the quest for crisis stability "whether superpower X compensates for improved war-fighting capabilities of superpower Y by strengthening the invulnerability of its own retaliatory force or imitates the counterforce and defense emphasis of Y."

This book is a valuable introduction for those seeking a better understanding of the crucial arms-control issues facing us, and of the political problems of trying to shape a stable nuclear future along one of four directions that are mapped out. It is also an excellent text for students of these problems because the authors have asked, with clarity and sobering restraint, the hard questions and sought to provide some answers.

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Atomic Nuclei and their Particles

E. J. Burge
193 pp. Clarendon (Oxford U.P.), New York, 1977. $13.95

Atomic Nuclei and their Particles is an introductory text intended for first- or second-year undergraduates. It is the thirteenth volume in an integrated series—the Oxford Physics Series—covering elementary through advanced material in a reasonably priced format. In the present text, in roughly 200 pages, E. J. Burge discusses the particles of nuclear physics, ranging from the pre-Rutherford era of electrons, atoms and photons, through the hadrons up to the recent era of the psions. Along the way, he treats, in an offhand, conversational way, nuclear accelerators, nuclear instruments, nuclear reactions, forces and models, cosmic rays, and elementary particles. The level of the presentation is roughly that of *Scientific American*, but the presentation lacks the skillful simplicity and clarity of illustration in that journal.

It is not clear what degree course could make use of this text. Burge uses an historical, descriptive approach for much of the material (amply supplied with the familiar names and dates) and this material is easily accessible. For the more difficult material, he tosses off ideas and concepts at a rapid pace, but the explanations (though technically correct) cannot really be all that understandable to the intended audience. Burge has an unfortunate tendency to bring in new concepts without even an attempt at a definition of the words or symbols. This is particularly annoying for dimensional units, and the table at the back of the book makes matters worse (confusing, as an example, F for the Faraday (charge) with F for farad (capacitance)). Similar

lack of attention to detail leads to confusing Proust with Prout and produces an "Emil Wigner" for Eugene Wigner.

Burge has enlivened the book considerably by the use of illustrative anecdotes; the one attributed to Denys Wilkinson is a gem.

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Mössbauer Isomer Shifts

G. K. Shenoy, F. E. Wagner, eds.
956 pp. North-Holland, New York, 1978.
$107.50

The isomer shift in Mössbauer spectroscopy refers to changes in the resonance energy resulting from electric-monopole hyperfine interaction between the finite nuclear-charge distribution and the electron density at the nucleus. For a typical source-absorber experiment, the shifts depend on two factors: the difference in mean radii for the resonant nuclear levels and the difference in electron densities at source and absorber nuclei. Thus, any treatment of isomer shifts implicitly involves nuclear-structure considerations together with determinations of electron-charge distributions in condensed matter. For a given Mössbauer isotope, the nuclear factor is essentially constant and a determination of this quantity (by calculation or electron-density calibration) allows observed isomer shifts to be interpreted, in principle, as relative electron densities at source and absorber. The isomer or chemical shift was first reported in 1960 by O. C. Kistner and A. W. Sunyar for the case of an α-Fe_2O_3 absorber and source of Co^{57} in stainless steel. This important feature of Mössbauer spectroscopy has motivated a significant amount of research during the ensuing years, and this work is authoritatively surveyed in the present volume.

The amount of study devoted to Mössbauer isomer-shift determination is reflected in part by the size and composition of the present volume: 956 pages, with 21 chapters or subchapters, and six appendices. The large size also reflects the fact that the determination of electron charge-density is a complicated business, particularly when the observed shifts arise from small changes ($\lesssim 10^{-3}$) in the total electron density at the nucleus. Each isotope (significant data for more than 25 isotopes are available) and materials class can represent special cases. Despite this complexity, the authors and editors have produced a useful, indeed definitive, treatment of the field. The graduate- and research-level text edited by Gopal K. Shenoy and F. E. Wagner has achieved its stated goal of providing a standard reference work on Mössbauer isomer shifts.