able information on elastic nucleon-deuteron scattering, on polarization effects in nucleon-deuteron scattering, and on effects of final-state interactions in the three-body system, make this volume particularly useful. The majority of the theoretical papers discuss mathematical methods for the solution of the three-body problem, with the Faddeev equations playing a central role. One can't help noticing, however, that there is little discussion of the dynamics of the three-body system. Three-body forces are not even mentioned except in an abstract near the end of the book. The conference often focused on the two-body interaction in the three-body system, but one important aspect of this interaction, namely its locality or nonlocality, is not given sufficient attention in spite of a forceful introduction of this subject by H. P. Noyes. Furthermore, in spite of the title of the volume, there is little in it that will interest elementary particle physicists. What there is, however, is stimulating—R. D. Amado's model for the study of final-state interaction effects in three-body decays, the article by J.-Y. Pasquier and R. Pasquier on three-meson resonances from Faddeev type equations, R. Blankenbecler's paper on relativistic aspects of the three-body system, and the extension of Faddeev's work to the *N*-particle case by Faddeev's student O. A. Yakubovsky.

The experimental papers deal primarily with the search for resonances and excited levels of the three-body system and the investigation of low-energy scattering parameters of the two-body interaction in the final state of the three-body system, as well as with three-body final states. The Watson-Migdal model is often made use of, sometimes successfully and sometimes not very.

As R. E. Peierls observes in his closing summary of the conference, one appealing aspect of both the theoretical and the experimental papers is that they keep details of techniques and numerical-computational methods to a minimum and focus primarily on results. There is a wealth of results in this volume, especially of an experimental nature, and it is this feature I would like to emphasize. Another appealing feature is that the discussion that followed the presentation of papers seems to have been reproduced in full. One finds that one can often extract an additional ounce of wisdom from any given paper in perusing the post-delivery discussion. Finally, the bibliography seems to be more than adequate.

The articles along with the abstracts of contributed papers present a fairly satisfactory picture of the activity in the field of three-body calculations. This volume can be useful to workers in the field, but is not recommended for novices in the three-body problem.

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Satellite Data Interpreted

Plasma Waves in Space and in the Laboratory. Proceedings of a NATO Advanced Study Institute, Røros, Norway, April 1968. J. O. THOMAS and B. J. LANDMARK, Eds. Elsevier, New York, 1969–70. 2 vols. Vol. 1, viii, 488 pp., illus. $23.50. Vol. 2, x, 564 pp., illus. $21.

Plasma in space and plasma in the laboratory are particular examples of the same medium, and, although the parameters are vastly different, one expects to encounter the same physical phenomena albeit on different temporal and spatial scales.

This was once more convincingly demonstrated at the NATO Advanced Study Institute of which these volumes are the proceedings. The central theme of the discussions was measurements by the Alouette 1 and 2 and the Explorer 20 satellites and their interpretation. The proceedings are therefore considerably more specialized than the general title would suggest.

The most exciting, because unexpected, new information was provided by the topside sounders that detected plasma resonances at certain frequencies. The resonances that occurred at harmonics of the electron cyclotron frequency were identified as Bernstein waves, and it is probably in the interpretation of these resonances that a close coupling with laboratory plasma physics becomes most apparent. Because of their interesting dispersion characteristics Bernstein waves have been investigated extensively in the laboratory, and they are used more and more for the study of novel plasma effects. It is also not surprising that the few laboratory experiments on plasma waves that are reported in the proceedings deal mostly with aspects of Bernstein waves.

A considerable fraction of the papers is devoted to the performance of antennas in an ambient plasma, a crucial experimental problem in space physics. The theoretical analysis of the coupling between antennas and plasma has reached a high degree of sophistication, and it is encouraging to see that good experimental data on this phenomenon are gradually becoming available.

The third main subject is very low frequency phenomena, which cover the audio and subaudio frequency range. Drift waves and drift instabilities are increasingly recognized as possible important sources of such phenomena. Since drift waves have been studied in great detail both theoretically and experimentally, this might be another area where space and laboratory plasma physics can greatly benefit from each other.

The proceedings contain surprisingly little work on nonlinear aspects of plasma waves. It is probably safe to predict, however, that there will be much more emphasis on nonlinear effects in space plasmas as time proceeds.

The format of the proceedings deviates from the usual pattern in that the papers are divided among two volumes. Volume 1 contains invited papers that are supposed to provide introductions and reviews, whereas volume 2 is reserved for contributed papers. This commendable scheme, however, was only partially successful. Apart from excellent review papers, notably those by Thomas and Andrews on resonances in space and by Crawford on laboratory plasma wave experiments, volume 1 also contains several short and specialized contributions which appear more appropriate for volume 2.

The proceedings are nevertheless an excellent collection of generally high quality, and the subjects it deals with are ones that researchers in space plasmas and laboratory plasmas alike should find extremely stimulating.

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Ion Solvation

Electron Transfer Reactions of Complex Ions in Solution. HENRY TAUBE. Academic Press, New York, 1970. viii, 104 pp., illus. $5.75. Current Chemical Concepts.

