

The immense strides in optical science that have taken place since the statistical molecular theories of electric, magnetic, and optical saturation phenomena that came to light in the late fifties have been remarkable. This volume of fifteen review articles from many of the leading laboratories around the world details the most important research and findings to date on modern nonlinear optics.

This latest volume in Wiley's *Advances in Chemical Physics* series continues the series' tradition of presenting key research in chemical physics in a stimulating, broadly instructive format. Designed for the scientist determined to keep abreast of the literature in the many corners of scientific research, these volumes have provided an informative, accessible look at the newest areas of analytical investigation.

And *Modern Nonlinear Optics, Volume 85* in the series, offers readers a selective look at a host of cutting-edge research topics. Divided into three parts, *Part 2 of Volume 85* examines:

- Holography and double phase conjugation
- Laser and pulsed-laser NMR spectroscopy
- Selection rules for coherent and incoherent nonlinear optical processes
- Molecular theory of harmonic generation
- Some properties of longitudinal fields and photons
- Frequency-dependent continuum electromagnetic properties of a gas scattering centers
- The interaction of squeezed light with atoms

Forming a thoroughly balanced complement to *Part 1 of Modern Nonlinear Optics*, *Part 2* widens the discussion to include the innovative work being done in key optical laboratories worldwide. Professionals interested in the newest and most influential discoveries and issues shaping optical science today will also find in *Modern Nonlinear Optics* an inseparable link to the state of the science tomorrow.

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**MODERN NONLINEAR OPTICS**  
**Part 1**

ADVANCES IN CHEMICAL PHYSICS

VOLUME LXXXV

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## Part 1

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VOLUME LXXXV

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## INTRODUCTION

Few of us can any longer keep up with the flood of scientific literature, even in specialized subfields. Any attempt to do more and be broadly educated with respect to a large domain of science has the appearance of tilting at windmills. Yet the synthesis of ideas drawn from different subjects into new, powerful, general concepts is as valuable as ever, and the desire to remain educated persists in all scientists. This series, *Advances in Chemical Physics*, is devoted to helping the reader obtain general information about a wide variety of topics in chemical physics, a field which we interpret very broadly. Our intent is to have experts present comprehensive analyses of subjects of interest and to encourage the expression of individual points of view. We hope that this approach to the presentation of an overview of a subject will both stimulate new research and serve as a personalized learning text for beginners in a field.

ILYA PRIGOGINE  
STUART A. RICE

## PREFACE TO SECOND PRINTING OF VOLUME 85 (PART 1)

Prof. Dr. Stanisław Kielich died on October 15th., 1993, after a long illness, bravely suffered. The first print run of the first part of this issue, Volume 85 (Part 1) of "Advances in Chemical Physics", was sold out, and this is a second printing. This is also among the most eloquent of tributes that his contemporaries could pay to the late Professor Kielich and his renowned School at Adam Mickiewicz University of Poznań. In this preface I wish to pay my final respects to Stanisław Kielich, whose work I first came across as a graduate student some twenty years ago in Aberystwyth. Even then, it seemed to me that the proofs of his article for the Chemical Society of London was something quite out of the ordinary, so meticulous, accurate and thorough were its contents. Evidently, many others, all over the world, think the same, and the legacy of such a mind is a gift to all humanity. To me, it was indeed an honour to be associated with Kielich in the production of these three volumes, the first of which is the work of his School and Associated Laboratories. The other two volumes represent an outstanding international response in which the influence of Kielich and co-workers is liberally apparent.

"And death shall have no dominion", indeed do the words of the poet Dylan Thomas ring true, indeed it shall have NO dominion, the influence of Kielich and his School will, I hope, be recognized at long last as one of the most profound and original contributions to physics in the late twentieth century. This work is a triumph of the mind over circumstance, of the human spirit and of great courage, manifest in Stanisław Kielich to the last.

"The thoughtful, bearer of truths, the heavy shield,  
Is an intricate silence,  
His Gaze is one of deep pools,  
His the knowing power to paint the rocky, cruel land,  
With intricate harvest,  
His the burden of the mind,  
A shield of hard slate, lashed together by angry rain,  
For the keeper of ancient patterns and metres,  
Silence is all, and there is profound dignity.  
Even the faintest of words would be as stones  
Thrown into silence,  
Reverberating like an iron hammer  
In Iona's Scriptorium.  
Broken life is bourne on fields of deepest dark,  
And shields the bounty of the mind,  
Welcomed in the silent dawn  
Each photon of light is worked magnificently  
In the coal black galleries of time,  
Each a token of hope, still, after millenia, freely given,  
Yet mined in darkness as the new day slowly pivots  
In the mind's eye."

