

Radioactivity and Nuclear Physics

BY

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PREFACE TO THE SECOND EDITION

Since the first writing of this text three years ago, many areas in the field of Nuclear Physics have enjoyed phenomenal growth. Accelerators for both electrons and heavy particles, of varied designs, with increased outputs have been put into operation. Detectors of various kinds have been improved, and the photographic emulsion technique, particularly, has proved of outstanding value. Much has been learned of the interactions of the fundamental particles, and mesons have been produced beyond question in various laboratories. Radioactive isotopes have become more easily available and are finding ever-increasing uses in all branches of science. The physical dangers attendant upon the unguarded use of strong radioactive materials have become more clearly marked, and protective measures to insure complete safety have been outlined in what has become known as "Health Physics."

To cover these developments, many new topics and two additional chapters have been added to the text. It is hoped that the book will serve as an invaluable aid to research workers in this field. To this end a revised Table of Isotopes with energies and significant references is included, as well as many other tables relating range, energy, and momentum for various particles.

It has been the aim in this text to offer an authentic, historical development of each topic treated, and to list the pertinent references in the literature. In some cases a complete treatment would require a mathematical presentation more complicated than seemed desirable in a book of this type. It is intended that the material presented will continue to serve as a text for an introductory course in Nuclear Physics at the

upper undergraduate or beginning graduate level. New problems have been added at the end of each chapter whose solution should aid in an understanding of the various topics.

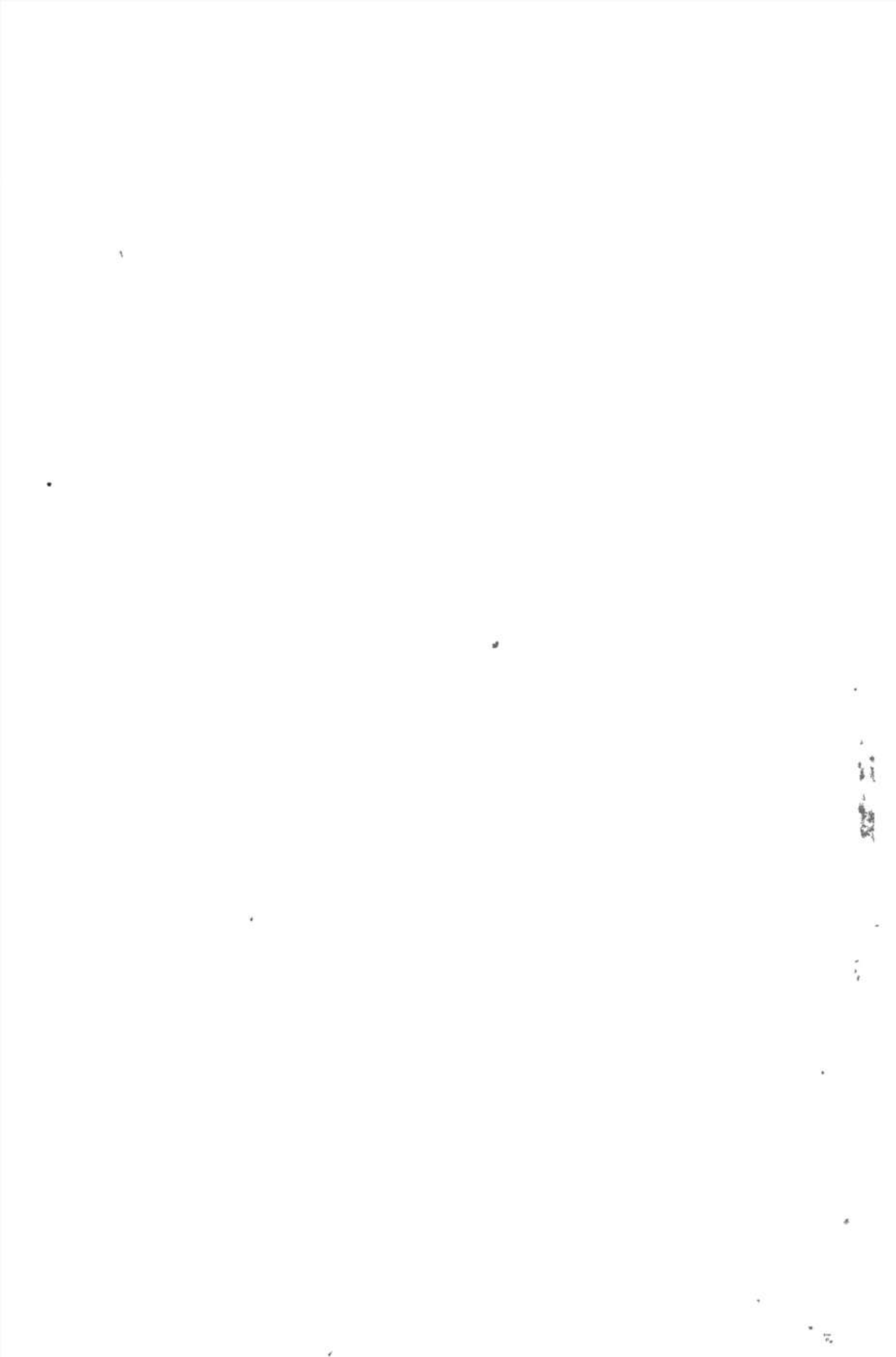
In addition to the original papers in the various scientific journals, many of the published texts dealing with the whole or certain particular parts of the subject have served as sources of information. Among these, it is a pleasure to refer to: Rutherford, Chadwick, and Ellis, *Radiations from Radioactive Substances*; F. Rasetti, *Elements of Nuclear Physics*; N. Feather, *An Introduction to Nuclear Physics*; M. Curie, *Radioactivity*; J. Hoag, *Electron and Nuclear Physics*; E. Pollard and W. Davidson, *Applied Nuclear Physics*; G. Gamow, *Atomic Nuclei*; W. Heitler, *The Quantum Theory of Radiation*; G. Hevesy and F. Paneth, *A Manual of Radioactivity*; and H. D. Smyth, *Atomic Energy*. Many excellent new books have appeared treating various phases of the subject. Among these may be mentioned: G. Friedlander and J. Kennedy, *An Introduction to Radiochemistry*; C. Goodman, *The Science and Engineering of Nuclear Power*; R. E. Lapp and H. L. Andrews, *Nuclear Radiation Physics*; J. Tutin, *Atomic Energy Yearbook*; W. H. Sullivan, *Trilinear Chart of Nuclear Species*; H. Yagoda, *Radioactive Measurements with Nuclear Emulsions*; M. Calvin and others, *Isotopic Carbon*; G. K. Schweitzer and I. B. Whitney, *Radioactive Tracer Techniques*. Several volumes of the elaborately projected National Nuclear Energy Series have already appeared, including *The Transuranium Elements*, G. Seaborg, J. Katz, and W. Manning; and *Isotopic Tracers*, W. E. Siri.

