larly those that have formed parts of larger treatises on experimental physics. Among those older German books are the one by Müller-Pouillet, the one by Chwolson, and last but not least, the one by Grimsehl. This feeling of frustration arises from the fact that this brand new book by Matossi is not very different from all the great classics that I just enumerated. Admittedly, there are additions that make it appear as an up-to-date book, but these additions are rather perfunctory, and do not make the book into a really modern textbook on experimental physics.

One of the difficulties is that maybe I am looking at this book with different eyes than those required for judging a book designed for German teaching. There isn't such a clear-cut distinction between undergraduate and graduate work as is common here, and therefore, it is hard to say whether the book is for undergraduate or graduate teaching. If we judge it entirely by American standards, then I would say that there is too much in it for undergraduate work and too little for graduate work, although it may be very useful for the undergraduate teacher for supplementing an elementary text with beautiful problems in geometrical optics.

At this point I would like to use two examples. Both are taken from the chapter entitled "Wave Character of Matter." I feel it quite debatable whether a chapter like this is needed in a book devoted to optics, and in particular when the treatment is rather perfunctory. For instance, in this volume, five pages are devoted to electron diffraction and eight pages to electron optics. It is obvious that such a treatment cannot cover the ground and it gives perhaps a somewhat distorted view of the importance of these two subjects. It would have been perhaps better to have omitted them completely.

There exist other areas that I would have liked to have seen included. The role of information theory in optics is getting more and more important. While the argument may be valid that the treatment of information theory in a book on experimental physics is perhaps going too far, there exist some related aspects that are close enough to information theory to justify partial inclusion. For instance, the beautiful method of wave-front reconstruction invented by Gabor has been derived from his studies on information theory to some extent. I think that this would have been quite proper in a book on experimental physics, particularly since holography is nowadays a very active branch of optics. Likewise, the beautiful experiment of Brown and Twiss on coherence is quite fundamental, and is sufficiently experimental to take a place in a book of this character. Also the diffraction treatment of geometrical optics that has been so beautifully worked out by the French school is missing. If there is a revision of this book, I recommend that at least these three items be included.

The book is beautifully produced and it is a pleasure to handle it.

* * *

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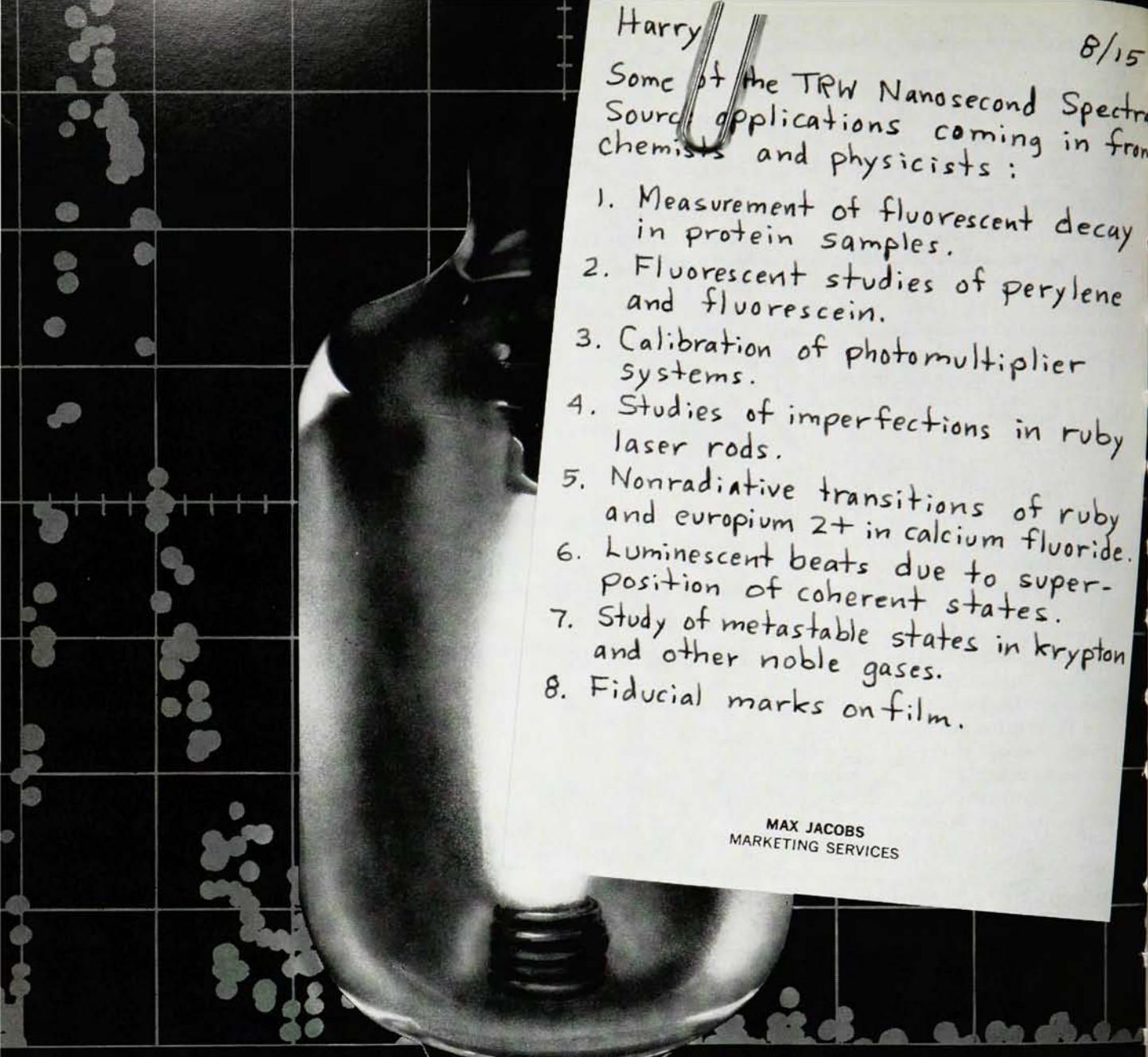
## Matter by structure

