particle interactions certainly appears appropriate for plasma-physics students.

The authors' highly individual style shows up best in the final chapter on the molecular theory of fluids, a chapter that was the most interesting to this reviewer but as written seemed to have the least to do with plasma physics. There are statements guaranteed to wake up a sleepy reader. For example in a section on the statistical mechanics irreversibility, the authors discuss memory effects that persist long after a disturbing force has been turned off, and say "... the system which has been disturbed differs in certain occult ways from that which has been left in equilibrium." The authors treatment of kinetic theory and transport phenomena in fluids is impressive and sophisticated and as difficult to follow as in many other books.

This book would be an adequate text for a year-long preplasma physics background course, something which does not exist in most universities. There are some problems scattered through the book, but not enough. The price of the book is so high ($35) that few students or research workers will buy it. Although I think it is a good source book for subjects that plasma physics students should know, I do not think that it can compete with existing books in fluid mechanics, electromagnetism, statistical mechanics, and so on.

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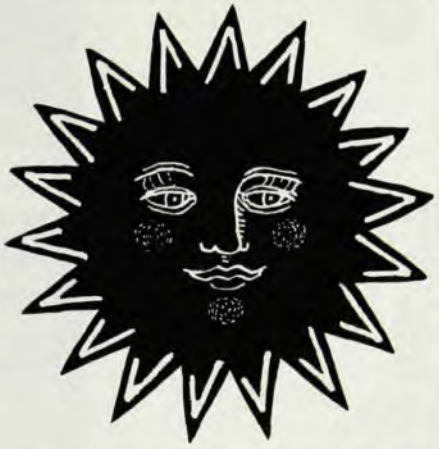
Early Solar Physics

A. J. Meadows

312 pp. Pergamon, New York, 1970. Hard, $7.00, Paper $4.75

This is an excellent and very reasonably priced treatise; not only students, but also the professionals in astronomy, physics, and the history of science will read it with fascination. By the term "early solar physics" the author means roughly 1850 to 1900, which indeed is the very period in which a consistent picture of our understanding of the Sun began to emerge. The author quotes Samuel P. Langley (this hitherto rather underestimated scientific genius), who wrote in 1888: " ... a new branch of astronomy has arisen ... sometimes called celestial physics ... and sometimes referred to as the New Astronomy."

A short introductory chapter provides a condensed general background and is followed by some 60 pages of a clear discussion of the growth of our insight into the real nature of various solar phenomena—sunspots, flares, temperature effects, chromosphere, prominences, corona, solar structure and solar energy. A closing section deals with "the new era of Solar Physics," culminating in George Ellery Hale's work at Mount Wilson Observatory. The remainder of the book is devoted to the splendid idea of bringing the outstanding researchers themselves to the speaker's forum, and on more than 200 pages we have the rare pleasure of listening to them through relevant extracts from their pioneering



publications. Here we find the nuclei of 27 papers, including Heinrich Schwabe (1843), Hermann Helmholtz (1854), Richard Carrington (1858, 1860), Gustav Kirchhoff (1860, 1861), Hermann Vogel (1864), Sir Joseph Lockyer (1866, 1868, 1869), Pierre Janssen (1868, 1871, 1879), Jonathan Lane (1870), Charles Young (1879, 1883), William Campbell (1899), Langley (1901), John Evershed (1901), Karl Schwarzschild (1906) and Hale (1908).

The demarcation line between "early" and "modern" is drawn by A. J. Meadow through the year 1913, when the rise of Niels Bohr's atomic work made it evident that "solar physics was ready to move ahead into the modern era." To read this lucidly written book, filled to the brim with fruits of a rich harvest, is most encouraging and a sheer delight.

