"the scientific and aesthetic views of nature, their possible conflicts, and their connection to religious belief." One of the most attractive features of this biography is that the author not only gives admirable critical accounts of Hamilton's individual scientific achievements, but he also provides succinct presentations of the historical backgrounds so that the reader can see the significance of Hamilton's own contributions. In addition, he traces some main topics up to the twentieth century, such as the principle of least action and the development of quantum mechanics. Furthermore, Hankins provides valuable information on such ancillary topics as the organization of science (Hamilton was a founding member of the British Association for the Advancement of Science), scientific education, science and philosophy (and religion), and scientific creativity. All in all, this is a model of a scientific biography.

I. Bernard Cohen
Harvard University

Experimental High-Resolution Electron Microscopy

J. C. H. Spence
370 pp. Oxford, U.P., New York, 1981.
$74.00

This is a very useful little book that contains a great deal of information concerning the use of conventional electron microscopes at high resolution. It neatly summarizes various theoretical results and gives practical examples. In addition, a considerable fraction of the volume is set aside for practical information on setting up and using the microscope.

The book is not for everyone, however. In spite of the title, the primary focus is upon the use of electron microscopes with thin crystalline specimens where diffraction and interference effects predominate. It is of little value to the biologist.

There is a wealth of information included in this volume, but it is not always correct. In fact, it can sometimes be misleading. To quote a couple of examples, in the chapter on electron optics, one reads:

"It can be seen that the lens shown . . . is very inefficient, since most of the power dissipated supports a field in the z direction which produces no force on the electron entering parallel to the axis. An octopole lens, while far more efficient, appears to have intractable practical problems associated with accurate alignment." It is difficult to make sense of this remark since octupoles have no first-order focusing properties whatsoever.

Then again, when discussing the measurement of ac stray fields, Spence writes: "a field can easily be measured with a coil connected to an oscilloscope which will also indicate the important frequency components of the interference. For maximum sensitivity use the largest possible number of turns of very fine wire." This is certainly misleading since the use of a very large number of turns can increase the inductance to the point where 60 Hz would not be detected at all.

In spite of these deficiencies, I can recommend the book to those interested in crystalline specimens who want to get the most out of their instruments.

Albert V. Crewe
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Enrico Fermi Institute

Electrons at the Fermi Surface

M. Springford, ed.
556 pp. Cambridge U. P., New York, 1980.
$85.00

This book, written in honor of David Shoenberg of Cambridge University, contains articles on subjects ranging from Shoenberg's specialty, the de Haas–van Alphen effect, to general principles of electrons in metals and provides interesting accounts of the current understanding of properties of metals involving the Fermi surface.

In the part of the book dealing with general principles, the first chapter, I. M. Lifshitz and M. I. Kaganov explain the semiclassical approach to electron motion and describe the different electron orbits used in determining the shape and topology of the Fermi surfaces of metals. It is an excellent review that will be useful to those who feel that there is some mystery involved in the "Fermiology" of metals. The second chapter, by John Wilkins, surveys the understanding of many-body effects in metals and He^3 and demonstrates how fermion excitation can be conceived as nearly independent. It provides a very readable account of many-body effects present in a number of phenomena without overemphasizing formalisms and mathematical detail. This article is highly recommended for required supplementary reading for students learning about formal many-body theory.

The third chapter presents R. G. Chambers' clear treatment of the Boltzmann equation and its application to the path-integral method of calculating transport properties of metals. Unfortunately, no description of recent uses of the theory is included.

The first article dealing primarily with the de Haas–van Alphen effect, by A. B. Pippard, is of general interest to solid-state readers because it discusses the cooperative effect of magnetic interaction, which mean-field theory can explain. (The mean magnetization field in the de Haas–van Alphen effect is not **H** but **B**.)

Three articles on Fermi surface studies of transition metals, itinerant-electron ferromagnets and the effect of strain on the Fermi surface bring theory and experiment together to provide critical reviews; they will serve as excellent references. These articles will be favored by research workers but disappoint those seeking introductory presentations.

The last four articles concern particular aspects of the de Haas–van Alphen effect. Written for experimentalists, they show the wealth of information, on topics from Fermi surface topology to many-body effects, that this effect can yield.

This book will be of value to researchers studying the electron properties of metals experimentally and theoretically. It is useful companion to a 1968 book, *Electrons in Metals*, edited by J. F. Cochran and R. R. Heering, and A. P. Cracknell's monograph *The Fermi Surface of Metals*. Parts of the book also provide good background and excellent supplementary reading for students taking solid-state physics courses.

W. R. Datars
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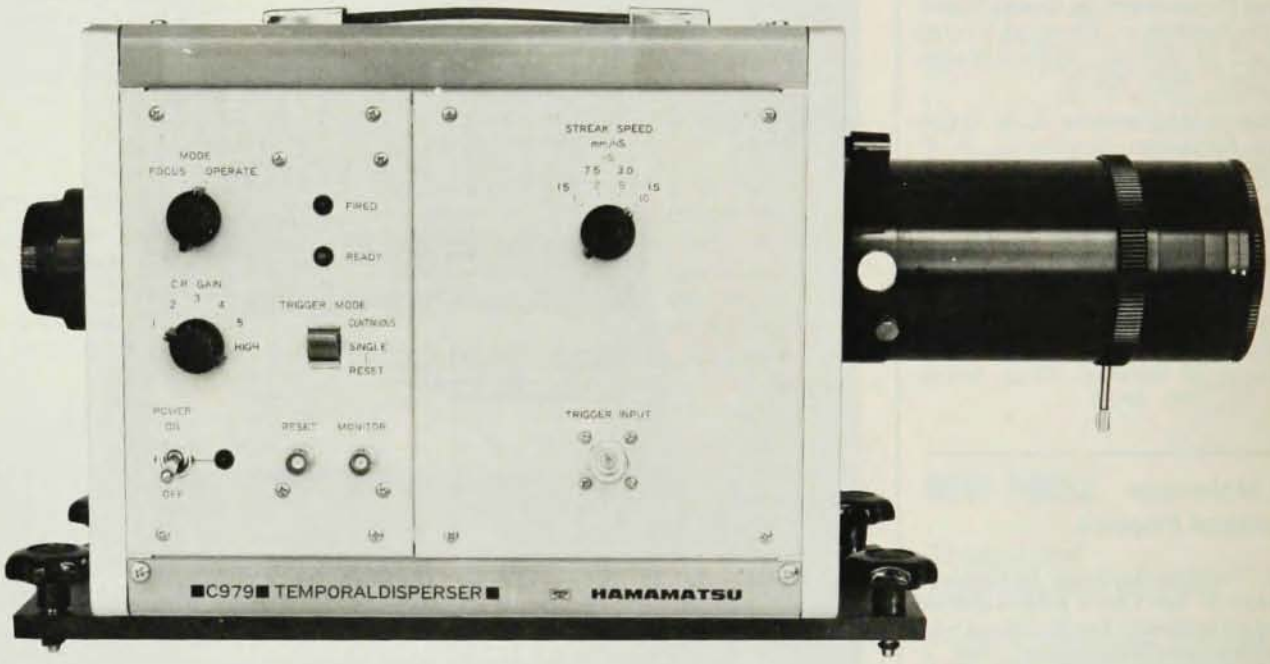

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