INSTITUTE
for ADVANCED STUDY

REPORT

FOR THE ACADEMIC YEAR

1997 – 98

PRINCETON : NEW JERSEY

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Extract from the letter addressed by the Institute's Founders, Louis Bamberger and Mrs. Felix Fuld, to the Board of Trustees, dated June 4, 1930.

Newark, New Jersey.

> It is fundamental in our purpose, and our express desire, that in the appointments to the staff and faculty, as well as in the admission of workers and students, no account shall be taken, directly or indirectly, of race, religion, or sex. We feel strongly that the spirit characteristic of America at its noblest, above all the pursuit of higher learning, cannot admit of any conditions as to personnel other than those designed to promote the objects for which this institution is established, and particularly with no regard whatever to accidents of race, creed, or sex.

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INSTITUTE FOR ADVANCED STUDY: BACKGROUND AND PURPOSE

The Institute for Advanced Study was founded in 1930 with a major gift from New Jersey businessman and philanthropist Louis Bamberger and his sister, Mrs. Felix Fuld, who wished to use their fortunes to make a significant and lasting contribution to society. They sought the advice of educator Abraham Flexner, who developed the concept of the Institute as a community of scholars whose primary purpose would be the pursuit of advanced learning and scholarly exploration. The Institute for Advanced Study has sustained its founding principle for more than sixty-seven years. This commitment has yielded an unsurpassed record of definitive scholarship.

The Institute fills a unique role in postgraduate education and scientific and scholarly research. Called (by Institute Trustee Vartan Gregorian) "the university to universities," the Institute serves all colleges and universities by providing a place where scholars can hone their skills and do their best work, thereby adding substantially to their ability to contribute as both teachers and scholars to the academic institutions where they base their careers. For young scholars just entering the academic world, an opportunity to work at the Institute can set the direction for lifelong research interests and thereby determine professional careers. The Institute provides more mature scholars with the opportunity to take a new direction in their research or to complete a major piece of work away from the many obligations and distractions of working life at a contemporary university. In our era, a time when pure research and scholarly activities are undervalued, these opportunities are exceedingly rare.

The Institute's foremost objective is the advancement of knowledge and the deepening of understanding across a broad range of the humanities, sciences, and social sciences. One of the Institute's unique strengths is its small and distinguished permanent Faculty, well-established scholars whose broad interests and extensive ties to the larger academic world are reflected in their own work and also in the guidance and direction they provide to the Institute's visiting Members. The Faculty defines the major themes and questions which become the focus of each School's seminars and other activities, and the Faculty selects and works closely with visiting Members. Small in number and organized in four Schools (Historical Studies, Mathematics, Natural Sciences, and Social Science), the Faculty and Members can interact with one another without the departmental and disciplinary barriers found in universities.

Each year the Institute awards fellowships to 160-180 visiting Members from universities and research institutions throughout the world. The Institute's nearly 5,000 former Members hold positions of intellectual and scientific leadership in the United States and abroad. More than a dozen Nobel laureates have been Institute Faculty or Members, and others are winners of the Wolf or MacArthur prizes. Twenty-seven out of thirty-six Fields Medalists, the Nobel equivalent for mathematicians, have come from the Institute.

The Institute does not receive income from tuition or fees. Resources for operations come from endowment income, grants from private foundations and government agencies, and gifts from corporations and individuals.

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HARRY WOOLF

ARTIST-IN-RESIDENCE

ROBERT TAUB

REPORT OF THE CHAIRMAN

The Institute for Advanced Study is a community of scholars – and more: it is a community of individuals who have understood its purpose and have made, each in his or her own way, a contribution to the fulfillment of that purpose. J. Richardson Dilworth, who passed away on December 29, 1997, was such an individual, a remarkable example of the difference one human being can make.

Dick Dilworth, by his own definition, was a scholar manqué. But his passion for learning led him, in 1964, to accept an invitation to join the Institute's Board of Trustees. In what must count as one of the less accurate predictions of Institute history, Sam Leidesdorf, in his letter to Dick – who was by then managing the Rockefeller businesses – informed him of his election to the Board and assured him that "the duties of the Trustees are not onerous." He did not know Dick's definition of a commitment.

