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► that if the standard accounts of the twin paradox were correct, the traveler would return not only younger, but also shorter (page 76),

► that the outside of a sphere has positive curvature whereas the inside has negative curvature (page 119) and

► that the Robertson-Walker metric is the de Sitter metric (page 164).

In other words, let the innocent reader beware!

WOLFGANG RINDLER
The University of Texas
Dallas

Practical Fluorescence: Theory, Methods and Techniques

G. G. Guilbault
664 pp. Marcel Dekker, New York,
1973. \$29.50

Although this book is entitled *Practical Fluorescence*, George G. Guilbault discusses both the theory and practice of this and other types of luminescence. Fluorescence is the most commonly observed and utilized of the different types of luminescence. There are several applications of fluorescence spectroscopic phenomena, which are of considerable importance in the qualitative and quantitative analytical chemistry of inorganic and organic species. Practical techniques involving luminescence spectroscopy are well established, luminescence having been first observed in 1565. Most laboratories are now equipped with spectrofluorometers, and the subject is an active field of research.

The first few chapters provide a general introduction to luminescence, including instrumentation, practical procedures, basic theory and structural and environmental effects on fluorescence. The author illustrates the practical applications of fluorescence techniques in analytical chemistry by chapters on their use in the determination of inorganic ions and organic compounds, in enzymology, photosynthesis, and in the assay of proteins. There are also chapters on more specialized subjects including phosphorescence, chemiluminescence, atomic fluorescence, solid surface monitoring, fluorescence indicators and applications of fluorescence in environmental and forensic analysis.

The above summary of the book's contents indicates the diversity of fluorescence techniques, which include inorganic and organic analysis and molecular and atomic fluorescence. With so far-ranging a subject as luminescence to cover within the confines of a single volume, it is obviously impossible, even for so widely an acknowledged an authority as Guilbault, to give an up-to-date and

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exhaustive review of all of the varied techniques involved.

The book therefore attempts and succeeds in providing an introduction to the theory and practice of the diverse luminescence techniques. Of particular interest in the practical section is the discussion of several commercial spectrofluorometers and their basic components, and the examples of the main features of the fluorescence spectra of about 10 000 organic compounds and several inorganic ions. The later chapters give a good introduction to the more specialized techniques, and indicate their advantages and limitations. The book will be of interest to both the student and the scientist, especially those who actually wish to use the techniques.

J. D. NORRIS

*Imperial College of Science and Technology
London*

Positron Studies of Condensed Matter

R. N. West

123 pp. Barnes & Noble,
New York, 1974. \$10.50

This little book is a reprint from *Advances in Physics* 22 263 (1973) with an index added. It is a very useful summary of the field. In the short space of just over 100 pages, R. N. West has discussed briefly the most important physics that has been learned, both the behavior of the positron itself and its usefulness as a tool in solid-state research.

He first outlines the mechanism of annihilation and then describes the three principal experimental methods: observation of positron lifetimes, which separates modes of decay and thus identifies the number of states of the positron at annihilation, and momentum measurements by both the angular correlation and Doppler-shift techniques, which can show in some detail the k-space distribution of the electrons in the specimen being examined. Any discussion of chemistry is intentionally omitted but West reviews the physics of a positron and of a positronium atom in liquids and gases in sufficient detail for a reader to gain easy access to the field. The usefulness of the technique in illuminating the electronic structure of solids, metals and alloys in particular, is outlined in some detail. Finally, he reviews the newer and rapidly expanding field of studies of defects in crystals, especially metals up to 1973.

West's straightforward style makes easy and occasionally amusing reading, and his extensive bibliography will lead readers to more detail in the original journals. The book is a very useful ad-