This book is an updated and expanded version of four lectures given at the Polytechnic Institute of Brooklyn in 1967. The material covered reflects to

a large extent the research interests of the author. Fortunately these interests are very broad indeed. Thus the structures and labilities of hydrated ions, inner- and outer-sphere activated complexes, the effects of inorganic and organic bridging groups, induced electron transfer, and detailed electron transfer mechanisms are all discussed. Not surprisingly, the monograph is dominated by work recently completed and currently in progress in the author's laboratory. However, contributions made by others are also discussed, placed in perspective, and criticized where appropriate.

There may be a theoretical equation in this book, but I did not find it. Instead the reader is treated to a refreshingly clear account of clever, often ingenious, experiments designed to answer difficult questions. In my opinion the experimentalist-author is at his best in the last chapter. Here he treats reactions in which one equivalent of an external oxidizing agent and one of an internal oxidant are consumed in the two-electron oxidation of a group coordinated to the internal oxidant. The experiments with these reactions are fascinating, and the author avoids the pitfalls with aplomb (and a cobalt).

Taube's style and the current status of much of the electron transfer field are aptly epitomized by the closing sentence of the booklet: "At this stage, it would be premature to attribute the difference to effects of the kind we are searching for, but it would be equally premature to give up the search at this stage." This monograph is a personal and very readable account by one who not only has pioneered but still continues as a leader in the field.

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Valesek's Discovery

The Second International Meeting on Ferroelectricity. Kyoto, Japan, Sept. 1969. Physical Society of Japan, Tokyo, 1970. xii, 464 pp., illus. $20. Supplement to the Journal of the Physical Society of Japan, vol. 28.

On the eve of the 50th anniversary of Valesek's discovery of ferroelectricity in Rochelle salt, one is impressed by the breadth of appeal the subject has. Scientists whose interests range from switching and display devices to the statistical mechanics of the ferroelectric phase transition itself are actively engaged in this field today. This entire spectrum of viewpoints is represented in this collection of 158 papers.

Arranged according to the topical session in which they were presented at the meeting, the papers combine to give one an overall impression as to where the field now stands and where it might be headed. One might usefully divide the researchers in ferroelectricity into "hunters" and "transitionists," the former being concerned primarily with finding new and improving known ferroelectric materials and properties, and the latter with the phase transitions that connect the ferroelectric state to its nonferroelectric neighbors.

Among the five invited papers which set the tone of this volume, the transitionists are represented by the group theoretical discussions of E. Ascher and of L. A. Shuvalov, who review and catalog the relations imposed by symmetry on various electric and magnetic properties of crystal structures on either side of ferroelectric transitions. G. Shirane is perhaps most aptly named a transitionist. His paper on inelastic neutron scattering studies of soft modes brings into focus one of the most useful unifying concepts applicable to ferroelectric transitions: the soft or unstable normal mode whose frequency and symmetry serve to unite the static and dynamic aspects of these phase transitions. Numerous contributed papers in the sections that follow on Lattice Dynamics, Phase Transition, and Critical Phenomena develop and extend concepts discussed by Shirane.

The hunters dominate the proceedings, in a variety of papers dealing with improved characterization and production of the familiar ferroelectrics like the perovskites, KH_2PO_4 and its neighbors, and even Rochelle salt—the "original" ferroelectric—as well as with several new materials. Of particular interest among the new ferroelectrics are the diatomic crystals, represented on the one hand by the hydrogen halides and on the other by semiconductors like SnTe and GeTe. Also likely to be increasingly important are the very complicated systems such as the ferromagnetic-ferroelectrics (boracites) and the ferroelastic-ferroelectrics (molybdates) in which just about any kind of field can interact with just about any other—presenting challenge to the theorist and temptation to the device engineer.

Several papers on the optical properties of both new and old materials appear, epitomized by R. C. Miller's excellent review of the nonlinear optical properties of ferroelectrics.

The overall quality of the papers is high, and several deserve mention here. G. Samara's review of the effects of hydrostatic pressure on ferroelectric properties demonstrates the power of such experiments in suggesting how to improve materials and in testing theoretical models of ferroelectricity. T. Sakudo and Y. Fujii have observed electric-field-induced second harmonic generation in paraelectric $SrTiO_3$. V. Janovic attempts to relate ferroelectric transition to critical phenomena, including mention of the scaling law hypothesis that has been so successful in describing magnetic and liquid-gas transitions. This area deserves much more attention in the future. Rather underrepresented at this conference is the powerful technique of inelastic light scattering. T. G. Davis's paper on Raman scattering from soft modes in mixed perovskites is the best of a small lot, which contains no treatment of Brillouin scattering at all. Many other excellent contributions deserve the interested reader's attention, but he will have to wait for it until he reads the volume itself.

Like all such anthologies, these proceedings will be of most use to scientists already in the field who require detailed information on specific topics and to those entering the field who wish to gain quickly an impression of where it now stands. Those who are unfamiliar with basic ideas in ferroelectricity will not learn them here. Despite the generally high quality of the papers and the volume's organization, there are two omissions likely to cause considerable inconvenience: the book has no subject index and the papers have no abstracts. Both of these could have been provided easily, and their absence will be sorely felt by those who want to use the book for quick reference. On balance the conference committee deserves congratulations on the quality of the papers, the organization of the conference, and the rapidity of publication, and for demonstrating that ferroelectricity is alive and well as it enters its second half-century.

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