structure of hemoglobin, inelastic scattering of x-rays and electrons, and the development of wiggler-magnet sources of synchrotron radiation.

Introduction to Advanced Astrophysics

V. Kourganoff
492 pp. Reidel, Hingham, Mass., 1980
$71.05 cloth, $28.45 paper

This translation, by the author himself, of lectures given at the University of Paris between 1961 and 1977 is intended "to provide a basic knowledge of the main parts of modern astrophysics for all those starting their studies in this field at the undergraduate level." The "main parts of modern astrophysics" turn out to be radiative transfer, stellar structure, pulsars, the Newtonian two-body problem, and cosmology, an odd assortment of topics. Equally odd, given the book's intended audience, is the author's approach to his material. Chapter 1 begins: "Consider a point P in a radiation field ..." and plunges into a series of definitions. Seventeen pages and forty-nine equations later, the author is ready to *begin* his derivation of the equation of transfer. Having persevered thus far, readers may expect to learn what the equation of transfer means and what it can be used for. If so, they will be disappointed. The only application mentioned in the text is to the flow of radiation in stellar interiors, which illustrates some aspects of radiative transfer but not the most interesting or distinctive ones. Nor do later chapters make any use of the general theory.

Although most of the theoretical discussion is merely unenlightening, the discussion of relativity theory and cosmology is seriously misleading. It fails to explain either the limitations of Newton's theory or the power of Einstein's, nor does it mention the key distinction between expansion in a static Euclidean space and the expansion of space itself. The author asserts that "in the Newtonian approach, it is obvious that the universe cannot be static if the only forces acting ... are those of mutual gravitation." On the contrary, Newton's theory provides a self-consistent description of a macroscopically uniform, unbounded distribution of mass *only* if it is static in the large.

There is very little discussion of observational material, and what there is is of low quality. For example, on page 66 the author writes, "Quantities such as [the relative abundances of hydrogen, helium and other elements] are given by the quantitative analysis of spectra of stellar atmospheres .... [For] the Sun $X = 0.744$, $Y = 0.236$. Thus we can neglect Z [the metal abundance] which is in most cases of the order of 0.020." In fact the abundance of helium in the Sun and most other stars is not given by spectroscopic analysis, and its solar value is not yet well established to even one decimal place. Moreover, the value of Z, though small, can hardly be neglected. It plays a critical part in the construction of solar and stellar models.

In a time of rising book prices and shrinking library budgets, this is one book that physics and astronomy librarians can in good conscience refrain from ordering.

DAVID LAYZER
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Holography and Coherent Optics

L. M. Soroko
834 pp. Plenum, New York, 1980 (Russian ed. Nauka, Moscow, 1971). $59.50

Written in the 1960s, originally published in Russian in 1971, translated into English and published in 1980, this book reflects ideas and views on holography of the late 1960s. Although it contains some unusual treatments, the text presents no new material. The connection between holography, information theory and statistics is emphasized by the author, Lev M. Soroko, currently with the Russian Joint Institute for Nuclear Research.

The author commences with a general survey of holography that stresses phenomena and general principles and uses geometrical analysis in creative ways. The mathematical analysis begins in Chapter 2, where optical signals, transforms and linear filters are discussed in depth. With an emphasis on analysis, Soroko introduces few physical interpretations of the results. The nature of random optical signals, stationarity, average power and power spectra, for both a known and an unknown frequency dominate the next chapter. Both of these chapters contain fairly standard sets of examples.

The core of the text begins in Chapter 4. The coherence properties of optical signals and the means to measure coherence length and degree of spatial coherence are elaborated in detail. Again mathematical analysis dominates explanation of phenomena.

The application of sampling theory and Kirchhoff diffraction theory to resolution in optical systems is the core of Chapter 5. The presentation of the mutual intensity and illumination matrix is very good. Soroko introduces holography in terms of Fresnel–Kirchhoff diffraction theory. He uses approximations in the analysis of holograms of point and plane objects that could be more clearly enumerated; all analysis is first order, and details about aberrations are omitted. How dated the text is becomes apparent in the discussion of the reconstruction of a hologram. The reconstruction beam is always normal to the plane of the hologram, and side bands are shown centered around $\omega = 0$, even when the reference beam is incident at angles greater than zero. The final text chapter deals with coherent optical processors. The discussion, centering around various linear filters in sequential processors, ends with a review of coherent side-looking radar.

Following the regular text are reprints of three articles included to keep the treatment "updated." These reprints (dated 1972, 75, 77) deal with various aspects of optical computing and image processing. Since each of these is reprinted from a readily available journal, the only reason for inclusion lies in providing their extensive lists of references. Because the text is devoid of references, perhaps it was felt that inclusion of articles containing

extensive reference lists would be useful. However, most of these references have little to do with the general theory of holography and coherent optics.

Unfortunately I find this very expensive book most unappealing. Most of the material is dated; much of it has been presented in other (much shorter and more recent) volumes; and there are very few references to original sources. Had this book been published in English shortly after it was published in Russian, many of the above comments would be unnecessary. In fact, I question the publisher's reasoning in presenting such an obviously carefully done book at this late date.

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Introduction to Nuclear Reactions

G. R. Satchler
327 pp. Halsted (Wiley), New York, 1980. $59.95

Most of our information about nuclei comes from their reactions with electrons, nucleons, mesons and more massive projectiles. Because of the diversity of these phenomena and theories about them, it has been difficult to find or write any satisfactorily inclusive description of this field. Therefore it is gratifying to have, at last, an excellent introductory survey that is useful both to beginning graduate students for self study and to trained nuclear physicists who will appreciate its pointed insights and reference material. Written as a brief textbook for English undergraduates, this handsome book is unfortunately priced beyond the reach of its most likely users.

Its author, Ray Satchler, preeminent in direct-reaction theory and coauthor with David Brink of a successful, compact book on angular-momentum theory, is a master of clear presentation of theoretical ideas.

The book begins with a brief introduction to nuclear physics, which is followed by an orderly qualitative description of typical low-energy reaction experiments and the phenomena they disclose. Longer chapters present scattering theory and its applications to explicit nuclear models. There are excellent and copious illustrations as well as comparisions to experiment. Also provided are appendices on angular momentum, on the lab to center-of-mass transformation and on some standard data.

The discussion of scattering theory summarizes the simple wave-mechanical analyses of low-energy direct reactions. Some of this material has not previously been given in textbooks. The