

Introduction

THE INTERSTELLAR GRAINS PROBLEM has been the subject of scientific investigation for over 40 years. At various times during these years concentrated efforts have been made to arrive at definitive solutions. A new wave of research work, both theoretical and observational, was in progress at the time of the International Astronomical Union meeting in 1964. It therefore seemed appropriate and timely to gather together the various people actively engaged in the interstellar grains problem and those with interests in related scientific subjects in order to focus attention on the key avenues of research. It was hoped that such a scientific confrontation would result in a higher level of understanding and would consequently stimulate and coordinate future work in this field.

An organizing committee was formed during the International Astronomical Union meeting to arrange for a conference on interstellar grains to be held at Rensselaer Polytechnic Institute the following year.

The facilities and cooperation provided by the host institution contributed greatly to the overall success of the meeting.

During the course of the meeting approximately thirty papers were given. Many of these presented entirely divergent points of view. There were significant differences on the observational interpretations as well as on theoretical interpretations. The discussions as they appear in this volume have gone through several editing processes primarily in the interest of clarity and succinctness. We believe that little if anything essential has been deleted and perhaps even a modicum of the flavor of the originals may have been retained.

The publication of the proceedings of the Colloquium on Interstellar Grains has been delayed for various reasons, and although some of the papers have already appeared elsewhere, several very interesting ones are not yet in print. Furthermore the discussions contain both opinions and information which are as pertinent now as they were when originally spoken. We believe that these two features are equally important and we suggest that the discussions, following each paper, be considered an integral part of that paper.

The principal issues discussed at the colloquium have been the subject of further observational and theoretical investigations. Among these are: (1) The question of uniformity (and value) of the ratio of total to

selective extinction; (2) Dielectric grains versus graphite or graphite core plus dielectric mantle grains; (3) Variations of the reddening law and of the wavelength dependence of polarization and their respective association with localized phenomena or with problems of galactic structure; (4) Formation of interstellar molecules, mainly OH and H₂; (5) The diffuse interstellar lines; and (6) The physics and chemistry of grain nucleation and growth. We believe that those who participated in the meeting were aided by having had the opportunity to discuss these problems with their co-workers. We hope that the information contained herein will serve as a refresher for those who participated and will be of value to new workers in this field, even though some of the problems have been carried considerably beyond the point at which they end here. I should like to express my thanks to Mrs. Martha Hanner for her assistance in the preparation of this volume.

J. MAYO GREENBERG
Rensselaer Polytechnic Institute
Troy, New York