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University Optics, Vol. 1

D. W. Tenquist, R. M. Whittle, J. Yarwood

349 pp. Gordon and Breach, New York, 1970. $24.50

This is a British college text, printed in Hungary and offered in the US to fill no visible need. It is written "for the student preparing for Part I of an Honours Degree in Physics," etc. It covers the time-honored subjects in a traditional way, geometrical optics, in-

struments, photometry, interference and diffraction. There is essentially nothing in volume 1 that would have been written differently in 1890. "Laser" doesn't appear in the index. Not only is it out of date, but it is pedantic in style, unrelieved by considerations of either humanity or utility. It offers no advantage over the texts widely used (F. A. Jenkins and H. E. White, F. W. Sears, D. W. Ditchburn, G. R. Fowles, R. S. Longhurst) and makes no attempt whatsoever to prepare students for the exciting areas where the action is today—lasers, holography, nonlinear optics, image processing, Fourier-transform spectroscopy, aperture synthesis, and so on.

The authors promise a second volume on more current topics, but it appears quite likely that the student will have been turned off completely before he reaches it. Somehow if physics is to survive, its textbooks have to convey the sense that it is lively, useful, subtle and profound (rather than merely complicated), and fun. Few textbooks succeed. This one is no exception. Besides, it costs too much.

W. Lewis Hyde
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College Physics: A Text with Applications to the Life Sciences

D. E. Tilley, W. Thumm
596 pp. Cummings, Menlo Park, Calif., 1971.

Reviewing a textbook without having used it in a course has much in common with picking World Series participants in advance of the baseball season. Both chores, regardless of the care exercised, are simply guesses as to eventual effectiveness under pressures of performance. Thus nothing definitive can come from such activity, and its only usefulness is to draw attention to promising candidates.

One such promising text is this remarkable new book which is obviously the result of a happy collaboration between authors Donald E. Tilley and Walter Thumm and Cummings Publishing Company. The fact that these names are unknown to most readers may explain why this book is so successful. Their approach breaks completely with the turgid pedantry and esthetically unimaginative offerings that professional authors and publishers of physics texts have produced until recently. More important, this book is *for* something—physics as seen in the life sciences. It is not merely deficient in some very necessary ingredient, as the traditional, non-calculus physics text is.

The book starts with chapters on atoms and nuclei and forces (all kinds) and subsequent motion. Chapters on momentum, energy and relativity follow. Mechanical equilibrium (especially fluids) and waves (sound) have their own chapters and then four chapters on electricity and magnetism are followed by one on quantum mechanics and one on optics. The book ends up with three chapters on thermodynamics. Several useful appendices are included for students who have forgotten the high school level mathematics employed exclusively in the text.

The major strength of this material is not in its somewhat novel arrangement nor in its non-traditional emphasis, but rather in its selectivity. As anyone who has endured the agonies of a curriculum committee knows, it is not what to include but what to abandon that is difficult to resolve. In this task of selection, the authors have done a very good job.

Selection of examples from biology and medicine, though, is done with mixed success. Examples in the chapters on atoms and on optics are well-chosen. These same examples are found in several good biology texts, where they are explained in similar detail. However, many examples consist of simply stating their application to biology with no further explanation. One notable shortcoming of this type is where disorder and its increase in biological systems is treated in a mere three sentences. A cardinal principle of ecology such as this deserves more than a perfunctory discussion.

The layout of the book is excellent. Each chapter is preceded by a semi-abstract collage-photograph of a famous physicist together with his signature. The rather squarish pages have broad margins where variously appear sketches and parenthetical remarks to amplify points made in the text, quotations and photographs of significant physicists, and ample space for the reader's own marginalia. Some thirty interesting problems and excellent annotated lists of suggested readings end the chapters.

A major fault of this text is in the prose. The style is unnecessarily wordy and appears to result from considerable effort by the authors to make things clear. Instead of making things clear, in some places verbosity stems the flow of thought and produces a condescending tone. Constant references in the early chapters to what will be discussed later in the text are distracting. More poetry even at the expense (but not necessarily) of some clarity would be desirable in a text for this audience and level. As is always the