Copyright © 1981 by The New York Academy of Sciences. All rights reserved. Under the provisions of the United States Copyright Act of 1976, individual readers of the Annals are permitted to make fair use of the material in them for teaching or research. Permission is granted to quote from the Annals provided that the customary acknowledgment is made of the source. Moterial in the Annals may be republished only by permission of The Academy. Address inquiries to the Executive Editor at The New York Academy of

Copying fees: The code at the bottom of the first page of each article in this Annual states the fee for each copy of the article made beyond the free copying permitted under Section 107 or 108 of the 1976 Copyright Act. (If no code appears, there is no fee.) This fee should be paid through the Copyright Clearance Center. Box 765. Schenectady, N.Y. 12301. For articles published prior to 1978, the copying fee is \$1.75 per article.

## Library of Congress Cataloging in Publication Data

International Conference on Collective Phenomena (4th: 1981: Moscow, R.S.F.S.R.) Fourth International Conference on Collective Phenomena.

(Annals of the New York Academy of Sciences; v. 373)

1. Science—Congresses. I. Lebowitz, Joel Louis, 1930— . II. New York Academy of Sciences. III. Title. IV. Series.
Q11.N5 vol. 373 [Q101] 500s [500] 81-16792
AACR2

SP
Printed in the United States of America
ISBN 0-89766-135-4
ISBN 0-89766-136-2

### ANNALS OF THE NEW YORK ACADEMY OF SCIENCES

VOLUME 373

October 30, 1981

# FOURTH INTERNATIONAL CONFERENCE ON COLLECTIVE PHENOMENA\*

Editor

JOEL L. LEBOWITZ

#### CONTENTS

Foreword. By JOEL L. LEBOWITZ	vii
The Arbitrariness in the Perturbation Series in Non-Abelian Gauge Theories.  By H. EPSTEIN AND J. ILIOPOULOS	1
Possible Tests of Quantum Chromodynamics in Large Transverse Momentum Hadron Photoproduction. By D. Schiff	8
Photon-Photon Collisions. By PAUL KESSLER	15
The KMS Condition for *-Algebras. By J. ALCANTARA AND D. A. DUBIN	22
Lattice and Molecular Dynamics of Some Amine Intercalates of FeOCl.  By R. H. HERBER	28
Quantum Chemical Aspects of Some Problems in Bioinorganic Chemistry. 111.  Some Ligand Properties of Metal Complexes: Population Analysis.  By 1. FISCHER-HJALMARS AND A. HENRIKSSON-ENFLO	37
Phospholipid Methylation and Membrane Function. By JULIUS AXELROD AND FUSAO HIRATA	51
Inverse Scattering, Ordinary Differential Equations of Painlevé-Type, and Hirota's Bilinear Formalism. By A. RAMANI	54
Explosively Heated Gaussian Objects. By F. J. MAYER AND D. J. TANNER	68
Surface Studies of Fusion Reactor Wall Materials at AFI. By T. FRIED, B. EMMOTH, AND M. BRAUN	77
A Quantum Model of Doubt. By YURI F. ORLOV	84
Agreement Through Fair Play. By ALEKSANDR YA. LERNER	93
Nonsmooth Analysis and the Theory of Fans. By ALEKSANDR D. loffe	101
On Multiple Regression for the Case with Error in Both Dependent and Independent Variables. By VIKTOR BRAILOVSKY	113
On Multivariate Linear Regression with Missing Data among the Independent Variables. By VIKTOR BRAILOVSKY	128
On Some Important Features of Extra Low Frequency and Low Frequency Electromagnetic Waves $0 \lesssim \omega \lesssim \omega_L$ in a Magnetoplasma Connected with the Influence of Ions. By YAKOV L. AL'PERT	138

\*This volume is the result of the Fourth International Conference on Collective Phenomena, held on April 12, 13, and 14 in Moscow, USSR, sponsored by the New York Academy of Sciences.

The Effect of the Earth's Rotation on the Propagation of Weak Nonlinear Surface and Internal Long Oceanic Waves. By A. I. LEONOV	150
Recent Developments in Contour Dynamics for the Euler Equations.  By NORMAN J. ZABUSKY	
Confinement and Phase Transitions in Gauge Theories. By LAURENCE JACOBS	160
Some Considerations of Stability in Solidification of Lamellar Eutectics.  By J. S. LANGER	171
On Two-Element Subsets in Groups. By L. V. BRAILOVSKY AND G. A. FREIMAN	179
Integer Programming and Number Theory. By P. L. BUZYTSKY AND G. A.  FREIMAN	183
Trends in the Development of Computer Applications. By DANIEL D.  Dock M. D.	191
Doob-Meyer Decompositions for Two-Parameter Stochastic Processes. By ELY	202
Magnetic Properties of Relativistic Fermi Gas. By E. M. CHUDNOVSKY	205
Entropy and Irreversibility Ru Or wer Drynger	208
Entropy and Irreversibility. By OLIVER PENROSE	211
Microscopic Dynamics and Macroscopic Laws. By JOEL L. LEBOWITZ	220

The New York Academy of Sciences believes that it has a responsibility to provide an open forum for discussion of scientific questions. The positions taken by the scientists whose papers are presented here are their own and not necessarily those of The Academy. The Academy has no intent to influence legislation by providing such forums.

