

cheap solutions do not always lead to reliable results, and a serious student has to complement his or her physics knowledge with a reasonable study of the wide range of numerical techniques from more specialized sources. I would also like to have seen some discussions of why the authors chose one solution method over another (even though this additional material might have resulted in an excessively long text).

It would have been useful, I think, to provide the authors' electronic-mail addresses in addition to their postal addresses, so that readers could get additional information or more sophisticated versions of the programs directly from the authors. In addition, because some of the subroutines described in the book could be used as canned programs, a subroutine-program index might have been a useful addition to the subject index.

In spite of the fact that my comments sound critical, on the whole I warmly recommend this book as a useful complement to a graduate course in nuclear structure physics. This compendium should help students to get a better feel for what they are studying, and teachers can use the programs to formulate a range of exercises for their classes. At the same time, the book might even help professional physicists who need to get a quick and simple result but don't want to go through the pain of writing a program themselves.

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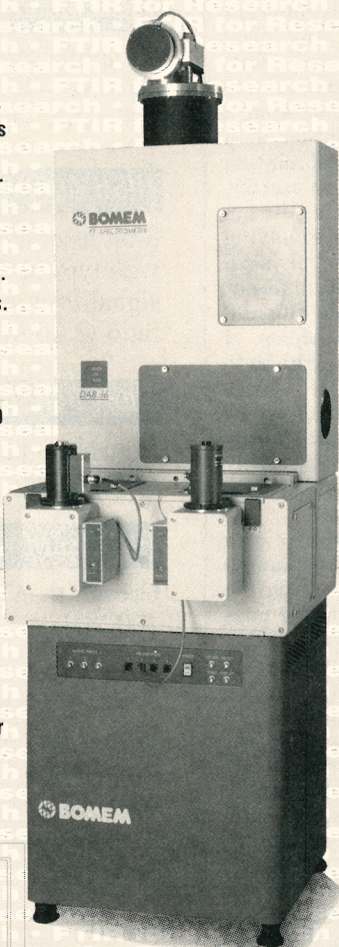
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Evaluation and Control of Measurements

John Mandel

Marcel Dekker, New York,
1991. 249 pp. \$89.75 hc
ISBN 0-8247-8531-2

Physics is, above all else, an experimental science. Measurements determine the acceptance of physical theories. It is puzzling, therefore, that so little of a physicist's education deals with the design, evaluation and control of measurements. Most physicists are unfamiliar with such issues as the statistical design of experiments, statistical process control and exploratory data analysis. Names such as Deming, Tukey and Shewhart and terms such as factorial design, control chart, analysis of variance and boxplot are seldom in a physicist's vocabulary. Reading John Mandel's *Evaluation and Control of Measurements* can correct some, though not all, of these deficiencies in our collective educations.

Mandel is a guest researcher at the National Institute of Standards and Technology and a well-known figure in statistics and the control of measurements. His thesis is stated at the start of the book: "Manufactured products are the end product of a process called a manufacturing process. Similarly, measurements are the end product of a process that we call a measuring process From the analogy . . . it follows that there is a need for quality control of measurements."

An entire branch of science and engineering has evolved to address the need for statistical control of manufacturing processes to provide quality control of manufactured products. W. E. Deming brought these ideas to the attention of the Japanese in the 1950s; they applied the ideas broadly, with results that are evident today in Japanese manufactured

goods. Mandel's book explains how to apply some of these same concepts to evaluate and control the measurement process. Because examples are chosen from a wide range of scientific and engineering applications, the book is not a physics text. But it is a worthwhile read and a good complement to, though not a replacement for, texts such as *Random Data: Analysis and Measurement Procedures* by Julius S. Bendat and Allan G. Piersol (Wiley, New York, 1971), *Statistics for Experimenters* by George E. P. Box, William G. Hunter and J. Stuart Hunter (Wiley, New York, 1978) and *Exploratory Data Analysis* by John W. Tukey (Addison-Wesley, Reading, Mass., 1977). (Experimenters in every branch of science should read these books or their equivalents.)

The introductory material in the first few chapters—on basic statistics, precision, accuracy and variability—is generally clear and well illustrated. I found Mandel's treatment later in the book of the structure of data in two-way designs enlightening, and his use of h and k statistics for interlaboratory comparisons was completely new to me.

The book can be read by anyone who has mastered first-semester calculus, and it is intended for a broad range of experimental scientists. My most severe complaint about the book is that it neglects some important issues, such as blocking, randomization, nonparametric statistics and modern techniques for exploratory data analysis. Thus, if this is the only book you read on this subject, there will be serious gaps in your knowledge. However, there are limits to what can be presented in 200 pages. On a four-star scale, I give this book three stars.

JAMES R. MATEY

David Sarnoff Research Center
Princeton, New Jersey

Advanced General Relativity

John M. Stewart
Cambridge U. P., New York,
1991. 228 pp. \$49.50 hc
ISBN 0-521-32319-3

The title of this book is slightly misleading: Rather than a comprehensive survey of all possible advanced topics in relativity, the book's subject is the mathematics required to discuss gravitational radiation (in which John M. Stewart is a leading expert). Recent progress in techniques of gravitational wave detection is bringing us to the sensitivities

at which, by all reasonable estimates, we should be able to detect some definite signals. Hence, the theoretical tools for detailed analytical and numerical prediction are becoming increasingly important. Stewart's concise and lucid summary, the only book of its kind, is therefore very timely. In addition to topics that have been treated in other texts, one finds here well-organized, clear discussions of material not readily obtainable

elsewhere—including some from Stewart's own research.

The book is self-contained, providing a comprehensive but terse introduction to the requisite differential geometry, as well as its use in Newtonian theory and in special and general relativity. A reader new to the subject, however, would probably find this section hard to read compared with the more leisurely treatments in introductory texts. The level of pre-

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