BOOK REVIEWS

Nuclear Research Emulsions. Vol. 1, Techniques and Theory. By Walter H. Barkas. Vol. 15 of Pure and Applied Physics, edited by H. S. W. Massey. 518 pp. Academic, New York, 1963. $18.00.

Reviewed by ***Herman Yagoda,*** *Air Force Cambridge Research Laboratory, Bedford, Massachusetts.*

In recent years the nuclear-emulsion technique has become one of the most thoroughly documented of the several methods for the study of ionizing radiations. Since the conception of the Wilson cloud chamber in 1912, only two small volumes have appeared, and these are largely atlases of typical photographs rather than descriptions of the mechanics and operation of the instrument. The devotees of the solid emulsion chamber have been much more prolific. The past five years have seen the publication of Professor Pierre Demer's *Ionographie,* followed a year later by a colossal tome by the Bristol investigators Powell, Fowler, and Perkins. Besides these comprehensive works, almost all of the handbooks on experimental physics contain lengthy chapters on emulsion technique, the most recent by Dr. Marietta Blau being virtually of book length. The question that comes to mind is whether there is need for a new two-volume treatment of the subject such as Professor Barkas has prepared. The answer to this is in the affirmative, as Volume 1 of the treatise, devoted to techniques and theory, is an exposition of the Berkeley methodology which has played an important role in the quantification of this tool.

Professor Barkas' book is addressed to advanced students in the physical sciences who have a mastery of differential equations coupled with a penchant for extreme experimental minutiae. The darkroom manipulations are described clearly and in great detail. The description of the assembly, alignment, and photographic processing of large blocks of emulsion is particularly informative. This volume is unique in its complete description of the semi-industrial plant problems associated with the processing of emulsion assemblies weighing 20 pounds or more. Details are given of water purification, the finicky plumbing system for conveying large volumes of reactive solution, and even the recovery of silver from the spent gargantuan hypo baths. A section is also devoted to the important problem of emulsion hypersensitization.

The problems of the microscopic examination of vast volumes of emulsion are given consideration—this for the first time. When the technique was young and simple, an individual physicist could examine a small parcel of thinly coated plates and draw conclusions from the exposure. Many of the fundamental particles were discovered by these "little red hen projects". Today, the examination of the plates and the track parameter measurements are relegated to large groups of scanners for whom Professor Barkas has coined the designation "visual measurements technicians"—a term bound to warm the hearts of all personnel classifiers. It took a courageous person to write this section, which defines the type of music permissible while engaged in microscopy and the frequency and duration of coffee breaks—all this to be carefully balanced against the effects of fatigue on accuracy and efficiency. Because of the inclusion of this delicate subject, it is recommended that all copies of this valuable book be kept out of the scanning room, for like *Uncle Tom's Cabin,* it may stimulate revolt.

A large fraction of the present volume is devoted to methods for estimating the charge and kinetic energy of a particle from information contained in the developed track structure. The methods of grain counting, scattering, and delta-ray measurements are presented on a rigorous mathematical basis. Chapter 9 contains a theoretical exposition of the relationship of the gap coefficient and the reciprocal mean gap length to the true grain density, which has not been published heretofore. The rigor of the theoretical sections can be surmised from a statement on page 338. To the mathematically oriented microscopic eye of Walter Barkas, it seems that: "Insofar as a track can be considered a one-dimensional continuous and differentiable locus, the various definitions introduced in the differential geometry of space curves apply to it".

The book is of value not only as a compendium of techniques practiced in the Berkeley Radiation Laboratory, but also because it contains detailed descriptions of the manufacture and processing of Soviet nuclear-type emulsions. Volume 1 is a valuable nonreplicative addition to the literature, and the critic looks forward to the appearance of the second part, which is to deal with the behavior of elementary-particle tracks.

Temperature: Its Measurement and Control in Science and Industry, Volume 3. Charles M. Herzfeld, ed. Part 2, Applied Methods and Instruments, edited by A. I. Dahl. 1094 pp. Reinhold, New York, 1962. $29.50.

Reviewed by ***D. E. McFeron,*** *University of Washington.*

The increasing frequency and scope of symposia on temperature measurements are convincing evidence of the growing importance of this subject in science and today's industry. The Fourth Symposium, reported partially in this volume, was held in 1961, just seven years after the third such meeting. The large number of papers presented required the publication of three separate volumes, and Part 2, Applied Methods and Instruments, contains over one hundred papers. Part 1 deals with basic concepts, standards, and methods, while Part 3 treats the special area of biology and medicine.

The first section of Part 2, on thermoelectric thermometry, contains twenty-four papers. It is well done with ample emphasis upon fundamentals. Particularly timely is the paper by Benedict and Ashby setting forth arguments for improved thermocouple reference tables. Data reduction by computers and the need for increased accuracy in temperature determina-