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extensive discussions of the various topics are included. Correction of these substantial defects in a second edition would make the book suitable as a refreshing text for students or as a useful monograph for researchers in the field, but in its present form its most valuable role may be in quickly providing the experienced physicist with the flavor of recent efforts to understand "correlations" in the framework of the shell model. A bonus for the general reader is the frequent mention of the connection between nuclear properties and related phenomena in solid-state physics, such as paramagnetism, superconductivity, excitons, plasmons and Friedel oscillations.


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## Basic Principles of Plasma Physics, A Statistical Approach

**S. Ichimaru**
324 pp. W. A. Benjamin, Reading, Mass., 1973. $19.50 hardcover, $12.50 paperback

A course in plasma physics can vary in content over a remarkable range depending on the "historical" background of the professor. If he entered plasma physics via the route of atomic physics, weakly ionized plasmas or fluid dynamics, the emphasis may be on fluid equations, orbit theory and fluid instability theory of non-uniform plasma. If his entry to the field coincided with the emphasis on instabilities in collisionless plasmas, he may concentrate on the Vlasov equation, quasilinear theory and microinstabilities. Those whose background was more oriented to electrical engineering and microwaves may spend considerable time on wave propagation in plasmas, while mathematicians often concentrate on equilibrium solutions of the MHD equations in complex geometries. Yet another group found plasma physics to be a rich new vein for advances in statistical mechanics. S. Ichimaru seems to be of this latter persuasion, and his book clearly reflects that historical bias in fact as well as in title.

Those wishing to present a course in plasma physics with emphasis on statistical mechanics will find this an excellent graduate text. I emphasize "graduate" because the material, although very well written, moves at a fast pace and at a high level. For example, I doubt that a student not previously exposed to plasma kinetic theory would follow the very rapid development of the BBGKY hierarchy, Vlasov equation, Bogoliubov time scales and Balescu–Lenard collision term in chapter 2.


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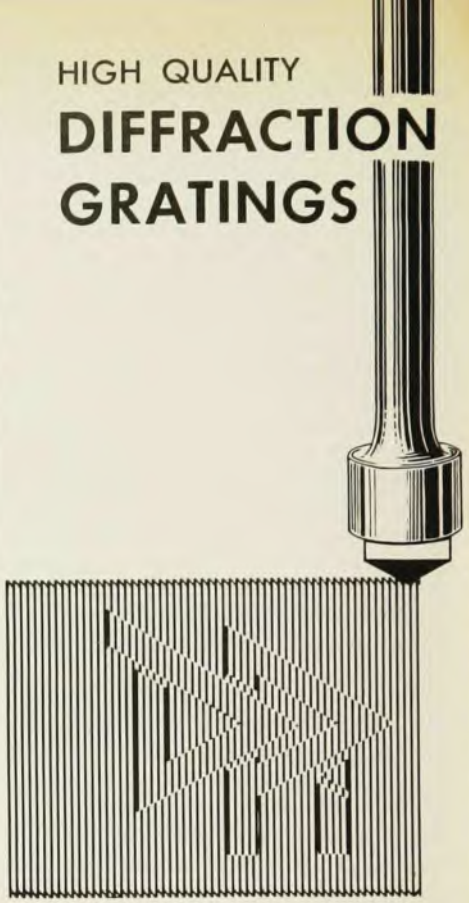

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A statistical approach has its pluses and minuses, as does any other. Turning to the minuses first, a statistical analysis normally leads one to consider uniform plasmas almost exclusively. Thus there are excellent treatments of the dielectric properties of uniform plasmas (chapters 3, 4, 5) and of microinstabilities in uniform plasmas (chapter 7). However, the treatment of non-uniform plasmas leaves much to be desired. Orbit theory is given short shrift, and indeed it is not clearly pointed out that the dielectric "drift" is not a particle drift. One looks in vain for mention of the $\delta W$ method, of MHD equations or a general treatment of interchange instabilities. In all fairness, the author has clearly called attention to these omissions in his preface.

On the plus side, the author really comes into his own in his discussion of fluctuations (chapter 9) and relaxation processes (chapter 10). The chapter on transient processes is also excellent, especially in the treatment of plasma echoes. This book, if nothing else, will also be an excellent reference source for material on dielectric screening. The last chapter, "plasma turbulence," is based almost entirely on original work by Ichimaru and his coworkers.

As I mentioned earlier, the "flow" of the writing is very good. At every stage, the author gives physical interpretations of the results. His background in solid-state plasma physics also enriches the choice of illustrations and adds depth to several of his discussions.

I can certainly recommend this book as an excellent text or backup source for a statistically oriented graduate plasma course. It will not do as well for a course that is more fluid oriented but would remain an invaluable reference for dielectric behavior, waves, fluctuations and relaxation.

ALBERT SIMON
*University of Rochester*
*Rochester, New York*

## Superconducting Materials

**E. M. Savitskii, V. V. Baron, Yu. V. Efimov, M. I. Bychkova, L. F. Myzenkova**
459 pp. Plenum, New York, 1973. $27.50

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