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biologists whose work involves the interaction of electromagnetic radiation with matter as well as to graduate students preparing to work in this field.

Steven T. Manson is a professor of physics at Georgia State University. He has been an active worker in the field of theoretical atomic physics, with particular emphasis on photoionization and photoelectron angular distributions, since the late 1960's.

Physics of High Temperature Plasmas (Second Edition)

G. Schmidt

418 pp. Academic, New York, 1979. (first ed., 1966). \$29.50

This book is designed for graduate students who have already had some exposure to plasma physics. As is well known by readers of PHYSICS TODAY, this field has seen an explosive rise in activity between the publication of the first edition (1966) and the latest edition (1979). Fusion research is obviously the major part of this effort, and George Schmidt has oriented this text in that direction. Students of low-temperature plasma physics could benefit much more from other textbooks.

Schmidt, a renowned theorist and educator, has attempted to provide a broad background of fusion-oriented

plasma physics in which he relates the theory to experiments. I particularly enjoyed his chapters on MHD, hydromagnetic stability, steady-state plasmas and collisions. He uses phase-space trajectories to explain particle motion and waves, but unfortunately neglects its connection to magnetic topology. By contrast, the author includes a well-developed section on nonlinear waves with an especially welcome treatment of solitons. He has provided answers to many questions often asked by students.

That Schmidt has retained his fine pedagogical style is clearly evident in the chapter on hydromagnetic stability. The energy principle, in particular, is presented well. His chapter on bounded plasmas concentrates a bit too much on flute instabilities, leading him to neglect mentioning other important instabilities such as ballooning modes. It must be pointed out that the section on collisions does a good job of introducing both heat and mass transport. A brief section on the applications of these quantities to various fusion geometries is also included.

There are many uses for this text beyond the classroom level. I have found that the first edition often supplied quite detailed explanations of the basis for assumptions utilized in other texts or papers.

Since Schmidt's closest interaction with experimentalists have been in the mirror and cusp geometries, it is expected that these would occupy a sig-



Nollet's experiment performed in Japan. One of the most spectacular electrical experiments of the mid-eighteenth century consisted of discharging a "battery" of Leyden jars through hundreds of soldiers and monks who formed a human chain. The shock of the discharge caused the participants to jump simultaneously. Reproduced from *Album of Science: From Leonardo to Lavoisier*. I. B. Cohen. Scribner's, New York, 1980. \$37.50.

nificant part of the textbook. Nevertheless, devices that have come into fashion since the first edition such as tokamaks (can it be over 12 years?) are included with many helpful insights, though the author should have caught the repeated misspellings of the word itself.

It is much to Schmidt's credit that he does not write in a telegraphic style but follows through on the major mathematical developments. This is quite important for a textbook at this level. I shall enjoy the second edition fully as much as the first.

J. LEON SHOHEIT

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Reliable Knowledge: An Exploration of the Grounds for Belief in Science

J. Ziman

197 pp. Cambridge U., New York, 1978.
\$18.95

John Ziman—physicist turned philosopher—tells us that this small volume has arisen from “two sources: a *challenge* and a *theory*.” The “challenge” relates to the “beneficence of science,” the “theory” is concerned with the “nature of scientific knowledge.” It must be said at the outset, however, that the “beneficence” of science is not discussed directly and that the “theory” is less a theory of scientific knowledge in general than a discussion of physics primarily, or of aspects of science that may be like physics.

In discussing the “nature of scientific knowledge,” Ziman sets forth the view that such knowledge is the currently accepted intellectual “map” of the external (or “material”) world, a consensus resulting from an assemblage of independent experiments and observations, theories and critical tests. There is, therefore, no guaranteed scientific truth tested and approved by logic or computer programs; the state of knowledge at any time consists only of the shared set of beliefs of the scientific community. These ideas are much like the well-known analysis of Thomas S. Kuhn, who is mentioned primarily in footnotes, without any definite indication of the degree to which Ziman's presentation was directly influenced by Kuhn's.

While there are scattered references to scientific events, past and present, there are no worked-out examples or case-histories. The result is that the presentation is needlessly abstract and general. And when Ziman does occasionally dip into history, he turns out to be a untrustworthy guide. For example, he criticizes medieval anatomical diagrams as mere illustrations of “the verbal descriptions of the human body

inherited from Galen” and contrasts them with the anatomical drawings of Leonardo da Vinci, which show his “transcendental genius.” “Leonardo,” we are told, “was probably the finest scientific observer that ever lived; unfortunately his anatomical work was not published until centuries later. His research programme, which was eventually carried out by Andreas Vesalius, depends absolutely on the consensibility of visual perception. In assessing the ‘truth’ of such work, the anatomist

should, in principle, take little account of theories; he simply carries out a dissection, and compares the drawings with what he can see with his own eyes. In practice, it is difficult for him not to see what he has learnt to see, under the influence of the accepted paradigm of his subject. But within that limitation of vision, the messages that anatomists communicate to one another, and store as ‘objective knowledge’ in the scientific archives, are drawings and photographs, to which

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