AN INTRODUCTION TO
NUCLEAR PHYSICS
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BY

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PREFACE

If the naive distinction between experimental and theoretical branches of a science be maintained, the present book must clearly be regarded as dealing with the experimental side of the science of nuclear physics. On the other hand, the farther removed the subject matter of any science is from common experience, the more trivial the distinction between “experimental” and “theoretical” becomes, in application to that science. It is certainly a trivial distinction in respect of nuclear physics. Individual researches may be carried through by “experimenters” and “theorists”, respectively; they become significant, however, only when their results are fused in a common statement. This is the point of view from which succeeding pages have been written: it will probably appear most plainly in Part I, where, for the most part, well-known results are under discussion.

In Part I the attempt is made to trace the growth of the necessity of the concepts “nuclear atom” and “atomic-nucleus-possessing-internal-structure” for the progress of research in physics; Parts II, III and IV summarise the developments of the subject which followed upon the acceptance of this general scheme of interpretation. Again, the presentation may be said to be chiefly experimental in these later parts, if only for the reason that a change in the conceptual scheme would call for less alteration here than in any parallel, but more formal, treatment. Phenomena, rather than the mental constructs in terms of which they are variously interpreted—according to the accident of the time—are really fundamental. For this reason all discussion has been kept as far as possible phenomenological.

The book, then, is an introduction and a summary: the chief ideas necessary for an understanding of current research in nuclear physics have been given with the aid of a few illustrative examples; on the other hand all the important results have also been included, in tabular form.
PREFACE

Finally, a number of acknowledgments remains to be made: to Dr R. R. Nimmo who has read through the whole of the proofs with characteristic energy, to Dr H. S. W. Massey who has offered the opinion of a theorist on many matters under dispute, to Professor H. J. Taylor for the originals of Plates I (b) and III (e) and (f), to Dr T. W. Bonner for the original of Plate II (d) and to Dr G. Gamow an acknowledgment of a less precise nature. During the preparation of Dr Gamow’s forthcoming Structure of Atomic Nuclei and Nuclear Transformations the task of revising the manuscript for publication was allotted to me. I wish to acknowledge the many advantages which the performance of this task conferred; I trust they have not here been abused, in any particular. Presently, Dr Gamow’s book and the extensive monograph of Drs Bethe and Bacher\(^a\) will provide all the “theoretical” background that any reader of these pages is likely to require.

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NOTE TO SECOND IMPRESSION

Pending the preparation of a new edition this photographic reprint of the first edition is issued to meet the urgent needs of University students.

N. F.

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\(^a\) Part A, Rev. Mod. Phys. 8, 82, 1936; Part B, in preparation.