For from that time forward until his death last December, Dick Dilworth was an active participant in the life of this institution. He shared its every concern, sat on its every committee, responded generously to its every need. He defended its physical and fiscal integrity, and, in the final years of his life, participated in the long and ultimately successful negotiations to protect the Institute's woods and farmlands without infringing upon the investment that the property represented. Firm in his standards, he was, at the same time, sensitive to the nuances of every situation and realistic about possible solutions. He well appreciated the Institute's responsibility to the larger social and intellectual universe of which it is a part.

A businessman of exceptional ability, he understood that so unique an enter prise as the Institute requires extraordinary funds, and these should be secured. He was resolutely cheerful in their pursuit, persuasive towards their acquisition, and willing to lead the way himself.

"Any society," he once wrote, "must create and nurture – if it is to survive, let alone prosper – a few foci of excellence." In the Institute, Dick Dilworth found such a focus, and we are all the better for his remarkable service of thirty-four years towards the sustaining of its purpose and the continuity of its excellence.

For the Institute to remain indeed a focus of excellence, it must never assume that its current activities are sufficient. With the vision of the Institute's Director, Phillip A. Griffiths, and the extraordinary generosity and guidance of the President of the Corporation and Chairman of the Executive Committee, Leon Levy, a new Initiatives Fund has been created to preserve the vitality of the Institute and there by better serve the larger scholarly community into the future. The importance of this fund cannot be overemphasized. The program for new initiatives provides the ability to explore an academic area not currently represented in one of the Schools without, or prior to, making a permanent commitment to it. The Fund is designed to provide a mechanism for change within the Institute's structure and to make this institution better able to adapt to a changing world. Leon Levy has not only made this Initiatives Fund fiscally possible, but the structure of the fund and its potential for making a difference to the future of the Institute are in no small part due to his wise counsel.

The leaders of the Institute believe that an institution such as this one must seek to improve all levels of education whenever possible. In mathematics education, the Institute for Advanced Study in 1993 assumed the institutional responsibility for the IAS/Park City Mathematics Institute (PCMI), which was begun, and is still led by, some of this nation's most esteemed mathematicians. As a life-long proponent of responsibility for educational outreach on the part of our major institutions, I am exceedingly pleased by the Institute's sponsorship of PCMI and am only concerned about the funding challenges that it has encountered. The Summer Session of PCMI is an exciting revelation for high school teachers, who in the course of the program come to understand the vitality of current mathematical research. Likewise, PCMI is of great importance for research mathematicians, who develop a better understanding of the complex issues involved in teaching mathematics. We are fortunate to have the vision and wisdom of our Director and mathematician, Phillip Griffiths, and also that of the PCMI Oversight Board and Steering Committee, as the Institute pursues this program which integrates mathematics research and education.

Another individual I would like to mention is Albert Hirschman, who, in 1974, was the second professor appointed to the Faculty of the School of Social Science. Albert Hirschman has made exceptional contributions to our understanding of international economics and to the related areas of political economy and the history of economic thought. I am very pleased that the Institute is acting to recognize Albert's legacy through the establishment of a permanent place for the field of economics at the Institute by creating the Albert O. Hirschman Chair and Memberships in Economics. The Professor and Members who hold these positions will seek to perpetuate the original thinking which makes Albert Hirschman's presence at the Institute so fruitful for scholarship and for the world.

The Institute was fortunate this year to have the energy and dedication of new Trustees Martin Chooljian and Immanuel Kohn. Mr. Chooljian is the President of CH Capital Corporation in Princeton, New Jersey. He was formerly the President of Penn Corporation, of which he was a founder, and the Treasurer of Litton Industries. Mr. Chooljian has had a life-long interest in physics, and for several years he and his wife, Helen, have sponsored a visiting Member in the School of Natural Sciences. Mr. Chooljian received both his B.S. and M.B.A. degrees from Harvard University.

Mr. Kohn is Senior Partner and Chairman of the Executive Committee of Cahill, Gordon & Reindel, New York, and is a graduate of Harvard University and Yale Law School. With his wife, Vera, Mr. Kohn has been an active member of the Friends of the Institute for many years. The Kohns have been generous in their support of the School of Historical Studies, of which Mr. Kohn's father, Hans Kohn, was a visiting Member in 1948 and again in 1995.

