in particular on the possible role of regions in spiral arms that are temporarily active in star formation—a problem discussed by Lindblad, Oort, Eggen and Woolley.

In this connection, I should like to comment on one particular problem. Delhaye and Blaauw in studies of space motions of A stars as well as G and K giants have shown that these stars occur in a ridge in the $U - V$ plane which is not populated by the youngest population I stars. This ridge contains the stars of the Ursa major stream. The interpretation of this phenomenon is being considered on the basis of space velocities and ages for the stars in question.

Although some of the conclusions regarding the possibility of age determinations of sufficient accuracy for the use in discussions of places of origin of the stars are encouraging, I wish to emphasize again the many difficulties, and also the fact that applications of the method on a large scale have not yet been made. I believe, however, that is worth while to try method out by pursuing the various programs outlined.

16. STELLAR DISTRIBUTION AT HIGH GALACTIC LATITUDES

B. J. Bok

In recent years much work has been done on the problems of stellar distribution in the north and south galactic polar caps. Most of the relevant papers have been summarized in the Report of Commission 33 and we shall soon have available T. Elvius's summary in Chapter 3 of Compendium, Volume 5. Because of the likely close approach to the steady state (equivalent to the well-mixed state) in the directions of the two galactic poles, the continuing emphasis must be on related studies of stellar distributions and velocity distributions perpendicular to the galactic plane for homogeneous groups of stars differentiated on the basis of spectral or colour characteristics. Spectral data have become available through the researches carried on at the Warner and Swasey, the Hamburg-Bergedorf, the Uppsala and Lick Observatories. In recent years valuable additional radial velocity material has been contributed by the Dominion Astrophysical Observatory, by the Hamburg-Bergedorf Observatory and through the combined efforts of the Royal Greenwich Observatory and the Cape Observatory. Much additional information on the distribution of faint dwarf-stars, including white dwarfs and subdwarfs, continues to accumulate through the surveys of W. J. Luyten, G. Haro and F. Zwicky. Colour data are now being gathered through the work of J. M. Basinski and myself and that of W. Becker and associates in Basel. In recent years the most extensive analyses have been carried out by J. H. Oort and E. R. Hill, by A. R. Upgren, by T. E. Elvius, by I. I. Kuzmin, by J. E. E. Einasto and by R. v. d. R. Woolley.

There are two reasons why these researches must be continued and extended during the next few years. The first is that from related radial velocity and density distribution studies for stars relatively near the galactic plane, one obtains precise information for the mass density in the galactic plane near the Sun. Most workers seem agreed that 0·15 solar masses per cubic parsec represents the best value, but Kuzmin and Einasto favour 0·09 as the best solution. If the majority is right, then a total mass density of 0·05 solar masses per cubic parsec remains unaccounted for, but there would be no such excess of unknown stars, and possibly molecular hydrogen, if the quoted value of Kuzmin and Einasto proves to be correct. The second reason for studying stellar and velocity distributions perpendicular to the galactic plane is that through such work we can learn much about the nature of the general galactic field of force—which affects the functions predicted for large distances from the plane.

In the years to come, studies of the related distributions of $(U - B)$ and $(B - V)$ colour indices will probably assume increased significance, especially since these quantities can be measured with precision for much fainter stars than are within reach of spectral classification techniques. It is not at all difficult to apply the techniques of narrow-band photometry to faint stars in the galactic polar caps. Colour work promises rich returns for our knowledge of the general galactic field of force; the virtual absence of uncertainties created by interstellar absorption encourages one to concentrate increasingly on colour studies. The differentiation between Population I and II stars should be relatively easy in these high latitude studies. Since there are indications for the presence of inequalities in the stellar distribution over the galactic polar caps (Elvius and Upgren), it appears important to cover the largest possible fields, but it should be realized that, for studies of the distribution perpendicular to the galactic plane, we should limit ourselves to fields with galactic latitudes between $\pm 70°$ and $\pm 90°$; the study of stellar distributions between galactic latidudes $\pm 20°$ and $\pm 70°$ is of great interest, but the latter gives information on a totally different set of problems than does the work on the polar caps themselves.

The recent paper by J. M. Basinski and myself (*Mount Stromlo Observatory Memoir* no. 16) illustrates the power of the colour approach. The extreme scarcity of stars with $(B - V) < +0{\cdot}30$, in a survey extending to $V = 16$, shows that the average space density of the A stars at $z = 3200$ pc is only 1/600 of the value derived by Woolley for $z = 250$ pc. From colour data alone, space densities can be derived for stars with $+0{\cdot}30 < B - V < +0{\cdot}60$ to distances $z = 2000$ pc, whereas for these same stars available spectral data reach for F0 stars to $z = 800$ pc and for F8 stars to $z = 400$ pc. The colour work in U, B, V and narrow-band photometry in the same wavelength range, will increasingly have to be supplemented by work in the red and the infra-red, for it is in the far infra-red that one can most readily differentiate the late-type dwarfs, which predominate among the fainter stars.

DISCUSSION

Zwicky. I wonder how your results compare with those of Luyten, Haro and myself. Near the north galactic pole I discovered in 1940 32 high latitude Humason-Zwicky stars. They are brighter than the fifteenth apparent photographic magnitude and for all of them $B - V < 0$. Also, from surveys by myself and others there seem to be rather considerably more faint blue stars than you find per unit area in your field of 14 square degrees at the south galactic pole.

Furthermore, do you know how many of your stars are white dwarfs or blue subdwarfs? The presence of an appreciable number of these would falsify your determination of the space density of stars as a function of the height above the galactic plane.

Bok. Mrs Basinski and I, too, were surprised to find in our survey so few really blue stars to $V = 16{\cdot}25$. As far as we can judge, our survey is complete to our magnitude limit and no stars seem to have been missed. To show the paucity of these stars, I may mention again that there are only three stars with $12{\cdot}5 < V < 14{\cdot}5$ and $B - V < +0{\cdot}30$ in an area of the sky of 8·3 square degrees.

17. THE VALUE OF THE DYNAMICAL PARAMETER C

J. Einasto

The most important galactic parameters, featuring the general structure of the galactic system, are

R_0: The distance of the Sun from the centre of the Galaxy;
A, B: Oort's rotational parameters;
C: Kuzmin's dynamical parameter ($-C^2$ being the gradient of gravitational acceleration in the z-direction at $z = 0$).

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