donor molecules and iodine had much larger experimental errors than was previously admitted. As a result, in the chapter on charge-transfer complexes the complicated discussion of the variation of intensity of the charge transfer band with donor strength for aromatic donor molecules is probably unnecessary, although the discussion does indicate a number of factors that should still be considered. Similarly, the discussion of solvent effects of charge-transfer complexes would now be simplified, since better data for the gas-phase studies of complexes have become available from recent studies, mostly by Tamres.

In summary, this book provides the reader with a good, balanced, provocative, and generally sound introduction to the theory of the effect of intermolecular interactions upon electronic states of molecules and a very useful survey of experimental methods of studying these effects.

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The Elements of Neutron Interaction Theory

A. Foderaro
582 pp. MIT Press, Cambridge, Mass., 1971. $19.95

The interactions of neutrons with matter are among the more important fundamental processes that govern the design and operation of fission reactors as well as the fusion reactors of the future. All nuclear-engineering curricula, therefore, provide the student with a thorough understanding of the physical processes involved in these interactions. He learns about the meaning and measurement of neutron cross sections and about the theoretical techniques that permit their estimation when no adequate measurements exist. Anthony Foderaro's text book for a first-year graduate course in nuclear engineering is unique in that it concentrates almost exclusively on the theoretical tools for describing and calculating neutron cross sections.

Assuming a minumum previous knowledge of physics, the first third of the book guides the reader from Newtonian mechanics through the Langrangian and Hamiltonian formulations to quantum mechanics, including collision theory. This brief but often formally detailed condensation of the traditional course material in classical and elementary quantum mechanics is likely to overwhelm the intended student unless it is supplemented by generous readings from among the many

excellent texts that are tantalizingly introduced in the reference lists of Foderaro's book.

Nuclear structure theories are touched in very brief and mainly quantitative descriptions of the shell model, the collective model, and the statistical model of highly excited nuclear states. In dealing with neutron interactions, proper, there are quite detailed accounts of resonance theory, of the R-matrix theory of nuclear reactions, the optical model for neutron scattering, and Hauser–Feshbach calculations for neutron induced reactions, most of which include step-by-step prescriptions for carrying out numerical calculations. There are also more cursory descriptions of the theories of radiative capture and gamma-ray spectra, and a chapter on the effects on neutron scattering of target structure and atomic motion. The brief treatment of fission theories omits more recent developments on the "double-humped" nature of the fission barrier. Selected exercises close each chapter, and an appendix lists various constants and units.

The material is organized chiefly along historical lines and the tone of the book tends to the didactic rather than the explanatory. Thus, a very nice explanation of the need for the optical model is apologetically tacked to the end of the discussion on that subject, instead of introducing it. If the first-year nuclear-engineering graduate student finds that he needs much additional information on physical phenomena and experimental facts in order to appreciate the theories in this text, he may later value Foderaro's book as a thorough and succinct collection of formulas and derivations from among the long line of theories that stretch from Newton's laws to neutron resonances.

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Notes on Elementary Particle Physics

H. Muirhead
252 pp. Pergamon, New York, 1971. $13.75

This is a short book derived from thirty lectures given to first-year graduate students at the University of Liverpool. The author is an experimental physicist who earlier wrote a longer text entitled *The Physics of Elementary Particles.* High-energy physics has traditionally been taught at many universities to students in their second or third year as an advanced graduate course. Since most other fields of specialization in physics offer a course at a lower