

PART 4

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A. JOINT DISCUSSION
ON
LOCAL STRUCTURE AND MOTIONS IN THE GALAXY

Wednesday 2 September, all day

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I. INTRODUCTION

A. Blaauw

Mr President, Ladies and Gentlemen,

We now begin our Joint Discussion on the Local Structure and Motions in the Galaxy, and I should like to present, on behalf of the Organizing Committee, a few introductory remarks on the programme which the Committee has drawn up.

The idea of choosing this subject for a Joint Discussion arose about a year and a half ago, during the Australian IAU Symposium on the Galaxy and the Magellanic Clouds. That symposium dealt mainly with the large-scale properties of the galactic system, and a few days ago we heard about those aspects again in Prof. Oort's admirable discourse.

Today we shall focus attention on the properties of the small portion of the system surrounding the Sun. There were various inducements to do so. At these short distances we are naturally able to investigate structure and motions in much greater detail than in the more remote parts of the Galaxy. It is generally believed that our local region is in many respects a representative sample of the outer parts of the Galaxy in general. Thus, much of the information obtained here is of much more than local significance. This applies especially to studies of the stellar composition with reference to subdivision into age groups, with their different chemical and kinematical properties, and to the inferences with regard to the history of the Galaxy as a whole.

However, there is also the field of investigations which deal with the local region in its own right. I am thinking here particularly of the components which are typical for the most recent phase of the evolution in the Galaxy: the interstellar medium and the young stars. Although the structural features here certainly must be seen as part of the *general pattern* that we usually indicate by the term spiral structure, this detailed structure varies from place to place, and it is of great importance that we try to assemble all the information on the structure and state of motion of *this particular region*. Such studies may throw light on the detailed behaviour of the gas and dust within a local stretch of a spiral arm; on the rate of change of the local spiral structure, on the rate of star formation out of the gas and the kinematics with which the stars are formed, on the degree to which these local affairs are submitted to influences from outside, etc.

The Organizing Committee has decided to stress in this Joint Discussion *these* special aspects of the *young component* of the population, rather than the ones I mentioned first. We encounter here a large variety of fields of research which are intimately connected, and for which it seemed useful to bring out their mutual relation in a somewhat systematic survey. The logical order seemed to be, to start with a review of the properties of the interstellar medium. This, we will do this morning, in the afternoon we will proceed, first, to the stars of most recent formation, and next to some related problems.

A number of speakers have been invited to present review papers on the different aspects of the subject. Naturally, there will be opportunity for brief remarks and discussion following these reviews. The speakers have been informed about the time they have available, and we hope they will stay within these limits. In view of the large number of contributions, may I urge those who wish to present additional remarks to be brief, and strictly limit them to items dealing with the *local properties* of the Galaxy.

I. LOCAL PROPERTIES OF THE INTERSTELLAR MATTER

2. OVERALL PROPERTIES OF THE INTERSTELLAR GAS

F. J. Kerr

General Remarks

This paper is a review of some of the overall properties of the interstellar gas, as an introduction to the more detailed papers. The most extensive information on the gas comes from radio observations, particularly of the 21-cm hydrogen line. There are some difficulties, however, in fitting together radio and optical results.

The radio investigations are least precise in the solar neighbourhood, where small deviations