A Trustee of the Institute who has served this institution so well for the past five years and whom we will miss tremendously is Malvin Ruderman, Centennial Professor of Physics at Columbia University. In the five years he served as the Academic Trustee for the School of Natural Sciences, Professor Ruderman clarified highly complex scientific concepts and contributed notably to the discussions of the Board on all issues.

The new Academic Trustee for the School of Natural Sciences is Sir Martin Rees. In addition to being Britain's Astronomer Royal, Sir Martin is Royal Society Professor at King's College, Cambridge. Previously, he was Plumian Professor of Astronomy and Experimental Philosophy at Cambridge, having been elected to this chair at the age of 30. He is also Past President of the British Association for the Advancement of Science, and for the last twenty years has directed wide-ranging research programs at Cambridge's Institute of Astronomy. Sir Martin, who is the author or co-author of 350 research papers and three technical books, was a visiting Member in the Institute's School of Natural Sciences in 1969-70.

It is my pleasure as well to introduce to the Institute community Mario Draghi, who was elected to the Board at its meeting in May. Director-General of the Department of the Treasury in Italy, Dr. Draghi also serves as Chairman of the Deputies of the Group of Ten; Chairman of SACE, Italy's special agency for export credit insurance; a Board member of the European Investment Bank; and a professor of international economics at the University of Florence. Among his non-financial interests, Dr. Draghi is a voracious reader of Greek and Latin classics.

Planning has begun for Bloomberg Hall, which will unify the School of Natural Sciences in one building for the first time in the School's history. This will contribute to nurturing and strengthening the unique atmosphere the School provides for research in broad areas of theoretical physics and astrophysics, and will encourage interaction among scientists working in closely allied areas of forefront mathematics. The building will be named for a generous and remarkable Trustee, Michael R. Bloomberg, in appreciation for his pace-setting gift to the School.

To the Faculty, the current and past Members of the Institute, the staff, the Friends and other supporters of the Institute, I express my deepest appreciation. The Institute for Advanced Study thrives because of the individual commitment of each of you, a commitment for which I am extraordinarily grateful, and which I feel privileged to share.

James D. Wolfensohn
Chairman

REPORT OF THE DIRECTOR

It is my pleasure to review activities at the Institute over the past year. This is a record of many individual efforts undertaken within and to varying extents shaped by the unique context of the Institute itself. This community of schol- ars, created and sustained by each person's effort and commitment, has been devoted since its beginnings to intellectual inquiry and to the research that not only leads to new knowledge, but provides a basis for future knowledge.

I am delighted to announce the appointment this year of Heinrich von Staden to the permanent Faculty of the Institute's School of Historical Studies. Professor von Staden, an internationally-known scholar whose varied specialties include classical philosophy and literature as well as myth, ancient medicine and science, has joined the Institute from Yale University, where he was the William Lampson Professor of Classics and Comparative Literature. A 1961 graduate of Yale College, Professor von Staden holds a doctorate from Universität Tübingen. He joined the Yale faculty in 1968, and has taught and written extensively on myth, science, philosophy, Greek and Latin authors, classical literary theory, and ancient medicine and science.

Oleg Grabar and Christian Habicht, both Faculty members in the School of His- torical Studies, became Professors Emeriti this year. Oleg Grabar came to the Institute in 1990 from Harvard University, where he was the Aga Khan Profes- sor of Islamic Art and Architecture. When Professor Grabar began his career in the early 1950s, there were few historians of Islamic art in the United States. Forty years later there are dozens, and Professor Grabar has been involved in the education of almost all of them. In his distinguished academic and professional career Professor Grabar has had a far-reaching and profound influence on the study of Islamic art.

Christian Habicht, who came to the Institute in 1973, has for many years been recognized as a leading authority on the history of Athens in the centuries between the fall of the Athenian Empire, in 404 BCE, and the establishment of the Roman Empire. He was awarded the Henry Allen Moe Prize of the Ameri- can Philosophical Society in 1996, and his recently published book *Athens from Alexander to Antony* (Harvard University Press, 1997) was chosen by the London Hellenic Society as the winner of the Criticos Prize for 1997, the first year that award is being conferred.

