Book Reviews

Reactor-Noise Analysis in the Time Domain by Nicola Pacilio, Critical Review Series, U.S. Atomic Energy Commission, 98 pp., $3.00 (1969).

We are all indebted to Dr. Pacilio for his excellent Critical Review on the measurement and analysis of counting statistics from chain reacting systems. This volume throughout bears the stamp of the theoretician who has actually carried out experiments over the entire spectrum of techniques. His approach is direct, efficient and to the point, which perhaps slants the treatment toward those who are experienced in the field. For those readers this condensed format is ideal. Although some other readers might fault Dr. Pacilio for not including more detailed information on instrumentation, I find his philosophy of indicating methods of measurement by block diagrams to be preferable because this does not dilute his text with soon-to-be-obsolete information. One of the most useful contributions of this treatise is the unbiased consideration of advantages and limitations of the alternative techniques. Dr. Pacilio does not attempt to sell any particular method.

The division of the book is into four logical sections. The first, "Time Correlation Analysis Among the Neutron-Detection Pulses," treats the Rossi-alpha method and other derived techniques. Dr. Pacilio does dwell on the pitfalls associated with time analyzer operational modes and deadtimes when detectors are of high efficiency, but perhaps not even strongly enough. Anyone contemplating experiments to establish reactor parameters by time correlation analysis should refer to Edelmann's investigation of the effects of non-ideal conditions (Karlsruhe report INR-4/68-15).

The second section, "Analysis of the Moments of Neutron Distribution," begins with the Feynman variance method, includes the other important moments techniques, and finishes with a short rundown on two-detector covariance analysis. I believe that the author's contention that lower efficiencies are required for success with the latter technique than with the single-detector variance method bears investigation.

The section, "Analysis of the Probability of Neutron Detection," considers the methods based on individual probabilities of detection, of which the well-known P_0, or zero count probability method, is an example. These methods have the advantages that instrumentation may be extremely simple and that nearly 100% duty cycle for data collection can be achieved. The author could have pointed out that a measurement of the complete probability distribution would permit several different fluctuation analyses of the same data, thus leading to an evaluation of the relative advantages and shortcomings that exist. This exercise could profitably be undertaken by someone. Modern instrumentation makes the P_n distribution measurement relatively simple and inexpensive.

A final short section, "Correlation Analysis Among the Signs of the Fluctuations," adequately summarizes the existing work on polarity correlation.

In conclusion, I would recommend purchase of this book for a comprehensive summary of the subject. The bibliography alone is well worth the price.

J. D. Orndoff

Los Alamos Scientific Laboratory
Los Alamos, New Mexico 87544

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About the Reviewer: John Orndoff has been a member of the staff of the Los Alamos Scientific Laboratory since 1946 where, in most of the intervening years, he has been engaged in reactor physics studies with critical assemblies. Dr. Orndoff did undergraduate work at Waynesburg (Pennsylvania) College and completed his graduate work at Purdue in 1944. He is very well known for his early, and continuing, investigations in the time behavior of fission neutrons.

Introduction to Modern Physics, 2nd Edition. By C. H. Blanchard, C. R. Burnett, R. G. Stoner, R. L. Weber, 100s ($12.00), 488 pp., Prentice-Hall International, Englewood Cliffs, N.J. (1969).

The authors have admirably met the goals set forth in the preface to provide a more rigorous introduction to modern physics. In addition, the broad scope of the text adds much to its value as a second year physics text. Student preparation for a course using this text to its fullest would require a high level, rigorous general physics course with mathematics beyond the first year of calculus. Assuming the appropriate student preparation, the text provides an excellent introduction to the concepts needed for the understanding of modern physics.

The scope of the text takes the student from classical physics to high energy physics. The development of classical physics through the review presented in the early chapters provides an excellent basis. The fundamentals of atomic and molecular physics are more thoroughly treated than is usual for a text of this level. The placing of relativity in Chap. 10 seems somewhat anomalous. Most texts introduce relativity earlier and use it more fully in the development of atomic and molecular structure. However, the rigor and coherence of the text does not seem to be compromised by this sequence of subjects. The principles developed so thoroughly in the text do not seem to be adequately brought out in the problem sets. Some of the problems seem too simple for a text of this level. A