

not covered; only on p. 77 are we told which areas were covered, having in passing (p. 59) learnt that the rationale underlying these committees was to stimulate important but under-researched zones of action. It is clear enough when pieced together, but the task could have been easier.

These are trivial reservations, however, in comparison with the authors' achievements. For the book is not only a detailed review of post-Rothschild developments in the DHSS — a notable feat in itself, if one of limited appeal. It is also an original exercise in the combination of the approaches of the sociology of science and of public administration to the study of science policy. As such, it is a rich quarry of ideas on how to conduct such studies, and on the sheer complexity of the subject. It should be read not only by academic students of science policy and public administration, but by all who are concerned, in whatever way, with relations between science and government.

The book examines theoretically the extent to which science is steerable, or, in a different metaphor, permeable by social values. Drawing on the "finalization" school of sociology of science, the authors distinguish between different phases in the development of disciplines, arguing that disciplines are more steerable (though in different ways) when in the pre- and post-paradigmatic phases, but that in between, where work is beginning to crystallize around key theoretical models, the research programme is much more dictated by "internal" needs and is less susceptible to outside influence. They show how epistemological ideas must be linked with analyses of the institutional power of different sciences (contrast, for example, most medical research with most social science) in order to grasp the heterogeneity of science and the complexity of its relationships with policy. One might add, in the context of increasing interest in the evaluation of research, that these same considerations should urge caution in trying to apply blanket measures of research performance: the form, as well as the substance, of the products of different disciplines varies and demands great sensitivity in cross-disciplinary evaluations.

On the customer side of the picture, the authors show the variety of roles that exist in government, and the range of expectations that can be held of science. Officials concerned with policy-making, scientific advice, research management and research liaison have markedly different perspectives on science-government relations. Moreover, policymakers themselves are heterogeneous: some take a purely instrumental and short-term view of research; others, especially those with remits concerned more with policy analysis, are more interested in how research might help develop policy. Much emphasis is given to the need for, and complexity of, "brokerage" between departments and

research councils, and between policy and science. We also learn a good deal about the need for sustained, long-term commitment to the development of the customer role, a process not aided by the relatively rapid turnover of staff on that side of the customer-contractor relationship.

Not surprisingly, the authors conclude that no single or straightforward model of science policy is appropriate, and that the metaphors of customer and contractor are oversimple. The customer metaphor implies that government can be clear and authoritative in stating its objectives "before entering the marketplace to purchase knowledge" (p. 164). The contractor metaphor likewise assumes a coherent, identifiable and independent scientific community, able to negotiate from strength. In practice, both sides of the relationship exhibit a multiplicity of goals, functions, epistemologies and power bases. The social steerability of science

depends, therefore, in a complex way on the effort put in by the customer, on the developmental state and institutional power of the scientific discipline concerned and on the level in the system at which one is working: micro-policy questions are easier to resolve than macro ones. Hence, finally, the conclusion that, at least in the broad field of social welfare, government should apply its energies to interaction with science rather than steering of science: it should be concerned with the impact and implementation of research, and with the slow, steady and sustained development of strong communities of researchers and policy makers, rather than with rationalistic or imperative planning. □

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East-West pairing

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Excitons.

Edited by E.I. Rashba and

M.D. Sturge.

North-Holland: 1983: Pp. 860.

Dfl. 425, \$181.

Excitons is one of the first (actually Volume 2) of a series of books entitled *Modern Problems in Condensed Matter Sciences*, to be edited by V. M. Agranovich and A. A. Maradudin, and published jointly in English by North-Holland and subsequently in Russian by the publishing house Nauka. Each volume has editors and contributors who, like the general editors, are drawn from the Soviet Union and from the West.

As we all know, communication with Soviet colleagues is not as easy as we would like, partly because of language differences and partly because of the restrictions on travel to and from the Soviet Union. It is therefore particularly useful to have a series of up-to-date reviews which come in this form. It will make it less easy for scientists in the West to overlook Russian work in related fields.

Excitons are particularly appropriate for such a joint review. One leg of the theoretical foundation of the subject is firmly planted in Russia, on the work of Frenkel, Pekar and others, and relates largely to ionic and organic materials. The other is based in the West on the work of Wannier, Mott and others, and refers most directly to semiconductors. Experimental work in both areas has been carried out in parallel in all countries; for example, the rich exciton spectrum of cuprous oxide was evaluated in detail by Gross in Leningrad and by Nikitine in Strasbourg, and similar parallels exist in the work on polariton

effects and on high-density excitons such as electron-hole droplets.

The book contains 18 chapters devoted to recent developments in this vigorous area of solid state physics and chemistry, their diversity displaying the remarkable wealth of the subject. Several refer to polariton (excitron) effects, which lead to spatial dispersion and non-local effects, which appear remarkable and unusual in classical optics. Another group of papers deals with the effects of perturbations on exciton spectra, either arising from applied electric and magnetic fields, or from impurities. Isolated impurities cause trapping and in a semiconductor alloy the large number of impurities can give rise to different and important effects. Multi-exciton complexes are also considered, ranging from the relatively simple bi-excitons in CuCl to the many particle electron-hole complexes found in some semiconductors. Finally, the book's coverage has been extended to cover excitons in more specialized materials, including strained molecular crystals, magnetic insulators, and photosynthetic and other biological systems. Vibrational excitons (bound phonon pairs due to molecular anharmonicity) are also included.

The quality of the articles is uniformly high. There is naturally some variation in approach, but this is inevitable in the treatment of such a diverse field. The editors have brought together so many aspects of exciton physics that all those with an interest in the subject are bound to find not only useful reviews of their own speciality, but interesting insights into related fields. This volume augurs well for the rest of the series — I hope that at least some libraries will be able to afford it. □

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