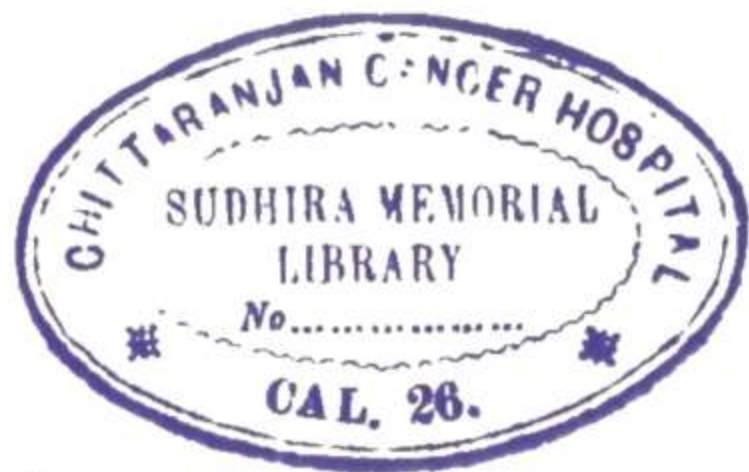
The well-being of American science is and will continue to be vitally influenced by governmental policy. The granting of financial support, the censorship of publication, and the prohibition of free research on the heavy elements, or in any other domain, are powers whose use may do much to advance or retard progress. Decisions must necessarily be made by officials not particularly trained in science. It is quite probable that such individuals will have a greater appreciation of the

application of science than of the basic research that made the application possible. Any course of action that discourages fundamental investigation is apt to be ultimately disastrous. It is of the utmost importance that researches in these frontiers of knowledge be encouraged. Even though the results may have no apparent value, they may lead to a better understanding of the fundamental laws of nature and in the end have undreamed-of application.

J. M. C.

February, 1950





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