$ years; in other words, the existence of galactic clusters provides the strongest evidence not only for the operation of dynamical friction but also for a time scale of the order of $3 \times 10^9$ years.