

1971

IEEE / OSA Conference

ON

Laser Engineering and Applications

June 2-4

Washington Hilton Hotel
Washington, D.C.

Papers of
Special Interest

**LIQUID LASERS
INTEGRATED OPTICS**

Exhibit of Scientific Equipment

FOR FURTHER INFORMATION WRITE:

Conference Manager

Courtesy Associates

Att: Mrs. Dorothy Edgar

1629 K Street, N.W., Suite 700

Washington, D.C. 20006

Exhibits Manager

Lewis Winner

152 W. 42nd Street

New York, New York 10036

niques. It is the first book devoted entirely to this new technology of thin-film deposition and covers the topic in sufficient breadth so that those unfamiliar with the technology can evaluate it. Therefore, whenever possible the thin-film transistor is compared with its more familiar competitor, the MOS (metal oxides-semiconductor) transistor, which frequently serves as a point of reference. To distinguish the thin-film transistor from the MOS transistor, theoretical analyses are provided.

The second volume, *Applied Solid State Science*, is the first in a series of reviews of current work in solid-state science. It contains an article on junction electroluminescence by P. J. Dean, chapters on metal-insulator-semiconductor physics by Goetzberger and Sze, ion implantation in semiconductors by Mayer and Marsch and transport through thin-film insulator by Pollack and Seitchick.

It appears as though the authors have made a serious attempt to explain these electronic phenomena using basic physics concepts. These books are addressed to an audience of sophisticated device engineers and applied physicists.

Daniel C. Mattis
Yeshiva University

Phenomenological Theories of High Energy Scattering An Experimental Evaluation

By V. D. Barger, D. B. Cline

Benjamin, New York, 1969. Cloth
\$15.00, paper \$6.95

Ever since Marvin Goldberger announced at the 1966 Eastern Conference on Theoretical Physics, that the death of Regge-Pole theory was "premature," the present reviewer (who is by nature a pragmatist in the field of particle theory) has been yearning aloud for a book that will summarize and review in detail just what is the experimental basis for this resurrection. Vernon Barger and David Cline in their book *Phenomenological Theories of High Energy Scattering: An Experimental Evaluation*, supplied just this need. The authors are eminently qualified to handle this task because they themselves did much of the application of phenomenological aspects of Regge theory to experiments; Cline is himself an experimentalist of some distinction and hence the claim of "an experimental evaluation" is fully justified.

Needless to say the authors approach their evaluation from an enthusiastic viewpoint, namely that Regge theory is a basic tool of strong-interaction physics and that there is hope that it will give a unified account of most experimental

data in the field. This premise (or bias?) is underlined by the very fact that though the title of the book is styled "Phenomenological Theories of High Energy Scattering," only about three pages out of 200 in all are devoted to phenomenological theories not obviously related to Reggeism (for example the diffraction type models of Yang and collaborators).

The authors do forcefully point out the successes of Regge-pole model, illustrating at length with many figures experimental data points versus theoretical prediction curves. Much is made of the various correct predictions of Regge-pole theory for some shrinking diffraction peaks, for dips in angular distributions and for particle trajectories in the mass-versus-spin plots. They discuss finite energy sum rules, which are essentially dispersion relations written for the difference of asymptotic and nonasymptotic amplitudes, and demonstrate their power of relating high-energy Regge contributions to low-energy resonances. The need for conspirators, a set of particles not yet seen experimentally, is looked upon as a "prediction" of the theory rather than as a problem child vitiating the simplicity of the theory. Likewise the remarkable success of the Reggeized baryon-exchange model for fitting π^+-p backward-scattering data is emphasized, though some uneasiness exists about a predicted dip in backward π^-p scattering for large values of $|u|$.

In summary, I am convinced that the resurrection of Regge-pole theory as a theory of current contending interest has been amply justified by the work of the present authors. On a long-term basis, there remain some questions about whether the successes of Regge-pole phenomenology are sufficiently convincing to qualify it as the leading contender for the ultimate theory. After all, given a set of parameters optimized against experimental data (and most Regge predictions do draw fairly heavily on background data as input) it is very difficult to construct a theory that has not at least some successful features. Admittedly this last statement is an extreme viewpoint on the side of pessimism that I do not entirely share.

The first two chapters of the book summarize in a succinct and entirely pleasing way those general features of strong-interaction data that must be explained by a theory of high-energy scattering. Chapter 3 summarizes the basic theoretical tools that will be needed in subsequent chapters to analyze data; there is no serious attempt to make the detailed derivations available here and the concerned reader must find it from other sources. The remaining chapters for the most part, draw upon these theoretical tools to analyze various experimental data on inelastic

reactions, total cross sections and forward elastic scattering, baryon exchange, intermediate-energy scattering, conspiracy and evasion and so forth. The book concludes with brief discussions on finite energy sum rules and asymptotic projections (essentially a horoscope for the future based on their existing analysis). Although the book is by no means complete even in the limited area the authors tackled, it is a relevant reference book to have—at least for the serious student in high-energy physics.

San Fu Tuan
University of Hawaii

Tongues of Conscience: Weapons Research and The Scientists' Dilemma

By Robert W. Reid

352 pp. Walker and Co., New York, 1969. \$7.50

Modern warfare has been made devastating by the systematic application of principles of science and technology. A tangled skein of applications and motives ties the production of new knowledge to the invention of weapons of war and techniques for their application. Those scientists who engage in fundamental research usually lack control over ultimate end use of products of their ingenuity, while those who engage overtly in weapons development may later see their participation in a markedly different light as the circumstances of their nation's military involvements change.