The Institute has begun a new program in theoretical biology, initially for a period of five years, and seen by the Institute as a first step toward creating a long-term presence in this field. The first initiative will be in mathematical biology and will be led by Martin A. Nowak, who comes to the Institute from Oxford University, where he was Professor of Mathematical Biology and Wellcome Trust Senior Research Fellow. For the past nine years at Oxford he has worked closely with Pro- fessor Sir Robert May (a Member in the School of Natural Sciences in 1971-72), developing a wide variety of mathematical models to address a broad range of problems in evolutionary biology and infectious diseases. At the Institute Dr. Nowak will lead research in diverse areas of mathematical biology, ranging from evolutionary theory and ecology to infectious diseases of humans. There will be

important emphasis on establishing and continuing research collaborations with many leading experimental groups in the United States and elsewhere. The new program is made possible in part by the Initiatives Fund established to provide greater flexibility in exploring promising new areas not already represented within the Institute, and generously supported by Institute Trustee Leon Levy.

As our chairman, Jim Wolfensohn, noted in his report, J. Richardson Dilworth was an individual who made a very significant difference to the Institute community, and we continue to mourn his death this winter. Elected a Trustee of the Institute in 1964, Mr. Dilworth subsequently served on all of the major committees of the Board. In 1976 he became President and Vice Chairman of the Board, and in 1981, Chairman. He retired as Trustee and Chairman in 1986, after twenty-two years on the Institute's Board, but continued to serve as Trustee Emeritus. As George F. Kennan wrote at the time, "In the passing of J. Richardson (Dick) Dilworth the Institute lost one of the most remarkable, most deeply respected, and most valuable of its friends."

Over the past ten years the financial industry has seen a tremendous increase in the use of technology. This phenomenon has attracted some of the most talented mathematical minds to Wall Street and stimulated a vigorous exchange of ideas between academics and practitioners. The Institute planned a day-long exploration of these interactions, and "Mathematics and Finance," the Institute's fourth annual conference on financial mathematics, was held on Friday, September 26. The event brought together researchers and professionals from different areas which use and/or create financial mathematics. Over two hundred participants attended the conference, which was designed to offer useful information both to young people exploring the field and to more established practitioners. The program was organized by Institute Trustee Martin Leibowitz, Vice Chairman and Chief Investment Officer of TIAA-CREF, and S.R. Srinivasa Varadhan, Professor of Mathematics at the Courant Institute. It was funded by Bankers Trust Company Foundation.

Sabine G. McCormack, Professor of History and Classical Studies at the University of Michigan, completed her second and final year as the School of Historical Studies' Two-Year Visiting Andrew W. Mellon Professor. During 1997-98 she led a seminar at the Institute on "Historical Thought in Spain and Spanish America," which focused on texts of the sixteenth and seventeenth centuries. The purpose of the seminar was to explore possible convergences between indigenous American, especially Inca ways of understanding the past and European equivalents.

In December Professor Jack F. Matlock, Jr. organized and chaired an international conference at the Institute entitled "Understanding Nationalism," which explored the current state of research on nationalism and its implications for nation and state building. The conference identified promising directions for future research on issues related to nationalism.

I am very pleased that this year pianist and scholar Robert Taub accepted the Institute's invitation to remain for an additional three years as Artist-in-Residence. Having completed his three-year project of performing and recording the Beethoven Piano Sonatas, Dr. Taub led the Institute's concert series in an entirely

new direction this year, with two programs of chamber music in November (with guest artists The Stanford String Quartet) and January (with guest artists The St. Lawrence String Quartet), and a solo piano concert in March. Robert Taub completed his book on Beethoven and piano technique in December; it will be published by Princeton University Press in 1999.

Karen Uhlenbeck was the Distinguished Visiting Professor this year in the School of Mathematics. This program was begun in 1988 with the support of the Ambrose Monell Foundation, and was designed with two objectives: to define areas of concentrated activity in mathematics and to make it possible to bring to the Institute a distinguished scholar with interests related to those areas. Professor Uhlenbeck devoted her year at the Institute to exploring dif- ferent viewpoints of geometric partial differential equations. Together with School of Mathematics Faculty member Jean Bourgain, Professor Uhlenbeck led a weekly seminar on geometric partial differential equations, focusing on bring- ing together geometers with experts like Professor Bourgain in the analysis of evolution equations. A second seminar which combined the analytic, algebra- ic and geometric approaches to the theory of integral systems was organized with the help of Chuu-Lian Terng, and as a third component, Professor Uhlenbeck organized short courses in integrable systems and quantum field theory.

