

placed" and "Will fusion energy from the D-T cycle prove the sovereign power? Or hydrogen from water?" The author, Roy Meador, is identified only as "Science Writer, Ann Arbor, Michigan." The writing is flamboyant, verbose and full of poetic quotes of doubtful relevance. The science is often missing or wrong: The constant reiterations of "inexhaustible energy sources" betrays a lack of insight into the First Law of Thermodynamics, and the bland assurances that fusion and other impending energy sources will not have any "waste heat" problems displays complete ignorance of the Second Law of Thermodynamics. Meador seems to confuse the amount of a resource with the time necessary to produce it; thus oil is presently in short supply apparently because "Nature needed over 40 million years to make a barrel of petroleum."

In our democracy every citizen should be aware of the dimensions of the current energy crisis, that is, national and international energy demands and the resources available to meet those demands. More importantly, in terms of societal decision making, the citizen should have some knowledge of reasonable projections of energy demand and anticipated energy resources so as to be able to estimate the present and future costs of alternative actions or lack of action. Many recent books, by individual authors and by committees and addressed to technical and lay audiences, have attempted to advise our citizenry on these matters. Meador's book commendably attempts to do the same; it is a survey of future energy resources in the context of today's energy crisis. It is, however, full of errors, misstatements and contradictions, betraying overly rapid and faulty writing and/or editing. Meador presents no quantitative comparisons between different approaches; the giving of a name, or quotation, or reference to another author, often substitutes for explanation or analysis. Meador constantly refers to economics and the role of high costs in presently denying us this or that energy resource, but does not attempt to explore the factors determining such costs. The book seems to be full of hopes (good hopes), but it keeps confusing hope and reality.

To his credit, Meador presents a series of questions important for our energy future. However, he neither answers them nor phrases them precisely enough to know how to answer them. But he does raise the questions! At the end, the book attacks the general public's complacency with regard to energy matters and its peculiar combination of hostile and complaisant attitudes toward technology. Meador correctly points out the shortsighted foolishness of those who don't believe in "the energy crisis" and who attribute fluctuations in the expected costs and supplies of energy solely to corporate greed or political desires. Unfortunately, his book is neither authori-

tative enough nor sufficiently concrete to persuade these doubters of the reality of the crisis. More importantly, it offers neither "doubter" nor "believer" any criteria upon which to base the necessary energy-policy decisions that our society constantly faces and that, almost as constantly, it seeks to avoid.

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Atom and Ion Sources

L. Valyi
429 pp. Wiley-Interscience, New York,
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For many scientists the understanding of atom- and ion-source operation is limited to the empirical art of producing a beam adequate for the purposes at hand. As such sources find increasing applications to technology, in ion implantation and other fields, it is necessary that the subject be placed on a firm scientific footing and removed from the realm of black magic. It is indeed an opportune moment for a comprehensive monograph such as *Atom and Ion Sources* by Laszlo Valyi. The stated aim, from the preface, is to provide both a textbook on the physical processes taking place in sources and a manual for guidance in the selection of a source appropriate to a given task.

Valyi opens his book with a useful review on the atomic and molecular processes that govern source operation. Three separate chapters follow on sources of atoms, sources of positive ions and so-called "special ion sources"; the latter category includes sources of negative ions, nuclear-spin polarised ions and methods of producing pulsed beams. The coverage is encyclopaedic in form with discussions of sources in practical use as well as those of only historic interest. Numerous excellent diagrams of source construction are given, along with voluminous references to the original papers. In each case Valyi provides a capsule description of the more important operating characteristics.

It is confusing to find discussions of such matters as output-beam energy spread, emittance and composition relegated to the final chapters and somewhat remote from the description of the sources to which the comments refer. Valyi does address very briefly the important question of how to monitor the output of a source; this discussion, however, is relegated to an appendix and is quite inadequate.

The format is that of an encyclopaedia of source designs rather than a textbook. Fully 80% of the references are dated before 1966 and predate modern techno-

logical applications; thus the encyclopaedia is largely out of date. The technologist concerned with source design will seek guidance as to the selection of a source for a problem at hand. He will seek in vain. Valyi provides little comparison between characteristics of different sources and no guidance as to choice for current technological applications. The technologist is far better served by a book such as *Ion Beams* (1973) by Robert G. Wilson and George R. Brewer (also published by Wiley), which, despite a concentration on ion implantation, does provide guidance as to source selection and optimisation. The research scientist will find Valyi's book to be a useful compendium of information, but he too will be conscious of shortcomings. For example, the excited-state composition of an ion or atom beam will substantially influence the atomic physics of its interaction with a target; nowhere in this book is the excited-state composition of sources discussed. Recent developments that permit production of excited-state selected beams are completely absent from this text.

This book is unusual in that it is a joint production between John Wiley and the Hungarian publishing house Akadémiai Kiadó of Budapest. This perhaps explains the numerous editorial inadequacies such as misspelled names in the bibliography and clumsy use of colloquial scientific terminology in the English language. Other errors, such as incorrect references to figures, also serve to annoy the reader. Despite the shortcomings the book will find much use as a reference simply because no other comprehensive treatise is available. The reader will be disappointed by the lack of up-to-date information, and the absence of any clear fundamental explanation of why sources give their observed performance. Valyi has failed to raise the subject of atom and ion "sourcery" from a black art to a science.

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Scientists under Hitler: Politics and the Physics Community in the Third Reich

A. D. Beyerchen
287 pp. Yale U. P., New Haven, 1977.
\$18.50

This is an important book; it is also a very timely book. The title instantly evokes the "German science" movement and especially "Aryan physics"—that all-too-well known example of political