

# Foreword

Only in recent years has the true nature of comets become evident. With this knowledge has come the realization that comets are almost certainly debris left over from the building of the outermost planets. This material must be typical of the gas and dust in the interstellar cloud from which the Sun and planetary system evolved. Thus, comets appear to offer us an opportunity to study primitive matter involved in the origin of the solar system, material that has been stored in deep freeze for  $4.6 \times 10^9$  years. At the same time, the comets provide a link with interstellar solids, of which they are probably largely composed. The physical and chemical study of comets has now replaced classical celestial mechanics as the major focus of observational and theoretical research. Familiar areas of astronomical spectroscopy are approached from a somewhat unusual point of view in cometary studies, while comets provide an entirely new laboratory for an increased understanding of magneto-hydrodynamics. On the other extreme, the physics of amorphous ices and other solids can be applied to probe the internal structure, origin and activity of the comet nuclei. In summation, the study of comets has now become a manifold discipline with fascinating potential, particularly as the space age provides new observational input over the entire electromagnetic spectrum, coupled with the expectation of direct *in situ* studies and even the eventual return of samples from cometary nuclei. The marked progress in this direction is represented by the new results described in this book's revised (second) edition. The several missions to Halley's comet have filled in many lacunae of comet knowledge.

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