#### **FOREWORD**

#### Joel L. Lebowitz\*

Departments of Mathematics and Physics Rutgers University New Brunswick, New Jersey 08903

The Fourth International Conference on Collective Phenomena took place, like the preceding ones, not in a well-appointed academic lecture hall but in a cramped living room in a Moscow apartment under the discomforting surveillance of the KGB. Yet the room, indeed, the whole apartment, was full to overflowing with both local and foreign scientists, and the papers presented, as can be seen in this volume, were of high quality and interest.

Why should scientists with comfortable positions in Western universities travel to Moscow to attend an unauthorized conference in a crowded apartment? The answer to this question raises another, broader, issue, for, simply by their presence there, all who attended the conference were expressing their involvement with the cause of human rights and dignity. What does science have to do with human rights? Do scientists have a special duty to human rights?

Yes, for science is a humanistic enterprise—that is, it is, above all, a distinctly human adventure. The fact that our minds can actually comprehend something about the structure and nature of the universe is not something to be taken for granted—it is cause for great surprise, great excitement, and even greater awe. Given their vision and understanding of the universe, scientists are, or should be, particularly aware of the preciousness, uniqueness, and inherent dignity of human beings. Intellectual honesty and respect for truth should also make us recognize the indivisibility of this human dignity. Denying this dignity to anyone, in any country, diminishes all of us, in every country.

As scientists, we also realize how precarious human existence and human civilization are. The only long-term safeguard of our civilization, our values, and our lives is a completely peaceful world. Such a world is possible only if human rights and human dignity become a permanent and universally respected part of society.

It is, then, for these very selfish, very practical reasons that scientists, as intellectual leaders, should be concerned with human rights, both here and abroad. And it is particularly appropriate for us to start with the human rights of our scientific colleagues, which are cruelly violated in many parts of the world today. During the past few years, the New York Academy of Sciences has been deeply involved with this problem—mainly, though not exclusively, with regard to scientists in the Soviet Union.

Why single out the Soviet Union? Indeed, the Soviet Union is not the worst offender in this respect at present. One of our so-called friendly neighbors, such as Argentina, Chile, or Uruguay, probably bears that ignoble distinction. However, the Soviet Union is a country of especial concern to us because it has, like us, the capability to destroy the world. Also, the achievements of Soviet scientists are, in

<sup>\*</sup>Chairman, Human Rights Committee of the New York Academy of Sciences.

many areas, equal to or superior to our own. It is, therefore, a country that we would, for purely pragmatic reasons, very much like to see pursuing a peaceful course. This requires, as I have said, that it respect the dignity and rights of all people.

This is not the case at the present time. All the local participants in the fourth of these conferences had applied for and been refused permission to emigrate to Israel (thus, "refusniks"). They had consequently lost their jobs or been demoted and, in all cases, had been shut out completely from the scientific life of the Soviet Union. Other "dissident" scientists—those who had spoken out for human rights—were unable to attend this meeting because they were in labor camps (Orlov, Shcharansky, Kovalev, etc.) or in exile (Sakharov).

These conferences are an extension of the Moscow Sunday Seminars begun in 1972 by a group of refusnik scientists so that they could keep up their professional work despite their exclusion from all official scientific activities. The Seminar soon gained a reputation for its high standards and for the devotion of its participants to science. It has taken place in the Brailovskys' living room since 1977 and has been visited by scores of Western scientists.

The Seminar's first attempt to organize an international conference in 1974 was foiled by the Soviet authorities—the organizers of the conference were arrested and held for fifteen days. Meetings did take place in 1977, 1978, and 1980, though under the surveillance of the authorities, with some intimidation of the local participants.

Unfortunately, the situation has worsened since the April 1980 conference. Viktor Brailovsky, the organizer and conference chairman, was arrested in November of that year and subsequently convicted of "defaming the Soviet Union." He was sentenced to five years of exile. The charges against him were based on his role in the publication of a short-lived unofficial magazine Jews in the USSR. The seminar itself, being "legal" by Soviet law, was not officially cited against him. There are, however, strong reasons to believe that the Seminar was, indeed, a cause of Dr. Brailovsky's problems. The Seminar has since been forcibly prevented from taking place on many occasions and its future is uncertain. There have also been other arrests of many dissident and some refusnik scientists.

Given this bleak situation, what can scientists do to effect changes for the better? This is a difficult question, to which I can only give partial and personal answers. First and foremost, it is very important that we not remain silent in the face of the continuing mistreatment of our colleagues—no matter how repetitious our protests appear to be. I believe that the Soviet authorities care about their image in the outside world and scientists are an influential group in the West and in some third world countries. What scientists think about the Soviet Union can affect arms agreements, technology transfers, and other matters that go beyond purely scientific exchanges. We should, therefore, persist in making our concern known to the Soviets in all kinds of ways: by protest actions and by keeping in touch with dissident and refusnik scientists.

These scientists greatly value contacts with their Western colleagues. They wish to have correspondence with and visits from us. We must not fail them. If you wish more information on how you can help scientists in trouble, in the USSR and elsewhere, please contact me or Mrs. Dorothy Hirsch, Committee of Concerned Scientists, 9 East Fortieth Street, New York, New York 10016.

I would like to thank Frederick Bartlett, Bill Boland, and India Trinley of the New York Academy of Sciences, Simon Levin of Cornell University, Valentin Turchin of the City College of New York, Lee Segal of Rensselaer Polytechnic Institute, and Martin Kruskal and Thomas Stix of Princeton University for their aid in the publication of this Annal.

			î ,