

partly on applications. In discussing collective states, he also concludes that (page 77) "the mechanism for the appearance of the so-called collective states is not readily understandable from the general expression. . ." He discusses the random-phase approximation and various approaches to it, which "are not quite equivalent in their point of view nor in the physical insight they give into the RPA. Furthermore each of them is the starting point of different higher approximations. . ." Then one sees a figure on page 101 that suggests that the results of calculations have little to do with experiment. One gets the impression of a large number of methods, none of which is very useful. One also feels that the effective two-body force mentioned on page 98 (it is a local, central force) is extremely simple minded. Maybe Bloch also had that point in mind.

Elliott considers the effective interaction in the shell model. His effective interaction has local, central, tensor and spin-orbit terms, all having the same radial dependence. That is some improvement; yet much is missing. He effects some comparison with the Hamada-Johnston potential in table II, and finds encouragement in not very much. He then takes up the pairing force.

Migdal discusses the method of interacting quasi-particles. After a tremendous formal development, one comes to an effective interaction between quasi-particles (equation 4.5 on page 199). The development appears to fall a bit short of deriving everything from the two-nucleon interaction and the Schrödinger equation.

David Brink on the alpha-particle model of light nuclei brings us back to the thirties, but in many ways is quite refreshing after Migdal's Green's functions.

It is just not possible to mention all of the articles in this very valuable collection of lectures. As Bloch says, all of the lecturers deserve much credit for getting this material together. What a heroic task it would be to carry out the program mentioned by Bloch! This book has nearly 600 pages, and it is hard to see how anybody could get abreast of so much material. Still, if anyone ultimately succeeds, this book could have helped him.

On the assumption due to Einstein, "I believe that it is better to know some of the problems than all of the

answers," one would like to see a carefully listed set of glaring difficulties. Let me mention one. With the 7% deuteron D state of recent potentials and the notorious fact that tensor and spin-orbit potentials are ineffective in the three- and more-body problem of nuclear physics, so that the binding energy even of tritium comes out too low and Hans Bethe finds too little binding in nuclear matter, isn't it likely that three- and more-body forces are not really negligible?

* * *

John L. Gammel (Los Alamos) collaborated with Keith A. Brueckner in antediluvian work on the many-body problem of nuclear physics. In the same period, he collaborated with Robert M. Frank and Kenneth M. Watson on the foundations of the optical model. He and Brueckner derived a very complicated effective nucleon-nucleon interaction for nuclear matter, and Brueckner, Maunel Rotenber, and Andrew Lockett attempted to use this in shell-model calculations. These early attempts ran afoul of the same facts with which the lecturers in this summer school are struggling.

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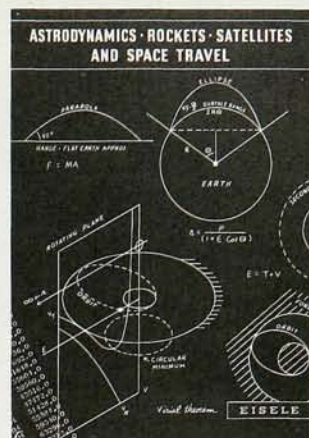
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