

fuels, might reasonably be excused if they remain confused after trying to read the multi-faceted presentation from cover to cover. The book contains a bit of everything in energy; atomic, wind, geothermal, hydro and tidal illustrations are all martialled sequentially, as well as the main subjects of the book, to help to answer a whole host of questions about the rate at which abundant 'clean' energy might substitute for diminishing resources of coal, oil and natural gas. The oil and gas, warns the author, may be scarce and expensive within a few decades and the demise of coal may be only a few decades later. Nuclear fission and fusion systems will have their problems and may not be sufficient if the time before there is a real need for them is shorter than some people expect.

The propositions concerning doom in the 21st century due to increasing CO₂ and aerosols in the atmosphere, from the burning of fossil fuels, affecting world climate are brought out, as are the prospects of NO, CO and SO₂ causing substantial health hazards. The idea of the delayed and therefore necessarily nimble changes in technology and engineering being achieved to avoid catastrophe by providing

abundant new forms of energy, are not expected to be realised. Practical population control and the highly efficient recycling of materials to avoid shortages are not viewed hopefully. Experience indicates that modifications in the world energy mix and social behaviour patterns are slow and will continue to be so.

How soon in the future will ideas of the solar-hydrogen economy be strongly tested? Will the money, the manpower and materials necessary be made available by Governments for building large remote land-based, or offshore, atomic and solar power stations? If they can be, the scale of expenditure is bound to be limited. The reader may have doubts about this happening significantly in view of the recent slowing down of fission and fusion power research and development work. The stages outlined by Bockris seem then to be far too ambitious and to deviate too far from a main line of attack on the main solar electric and hydrogen production problems.

On these matters the reader is best left to form a personal judgement, to assist which some of the multitude of references so excellently given could be consulted, at a rate averaging about 1.6 per page of text. □

encyclopaedic survey by Christos Flytzanis of the Theory of Non-linear Susceptibilities. The author presents their phenomenological properties and evaluations in massive mathematical detail. Generalisations then give way to minute discussion of individual models relating to rarefied and condensed media. Some 500 references complete the review. The Measurement of Non-linear Optical Susceptibilities by Stewart K. Kurtz complements the previous theory. After a prefatory review of Gaussian beam optics and light propagation in anisotropic media, there follow practical descriptions of the absolute methods of phase matching, parametric fluorescence and Raman scattering; and the relative methods of Maker fringes, and wedges.

Introducing Part II (Non-linear Optical Processes). Two-Photon Absorption Spectroscopy by H. Mahr is a lucid account of the underlying physics of symmetry, polarisation and resonance applied to molecular and electronic transitions. Experimental results in solids, liquids and gases are surveyed. I. L. Fabelinskii reviews experiments and practical theory relating to the Stimulated Mandelstam-Brillouin Process. Studies of electrostrictive coupling, stimulated temperature process, non-linear absorption are related to a variety of stationary and transient phenomena. A short essay by C. L. Tang on Spontaneous and Stimulated Parametric Processes explains the basic theory and experimentation of parametric fluorescence, and discusses its applications. Concluding Part II, Chen-Shou Wang writing on The Stimulated Raman Process presents theoretical studies of the Raman coupling of pump and scattered light with mechanical mode excitation, both in forward and in backward transient stimulated scattering. Related effects and experimentations are briefly discussed.

Part III (Applications) opens with a substantial review by S. A. Akhmanov, A. I. Kovrygin and A. P. Sukhorukov of Optical Harmonic Generation and Optical Frequency Multipliers. This chapter concentrates on the theory and design of optical frequency multipliers, and divides into steady-state and transient generation, the latter including ultrashort laser pulses. In Optical Parametric Oscillators (Robert L. Byer), theory and experimentation are elegantly blended into a complete exposition of operation characteristics, devices and materials. In the final chapter by John Warner, the technique of Difference Frequency Generation and Up-conversion are briefly explained, the latter mainly for signal and image detection.

These volumes should form an authoritative text for some years.

P. G. Harper

Solar connection

Possible Relationships Between Solar Activity and Meteorological Phenomena. Edited by W. R. Bandeen and S. P. Maran. Pp. ix+263. (NASA: Washington, DC, 1975; sold by US Government Printing Office.) \$4.00.

THIS book marks the official publication of the proceedings of the NASA Symposium on possible relationships between solar activity and meteorology held at the Goddard Space Flight Center in November 1973. I share the disappointment of NASA's Scientific and Technical Information Office concerning the delay in publication, as this was clearly an important conference in defining the starting ground for much of the current work on solar-weather links. Publication in 1974 would have been of great value to those investigating these links who were unable to attend the conference. Two years later, its value is much diminished.

Since the proceedings have been available in preprint form since June 1974, at no charge, and the book costs \$4, it might seem that the only recommendation for this edition is that it is more compact than the preprint. The papers are often brief to the point of superficiality and in many cases very subjective, whereas the field of study is very rapidly becoming a much tighter and more

objective discipline than it was up until recently. S. I. Rasool aptly summarises the conference: "What we do not want is a symposium where there are 5-minute presentations and where one cannot ask a question without a microphone". Nor, in 1976, do we want a book which reports uncritically the proceedings of such a symposium on this important topic.

John Gribbin

Authoritative text on quantum electronics

Quantum Electronics: A Treatise. Edited by Herbert Rabin and C. L. Tang. Vol. 1: Non-Linear Optics, Part A. Pp. xi+472+9. \$35; £17.50. Vol. 1: Non-linear Optics Part B. Pp. ix+473-753. \$22.50; £11.25. Academic: New York and London, December 1975.)

THE nine chapters of these long-awaited volumes cover substantial ground, enough, as Bloembergen remarks in a general introduction, to catch the spirit of non-linear optics without exhausting its content. Common chapter organisation and notation, frequent cross-referencing, a universal index, all in attractive format, make for good consultation.

Part I (Non-linear Optical Susceptibilities) is mostly taken up with an