

Principles of MAGNETIC RESONANCE

C.P. Slichter,

University of Illinois at Urbana-Champaign
Second corrected and revised printing of
the second edition

the book remains one of the best expositions of the quantum theory of resonance in existence. It has my highest recommendation.

—*Journal of the Optical Society of America*

this is an excellent updating of what was already an established standard

—*Applied Spectroscopy*

This essential graduate textbook now includes additional references as well as a conversion table to assist in transforming expressions in the text into SI units.

(Springer Series in Solid-State Sciences, Vol. 1). 1980/416 p./115 illus./Cloth \$24.80
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Newtonian, Lagrangian and Hamiltonian mechanics and then thirteen "Appendices" on advanced topics. The level of exposition is uniformly high and throughout there are little gems, for example, a pretty set of problems (Section 8.D) showing that only two central force fields have all orbits closed, or a simple application of homotopy concepts to the existence of periodic motions (Section 45). His presentation of parametric resonance (Section 25) is especially good. I would not hesitate to use the first two parts as a basic text in an advanced undergraduate course. I am not so happy with Arnold's appendices: there is too much "pop science" about them and no real coherence. One wished he had said twice as much about half the subjects; it is especially sad that he says so little about KAM.

Thirring's book is not only the shortest but he deals with several important subjects (scattering and relativistic mechanics, including a discussion of particle motion in the Schwarzschild solution) not discussed in the other books. He does this by omitting the treatment of several other basic topics like rigid bodies and constrained systems and by not carrying the mathematical formalism very far. It should be mentioned that this is the first volume of a four volume set which is sort of a mathematical physicist's Landau-Lifschitz. Like the first volume, they are all well-written, but unlike the first, the later volumes have no real competition and the last two on quantum mechanics are likely to become classics.

My biggest complaint about the Abraham-Marsden volume is summarized in the term "overkill": too much notation, too many reformulations of the same result, too many extra things added that really shouldn't concern their audience. In spite of this, if one penetrates their notation (particularly difficult if someone with some mathematical background takes their advice and skips the first 160 pages of "Preliminaries"), one finds clear writing. Moreover, their Part III, "An Outline of Qualitative Dynamics" is absolutely unique. It is clear that someone who's appetite is whetted by Arnold would probably have to be sent to this part.

Finally a word about these books as an introduction to the mathematical language of manifolds. I prefer Arnold's policy of introducing the concepts as needed over that of the other authors who begin with preliminary chapters full of mathematics. I also find this discussion in Abraham-Marsden too abstract and that Thirring has too much of a tendency to immediately introduce coordinates; again, I prefer Arnold's balanced presentation. But here I am not sure that a reader who was not already familiar with the lan-

guage of manifolds might not find Thirring preferable.

In summary, I think every aspiring physicist should get a copy of Arnold. Someone interested in some of the topics only treated in Thirring or who wants somewhat more elementary introduction to manifolds should consider also getting that book. Abraham-Marsden, their own description notwithstanding, is not really an introductory text. It shouldn't be attempted until the reader has mastered one of the other books but I welcome it as a useful addition to the more advanced literature.

References

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Barry Simon is a professor in both the departments of mathematics and physics at Princeton University. For the academic year 1980-81, he is visiting Caltech as a Fairchild Scholar. Simon has worked in a variety of aspects of mathematical physics.

Black Holes and Warped Spacetime

W. J. Kaufmann, III

221 pp. Freeman, San Francisco, Cal., 1979.
\$7.95

The study of black holes is a subject much written about these days. Unlike so many other popular versions, William Kaufmann's book provides a clear, thorough treatment of the new astrophysics without resorting to a "gee-whiz" narrative style. He has written several other books on astronomy and some of the material in *Black Holes and Warped Spacetime* can also be found in his *Galaxies and Quasars*.

Kaufmann patiently lays out the details needed for an understanding of the current black hole theories: how stars evolve through their thermonuclear fuel cycles; how they expire into gravitational collapse; the different categories of compact objects—white dwarfs, neutron stars, and black holes; various techniques for determining the

density and expansion of the universe; how an intense gravitational field warps both time and space; how the singular condition of black holes is reached; descriptions of black holes with charge and spin and those which evaporate; a discussion of quasars and their mysterious engines of energy transmission.

The text is full of apt analogies which make these difficult concepts more understandable to a popular audience. The many drawings and photographs, particularly the color plates, also complement the narrative.

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Introduction to Applied Solid State Physics: Topics in the Applications of Semiconductors, Superconductors, and the Nonlinear Optical Properties of Solids

R. Dalven
340 pp. Plenum, New York, 1980. \$27.50.

This is a textbook aimed at senior undergraduates and first-year graduate students interested in solid-state devices. It emphasizes the basic physical principles on which the devices are based and shuns the engineering details. *Introduction to Applied Solid State Theory* surveys a fairly large number of devices, but is by no means exhaustive. Magnetic materials and devices are, for example, omitted altogether. The book is based on a course given three or four times during the past decade by the author, Richard Dalven, at the University of California in Berkeley. The author found at Berkeley a sizeable number of students interested in obtaining a survey of solid-state electronic devices and of the physical concepts on which they are based but who did not want mathematical rigor or the engineering details. The book presupposes a knowledge of introductory solid-state physics and electromagnetic theory.

The first two thirds of the book (a little over 200 pages) deals with semiconductors. After a review of semiconductor physics and of the physics of p-n junctions, Dalven gives a description of diodes and transistors. Next, he discusses the physics of metal-semiconductor and metal-oxide-semiconductor junctions, on which charge-coupled devices and MOSFET's are based. Photoemission, photoconductivity, photovoltaic devices, radiation detectors, solar cells, light emitting diodes and lasers conclude the review of semiconductor applied physics. The last two chapters,

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