

Penman, Brown, Gross, Darnell, Perry, and others on this point is completely convincing to me, and if it is not to the author many readers would like to know why. Since we know nothing about the mechanism of nuclear activation, why would simultaneous but not interdependent activation of nucleolar and nucleoplasmic functions be so improbable?

I would recommend to readers a careful study of the phenomenology of the Sendai-virus-produced heterokaryon, as described in Harris's book. But I have also to add (especially for readers of tender age) that a clear view of the significance of much of this work will require independent knowledge of the literature, both cited and not cited.

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## Particle Concepts

**Elementary Particle Theory.** A. D. MARTIN and T. D. SPEARMAN. North-Holland, Amsterdam, and Elsevier, New York, 1970. xvi, 528 pp., illus. \$27.50.

It is impossible to write a book on elementary particle theory since, as the authors themselves emphasize at the very beginning of their preface, there is no such thing in existence. Nevertheless, a number of useful books have appeared in the last five years on this subject. The present volume is a fine addition to this list.

Although there is no elementary particle theory in existence, the amount of activity that has taken place in the field is staggering. In writing a book of finite length, therefore, some choices must be made. One such choice is whether the book should discuss theoretical constructs and ideas that have been generated in the field or should concentrate on summarizing how we have managed to classify, organize, and, after a fashion, "explain" the vast amount of experimental information that has been accumulated. The present volume opts heavily for the former, although occasional applications and phenomenological considerations are mentioned both in the text and in the problems.

Even within the body of theoretical ideas, some limitations have been imposed in this book. Almost all of the

discussion deals with what we have deduced from the Lorentz group and from analyticity, and the group theory used in particle classification and the theories based on the generalized concept of current are omitted. This limitation is explicitly stated by the authors and should not be counted as a drawback.

Within the boundaries thus outlined, the book is a very valuable contribution. The text is easy to read and lucid, the derivations are not overly formalistic, and the thread of development is logical and continuous. Credits for discoveries are not always accurately assigned, but that is an unimportant aspect of a book. The volume is greatly enhanced in value by the numerous problems given at the end of each chapter, with hints and partial solutions at the end of the book. This is a rare and welcome feature among elementary particle textbooks.

Although one-sentence comparisons are somewhat superficial, it might be said that the present volume is more abstract and more detailed than the book by Frazer, more theoretically oriented than the text by Kallen, and more modern in outlook than Muirhead's tome. As compared to Gasiorowicz's book, the present volume is less oriented toward field theory and less comprehensive, but on the topics treated more complete. Finally, the present book is of course more up to date than any of the above-mentioned "competitors," simply because it was written a few years later.

All in all, the book will undoubtedly find many readers among advanced graduate students learning about particle physics, as well as among workers in the field who want to clarify some basic concepts outside their own special area.

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## Element No. 92

**The Chemistry of Uranium.** Including Its Applications in Nuclear Technology. E. H. P. CORDFUNKE. Elsevier, New York, 1969. xiv, 250 pp., illus. \$16.75.

Anyone who sets himself the task of writing a monograph on the chemistry of uranium assumes an enormous amount of work, for uranium has probably been the most intensely studied

element in the periodic table over the last 20 to 25 years. Katz and Rabinovitch covered the work up to 1950 in a well-known monograph (*The Chemistry of Uranium*, McGraw-Hill, 1951), but, as the present author states in his preface, "Now the time seems ripe for a new book that gives a broad survey of the current chemistry and technology of uranium."

The importance of uranium in the generation of atomic energy is enough to make a good monograph on its chemistry important, and when the nuclear applications of the subject are included the potential value is even greater. When such a great amount of work is to be covered compromises must be made, and perhaps the nuclear and analytical chemist would feel somewhat slighted by Cordfunke's choices. For instance, neutron cross sections are hardly mentioned, and analysis by isotope dilution is not discussed; both of these topics are important in many phases of technology. Indeed, nuclear and analytical chemistry are covered only sketchily—but excellent compilations already exist on these specialized subjects.

This book brings together the enormous amount of recent work on uranium metal, alloys, oxides, and salts in a well-planned manner—a welcome change from the collection of papers presented by Katz and Rabinovitch. After giving an interesting history of the discovery of uranium, the author systematically treats each of these topics concisely but thoroughly. Extensive use is made of phase diagrams to convey a great amount of information in a minimum of space. Thermodynamics, crystalline form, and interatomic distances are extensively covered, and this coverage alone makes the book quite valuable. The author's extensive work on uranium oxide systems is evident in his treatment of this important topic. Uranium salts, hydrates, aqueous ionic properties, and metallurgical aspects of uranium metal and alloys are also featured.

The synthesis of chalcogenides (compounds with sulfur, selenium, and tellurium) of uranium is a relatively recent development which is well summarized and brought up to date. Technological applications are emphasized throughout the text and also are the subject of a special chapter. A rather unusual feature of the book is that at the bottom of each page of text it gives the numbers of the pages (ends of chap-