

This is an excellent book. The authors successfully make every effort to put their intuition at the service of the reader. They make analogies with electromagnetic phenomena time and again to introduce and clarify their approach. Their account is coherent, well integrated and persuasive. It is not an "easy read," however; their discussion, in order to highlight the physics, often does not provide the details of the intermediate steps. Summaries of the background formalism are relegated to 16 appendices and will be useful to the well-educated advanced student and research worker. As the authors point out, the number of possible references is enormous, so the major publications they cite are review papers. There is no attempt at completeness. The authors have a particular point of view and a fascinating story to tell, and for the most part they list only those references relevant to that point of view.

I have only two complaints. I would have liked a chapter on future directions for the field. And the cost of this book is exorbitant, a disservice to the authors and to the scientific community.

HERMAN FESHBACH

Massachusetts Institute of Technology

The Physics of Laser Plasma Interactions

William L. Kruer

Addison-Wesley, Redwood

City, Calif., 1988. 182 pp.

\$40.95 hc ISBN 0-201-15672-5

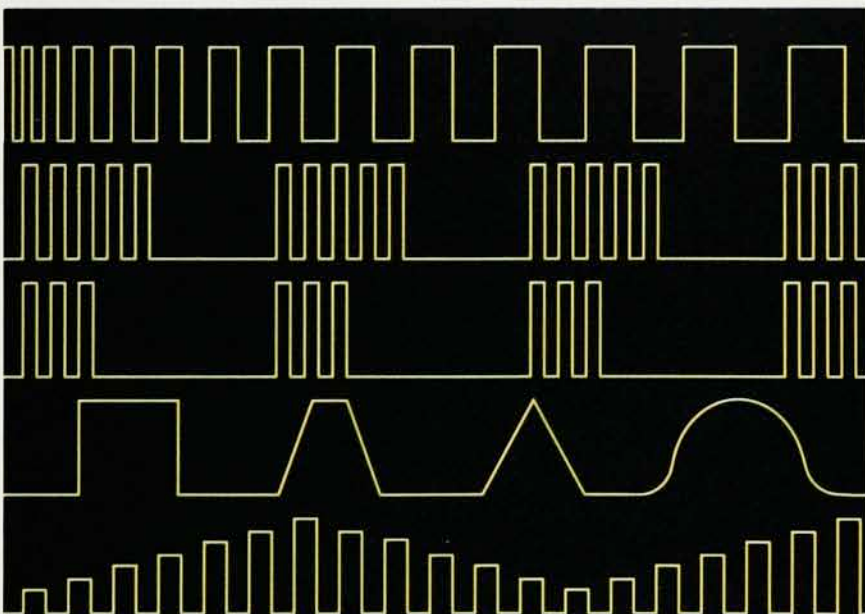
This is a timely and important book on recent developments in the theory of the interaction of intense laser light with plasma. Many of the topics discussed apply generally to any problem involving the interaction of intense electromagnetic radiation with an unmagnetized plasma. The field of laser-plasma interactions has developed over the past 20 years in support of work toward achieving inertially confined fusion using lasers. William Kruer, the book's author, has been a leader and a pioneer in efforts to understand the rich and challenging physics that has been discovered as a result.

Many phenomena compete and interact in laser-plasma interactions; one would think that little progress could be made. However, as this book clearly shows—through comparison of predictions with experimental results—a considerable degree of success has been achieved. This success has largely been obtained through

numerical modeling of phenomena in combination with analytic treatments of simple physical models incorporating the essential physical processes that show up in the numerical simulations. These results are verified by experiments. The resulting physical understanding has a considerable (though not perfect) predictive capability.

No one is better at explaining the basic physics considerations on which

this understanding is based than Kruer. The starting point is a fundamental understanding of the physics of plasmas, which includes kinetic theory, the theory of wave propagation in plasma and an understanding of important nonlinear processes such as those responsible for parametric instabilities, those involved in wave-particle interactions and those involved in nonlinear heat transport. All these and more are discussed in



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Kruer's small book.

The Physics of Laser Plasma Interactions grew out of lecture notes from a course Kruer taught in the applied science department of the University of California, Davis. As the foreword states, such books tend to have a rough, informal style, and this is true of Kruer's book. While Kruer states that the book does not assume an extensive knowledge of plasma physics and that the treatment is based on

simple physical models, I suspect that a student coming to the subject cold would have trouble learning from this book. Many plasma theorists who are used to more formal, detailed treatments of plasma processes may find the style too rough for their tastes. However, Kruer is presenting a broad-brush picture of the physics of laser-plasma interactions; he presents us with the forest and not detailed, leaf-by-leaf descriptions of

the trees. His broad physical pictures are supported by a large amount of work on numerical models and by experimental results. Kruer discusses these, but I suspect that the reader will not get a true feel for the imposing bulk of the supporting work. Some hint of its sheer magnitude comes through in the large number of cited references. If the book is used in a course, the instructor can undoubtedly fill in details and answer questions students have on the supporting material.

This is an excellent book, filled with insights into many of the complex phenomena involved in the interactions of intense electromagnetic waves with plasma. I recommend it to any student of the subject or, for that matter, to anyone interested in nonlinear processes in plasma.

JOHN M. DAWSON

University of California, Los Angeles

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