citations has papers by H. Lüth (on photovoltage spectroscopy), by M. R. Philpott (a very good review of surface excitons and polaritons in organic crystals), and by P. J. Hendra and M. Fleischmann (on Raman spectroscopy).

Surface chemistry is a very active research field at the present time. Even in a subfield such as the physical chemistry of solid surfaces one would have to read on the order of ten articles a day to follow the detailed developments at first hand. There is therefore an acute need for concise reviews of familiar topics, surveys of related areas, and accessible introductions to new ideas and techniques. The present volume is an admirable example of how this need may be satisfied.

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High-Energy Atomic Physics

Structure and Collisions of Ions and Atoms. I. A. SELLIN, Ed. Springer-Verlag, New York, 1978. xii, 352 pp., illus. $36. Topics in Current Physics, vol. 5.

The years 1931 and 1932 were exciting ones for nuclear physics. They saw the discovery of the neutron, announcements by R. J. Van de Graaff of a 1.5 million volt electrostatic generator "for the investigation of the atomic nucleus" and by E. O. Lawrence and M. S. Livingston of the principles of the cyclotron, and publication of a paper by J. D. Cockroft and E. T. S. Walton on nuclear experiments with high-velocity positive ions. Except for a few early atomic experiments by Livingston and W. M. Coates, most immediate efforts were understandably directed at the use of the new accelerators for nuclear investigations, and many productive atomic physicists of the period turned to nuclear research, which was then the frontier of physics. Only in recent years has it become widely appreciated that accelerators that produce beams of ions with energies of 0.1 and 10 MeV per atomic mass unit are ideally suited for the study of dynamical detail in ion-atom collisions, since projectiles with velocities comparable to the velocities of some of the more tightly bound atomic and molecular electrons serve as effective probes of atomic structure.

One of the most active users of particle accelerators in atomic physics, I. A. Sellin, has brought together in this book seven reviews by ten authors, all of whom report on the productive period of the last ten years in high-energy atomic physics, as atomic physics done with accelerators is sometimes called. (In this context, "high energy" means MeV energies, not GeV energies as is the case for elementary particles.)

The swiftness of progress in this field is underlined by the fact that this volume, which had an editorial deadline in 1976, has missed several major advances: the experimental demonstration of positron production in heavy ion-atom collisions (at the GSI accelerator in Darmstadt), for which the fine chapter by S. J. Brodsky and P. J. Mohr provides the theoretical background; the discovery of resonant coherent excitation of channeled ions by an Oak Ridge team with S. Datz, whose chapter on atomic collisions in solids sets the stage for this beautiful observation; and the detailed experimental investigations by Sellin and his collaborators of electrons emitted in ion-atom collisions as companions to the emerging projectile. Mention of this mode of electron emission in energetic ion-atom collisions is made briefly in the chapter by N. Stolterfoht.

The general physical scientist who wants an orientation to atomic physics done with particle accelerators will find particularly rewarding a systematic and careful chapter on the theory of inelastic atom-atom collisions by J. S. Briggs and K. Taulbjerg, a comprehensive report on x-ray production in heavy ion-atom collisions by P. H. Mokler and F. Folkmann, and the chapter by Brodsky and Mohr, although it is on a subject, quantum electrodynamics in strong and supercritical fields, that lies partly outside the scope of the title of the book.

The chapter by Stolterfoht, though especially rich in physical insights, is relatively narrow. It is complemented by Sellin's chapter on the information gained from beam-foil experiments about the spectroscopy of highly charged and highly excited ions, with emphasis on radiationless (Auger) transitions, which strongly compete with the more familiar radiative deexcitation of atoms. A chapter by L. Armstrong, Jr., on relativistic effects in highly ionized atoms, is both too technical in content and too casual in presentation. More than the rest of the chapters, this one suffers from not having been linked even superficially to the other pieces in the collection.

A volume like this, containing several contributions to which one may wish to refer during the next few years, would be much more useful if it included an author index, especially since the references accompanying the chapters are not alphabetically ordered and in some instances are not even sequential with respect to the text. A glossary of acronyms, such as FPES, PWBA, TIRS, and REC, would also have been handy even for the initiated reader. Few of these terms are mentioned in the subject index. These are more than matters of convenience, for the 753 references supplement the reviews in the book and direct attention to many still open questions.

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Books Received

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Avian RNA Tumor Viruses. Proceedings of a workshop, Pavia, Italy, Sept. 1977. Sergio Barlati and Carlo de Giuli-Morghen, Eds. Piccin Medical Books, Padua, Italy, 1978. xviii, 356 pp., illus. $30.

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Future Directions in Health Care. A New

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