ences of opinion are legitimate and of small importance, and the uninformed reader may submit himself with confidence to their advice.

In places the attempt to avoid this dependence leads to confusion: the chapter on detectors describes nearly 50 detectors, few of which are in common use or commercially available, and the novice may well feel an *embarras de richesse* which does not exist. Neither the reviewer nor his students could follow the explanation of the gas density balance.

Editorial policy is at times puzzling. The choice, for example, of automatic process systems and digital systems for separate chapters while preparative scale separations are omitted almost completely is curious. However, the introductory chapters on basic technique, column design, sampling and sample preparation, and interpretation of results are of universal value and will repay the reading time even of the experienced chromatographer.

The book will be widely used for reference on particular problems, as introductory reading for novitiates in gas chromatography, and for experienced chromatographers proposing to use a specialized technique for the first time.

S. J. HAWKES
Department of Chemistry, Brigham Young University, Provo, Utah

High Energy Physics

Bubble Chambers. YU. A. ALEKSANDROV, G. S. VORONOV, V. M. GORBUNKOV, N. B. DELONE, and YU. I. NECHAYEV. Translated from the Russian edition by Scripta Technica. William R. Frisken, Translation Ed. Indiana University Press, Bloomington, 1968. xii + 371 pp., illus. $17.50.

At the end of at least one of the beams from almost every accelerator of ≳ 2-BeV particles in the world can be found a bubble chamber. At many accelerators, the normal number is greater than one (for example, three at both Brookhaven National Laboratory's 33-BeV Alternating Gradient Synchrotron and the 28-BeV Proton Synchrotron at CERN in Geneva, Switzerland). Although spark chambers or counters, or both, with their excellent time resolution, are often used in arrays designed to accomplish one specific experiment, the bubble chamber, with superior spatial resolution, has become the ubiquitous workhorse of high energy physics. Well over 10^8 photographs (stereo multiplets) have been taken in experiments since bubble chambers began to be useful tools, with approximately 10^5 being the number for a typical experiment.

Perhaps such a well-established and complicated technique deserves a standard text, even though it is largely an assemblage of portions of other, more general techniques. The authors have attempted to produce such a text. It is systematic and pedagogic in tone, and written at about the level of a graduate engineering course.

The four chapters by Voronov on theory of bubble formation, growth to photographable size, and recondensation in superheated liquids are more nearly complete than anything I have previously seen published as applied to bubble chambers. There is a good introduction by Delone which would be worthwhile reading for all engineers and technical specialists charged with responsibility for the operation of bubble chambers. The chapter by Gorbunkov is a thorough treatise on the theory of illumination and photography of vapor bubbles in liquids, though it contains one important error. The author obtains a $\cos^6\theta$ relationship between the intensity of illumination in the image formed by a lens and field angle θ. This is escalated to $\cos^7\theta$ by a typographic error. If it were true, it would be disastrous for wide-angle photography, but, fortunately, the correct result is only $\cos^4\theta$.

Other chapters deal with the design of actual bubble chambers, and although the recitation of principles to be remembered in design and operation is acceptable, the illustrations of their application are badly out of date. Chambers which have operated for five years are referred to as though they were in preliminary design, and many important techniques introduced within the last five or six years are not mentioned. These include the use of hydrogen-neon mixtures in liquid hydrogen chambers to give a single chamber with density continuously variable from 0.06 gm/cm^3 to 1.2 gm/cm^3, and radiation length ranging from 1000 cm to 25 cm (1965); the use of "superinsulation" to reduce radiation losses in cryogenic chambers to near-negligible levels (1963); and the use of small-angle Scotchlite as a retrodirector of illuminating light (1963), which suddenly made feasible the design of very large bubble chambers (>10 m^3). Indeed, the book contains no reference later than 1963.

Although the translation is generally good in that the language seems fairly relaxed and normal, many minor errors have crept in somewhere during the process. These range from the merely amusing (Massey and Burhop become "Messi and Barhop") to the downright irritating (wrong exponents on important variables in functional relationships).

A final section in the book is devoted to the elements of methods for deciphering bubble chamber pictures. It is suitable for the uninitiate, though poor reproduction will prevent him from obtaining a clear idea of what bubble-chamber pictures actually look like from the few included.

ROBERT I. LOUTTIT
Physics Department, Brookhaven National Laboratory, Upton, New York

Books Received

Addiction and Opiates. Alfred R. Lindesmith. Aldine, Chicago, ed. 2, 1968. viii + 295 pp. $7.50.

Advances in Atomic and Molecular Physics. Vol. 4. D. R. Bates and Immanuel Estermann, Eds. Academic Press, New York, 1968. xiv + 465 pp., illus. $20.

Algebraic Theory of Machines, Languages, and Semigroups. Michael A. Arbib, Ed. Academic Press, New York, 1968. xviii + 359 pp., illus. $16.

The American Challenge. J.-J. Servan-Schreiber. Translated from the French edition (1967) by Ronald Steel. Atheneum, New York, 1968. xviii + 298 pp., illus. $6.95.

American Indian Mythology. Alice Marriott and Carol K. Rachlin. Crowell, New York, 1968. xiv + 211 pp., illus. $7.95.

Among the People. Encounters with the Poor. Irwin Deutscher and Elizabeth J. Thompson, Eds. Basic Books, New York, 1968. xviii + 408 pp. $10.

Analysis and Simulation of Multiport Systems. The Bond Graph Approach to Physical System Dynamics. Dean Karnopp and Ronald C. Rosenberg. M.I.T. Press, Cambridge, Mass., 1968. xiv + 221 pp., illus. $10.

Astronomical Objects for Southern Telescopes, with an Addendum for Northern Observatories. A Handbook for Amateur Observers. E. J. Hartung. Cambridge University Press, New York, 1968. x + 338 pp., illus. $8.50.

Astronomischer Jahresbericht. Vol. 66, Die Literatur des Jahres 1966. W. Lohmann, F. Henn, and U. Güntzel-Lingner, Eds. De Gruyter, Berlin, 1968. xii + 848 pp. DM 80.

The Battle of Majuba Hill. The First Boer War. Oliver Ransford. Crowell, New York, 1968. x + 154 pp., illus. $5.95.

The Beetles of the United States (A Manual for Identification). Ross H. Ar-

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