SEVEN STATES OF MATTER. By M. Gottlieb, M. Garbuny and W. Emmerich. 247 pp. Walker, New York, 1966. $5.95

*by J. E. Romain*

I do not remember having read a more fascinating book for months. The authors, three scientists of the Westinghouse Research Laboratory, have succeeded in writing together an homogeneous book, in which the various aspects of matter (from molecular structures to degenerate matter, through crystals, liquid structures, monoatomic films and plasmas) are authoritatively reviewed by men on the leading edge of research in the relevant fields.

The "seven states" of matter are not really seven. Although seven are indeed named: solids, liquids, two-dimensional films, gases, plasmas, degenerate Bose-Einstein systems and degenerate Fermi-Dirac systems, the main theme of the book is the very impossibility of specifying clear-cut boundaries between them, and such limiting cases as glass, liquid crystals, and quick-clay are emphasized. The link between the different states,

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which provides a smooth sequence of chapters that might otherwise apparently (but erroneously) seem unconnected, is found in the concepts of bonding force and temperature. An especially enjoyable description is given of superfluidity and of its particular case, superconductivity.

The book is profusely illustrated with excellent diagrams and pictures. The language is always simple, and the authors manage to give a fairly detailed, while qualitative, explanation of the phenomena. As a general rule, they try to make things plausible without recourse to mathematics. (The last chapter, on thermodynamics, is the only one in which equations are fairly numerous.) To be sure, they do not succed in providing a complete account of superfluidity, but, for that, I am not sure anyone could, so far, even with the help of quantum statistics. The main quality of this book, which makes it outstanding in this reviewer's opinion, is that it presents a readable account of topics that are otherwise described only in advanced textbooks or even in technical journals.

* * *

*The reviewer, who formerly taught theoretical physics, is now a scientific adviser in applied mathematics and physics.*

## NEW BOOKS

### ELEMENTARY PARTICLES & FIELDS

**Introduction to the Unified Field Theory of Elementary Particles.** By W. Heisenberg, 177 pp., Interscience, New York, 1967. $7.00

**Axiomatic Field Theory.** (Vol. 1, Brandeis University Summer Institute, 1965) M. Chretien and S. Deser, eds., 516 pp., Gordon and Breach, New York, 1966. $32.50

**Particle Symmetries.** (Vol. 2, Brandeis University Summer Institute, 1965) M. Chretien and S. Deser, eds. 691 pp. Gordon and Breach, New York, 1966. $35.00

### ATOMS & MOLECULES

**Microwave Spectroscopy.** By W. Gordy, W. V. Smith, R. F. Trambarulo, 446 pp., (Reprint of 1953 ed.) Dover, New York, 1966. Paper $3.00

### FLUIDS & PLASMAS

**Surface Tension and Adsorption.** By R. Defay, I. Prigogine, A. Bellemans. Trans. by D. H. Everett. 432 pp. Wiley, New York, 1966. $16.00

