NASA

Solar wind effect. The tail of this comet (Bennett 1969i) is blown by the solar wind, in a direction opposite to that of the sun.

mechanics and thermodynamics is the best of the book. Its level is comparable with that of *Statistical Physics* by Frederick Reif (volume 5 of the Berkeley Physics Course), by which it was admittedly inspired. As such, it is somewhat too advanced for the purpose intended. The last 90 pages of the book concern themselves with "time-independent electrical phenomena," meaning electrostatics, direct current and time-independent magnetism. Again, the level is often too advanced for a first-year physics course, particularly sections involving Laplacians, curls and line integrals.

Still, on balance, my impression of the book is favorable. Clarity of style, the 319 elucidative diagrams, and a typography that is uncluttered and pleasing to the eye, make for a welcome departure from the traditional format of European physics texts.

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Introduction to the Solar Wind

By J. C. Brandt
199 pp. Freeman, San Francisco, 1970. $10.00

The earth is imbedded in an interplanetary stream of plasma, a nonstatic extension of the outer atmosphere of the sun—the corona. This "solar wind" is a relative newcomer among astrophysical topics, with a wide range of implications, from space travel to stellar evolution. John C. Brandt, of NASA-Goddard and the University of Maryland, gives a concise account of this phenomenon covering all its observational and theoretical aspects.

Solar wind evolves from an extremely rarefied corona, heated to some two million degrees by turbulent shocks that emanate from the hydrogen convection zone in the outer layers of the sun. Such convection zones must exist in solar-type stars and other stars of not-too-early spectral type. These must possess hot coronas and emit "stellar winds," which lead to considerable, almost complete braking of stellar rotation, and to a less considerable loss of mass (a fraction of 10^{-4} for the sun during its lifetime). Early-type stars do not have convection zones and hot coronas, but even more intense "winds" emitted by superluminous stars are apparently caused by radiation pressure, which depends on the luminosity to mass ratio.

The presence of solar wind has been first clearly demonstrated by ground-based observations of comet tails. Being in extreme cases connected with auroral and ionospheric phenomena, it is now more directly being explored by space vehicles and shown to be always present, though variable. It consists mainly of a stream of protons, with some alpha particles and heavier ions, and with electrons balancing the space charge, traveling with a velocity around 450 km/sec, at a number density of some 5 ions per cm^3 and carry-

ing with it from the sun a radially extended magnetic field of the order of 10^{-5}–10^{-4} gauss in the earth's velocity.

Solar-wind problems are far from being exhaustively interpreted, and the book everywhere underlines uncertainties in this respect. Also, the author's treatment is laconic and presumes considerable background knowledge by the reader, who will often have to consult other sources to obtain clear understanding of theory and fact.

Therefore, the stated aim of the text, destined for the "advanced undergraduate ... the beginning graduate student" and "scientists in other fields," may be somewhat over-optimistic. A reader who will master and understand the book completely, will have to perform much more work and thinking than simply reading it as it stands. After that, he may qualify as a full-fledged researcher in the field, far more than merely an "undergraduate." Thus, while being a hard nut to crack for an unprepared reader, the monograph may offer good training toward independent thinking. This in particular refers to some incomplete labelling of the copious illustrations, to half-finished sentences, or to obvious slips of the pen such as the contention (on page 8) that electrostatic repulsion leads to one-half "the effective proton mass," "mass" being here confused with "weight." However, the algebra is generally correct.

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Interpretation of Spectra and Atmospheric Structure in Cool Stars

***By* Y. Fujita**
145 pp. University Park Press, Baltimore, Md., 1970. $10.00

The study of the atmospheric structure of cool stars has become a very active field of research in the past decade. Y. Fujita has summarized in this book some of the work done in this area up to 1968. Fujita and his associates in Japan have been working on cool stars for a long time. This book deals primarily with their work.

The topics discussed in this book include: identification of spectral lines, dissociative equilibrium, opacities and model atmospheres, spectral classification, quantitative analysis of spectra and chemical composition. The book gives a fairly detailed discussion of the observed spectra of cool stars, and quite a few spectrograms and tracings have been included. I was surprised not to see any discussion of the observations on mass loss from cool stars, on infrared stars and on flare stars. The discussions of opacities and model atmospheres are brief and dated. There is no mention of the early work on nongray atmospheres of cool stars by Owen Gingerich and his colleagues. Convective energy transport plays an important role in the atmospheres of cool stars and a detailed discussion of this problem should have been given.

Fujita's contributions to the study of carbon stars are well known, and the book gives a fairly detailed discussion of these stars. One chapter of the book is devoted to the interesting problem of the C^{12}/C^{13} ratio in carbon stars.

Although this book deals only with selected topics concerning cool stars, I am sure that all workers interested in this rapidly developing field will find it very useful. The book is handsomely produced and reasonably priced.

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Nuclear Collective Motion: Models and Theory

***By* D. J. Rowe**
340 pp. Barnes and Noble, New York, 1970. $17.50

The subject matter of this book is appropriately divided into two parts. The first part treats the purely phenomenological aspects of collective nuclear motion, while the second delves into the microscopic theory. The author avoids an historical development, as ample scientific perspective now exists on this subject for a more logical presentation. The material is well organized, and his logical approach is quite successful.

One of the primary highlights, in my opinion, is a large number of clever pedagogical examples that the author uses to clarify comparatively subtle theoretical aspects of the model. Many of these examples are real gems, not readily available elsewhere in the literature. In general, even the most sophisticated aspects of the subject are presented with exceptional clarity. The book is particularly well suited for graduate students and physicists who are encountering the material for the first time. The academic level is appropriate to a second-year graduate student who has had a standard course in quantum mechanics and a rudimentary knowledge of nuclear physics. Specialized mathematical methods are conveniently presented in the appendices.

Most of the defects are pointed out by D. J. Rowe himself. No attempt was made toward complete referencing. I would strongly recommend that an extensive bibliography for this text should be compiled, if the author contemplates a revised edition. Similarly, I would like to see a larger selection of