pleasure by reading these beautiful analyses of elementary but tantalizing paradoxes. Here also Bohr describes his principle of complementarity, which is his great tool for reconciling the apparent contradictions in quantum phenomona, and beyond that the basis for his whole philosophic position not only for science but more universally.

There is not enough space to discuss or even to mention the many wonderful papers in this volume or the rebuttals which Einstein gives to his critics in the last article. The careful reader will find this book an inexhaustible mine of insight and knowledge in the development of the scientific thought of our century.

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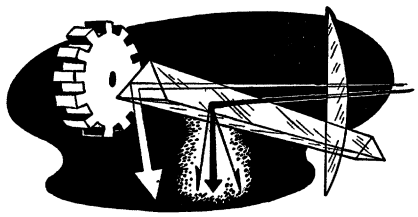

Reports on Progress in Physics. Vol. XII, 1948–49. London, S.W.1, England: The Physical Society, 1949. 382 pp. 2£ 2s. net.

This is the 12th volume of the admirable series of grouped surveys of topics in physics and the related sciences, which the Physical Society of London has been presenting to the world of physicists over a period of years. As contrasted with the nearest American approach to an equivalent—our *Reviews of Modern Physics*—the surveys of these volumes have often been better suited to the needs and powers of the nonspecialist, and many of them are actually readable. This volume is no exception to the rule; but since it is impossible to write 14 adequate reviews of as many articles on as many subjects, the reviewer can add little but names and titles to the foregoing words of general praise.

H. G. Thode and R. B. Shields deal with mass spectrometry, carefully defined as "instruments for ion collection and measurement in connection with relative-abundance determinations," and excluding the precise measurement of masses. B. V. Rollin treats briefly, under the title "Nuclear Paramagnetism," of what is more commonly called nuclear magnetic resonance. The essay of G. F. J. Garlick, "Phosphors and Phosphorescence," is "restricted to a survey of investigations of impurity-activated phosphors of crystalline structures which are synthesized by heat-treatment of their basic constituents." An article by D. K. C. MacDonald covers broadly and ably the field which he calls "spontaneous fluctuations," more commonly known perhaps as "noise." Transmutation, pair-production and other effects of the very short wave x-rays now available from accelerators are reviewed by W. Bosley and J. D. Craggs; and linear accelerators themselves by D. W. Fry and W. Walkinshaw of T. R. E., whose account will be read with especial interest by the constructors of high voltage research equipment in this country. G. O. Jones takes us abruptly to the other extreme of physics with a paper on "Viscosity and Related Properties in Glass," and N. Cabrera and N. F. Mott go clear over the border into chemistry with "Theory of the Oxidation of Metals."

We get back into solid-state physics in the second longest article of the book, that of E. Orowan, "Fracture and Strength of Solids," and then find ourselves among the gases and in the field of spectroscopy when we confront the "report" by A. Rubinowicz of which the purpose is "to summarize the more important of the recent advances in the field of atomic electromagnetic multipole radiation," and also the following essay by H. S. W. Massey, "Collisions between Atoms and Molecules at Ordinary Temperatures." K. Mendelssohn writes under the title "Low Temperature Physics," but confines himself to "recent advances in technique, superconductivity and superfluidity." M. Ross and J. S. Story provide us with a tabulation of slow neutron absorption cross-sections of the elements. Much the longest paper of the book is the last, the highly mathematical essay of J. de Boer entitled "Molecular Distribution and Equation of State of Gases." The reviewer envies anyone who can read all of these articles, good as they are.

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Fluorescence and Phosphorescence. Peter Pringsheim. New York-London: Interscience, 1949. 794 pp. $15.00.

An Introduction to Luminescence of Solids. Humboldt W. Leverenz. London: Chapman & Hall; New York: John Wiley, 1950. 569 pp. $12.00.

The science of luminescence is barely 100 years old (Sir George Stokes, 1852), but observations regarding luminescent materials are hundreds of years old. However, the understanding of the process of luminescence as contrasted to the emission of light due to temperature has been cleared up only within the last 30 years, after the successful interpretation of such observations on the basis of quantum theory. The first systematic attempt was Pringsheim's book, *Fluorescence and Phosphorescence in the Light of the New Atomic Theory,* 1921. This slender volume of about 200 pages, with some 260 references, is now expanded into the present imposing treatise containing a review of over 2,000 references (up to May, 1948).

In temperature radiation, the energy of radiation is due to the average energy content of the molecules as determined by temperature; whereas in the process of luminescence a molecule may receive an excitation energy exceeding the average temperature energy. This excitation energy is then emitted as luminescent radiation.

For luminescence it is therefore necessary that processes of excitation take place and that the energy taken up by atoms, molecules, or more complex systems be stored until it is emitted again as radiation. In rarefied gases, where the number of collisions is small, and in certain