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The Nature
of the Elementary Particle



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FOREWORD TO THE READER

The present book describes an approach to elementary particle structure that is not the usual one. In these studies we systematically explore the experimental data on elementary particles, and we attempt to keep our preconceptions about these particles to a minimum. Using a somewhat classical viewpoint, and stressing the connections with other areas of physics, we arrive at conclusions which are different from currently-accepted notions about these particles. Some of the ideas discussed in these studies are still in their formative stages, and the readers of the book are invited to send any comments that they may have on this work to the author. It is hoped that the present volume will serve as a stimulus for further research along these lines, and that comments and extensions of the work can someday be incorporated into a revised and expanded version of this book.

All of the material that is presented here has been published in *The Physical Review* and other standard scientific journals. Thus this material has been refereed by experts in the field. Also, the author has given invited seminars and colloquia on this work at more than twenty major universities in the United States and Canada. Hence these ideas have been subjected to public scrutiny, and they are, in spite of their somewhat revolutionary nature, physically plausible concepts. The correctness of these concepts is of course another question, and the main purpose of the present book is to demonstrate in detail the agreement between these concepts and the experimental data. In particular, we find accurate agreement between the present elementary particle model and the so-called New Particles, which were discovered after this model had already been formulated and published. From a phenomenological viewpoint, we find a rather close correspondence between elementary particle physics and certain aspects of nuclear physics, and the correspondence has ramifications which are important for both of these areas of physics. Also, some of our most striking results are obtained by making a straightforward extrapolation of standard relativity theory and applying it to rotating systems. It should be kept in mind that elementary particle physics is not a domain unto itself, but is just a segment of the field of science which embraces nuclear, atomic, and molecular physics, and the same universal laws must govern all of these systems.

This book has been written with a twofold purpose. The first purpose is to present these studies of the elementary particle in a manner that will be of interest to the specialist in elementary particle physics, because the ideas that we develop here are novel, central to the main problems of particle physics, and in some respects at variance with our usual ways of thinking about these particles. The second purpose is to make these discussions complete enough that they can be read and under-

stood by the scientist or would-be scientist who is not a specialist in elementary particle physics. In line with this second purpose, we have included an appendix, Appendix A, which gives a brief overview of the subject of elementary particle physics, and which, in particular, introduces the standard elementary particle terminology. This overview is important for the reader who is not completely familiar with the subject, and it is also of some help to the worker in the field in that it outlines the facets of elementary particle physics about which we are mainly concerned.

The author would like to take this opportunity to express his appreciation to Robert Howerton, to the late Simon Pasternack, to Glenn Fellows, to Dirk Brinkman, to members of the Particle Data Group, and to the members of his family, who in various ways have been of assistance in this project during the past several years.

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