the proceedings (at least not in the title), the various experimental discussions provide a well-balanced viewpoint on both analytical and experimental observations. As an editorial comment, I find that only the "blanket" paper by Ohlsson on p. 289 and the "Point Model Evaluations of EBT Performance" by McBride et al. on p. 379 in the "Experimental" section could perhaps have appeared in sections of the "Modes and Instabilities" and the "MHD Theory, Transport Phenomena and Codes," respectively.

Results and status reports of eight papers appearing in the "Experimental" section are highly informative—as if one were taking a general tour around European tokamak facilities, although major sites for JET, TFR, ZEPHYR, etc. were not included. Interpretation of some of the results (e.g., density/temperature scalings) is still debatable and in this sense some of the papers should be viewed as progress reports rather than any definitive experimental findings. (Readers should note that Proceedings I has a very comprehensive two-part review article on tokamak experiments by Bickerton on p. 423.)

I think that the materials in this proceedings are original and that theories and simulation studies are highly usable, although some of the first approximations and physical assumptions may eventually have to be modified. The materials covered would be of direct interest to plasma physicists (both theoreticians and experimentalists) and to fusion plasma engineers engaged in various toroidal systems. They are certainly not on the introductory level, but the materials were organized to cover ongoing research topics in an effort to exchange views and ideas. This effective exchange of information extended to researchers in these highly active areas of fusion plasma research, making the original effort by the editors highly successful.

The materials are reasonably well organized within given subject areas; especially the original texts of questions and discussion sessions are of high value for the wealth of information flow. I would like to suggest, however, that this volume and Proceedings I and II be combined into one three-volume proceedings.

In all, I would recommend this proceedings highly, not only to tokamak fusion researchers but also to serious graduate students who are in these relatively new and exciting areas of plasma physics. In fact, I had already adopted this proceedings as a reference for my graduate course on Magnetic Confinement Fusion Systems last spring, and based on my experience with that class, I may use this proceedings again for a future one.

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## The $(p,n)$ Reaction and the Nucleon-Nucleon Force

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|---|---|
| *Editors* | Charles D. Goodman, Sam M. Austin, Stewart D. Bloom, J. Rapaport, and G. R. Satchler |
| *Publisher* | Plenum Press, New York (1980) |
| *Pages* | 539 |
| *Price* | \$55.00 |
| *Reviewer* | D. A. Bromley |

This volume presents the proceedings of a conference, held in Telluride, Colorado, March 29-31, 1979, that focused on the question of what we now know about the force between nucleons and, specifically, on what new information concerning that force can be obtained from studies of $(p,n)$ reactions.

In very large measure, this book represents the realization of at least a decade of hard work by the senior editor who, having become convinced of the importance of this route to new information on the nucleon-nucleon force, had first to design the appropriate experiments and then to evolve the appropriate experimental techniques, cooperations, and facilities to pursue his original conclusions. The success of this entire venture has been closely tied to use of the Indiana University cyclotron facility, which has turned out to be uniquely suited to the required experimental studies.

It would be pointless to attempt to review the 35 review contributions presented at the conference and included in this volume. Suffice it to say that the volume represents a convenient and definitive treatment of present knowledge of the nucleon-nucleon force. While attention is focused on the free nucleon-nucleon force, extensive effort has been devoted to deriving *effective* nucleon-nucleon interactions for use in calculations of the structure of finite nuclei. This is a longstanding and central problem in nuclear physics, since it is obvious that nucleons within nuclear matter will have different interactions from those interacting *in vacuo*, and it is impressive to see the progress that has been made in placing what were once essentially empirical nucleon-nucleon interactions used in these structure calculations on a much more fundamental footing.

As Goodman had originally postulated, the $(p,n)$ reaction has indeed been demonstrated to be a most effective probe for the characteristics for the nucleon-nucleon interaction, and this book provides all the data now available on this entire branch of nuclear science. In particular, charge exchange reaction calculations are traced from energies below 100 MeV—where a $G$-matrix approach to the effective interaction is used—to energies above 100 MeV—where the impulse approximation is suitable and a $t$-matrix approach is used to connect the force with the free nucleon-nucleon phase shifts.

This book will be required reading for any active scientist working on the determination of nucleon-nucleon interactions, or their use, in calculations of either nuclear structure or dynamics.

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### From X-Rays to Quarks—Modern Physicists and Their Discoveries

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|---|---|
| *Author* | Emilio Segre |
| *Publisher* | W. H. Freeman and Company (1980) |
| *Pages* | 337 |
| *Price* | $20.00 hardbound; $9.95 paperbound |
| *Reviewer* | D. A. Bromley |

This is a fascinating book that should be required reading for all nuclear scientists, but most particularly those who are still students, or beginning their careers as active scientists. It also represents a treasure trove for historians of nuclear science.

Emilio Segre, from his early days in Rome through his days at Chicago and, more recently, at the University of California at Berkeley, has been present at the creation of both nuclear and particle physics, and has left his mark on both.

This book is not intended as a textbook on nuclear or particle science; indeed, Segre's textbook, *Nuclei and Particles,* has already been used by a generation of students in these fields. Nor is it intended as a comprehensive history of either of these fields of science; rather, it comprises the personal reminiscences centering on Segre's own experience and exposure throughout the course of his long and exciting career as a working scientist. But, because Segre always seemed to be where the action was, his memories of events, people, and discoveries trace a central thread through much of the development of these two fields of modern science, from 1927 to the present.

The book has 14 chapters and some 10 appendixes. The first chapter discusses the physicist's world in 1895 and establishes the scientific milieu in which the new fields took root and developed. It takes the reader through the discovery of x rays. The second chapter takes us forward through the discovery of radioactivity and the work of the Curies, while the third brings us to Rutherford and transmutation of the elements. Chapter 4 focuses on Planck and his reluctant postulation of quantization, while Chapter 5 focuses on Einstein and the revolution that he personally created in the world of science. Chapters 6 and 7 take up the work of Rutherford and Bohr on the discovery and understanding of the nuclear atom, while Chapter 8 discusses the remarkable development of quantum mechanics. Chapter 9 discusses the "wonder year," 1932, with its discoveries so central to nuclear physics, the neutron, the positron, deuterium, and the like; this was a year not to be duplicated until 1974 with the discovery of the psi-particles, new quarks, and the postulation of a unified theory of the forces of nature. Chapters 10 and 11 are devoted to Enrico Fermi and nuclear energy, and to E. O. Lawrence and particle accelerators, respectively. Chapters 12 and 13 go beyond the nucleus to the world of the elementary particles, the fundamental symmetries of nature, quantum electrodynamics, and the modern frontiers of physics, while in Chapter 14, Segre speculates briefly about what it all means, and where it will lead. His concluding sentences bear quotation: "Not only the subject matter but the philosophy of physics, too, changes with time and there is every reason to think that it will continue to do so, even at a profound level. I do not believe Galileo, Newton and Einstein have been the last of their ilk."

One of the very attractive features of this book is the fact that, drawing from his own files and those of his friends, Segre has been able to include a number of photographs of the giants of nuclear science at work and at play, photographs that have not previously ever been published. He also provides a detailed bibliography which will be invaluable to those searching for their scientific roots.

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