After the fall of the Berlin Wall, six institutes for advanced study, three from the United States and three from Europe, established the New Europe Prize as part of an effort to build new intellectual resources in the former Soviet Bloc. The Institute for Advanced Study has been very pleased to have been part of this worthwhile endeavor. Over the past five years one or two annual prizes with monetary awards have been presented to East European scholars who have studied at one of the six participating institutes, and who are committed to building independent centers for scholarship in their home countries. The 1997 New Europe Prize was awarded to Jan Strelau, Senior Professor in the Psychol- ogy Department of Warsaw University, during a ceremony held at the Hague in November. Professor Strelau supervises a small, active group of researchers who deal with behavior-genetic studies. With the prize money Professor Strelau set up the Interdisciplinary Center for Behavior-Genetic Research (ICBGR) for Central and Eastern Europe at the University of Warsaw. The Center's aim is to conduct behavior-genetic research and promote the development of behavior- genetic paradigms in the fields of psychology, biology, education, and health sciences. This area of research saw very little development during the commu- nist era.

This was the second year of a three-year interdisciplinary program in mathemat- ics and physics, led by Professor Pierre Deligne, School of Mathematics, and Pro- fessor Edward Witten, School of Natural Sciences, and titled "Algebraic and Geometric Aspects of Quantum Field Theory and Gauge Theory." The program is evidence of a remarkable commitment to sustained and sophisticated interac- tion on the part of participating mathematicians and physicists. Preliminary ver- sions of the lecture notes from this ongoing series of meetings are available on the Institute's website, and serve as a resource for the mathematics community world- wide. The program is funded by the National Science Foundation, the J. Seward

Johnson, Sr. Charitable Trusts, the Harmon Duncombe Foundation, the Ambrose Monell Foundation, and the Friends of the Institute for Advanced Study.

From July 12 to August 1, the Summer Session of the IAS/Park City Mathematics Institute (PCMI) was held in Park City, Utah. The topic this year was Representation Theory of Lie Groups. In 1998 PCMI introduced its newest program, the Mathematics Education Research Program, which focuses on research in pedagogical issues in modern mathematics education, collaborating closely with participants in both the High School Teacher Program and the Undergraduate Faculty Program. The Artist-in-Residence at the Institute for Advanced Study, Robert Taub, presented a concert in Park City, sponsored by Institute Trustee Jon M. Huntsman, Jr. Guests at the Summer Session included William H. Schmidt, Michigan State University and lead analyst of the Third International Mathematics and Science Study; Gail Burrill, University of Wisconsin and past President of the National Council of Teachers of Mathematics; and Elaine Wolfensohn. From May 11 through 21, the Institute hosted PCMI's annual Mentoring Program for Women in Mathematics. This program is designed to support the women students who will be attending the PCMI Summer Session and to help increase the number of women in the field of mathematics. The PCMI and the Women's Mentoring Program receive major funding from the National Science Foundation; their support has made possible this important program integrating research and education in the mathematics community.

Each year the Institute community is significantly enriched by the presence of Director's Visitors. This year they included Paul Berg, Director, Beckman Center for Molecular and Genetic Medicine; William Ewald, University of Pennsylvania; Efim Fradkin, Russian Academy of Sciences; Henning Ritter, *Frankfurter Allgemeine Zeitung*; Charles Ryskamp, former Director of the Frick Collection; Maxine Singer, President, Carnegie Institution of Washington; and Claire Voisin, École Normale Superiore.

The Association of Members of the Institute for Advanced Study (AMIAS) held its annual Board meeting at the Institute on March 16 and elected five new members to the Board, whom we are delighted to welcome. Melvyn B. Nathanson, Professor of Mathematics at Lehman College-CUNY and a former Member in the School of Mathematics, was elected the new President.

The Institute takes very seriously its responsibility not only to attract the best scholars, but to insure that they have as near-ideal conditions as possible during their residency at the Institute. With this in mind, work has begun on long-planned and much-needed renovations of the Members' housing that will greatly improve these facilities. Renovations began in late spring, with the bulk of the work planned for the summers of 1998 and 1999.

