

BOOK REVIEWS

Selection of books for review is based on the editors' opinions regarding possible reader interest and on the availability of the book to the editors. Occasional selections may include books on topics somewhat peripheral to the subject matter ordinarily considered acceptable.



Symmetries and Quark Models

Editor Ramesh Chand

Publisher Gordon & Breach Science Publishers

Pages 406 + Preface and Introduction

Price \$27.50

Reviewer D. C. Peaslee

This book is a summary of a conference under the given title held at Wayne State University, Detroit, Michigan, on June 18-20, 1969. The conference was mainly devoted to the theory of elementary particles and high energy reactions; only 2 reports out of 23 dealt directly with measurements. One of these is what one might have expected to see near p. 1 of the volume instead of p. 225: "Status of the Experimental Search for Physical Quarks," by L. W. Jones. This is a succinct review of the search for free quarks up to that time: not excessively numerous and uniformly negative. The author concludes, "At this time, I suspect that most experimentalists feel that physical quarks are either unobservable or do not exist." Indeed, this spirit informs the whole proceedings that quarks are sometimes used as a *model*, but never really taken seriously. The conference was essentially a review of selected subjects in high energy physics, the selection principle being a more or less close connection with the quark model.

The most comprehensive discussion of the strengths and weaknesses of the quark model is Lipkin's review

discussion following the experimental summary of Jones. It is made clear from the outset that the strength of the model is in providing a simple picture of symmetry properties in the coordinates isospin, baryon number, and hypercharge (IBY). Its weakness is in the dynamics of constructing observed particles from quarks, as becomes progressively clear in the Appendix. The real embarrassment is the quark mass (pp. 261 to 262); already the mass of a single quark must empirically exceed that of a nucleon by a factor of at least 5, and the model requires three quarks to compose a nucleon! At this rate there is a real question whether the discovery of a physical quark with very high mass might not raise problems more difficult than it solves.

Two or three other papers concern the quark model and its variations directly; the rest are simply expositions of current topics, valuable as introductions since they are very well documented. Another feature is that the quark model is a relatively concrete approach to elementary particles and therefore attractive for those who are only partially familiar with the subject.

On the whole, however, this book will not appeal to the complete novice in high energy physics. He who cannot read Jones' and Lipkin's articles with ease will probably find little else accessible. Also, the other papers are predominantly theoretical in character—with the exception of the nice survey of Ξ spectroscopy by Yodh. They are, therefore, likely to become dated a little faster than their experimental counterparts at, say, the contemporaneous Lund Conference.

People whose knowledge is at about the stage of a PhD student in high energy physics would find *Symmetries and Quark Models* of the greatest value. The book is excellently produced, with discussions and references, and provides a good introduction to interesting and still vital problems on the subject.

D. C. Peaslee received his AB from Princeton University in 1943 and his PhD from Massachusetts Institute of Technology in 1948. After working for a year on nuclear reactors at the Kellogg Corporation of New York, he was an AEC Postdoctoral Fellow at the ETH in Zurich, Switzerland. Subsequently, he held academic posts at Washington, Columbia, and Purdue Universities. After a Fulbright Fellowship at the Australian National University in 1958, he accepted a permanent position and is now professor of physics. His primary interest is in high energy physics.

Annual Review of Nuclear Science, Vol. 20 (1970)

Editor Emilio Segré

Publisher Annual Reviews, Inc.

Pages 613

Price \$10.00

Reviewer R. L. Macklin

Of the (baker's) dozen topics covered in this Annual Review, roughly half should be of direct interest to