those concerned with the interpretation of nuclear spectroscopic data in terms of nuclear models. When the book was started the shell model had only just emerged and it was nearly ten years later that Weisskopf exposed the important role of the exclusion principle in limiting two-body collisions of the bound nucleons and so making possible the long mean-free-paths required for the existence of independent particle motion. It then became possible to understand how the repeated influence of the residual interactions not included in the averaged potential of the shell model could lead to the formation of the compound nucleus. The addition of a short appendix covering this point would have helped new readers to avoid unnecessary confusion.

The book inevitably contains little discussion of reactions above 20 MeV and it is rather amusing to see energies between 10 and 50 MeV classified as "very high energies" and those above 50 MeV classified as "ultra high energies".

It is open to question whether the reissue of a book which was written nearly thirty years ago, without any revision or even up-to-date commentary in footnotes and appendices, provides a real service to nuclear physicists. The book still provides a very good introduction to the theoretical techniques of low energy nuclear physics and could usefully serve as a background reader for a first major course on nuclear theory. The book would be of little further use to postgraduates working on nuclear structure theory or direct reactions but should remain of some value to experimentalists working on very low energy reactions and electromagnetic interactions. Indeed, the book might now serve as a foundation for studies in applied nuclear physics.

From a less utilitarian standpoint, there are strong reasons for congratulating the new publishers for keeping this major work in print. It is a classic example of how to write a textbook in a newly developing field. The style is lucid and the authors were capable of being both imaginatively descriptive and searchingly critical. The mathematical formalism has an elegant, uncluttered appearance. This book is attractive to an extent unsurpassed by later works of comparable scientific complexity. □

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Atomic, nuclear and elementary particle physics

P.G. Murphy

The Structure of Matter: An Introduction to Atomic, Nuclear and Particle Physics. By R.M. Turnbull. Pp.266. (Blackie: Glasgow and London, 1979.) Paperback £7.95.

THIS book contains a concise account of atomic, nuclear and elementary particle physics, for the early years of an undergraduate course in science. It is written at a fairly elementary level compared with most of the numerous texts of this kind. It gives more space than is usual to elementary particles, justified by the inclusion of very recent developments of fundamental significance. Most of the book contains traditional material treated in an orthodox manner. It should therefore reach a very high standard to justify its addition to our libraries, or the expenditure of a large sum for a slim volume. Let us therefore look at the treatment of one of the most important parts of the subject. On page 96 we are told that "Schrödinger postulated a wave equation . . .", followed in the next sentence by equation 8.5, which is a wave equation; nothing is said to prevent the innocent student from believing that it is the Schrödinger equation. Unfortunately it is not (except possibly the relativistic form for a massless particle). The true Schrödinger equation does appear, two pages later, as a result of some unexplained manipulations on a harmonic wave. Then we are told that it is "known as the time-dependent form since . . . V is in general a function of both position and time". This is wrong; the phrase refers to the wave function, not to the potential (which could well be zero). The next sentence says "Wave-particle duality is incorporated . . . since it . . . contains a potential energy term describing the interaction of a particle with its environment". This duality is inherent in the interpretation of the wave function and has nothing to do with the potential.

Tutors who have to eliminate these ideas will wish that this book had not been published. I have described only the worst faults I have found. In other parts we find an inadequate treatment of the uncertainty principle, a long section on Wilson-Sommerfeld orbits which is an unnecessary difficult subject, again with misleading and inadequate explanations (it leaves us thinking that Sommerfeld's relativistic term explains fine structure correctly), and other inaccuracies. This book cannot be recommended. □

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Developments in physics

Leonardo Castillejo

The Structure of Matter. By S. Gasiorowicz. Pp.525. (Addison-Wesley: London, 1979.) £16.50.

IN 1933 the publication of Max Born's classical book *Atomic Physics* set a standard for a comprehensive yet simple introduction to the new ideas and developments in physics. Since that time the subject has grown so large that most authors choose to restrict themselves to one field such as relativity or quantum mechanics, solid state or statistical physics, and to provide within the chosen topic more mathematical details and worked examples to enable the student, not only to grasp the new ideas, but also to calculate things for himself.

In this textbook on *The Structure of Matter* Dr Gasiorowicz has combined both these aims. He includes all the topics listed above, together with a wide range of simple applications and illustrations in related fields. The mathematical requirements are few; basic calculus and the use of matrices. The physical arguments are presented very clearly and followed up with explicit calculations, often on a simple model, so that all the details can be worked out. The crucial features which generalise to the real problem are then clearly emphasised.

The book is divided into six parts. The first covers relativity. This is an excellent and lucid exposition of the essential ideas and provides a working knowledge of Lorentz transformations, relativistic kinematics and even some transformations of electromagnetic fields. The second section on statistical physics is based on a mixture of statistical distribution and kinematic theory, derives the Boltzmann distribution, with some applications, and discusses black-body radiation. I was unhappy that the concept of temperature, which is so fundamental, was introduced rather superficially in terms of the ideal gas law.

There follow three sections on quantum mechanics; the first explaining the early models, then a self-contained and beautifully clear section formulating quantum mechanics up to the harmonic oscillator and finally a more advanced section including angular momentum, the