In conclusion, I would like to thank each and every individual whose concern, commitment, and effort continually create this remarkable community and allow it to flourish. To the Faculty, Trustees, Members and former Members, the Friends of the Institute, and our staff, I express my deepest appreciation.

Phillip A. Griffiths
Director

OFFICE OF THE DIRECTOR
RECORD OF EVENTS

The following is a calendar of events sponsored by the Office of the Director

Academic Year 1997-98

September 24
Welcome Picnic for new Members and their
families

September 26
Mathematics and Finance Conference
Morning Session: "Mathematical
Opportunities in Finance"
Afternoon Session: "Lectures/Discussions on
Mathematical Problems in Finance"
Organizers: MARTIN L. LEIBOWITZ, *Vice
Chairman and Chief Investment Officer, TIAA-
CREF and Trustee, Institute for Advanced Study*
and SRINIVASA VARADHAN, *Professor of
Mathematics, Courant Institute*

October 1
Friends of the Institute
Friends' Forum: "A Fresh Look at the Planets"
FREEMAN DYSON, *Professor Emeritus,
School of Natural Sciences, Institute for
Advanced Study*

October 9
Institute Film Series

October 14
Reception for new Members
Hosts: PHILLIP A. GRIFFITHS, *Director,
Institute for Advanced Study* and MARIAN F.
GRIFFITHS, M.D.

October 24
Institute Lecture
"Fabled Cities and the Treasurers of Solomon:
Around the Myths of the Muslim Far West in
the Middle Ages"
OLEG GRABAR, *Professor, School of
Historical Studies, Institute for Advanced Study*

October 26
Friends of the Institute
Fireside Chat: "Wonders in the Deep"
PHILLIP A. GRIFFITHS, *Director, Institute
for Advanced Study* and MARIAN F.
GRIFFITHS, M.D.

October 29
Friends of the Institute
Dinner for new Friends
Hosts: PHILLIP A. GRIFFITHS, *Director,
Institute for Advanced Study* and JUDITH
OGDEN THOMSON, *Chair, Friends of the
Institute*

Institute Film Series

November 11
Einstein Legacy Society
Fall Luncheon/Meeting
Speakers: WILLIAM SCHREYER, *former
Chairman, Merrill Lynch*, THOMAS
KOZLOWSKI, *Senior Vice President, Merrill
Lynch*, and JOHN J. BROWN, *John Brown
Limited*

November 12
Friends of the Institute
Friends' Forum: "Scholarship and Greed:
The Market in Stolen Antiquities"
GLEN BOWERSOCK, *Professor, School of
Historical Studies, Institute for Advanced Study*

November 13
Institute Film Series

November 17
Institute Concert Series
Pre-concert lecture
ROBERT TAUB, *Artist-in-Residence, Institute
for Advanced Study* and STANFORD
STRING QUARTET

November 18, 21, 22
Institute Concert Series
Brahms: Fantasias, Op.116; String Quartet in
C minor, Op. 51, no. 1; Piano Quintet in
F minor, Op. 34
ROBERT TAUB, *Artist-in-Residence, Institute
for Advanced Study* and STANFORD
STRING QUARTET

December 4
Institute Film Series

December 7
Friends of the Institute
Holiday Reception for Friends and Faculty
Hosts: PHILLIP A. GRIFFITHS, Director,
Institute for Advanced Study and MARIAN F.
GRIFFITHS, M.D.

December 10
Institute Lecture
"Thoughts on Space and Time"
NATHAN SEIBERG, Professor, School of
Natural Sciences, Institute for Advanced Study

December 17
Institute Film Series

December 18
Holiday celebration for Institute children

January 11
Friends of the Institute
Fireside Chat: "The Diana Effect"
SIR JOHN THOMSON, British Ambassador
to the United Nations, 1982-87

January 14
Institute Film Series

January 21
Institute Lecture
"Ninth-Century Muslim Anarchists"
PATRICIA CRONE, Professor, School of
Historical Studies, Institute for Advanced Study

January 26
Institute Concert Series
Pre-Concert Lecture
ROBERT TAUB, Artist-in-Residence, Institute
for Advanced Study and ST. LAWRENCE
STRING QUARTET

Reception for new Members
Hosts: PHILLIP A. GRIFFITHS, Director,
Institute for Advanced Study and MARIAN F.
GRIFFITHS, M.D.

