

The wider range inevitably results in a more fragmented and loosely connected series of talks. Moreover, two fields of much recent interest and activity—Veneziano dynamics and deep inelastic electron scattering—are only slightly treated in the proceedings. If an underlying thread can be discerned in the majority of the contributions it is probably a concern with the use of field theoretic methods. A most interesting and promising development here is represented by Salam's talk on the new methods being developed to discuss non-polynomial Lagrangian theories. Another talk which must have been most interesting is unfortunately not recorded in the proceedings, for Gell-Mann has not provided a script for his exploration of the breaking of scale invariance.

As with many conference proceedings, some of the most interesting items occur in the records of the discussions, which provide a questioning counterpoint to talks themselves. At best, however, this type of proceedings is necessarily somewhat ephemeral. The publishers are therefore to be congratulated on producing the volume with sufficient speed to conserve its utility. It is to be regretted, however, that they have set a price which would be more appropriate for a definitive treatise with expectations of longevity.

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FUNDAMENTAL CONSTANTS

The Fundamental Constants and Quantum Electrodynamics

By B. N. Taylor, W. H. Parker and D. N. Langenberg. (*A Reviews of Modern Physics Monograph.*) Pp. xiii + 353. (Academic: New York and London, December 1969.) 47s.

THIS book, identical with an article published in *Reviews of Modern Physics* in 1969, provides a critical and comparative review of all the work bearing on the fundamental constants of quantum electrodynamics up to 1969. The original article was prompted in part by improved measurements for electrodynamic quantities (for example, the muon g -factor, the Lamb shift in deuterium, the hyperfine splitting in muonium, the fine structure of hydrogen), and improved theoretical calculations for such quantities. The strongest motivation for this reassessment, however, was probably that provided by the new possibility of determining e/h very accurately by measurement of the Josephson-effect frequency ($\nu = 2Ve/h$) for two weakly coupled superconductors maintained at d.c. voltage difference V . From the agreement found for e/h in measurements of ν in a wide variety of circumstances, the authors argue that any corrections to this simple formula are less (and probably much less) than $1/10^6$. Using the Josephson effect, they can obtain a value for $\alpha = e^2/hc$ without any essential use of quantum electrodynamics; with this value for α , they are then in a position to check empirically the quantum electrodynamic expressions given by theory, including the higher order corrections.

The book is very technical in its account of this subject, which is full of complex interrelationships, and the details discussed at length will be of interest primarily to the specialist on fundamental constants and experiments relevant to their determination. Their recommended set of fundamental constants will, however, be of more general interest, and the book includes an interesting chapter discussing what experimental and theoretical work is still needed to establish more reliably the fundamental constants. Section E ("Recommendations for Reporting Results") of this chapter could well be read by every research worker, for it illustrates the deficiencies of detail which critical readers find in many published papers today and which made the task of these authors unnecessarily difficult.

I am not completely clear why this book has been published. Its contents are readily available in a journal which will be found in every library likely to stock the book. The book has small pages, with stiff and shiny paper, which makes it tiring to read; the pages have wide margins so that the open book presents relatively little material to the eyes. I found the original article much easier to read; the journal format allows one to grasp the material more readily (each page has three times as much material) and to turn up some particular point more quickly. Perhaps republication in book form may give the article a wider attention than it may gain from the pages of a scientific journal.

The book is too detailed and technical to serve as a text. Nevertheless, its critical yet constructive approach is likely to give it an important influence on the future development of this subject.

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GOLDEN RULES FOR ENGINEERS

Brittle Fracture in Steel Structures

Edited by G. M. Boyd. Pp. xiii + 122. (Butterworth: London, June 1970. Published for the Navy Department Advisory Committee on Structural Steel.) 85s.

THIS book sets out to present clearly to the practising design engineer the general problems associated with brittle fractures in fabricated steel structures and to give specific recommendations on how these problems may be minimized by choice of material and control of fabricating procedure. The views expressed represent the consensus of opinion of members of the Navy Department's Advisory Committee on Structural Steels (NDACSS), but to a large extent they coincide with those of the editor, who possesses a great wealth of experience in the field of brittle fracture. Any review must be written in the context that the book is meant to educate and aid practical engineers and managers, who have only a vague awareness that an "elusive phenomenon known as brittle fracture" may cause trouble in their fabricated structures.

Brittle fracture problems are initially set in perspective by describing examples of service failures up to 1965. A detailed risk assessment is made only for the case of ships and, here, I feel that it would have been particularly interesting to have speculated on risks which could be involved with the mammoth tankers and ore-carriers now being built. A summary is made of the lessons learned from experience, and the book then continues with a description of the characteristics of brittle failures, before going on to outline ways in which mechanical and metallurgical factors may affect fracture. The separate mechanical and metallurgical effects of "massiveness" could have been expounded more clearly, and, in otherwise very good sections on welding, mention should have been made of heat-affected zone embrittlement in higher alloy ("transformable") structural steels. Tests for notch ductility are described and a review is given of the methods currently favoured by different countries for selection of steel. German, Japanese and Russian practices are included, but little comment is made on the extent to which the procedures may be said to prevent service failures.

The experience and expertise of the editor and committee emerge in the chapters which give detailed instructions on design for welding; they tread cautiously with regard to the advisability of proof testing, and recommend procedures for the selection of steels. It is pleasing to see that a consensus of opinion can provide precise Charpy impact values for specification purposes, but the Charpy test is admittedly invalid as a prime reference. The point is made, but the dependence of specific Charpy figures on the background experience of steel type and application