MYRON EVANS

## PREFACE

Statistical molecular theories of electric, magnetic, and optical saturation phenomena developed by S. Kielich and A. Piekara in several papers in the late 1950s and 1960s clearly foreshadowed the developments of the next thirty years. In these volumes, we as guest editors have been honored by a positive response to our invitations from many of the most eminent contemporaries in the field of nonlinear optics. We have tried to give a comprehensive cross section of the state of the art of this subject. Volume 85 (Part 1) contains review articles by the Poznań School and associated laboratories, and volume 85 (Part 2 and Part 3) contains a selection of reviews contributed from many of the leading laboratories around the world. We thank the editors, Ilya Prigogine and Stuart A. Rice, for the opportunity to produce this topical issue.

The frequency with which the work of the Poznań School has been cited by others in these volumes is significant, especially considering the overwhelming societal difficulties that have faced Prof. Dr. Kielich and his School over the last forty years. Their work is notable for its unfailing rigor and accuracy of development and presentation, its accessibility to experimental testing, the systemic thoroughness of the subject matter, and the fact that it never seems to lag behind developments in the field. This achievement is all the more remarkable in the face of journal shortages and the lack of facilities that would be taken for granted in more fortunate centers of learning.

We hope that readers will agree that the contributors to these volumes have responded with readable and useful review material with which the state of nonlinear optics can be measured in the early 1990s. We believe that many of these articles have been prepared to an excellent standard. Nonlinear optics today is unrecognizably different from the same subject in the 1950s, when lasers were unheard of and linear physics ruled. In these three volumes we have been able to cover only a fraction of the enormous contemporary output in this field, and many of the best laboratories are not represented.

We hope that this topical issue will be seen as a sign of the ability of scientists all over the world to work together, despite the frailties of human society as a whole. In this respect special mention is due to Professor Mansel Davies of Criccieth in Wales, who was among the first in the West to recognize the significance of the output of the Poznań School.

MYRON W. EVANS

*Charlotte, North Carolina  
August 1993*

# CONTENTS

RELAXATION THEORY OF NONLINEAR PROCESSES IN THE SMOLUCHOWSKI ROTATIONAL DIFFUSION APPROXIMATION	1
<i>By Władysław Alexiewicz and Bolesława Kasprowicz-Kielich</i>	
SPECTRAL ANALYSIS OF LIGHT SCATTERED BY MONODISPERSE SOLUTIONS OF RIGID, ANISOTROPIC MACROMOLECULES IN A REORIENTING AC ELECTRIC FIELD	51
<i>By M. Dębska-Kotłowska and A. Miranowicz</i>	
HYPER-RAYLEIGH AND HYPER-RAMAN ROTATIONAL AND VIBRATIONAL SPECTROSCOPY	89
<i>By T. Bancewicz and Z. Ożgo</i>	
POLARIZATION PROPERTIES OF HYPER-RAYLEIGH AND HYPER-RAMAN SCATTERINGS	127
<i>By M. Kozierowski</i>	
FAST MOLECULAR REORIENTATION IN LIQUID CRYSTALS PROBED BY NONLINEAR OPTICS	159
<i>By J. R. Lalanne, J. Buchert, and S. Kielich</i>	
NONLINEAR PROPAGATION OF LASER LIGHT OF DIFFERENT POLARIZATIONS	217
<i>By Genevieve Rivoire</i>	
SELF-ORGANIZED NONLINEAR OPTICAL PHENOMENA IN OPTICAL FIBERS	249
<i>By Pavel Chmela</i>	
NONLINEAR MAGNETO-OPTICS OF MAGNETICALLY ORDERED CRYSTALS	307
<i>By R. Zawodny</i>	
DYNAMICAL QUESTIONS IN QUANTUM OPTICS	375
<i>By Alexander Stanislav Shumovsky</i>	

PHOTON STATISTICS OF NONCLASSICAL FIELDS	405
<i>By Jan Peřina, Jiří Bajer, Vlasta Peřinová, and Zdeněk Hradil</i>	
QUANTUM RESONANCE FLUORESCENCE FROM MUTUALLY CORRELATED ATOMS	461
<i>By Z. Ficek and R. Tanaś</i>	
SQUEEZED STATES OF LIGHT IN THE SECOND AND THIRD HARMONIC GENERATED BY SELF-SQUEEZED LIGHT	497
<i>By S. Kielich and K. Piątek</i>	
SELF-SQUEEZING OF ELLIPTICALLY POLARIZED LIGHT PROPAGATING IN A KERR-LIKE OPTICALLY ACTIVE MEDIUM	541
<i>By S. Kielich, R. Tanaś, and R. Zawodny</i>	
AUTHOR INDEX	595
SUBJECT INDEX	613