THE STATISTICAL STUDY OF THE GALACTIC STAR SYSTEM

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IN THE FIRST PART of this paper the general problem of describing statistically the constitution of our stellar system will be outlined. In the second a particular problem, the distance distribution of stars in a limited area of the sky, will be taken up to indicate the kind of mathematical statistical problems met with in stellar statistics.

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Although our galaxy contains in addition to ordinary stars many peculiar objects such as variable stars, binary and multiple stars, star clusters, nebulae, and highly rarefied interstellar matter, we shall limit ourselves here to the distribution of ordinary stars. The statistical description of the system then involves the following eight variables:

Three polar coördinates with the sun as origin define the position in space

Galactic longitude	l
Galactic latitude	b
Distance	r

Two parameters are needed to describe the physical constitution of ordinary stars. We choose for these parameters

Spectral class	S
Absolute magnitude	M

If the stars are classified according to the pattern of absorption lines shown in their spectrum, the spectral classes for the great majority of stars form a continuous sequence. The spectral class S may thus be considered as a variable. Among the ordinary stars we include only those whose pattern of spectral lines fits into this sequence. The absolute magnitude is a logarithmic measure of the amount of light radiated by the star.

The velocity of a star relative to the sun is given by its three components in a rectangular coördinate system

$$\dot{x}, \dot{y}, \dot{z}$$

The description of the stellar system as far as ordinary stars are concerned is then supplied by the distribution law

$$F(l, b, r, S, M, \dot{x}, \dot{y}, \dot{z})dl\,db\,dr\,dS\,dM\,d\dot{x}\,d\dot{y}\,d\dot{z}\,,$$

which gives the number of stars for any combination of infinitesimal intervals of the eight variables.