A view of modern astrophysical research

Monsters in the Sky

P. Maffei
348 pp., MIT, Cambridge, Mass, 1980 (first Italian ed., 1976). $15.00

Reviewed by Stephen P. Maran

Faster than an erupting nova, a noted Italian researcher recounts one anecdotal astronomical narrative after another, from tales of escaping comets to the disharmony of Stephan's galaxy quintet. All of modern astrophysical research is fair game for the pen of Paolo Maffei, discoverer of the two famous neighboring galaxies that bear his name. This is the second of his two well-conceived books (the first was *Beyond the Moon*) intended for a fairly-well educated audience. There is much more here than the obligatory sections on black holes, supernovae and quasars. In fact, the great virtue of the book consists of its many accounts of past celestial phenomena and investigations that are now forgotten or at least almost unknown to nonspecialists. I found some of the discussion reminiscent of Otto Struve's well-remembered *Astronomy of the Twentieth Century* but with the major difference that *Monsters in the Sky*, although more lively, is also admittedly less authoritative. Maffei, as he forewarns the reader, generally takes sides on the controversial subjects that he discusses and there is space only to present his preferred point of view. When it agrees with mine (as in the account of the Gum Nebula and its likely origin), the presentation seems fine. On some matters, one wishes it had been more critical. The accounts of the alleged libration clouds of the Earth and of the ring of circumterrestrial dust nebulae supposedly glimpsed from a Polish ship cruising near Africa in 1966, for example, might well have been less ingenuous.

It is unfortunate that both the book itself and some of its chapters have such extravagant titles (Phantoms of the Solar System, the Killer Monsters, and so on.), for they may attract an audience not quite up to the text. Although nonmathematical, *Monsters in the Sky* is written for people used to thinking about both physics and astronomy. By the same token, the titles are likely to dissuade the more serious readers, including physics and astronomy teachers, who would most benefit from it.

The book is well produced and indexed and has a useful bibliography. The only mechanical error appears to be an interchange of texts, so that the proper contents of page 82 appear on page 84 and vice versa. A few numbers are arguable, such as the 700 000-year age quoted for the bright lunar crater Tycho (too small) and at least one is a misprint: surely the anticipated magnitude of the as-yet-undiscovered Planet X was not 2 in 1972 or on any other occasion. Translators Mirella and Riccardo Giacconi have done a fine job. This volume deserves to be on the shelves of all astronomy libraries and reading rooms.

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Laser Handbook, Vol. III

M. L. Stitch, ed.
900 pp. North-Holland, New York, 1979. $122.00

Laser technology has exploded during the 1970's with applications, finding their way into supermarkets, hospitals, telephone networks, military systems and the construction industry. Scientific advances have been made possible by ever-shorter and ever-more powerful light pulses, by increased frequency stability, frequency range and tunability. The directions for investigations have broadened from the original research in physics and electrical engineering departments into chemistry, biology, materials science, industrial engineering and medicine. What do all these lasers and their applications have in common? In the face of increasing specialization in the laser field, how can the researcher keep abreast of all that is going on? These questions face the organizers of the major laser conferences as well as the editor of *Laser Handbook, Volume III.*

The *Laser Handbook* is a set of reference volumes which introduces the basic technology of lasers and many of their applications. This is a hand-book in the German sense of the word—a collection of articles by experts in the field, providing an in-depth overview of various aspects of the laser field. It serves as a bridge between textbooks on lasers and exhaustive monographs on specialized subjects. Volume III follows by seven years the publishing of volumes I and II and is devoted to the more recent, high technology advances between 1970 and 1977.

Malcolm L. Stitch has done an excellent job of editing this volume and, as in the previous volumes, the authorship is generally of the highest caliber. Each contribution is basically a short monograph written by some of the foremost scientists in that particular area. The subjects covered should be of interest to most researchers in quantum electronics and there is little overlap with the first two volumes. Volume III provides a convenient source of both introductory and detailed knowledge about a variety of advanced lasers and applications.

Four articles were particularly interesting, since they were reviews of broad areas of technology. J. J. Ewing presents an excellent review article on excimer lasers, describing the physical basis of their operation, their design and experimental results. These rare-gas and rare-gas-halide lasers provide sources of very high power in the uv and vacuum uv. C. J. Ultee details the basic research in the powerful infrared chemical and gas-dynamic laser, which use chemical reactions to produce inverted populations in gases such as HF, CO_2, and HCl. An amusing oversight in this chapter is the failure to mention the wavelength of the HCl laser. W. H. Lowdermilk describes the generation of ultrashort light pulses by mode-locking. His tutorial discussion includes passive and active mode-locking, emphasizing solid-state and dye lasers. R. Wallenstein contributes a descriptive section on dye-laser technology, emphasizing construction and performance. This is an excellent introduction to the wide range of dye laser