mentarily. The chapters on binary fluids and charged fluids are outstanding, comparing calculations with the results of experiments with binary alloys, plasmas, and ionic melts. Even the fascinating, recently discovered electron-hole liquid is discussed. On the whole, however, such structural considerations are viewed only as the time-independent element of the neutron-scattering function.

From the point of view of kinetic theory, the neutron scattering function is the key to understanding the nonequilibrium properties of a fluid. The only results that have been rigorously established concerning this function are its short-time behavior, as given by kinetic theory, and its long-time behavior, as given by hydrodynamics. Its intermediate-time behavior is, at present, basically determined by various semiempirical interpolation methods, through the use of models of the response or memory function, and the determinations are tested against real or computer experiments. March and Tosi give a good account of these procedures, although neither they nor Hansen and McDonald discuss the important recent realization that the time scale for which hydrodynamics is valid is remarkably short and cannot be separated from the kinetic time scale.

Hansen and McDonald describe the modern fluctuation-dissipation approach for the calculation of transport coefficients. They fail, however, to point out that the transport properties and correlation functions can be well approximated by the hard-sphere model, as is the case for equilibrium properties. The hard-sphere results in turn can be well represented by the Enskog approximation, which, at present, is the only way of extending the low-density Boltzmann results to higher densities that can systematically be improved on by graph-theoretical techniques. Such corrections to the Enskog model contain, for example, the hydrodynamic modes that lead to the slow decay of autocorrelation functions and to the prediction of the nonanalytic behavior of the neutron-scattering function. They should not have been omitted. The unwary reader should have been warned that the perturbation technique so successful in equilibrium situations is fraught with danger in nonequilibrium ones.

These books cover a limited approach to a specialized topic. One would like to find in them only truths; not all the truths, but certainly the essential truths.

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Nuclear Astronomy

Gamma-Ray Astronomy. Nuclear Transition Region. E. L. CHUPP. Reidel, Boston, 1976. xiv, 318 pp., illus. Cloth, $39; paper, $19. Geophysics and Astrophysics Monographs, vol. 14.

As the subtitle suggests, Chupp's book is primarily concerned with astronomy in that portion of the electromagnetic spectrum that extends in energy from about 0.1 to nearly 100 million electron volts. It is that portion that contains the energy levels of atomic nuclei and hence exhibits gamma-ray lines, which are due to transitions between nuclear energy levels. Astronomical line spectrometry in this energy interval amounts to nuclear spectroscopy of celestial sources just as measurements of optical and x-ray spectral lines constitute atomic spectroscopy of such sources. The particle energies that are required for excitation of nuclei in the sources, however, are very much greater than those required for atomic excitation. There is widespread expectation that nuclear astronomical information will reveal much that is qualitatively new and different about the most prominent and fascinating problems of astrophysics, cosmology, and solar physics. The chief problem is that the expected fluxes of nuclear gamma rays at earth are so small that they are mostly beyond the detection capabilities of existing experimental techniques. Until recently, there have not been many reports of positive detections of nuclear gamma rays from astronomical sources. (An experiment conducted by Chupp's group is among the few positive detections; his group has been the only one to succeed in detecting nuclear gamma rays from the sun, during solar flares.) Nuclear gamma-ray astronomy is a small field compared, say, to x-ray astronomy. The small number of detections may be one reason for the comparative paucity of nuclear gamma-ray astronomers.

This is the first book devoted entirely to astronomical nuclear gamma-ray spectroscopy. It is written for researchers who are already in the field or are thinking of entering it. Written by an experimentalist, the book assumes that the reader already has some knowledge of nuclear physics and of astrophysics, but it does review the more pertinent material from those disciplines. The book has good summaries of production mechanisms and predicted gamma-ray spectra for continua, as well as discrete (line) emissions from various astronomical sources. There is also a discussion of the mechanisms by which gamma rays interact with matter. A good review is given of the various solar and cosmic observations that have been conducted. The book contains many references to recent research papers, through June 1976.

Perhaps the most useful part of the book, for both observationalists and theorists, is a chapter on the sensitivity limits of existing experiments and the problems associated with increasing sensitivity. The most fundamental problem is the activation of the detector itself by nuclear reactions of bombarding particles. Cosmic rays and other energetic nuclear particles that are present at balloon altitudes and in near-earth satellite orbits cause the detectors to become sources of the radiation one is attempting to detect from far-distant sources.

This volume belongs on the bookshelves of all those who are professionally interested in nuclear gamma-ray astronomy.

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Plant Reproduction

Sexual Interactions in Plants. The Role of Specific Substances in Sexual Reproduction. H. VAN DEN ENDE. Academic Press, New York, 1976. viii, 186 pp., illus. $14.75. Experimental Botany, vol. 9.

The compounds that control sexual interaction in plants have become one of the central concerns of experimental plant physiology during the last 10 years. It has become clear that the specificity characteristic of the sexual process in plants is mediated by chemical compounds, and such substances have been found and identified in algae, fungi, ferns, and flowering plants. In this book, van den Ende, who is an expert on sexual factors in Mucorales, emphasizes hormonal control in Mycophyta. Four chapters dealing with *Allomyces*, *Achlya*, Zygomycetes, and yeasts make up about half the book. The known mediators of sexual interaction in *Chlamydomonas*, *Volvox*, *Oedogonium*, brown algae, and ferns are also treated, and some highlights of the fertilization process in flowering plants are mentioned. Aside from the lack of consideration given to flowering plants, the taxa are treated nicely. Such processes as sex expression, agglutination, fusion, and chemotropic and chemotactic responses are discussed. The chemical compounds that have been identified as controlling sexual interaction in plants (sirenine, trisporic