P R E F A C E

Investigation of the interplanetary dust cloud is characterized by contributions from quite different methods and fields, such as research on zodiacal light, meteors, micrometeoroids, asteroids, and comets. Since the earth's environment and interplanetary space became accessible to space vehicles these interrelations are clearly evident and extremely useful. Space measurements by micrometeoroid detectors, for example, provide individual and eventually detailed information on impact events, which however are limited in number and therefore restricted in statistical significance. On the other hand, zodiacal light measurements involve scattered light from many particles and therefore provide global information about the average values of physical properties and spatial distribution of interplanetary grains. Additional knowledge stems from lunar samples and from dust collections in the atmosphere and in deep sea sediments. All these sources of complementary information must be put together into a synoptical synthesis. This also has to take into account dynamical aspects and the results of laboratory investigations concerning physical properties of small grains. Such considerable effort is not merely an academic exercise for a few specialists interested in the solar dust cloud. Since this same cloud exclusively allows direct in-situ acess to investigate extraterrestrial dust particles over a wide range of sizes and materials, it provides valuable information for realistic treatment of dust phenomena in other remote cosmic regions such as in dense molecular clouds, circumstellar dust shells, and even protostellar or protoplanetary systems.

After the famous first meeting at Honolulu (1967) it has become a tradition of the "interplanetary dust community" to periodically review on an interdisciplinary level the progress and state of the art: l.c. the meetings at Heidelberg (1975) and Ottawa (1979). This time the Colloquium on "Properties and Interactions of Interplanetary dust" at Marseille (1984) was organized by IAU Commission No. 21 (Light of the Night Sky). It was cosponsored by IAU commissions No.15, 22, 49, and by the relevant Section ISC.B-1 of COSPAR. The timing took into account that earthbound observations and data from Helios, Pioneer and other spacecraft were analyzed to a large extent and that the community is stepping forward towards a synopsis, combining optical and in-situ data with laboratory measurements, collected sample analysis and advanced modelling. With respect to the years 1985/86 (apparition of P/Halley) it seemed very appropriate and timely to provide a well founded, up-to-date synopsis of interplanetary dust. It was first envisaged to have the colloquium at Graz in combination with the COSPAR General Assembly 1984, which partially involves the same scientists. Since, due to funding problems, it was not possible

to combine the IAU Colloquium directly with the meeting at Graz we gratefully accepted the invitation of the LAS (Laboratoire d' Astronomie Spatiale, CNRS, Director Prof. Courtes) to have the colloquium at Marseille immediately after COSPAR. It was a good choice. Due to cooperation from COSPAR, which shifted its similar Topical Meeting to the Marseille program and by the engagement of all participants, the meeting became an exciting international workshop, involving 78 scientists of 14 nations, including China, which recently joined the IAU. Here is the place especially to thank the Local Organizing Commitee for their excellent organization, and to acknowledge the support of IAU, CNRS, CNES, LAS, and of the Universite de Provence, which provided their facilities for the meeting.

It was decided to publish the proceedings in a comprehensive form and to leave for later detailed presentations to appropriate journals. The rather limited space of about 4 or 10 pages for contributed papers or invited reviews, respectively, puts severe requirements of conciseness on the authors, who succeeded in condensing the highlights of their achievements into the very limited space. We acknowledge with thanks this high degree of cooperation in most cases. From the proceedings of former dust colloquia it is known that such a book, which presents the complete state of the art by short articles of the original investigators is an inestimable tool for daily work: Students at Bochum named the Heidelberg Proceedings "The Bible"! As a compromise between a high standard of language, uniform presentation and fast publication the editors refrained from sending papers to english speaking colleagues for linquistic perfection or to retype all contributions. However, when they were asked for or when they realized major problems, they changed the manuscripts and sent them for approval to the authors. To save time, minor changes or formal adaptions were made without contacting the authors. We apologize and accept responsibility for any mistake which might be brought in by this procedure. On the other hand - with the exception of the panel discussion - all discussion remarks were to be handed out directly to the authors, who were responsible and free to incorporate in their camera ready manuscripts aspects raised in the discussion or to include formal answers. Certaintly each paper does not reflects the view of the editors or of the majority of investigators attending the meeting. It is, however, an attribute of colloquia to stimulate progress in research by sometimes new or even exotic ideas which are presented to the scientific community for discussion and helpful criticism.

Due to the manifold interrelationships between methods and problems there is no "king's way" to organize a book on interplanetary dust. Nor is there an importance to the order of presentation. In this proceedings we followed mainly the order of presentation during the meeting. We start with observations of zodiacal light and F-corona (I) followed by space and ground studies of interplanetary dust (II). Investigations of interplanetary dust particles by laboratory studies (III) has become an important tool of research on dust. In a similar

way optical observations provide further progress only if they are followed by laboratory investigations, theoretical work and modelling. This type of work was taken care for in the section "Optical studies of dust (IV)". Comets and meteoroids (V) were treated as far as they are related to interplanetary dust. An important aspect of dust particles in the heliospheric medium are dust-plasma interactions (VI). Finally, if all topics referred to above are involved, one arrives at a realistic treatment of the dynamics of interplanetary dust (VII), which will lead to an understanding of the complicated interactions between sources, sinks, development of interplanetary dust particles and to an insight as to why the interplanetary dust cloud is as we find it today. An outlook to future problems and recommended investigations in the panel discussion (VIII) and a summary of the present status as it results from the meeting is presented in the conclusions (IX).

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