

Part III begins with a history of computers and moves into a discussion of reduced instruction-set computer machines. The author presents his design for an optical reduced instruction-set computer and suggests this design may be the first. He introduces the concept of dataflow computers and describes electronic dataflow architectures, providing background for hybrid optoelectronic implementations of the static data-

flow architecture. Chapter 15, on optical cellular automata, is a good representation of the ongoing work in this area. It is curious that so much of this work involves optics when in fact nearest-neighbor computation is a good match for conventional electronics.

Unlike numerous edited books in the field, the author has organized *Optical Computer Architectures* to serve as a textbook, and he includes

exercises at the end of each chapter. The topics of the exercises are well chosen, but the gap between what is discussed in the text and what is challenged in the exercises is too great for the exercises to serve as an effective pedagogical device unless an expert is teaching the course.

In terms of form and style, the general flow is logical, starting with background and motivations, building up to optical devices finally leading to complete systems. As can be expected, the untested ideas are saved for later chapters. The use of language is generally good, although the author alternates between present and past tenses and between first-person singular and first-person plural. There are over three dozen typographical and sentence construction errors, ranging from double periods to the use of the word "emitted" where "omitted" is intended. Although somewhat disconcerting, the errors are few in relation to the length of the text (531 pages) and in consideration of the fact that this is the first edition of the book.

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Comet Halley: Investigations, Results, Interpretations

Edited by John W. Mason
Ellis Horwood, New York,
1990.

**Volume 1: Organization,
Plasma, Gas.** \$110.00 hc
ISBN 0-13-171075-3

**Volume 2: Dust, Nucleus,
Evolution.** \$110.00 hc
ISBN 0-13-171083-4

The return of Halley's comet and the various ground, air and space missions involved produced a great quantity of new, high-quality data. This achievement required the efforts of several thousand astronomers and technical people from more than 50 countries plus many more amateurs worldwide. These two volumes condense the results of these efforts into 570 pages, the third such compilation. (The first, some 1608 pages long, contains technical papers presented at an ESLAB symposium held in Heidelberg, West Germany, in October 1986. The second compilation condensed these papers into 936 pages and was published by Springer-Verlag in 1987.)

The authors of the 39 scientific chapters in the current two volumes are largely principal investigators of experiments on the missions, or were

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heavily involved in the experiments, observations or analysis. Thus they are highly able specialists in their fields writing primarily for their peers, as is usual in scientific journals. They make no concessions to the "popular" reader in terms of nomenclature or mathematical theory. On the other hand the editor provides in each volume comprehensive lists of names, acronyms and abbreviations.

In spite of the above caveats, the amateur or serious student with a modest technical background should find much of the material comprehensible and enlightening. Unfortunately, the format of most of the chapters does not follow the standard form for scientific papers, which usually consist of an abstract, introduction, content and conclusions or discussions. The tyro can consult the editor's introduction to each volume to ascertain the general contents of each chapter to make a rational choice for serious reading. For skimming, most of the chapters do end with summaries, conclusions or discussions.

Of the 39 chapters, 31 are devoted to the direct scientific results from the space missions, ground-based observations and airborne or rocket studies. The editor includes two introductory chapters in the first volume for a presentation of the superb international cooperation and organization that led to the great success of the research. The lack of such organization during the 1910 apparition of Halley's comet led to a dissipation of much of the observational material. The most complete but still only partial analysis was delayed until the later 1920s; this took place at Berkeley, while I was there as a graduate student in astronomy. In fact that study by the late N. T. Bobrovnikoff helped to arouse my own interest in comets.

At the end of the second volume, the editor includes six chapters on evolution and orbital motion. The addition of the historical, organizational and theoretical chapters rounds out the presentations to provide the reader with a broad view not only of the present status of cometary research but of its past and future. In particular, the International Halley Watch program is about to issue an enormous compilation of the observational data assembled from all the programs encouraged and organized through its efforts. As a consequence, many more scientific results can be expected.

The editor went to great effort and was successful in maintaining the uniformity and quality in the writing

and the intelligibility of presentations by authors of many nationalities. As he notes, he also attempted (with success, I think) to minimize unnecessary overlap between the chapters of each section and to allow the authors to make clear their diverse opinions or conclusions. The publisher succeeded admirably in producing two beautifully constructed volumes with many illustrations, including several

pages of full-page color illustrations nested in the centers of each volume.

FRED L. WHIPPLE

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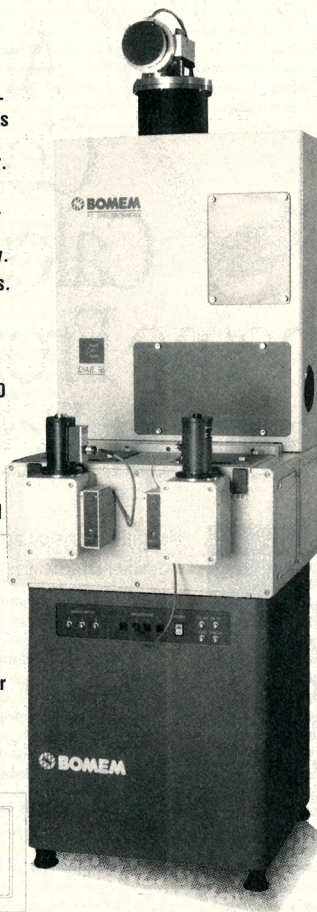
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