

# BOOK REVIEWS

## Many-body Interactions

*Many Electron Theory.* By Stanley Raimes. Pp. xi+272. (North Holland: Amsterdam and London, 1972.) Dfl. 65; \$20.15.

As the author points out in the preface this book is for those who have already tried to master the field theoretical approach to the many-electron problem but found other books<sup>1-3</sup> too difficult to read. That is to say, the reader must have a well formed idea why he wants to learn this formalism, for he will find no discussion of any physical phenomena to motivate him.

What is gained in clarity is paid for by an almost crippling narrowness of scope. In order to allow himself sufficient space for details the author limits his discussion to the point where the already restrictive title becomes misleadingly broad. In fact, only the ground state energy of a many-electron system is considered in any depth. This takes up the first nine chapters. In the remaining two the one particle Greens function is introduced with unusual care. This is the only book I know where the many-body Greens function defined in terms of creation and annihilation operators is shown, in detail, to go over to the mathematical Greens function of the one electron Schrödinger equation in the limit where the electron-electron interactions are neglected. On the other hand, there are only hints at what the Greens function might be useful outside the calculation of the ground state energy. Also, the two particle Greens function is hardly mentioned, and the discussion stops short of considering how the formalism must be modified at finite temperatures.

Having said this, one must add that in its limited aim the book succeeds admirably. It is well written, most of the calculations are carried out in sufficient detail for the reader to follow them easily, and there is a welcome vigour, not usual in books on many-body theory, in the critical comments on the ranges of validity of many standard approximations. The necessity for using infinite order perturbation theory and the usefulness of the Feynman diagrams are

particularly well argued and clearly demonstrated.

It is probably fair to say that if an uninitiated someone who learnt quantum mechanics from Schiff's book wants to understand the details and the significance of the Gell-Mann Bruckner theory of correlation energy, this book will provide all that is necessary.

However, on its own, this book is not sufficient to provide the material to be covered in a postgraduate course for physics, chemistry or metallurgy research students interested in the many-body aspects of electron-electron interactions. In such a course one customarily covers a wider range of topics at the expense of detailed calculations. Nevertheless, Dr Raimes's book can be useful as a supplementary reading and will probably be extremely welcome when the student begins to want to do his own calculations.

In view of the fact that its use will be limited to a particular period of one's education in the subject, since it does not have the scope to be a reference book, the price of about £8 is excessive for private consumption. A paperback version at £2 or £3 would make it an excellent buy. All scientific libraries should have it, however.

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<sup>1</sup> Nozieres, P., *The Theory of Interacting Fermi Systems* (Benjamin, New York, 1964).

<sup>2</sup> Abrikosov, A. A., Gorkov, L. P., and Dzyaloshinski, I. E., *Methods of Quantum Field Theory in Statistical Physics* (Prentice-Hall Inc., 1963).

<sup>3</sup> Fetter, A. L., and Walecka, Y. D., *Quantum Theory of Many Particle Systems* (McGraw-Hill, New York and London, 1971).

## Information Systems

*Selected Federal Computer Based Information Systems.* Edited by S. Herner and M. J. Vellucci. Pp. ix+215. (Information Systems: Washington, DC, October 1972.) \$24.95.

THIS volume offers descriptions of thirty-five selected computerized information services operated by Federal Govern-

ment agencies of the USA. The basis on which the selection was made is not stated nor is it clear how up to date the descriptions are. The descriptions are set out in a compact standardized format to help the reader to compare one system with another. The systems described include several whose activities are well-known outside the USA: MEDLARS (National Library of Medicine) which provides references to biomedical literature; MARC (Library of Congress) which offers catalogue data of American books in machine-readable form; ICEREPAT (US Patent Office) which handles the data relating to the patents of twenty member countries; and HRIS (Highway Research Board) which has information agreements with similar systems including that of the British Road Research Laboratory. But there are others of more domestic concern including several run by the Department of Defense which have, of course, only restricted access and CAP (Smithsonian Institution) which offers information on portraits of Americans from all periods of history. As, on average, the complete descriptions occupy six A4 pages, of which two are devoted to schematic diagrams, they offer only outlines of the systems described.

Possible trends can be glimpsed under the sections headed "Future Plans". Most systems are concerned to extend their services, some in computer-to-computer networks, and to expand and to exploit further their data-bases. It looks as though, in general, computer data-processing techniques have become stabilized for the present and that the next advance awaits the development of direct-input devices. Those systems which report under Evaluation and Testing seem to rely mainly on user feedback. Relatively few mention automatic monitoring of the mechanized processes to provide system control data.

The reader is left with the impression that these compact descriptions hide much continuing development. Nevertheless this well-edited catalogue gives an impressive picture of the confident application of the computer to an ever widening range of information systems.

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