**Plasma Instabilities and Anomalous Transport.** Conf. proc. William B. Pardo and Harry S. Robertson, eds. 286 pp. University of Miami Press, Coral Gables, Fla., 1966. Cloth $8.00, paper $4.00

**Elements of Magnetogasdynamics.** By L. E. Kalikhman. 366 pp. Trans. by Scripta Technica. W. B. Saunders, Philadelphia, 1967. $8.75

**Radiation Processes in Plasmas.** By G. Bekefi. 377 pp. Wiley, New York, 1966. $15.75

### SOLIDS

**Reaktionen in und an festen Stoffen.** By K. Hauffe. 968 pp. Springer-Verlag, Berlin and New York, 1966. DM 148

**Crystal Structures.** (2nd ed.) Vol. 5, The Structures of Aliphatic Compounds. By W. G. Wyckoff. 785 pp. Wiley, New York, 1966. $25.00

**X-Rays and Their Applications.** By J. G. Brown. 258 pp. Plenum Press, New York, 1966. $12.00

**X-Ray Determination of Electron Distributions.** By R. J. Weiss, 196 pp. (North-Holland, Amsterdam) Wiley, New York, 1966. $10.50

**Electrical Conduction Mechanisms in Thin Insulating Films.** By D. R. Lamb. 114 pp. Methuen, London, 1967. $4.50

### CLASSICAL PHYSICS

**Thermodynamics of Steady States.** By Ralph J. Tykodi. 217 pp. Macmillan, New York, 1967. $10.95

**Acoustics.** By Alexander Wood. 594 pp. (Reprint of 1960 ed.) Dover, New York, 1966. $3.50

**Electrodynamics and Classical Theory of Fields and Particles.** By A. O. Barut, 235 pp. Macmillan, New York, 1965.

**Critical Phenomena.** Conf. proc. (Washington, D. C., April 1965) M. S. Green and J. V. Sengers, eds. 242 pp. National Bureau of Standards, Washington, D.C., 1966. $2.50

**Nonlinear System Analysis.** By Austin Blaquière. 392 pp. Academic Press, New York, 1966. $14.50

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**The Variational Theory of Geodesics.** By M. M. Postnikov. 200 pp. W. B. Saunders, Philadelphia, 1967. $6.00

**Formulas and Theorems for the Special Functions of Mathematical Physics.** (3rd ed.) By W. Magnus, F. Oberhettinger, R. P. Soni. 508 pp. Springer-Verlag, New York, 1966. $16.50

**Mixed Boundary Value Problems in Potential Theory.** By I. N. Sneddon. 282 pp. (North-Holland, Amsterdam) Wiley, New York, 1967. $12.75

**Boundary Value Problems of Mathematical Physics.** Vol. 1. By Ivar Stakgold, 340 pp., Macmillan, New York, 1967. $12.95

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**Elementary Reactor Physics.** By P. J. Grant. 196 pp. Pergamon Press, New York, 1966. Paper $5.00

**Elements of Pulse Circuits.** By F. J. M. Farley. 159 pp. Methuen, London, 1967. Cloth $3.75, paper $1.95

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**Dictionary of Inventions and Discoveries.** E. F. Carter, ed., 193 pp. Philosophical Library, New York, 1967. $6.00

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**An Anthology of Philips Research.** H. B. G. Casimir and S. Gradstein, eds. 469 pp. Centrex Publishing Co., Eindhoven, Netherlands, 1966. $5.00

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**Scientists in Organizations.** By Donald C. Pelz and Frank M. Andrews. 318 pp. Wiley, New York, 1966. $10.00

**Biographical Memoirs of Fellows of the Royal Society.** Vol. 12, 1966. 264 pp. The Royal Society, London, 1966. $15.00

**The Relevance of Physics.** By Stanley L. Jaki. 604 pp. University of Chicago Press, Chicago, 1966. $12.50

**Nobel Lectures in Physics.** Vol. 1: 1901–1921. 498 pp. American Elsevier, New York, 1967, $85.00 for 3 volume set

**This New Ocean.** A History of Project Mercury. By L. S. Swenson, Jr., J. M. Grimwood, C. C. Alexander, 681 pp., NASA, Washington, D.C. $5.50

### BIOPHYSICS

**Aspects of Medical Physics.** Conf. proc. (Harrogate, England Sept. 1965.) J. Rotblat, ed. Taylor and Francis, London, 1966. $6.50 □