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THE HERTZSPRUNG-RUSSELL DIAGRAM

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PREFACE

A Symposium on the subject of the Hertzsprung-Russell Diagram was held in connection with the 10th General Assembly of the International Astronomical Union at Moscow, USSR, occupying half of August 15 and August 16. The Symposium program was organized by a Committee consisting of J. L. Greenstein (Chairman), P. P. Parenago, E. Schatzman and O. Struve. The program of the Symposium was a crowded one, and was only made possible by the use of simultaneous translation broadcast over an ear-phone system in English, French and Russian. We were fortunate in having in the audience one of the fathers of this most active field, Professor E. Hertzsprung.

The choice of topics within so broad a title was a difficult one, and the organizing committee chose to limit the first group of communications to those concerned with our current knowledge of the accurate HR diagrams of the nearby stars, galactic and globular clusters, associations and the Magellanic Clouds, from the observational point of view. As complete an exploration as possible was made of the various types of HR diagrams shown by various systems, of various ages and positions in the Galaxy. While our knowledge of these diagrams is still incomplete, and in some cases inaccurate, it is clear that the growing use of photoelectric techniques will soon provide a fairly complete set of possible diagrams for theoretical interpretation. The extension of such diagrams to extragalactic systems and to unusual types of populations of our own Galaxy is still a work for the future.

In the second half of the Symposium, attention was devoted to interpretation of the diagrams, and an attempt was made to bridge the presently existing gap between the (1) theoretical computations of stellar interiors and stellar evolution with constant mass, admitting the possibility of internal inhomogeneity, and (2) the point of view that stellar evolution occurs with substantial change of mass during the life of the star. While of course no final conclusion can be reached at present, theoretical interpretations of HR diagrams or color-magnitude diagrams of high accuracy will eventually settle the question as to whether evolution occurs with mass loss in main sequence stars, or only at later stages of stellar evolution, say in the red giants or the white dwarfs. Some consideration was also given to the amount of cosmic scatter in the physical parameters of the star, and the finer methods of analysis which will permit distinction to be made between the various population types and sub-systems by physical measurements, such as multi-color photometry. In addition there was some discussion of the meaning and nature of those stars around the fringes of the HR diagram which probably represent very late stages of stellar evolution.

Each session of the Symposium was introduced by a resumé article, Professor Parenago giving a review of, and the history of, our knowledge of the HR diagrams of the nearby stars in his introduction to the first session, Professor Schwarzschild discussing the theoretical problems and results on stellar evolution from the point of

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view of the theory of stellar interiors in the second. Professor Oort presided over the first session, and Professor Ambartsumian over the second.

The papers as presented in this volume represent in most cases somewhat fuller versions than were actually given at the Symposium, because of lack of time. Discussion, when it could be recorded, has been appended to each chapter, and I am very much indebted to Professor Schatzman for his cooperation in acting as Secretary for the Symposium.

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