Tongues of Conscience describes the recent history of the involvement of scientists with weapons development ranging from the explosives work of Alfred Nobel to recent developments in chemical and biological warfare. The title is drawn from William Shakespeare's *Richard III*:

"My conscience hath a thousand
several tongues
And every tongue brings in a several
tale
And every tale condemns me for a
villain."

Many of the tales that are told in this book have been told before and the impressive feature about gathering them together in one volume is perhaps the remarkable circumstantial parallelism between the military involvements of scientists and engineers 70 years ago and those of scientists and engineers today. What is different is perhaps the pervasiveness of modern weapons technologies and the major consequences that their use implies for noncombatants.

This book is quite complete. It is also very sketchy. The author is Robert

W. Reid, a British science writer and broadcaster, who gives only enough detail in each example to bring out its principal historical significance. There is little detailed analysis of the character or behavior of the individuals involved and their motivations, attitudes, and so forth. The book contains essentially no moralizing or preaching. It is also rather short on useful lessons or advice. It should be particularly useful reading for younger scientists to whom the living participants in various cases are now legendary figures and the details of pre-World War II scientific involvement in military matters are perhaps unrealized or unknown. A book that places such involvements in historical perspective has particular value now because of recent vigorous criticism of on-campus activities related to the military at virtually every college and university.

The book contains considerable documentation and numerous illuminating direct quotations. A remark of Alfred Nobel in 1892 provides a theme that recurs, though without special emphasis, throughout the book:

"Perhaps my factories will put an end to war even sooner than your Congresses. On the day that two army corps can mutually annihilate each other in a second, all civilized nations will surely recoil with horror and disband their troops."

This remark and many similar subsequent comments by scientists concerned with the production of weapons, demonstrate quite directly that able technologists can still be poor social psychologists or political prophets.

The dilemma of the scientist is perhaps more properly the dilemma faced by all intellectuals when they must consider the question of participation or nonparticipation in the operation of our society. The complexities of modern life and the failures of intuition and experience in predicting and controlling its details give the individual very few clues as to whether his act of participation is benign or malign. It can not be expected that this dilemma will be simply resolved. Rather, high technology appears to have brought with it a growing social chaos and a high degree of alienation of many parts of the citizenry from both science and technology. Yet those who know the power of technology appear still to feel that the answers to the dilemmas related to science and technology will arise only through more science and more technology.

It is highly unlikely that the fundamental decisions to implement weapons of war, such as are described in *Tongues of Conscience*, will be markedly influenced by the views of scientists

LASER INTERACTION AND RELATED PLASMA PHENOMENA

Edited by Helmut J. Schwarz, Rensselaer Polytechnic Institute, East Windsor Hill, Connecticut, and Heinrich Hora, Rensselaer Polytechnic Institute and Institut für Plasmaphysik (Max Planck Society), Germany

CONTENTS: N. G. Basov, Foreword • P. Harteck, Introductory comments to laser interaction and related plasma phenomena • A. J. DeMaria et al., Picosecond laser pulses • H. Schwarz, Thin films of metals and inorganic compounds vacuum deposited by high energy laser • R. E. Honig, Mass spectrometric studies of the interaction of laser beams with solids • S. C. Wait, Scattering of laser radiation • A. H. Guenther et al., Laser triggered switching • W. I. Linlor, Energetic ions produced by laser pulse • H. Schwarz, Linear and nonlinear laser induced emission of ions from solid targets with and without magnetic field • S. Witkowski, Thin films of solid hydrogen • G. V. Sklizkiy, Kinetic and ionization phenomena in laser produced plasmas • S. Witkowski, Free targets • H. Hora, Experimental results of free targets • A. Caruso, Interaction of intense light pulses with solid materials • J. W. Shearer et al., Numerical calculations of plasma heating by means of subnanosecond laser pulses • S. Witkowski, Shock wave process • J. M. Dawson, Thermokinetic expansion theory; Reflection of light from a non-uniform plasma • H. Hora, Some results of the self-similarity model • H. Hora, Nonlinear effect of expansion of laser produced plasmas • H. Hora, Application of laser produced plasmas for controlled thermonuclear fusion • F. Floux, High density and high temperature laser produced plasmas; Appendix—Neutron production in solid deuterium laser created plasmas • N. Bloembergen, Nonlinear optics, scientific past and technological future • List of contributors and attendees.

Proceedings of the First Workshop, held at Rensselaer Polytechnic Institute, Hartford Graduate Center, East Windsor Hill, Connecticut, June 9-13, 1969

509 pages February 1971 \$25.00 SBN 306-37141-3

LASER APPLICATIONS IN MEDICINE AND BIOLOGY*

Volume 1

Edited by M. L. Wolbarsht, Professor of Ophthalmology and Director of Research, Department of Ophthalmology, Duke Univ. Medical Ctr., Durham, N. C.

CONTRIBUTORS:—J. R. Hayes, D. K. Heffner, R. C. Hoye, G. C. Riggle, N. Saks, D. H. Sloney, R. H. Stern, A. Vassiliadis, M. L. Wolbarsht, E. Zeitler & H. C. Zwing.

Approx. 260 pages March 1971 \$18.00 SBN 306-30492-9

* Place your continuation order today for books in this series. It will ensure the delivery of new volumes immediately upon publication; you will be billed later. This arrangement is solely for your convenience and may be cancelled at any time.

plenum press/consultants bureau

Divisions of Plenum Publishing Corporation
227 W. 17th ST., NEW YORK, NEW YORK 10011