January 27, 30, 31
Institute Concert Series: Scriabin: Two
Etudes; Sonata No. 10, Op. 70; Shostakovich:
String Quartet No. 3; Brahms: Piano Quartet
in C minor, Op. 60
ROBERT TAUB, Artist-in-Residence, Institute
for Advanced Study and ST. LAWRENCE
STRING QUARTET

February 5
Institute Film Series

February 11
Friends of the Institute
Friends' Forum: "The Expansion of NATO
and Russia Resurgent"
JONATHAN HASLAM, School of Historical
Studies, Institute for Advanced Study

February 18
Institute Film Series

February 21
Institute Mid-winter Party

February 25
Institute Lecture
"The Conundrum of Equality"
JOAN SCOTT, Professor, School of Social
Science, Institute for Advanced Study

February 27
Friends of the Institute
Presentation and luncheon for prospective
Friends
Host committee: CLAIRE BURNS, RYSIA de
RAVEL, TINA GREENBERG, ROSANNA
JAFFIN, LYNN JOHNSTON, PEGGY
KARCHER, MARY KEATING, ROSEMARY
O'BRIEN, DOROTHY THOMAS
Speaker: PATRICIA LABALME, School of
Historical Studies, Institute for Advanced Study

March 2
Salute to Senator Jack Ewing
Hosts: PETER R. KANN, Publisher and
Chairman, Dow Jones & Company, Inc. and
Trustee, Institute for Advanced Study and
PHILLIP A. GRIFFITHS, Director, Institute
for Advanced Study

March 5
Einstein Legacy Society
Spring Luncheon/Meeting
Speaker: CHARLES W. COLLIER, Senior
Planned Giving Officer, Harvard University

Institute Film Series

March 9
Institute Concert Series
Pre-Concert Lecture
"Works of the Romantic Era"
ROBERT TAUB, *Artist-in-Residence,*
Institute for Advanced Study

March 10, 13, 14
Institute Concert Series
"Works of the Romantic Era"
ROBERT TAUB, *Artist-in-Residence,*
Institute for Advanced Study

March 15
Friends of the Institute
Fireside Chat: "Sex, Society, and Education:
What Should We Teach Our Children?"
SUSAN N. WILSON, *Executive Coordinator,*
Network for Family Life Education

March 18
Institute Film Series

March 25
Institute Lecture
"Aspects of Mathematics in Modern Society"
ENRICO BOMBIERI, *Professor, School of*
Mathematics, Institute for Advanced Study

March 26
Friends of the Institute
Director's Circle Dinner
Hosts: PHILLIP A. GRIFFITHS, *Director,*
Institute for Advanced Study and MARIAN F.
GRIFFITHS, M.D.

March 31
Presentation and luncheon for guests of the
Board of Trustees
Host: HAMISH MAXWELL, *Retired*
Chairman and CEO, Philip Morris Companies,
Inc. and Trustee Emeritus, Institute for
Advanced Study
Speakers: JACK F. MATLOCK, Jr., *Professor,*
School of Historical Studies and NINA
KHRUSHCHEVA, *School of Historical*
Studies, Institute for Advanced Study

April 1
Friends of the Institute
Culinary Discussion Group
BETTY FUSSELL, *food historian and author*

April 7
Presentation and luncheon for guests of the
Board of Trustees
Host: MARIE-JOSÉE KRAVIS, *Hudson*
Institute, Inc. and Trustee, Institute for
Advanced Study
Speaker: STEPHEN L. ADLER, *Professor,*
School of Natural Sciences, Institute for
Advanced Study

April 19
Institute Film Series

April 22
Friends of the Institute
Dinner for new Friends
Hosts: PHILLIP A. GRIFFITHS, *Director,*
Institute for Advanced Study and JUDITH
OGDEN THOMSON, *Chair, Friends of the*
Institute

May 1
Institute Lecture
"Russian Classical Philology After Two
Revolutions"
ALEXANDER GAVRILOV, Russian
Academy of Sciences
"Remembering to Forget: The Memory of
Communism"
ISTVÁN RÉV, Central European University,
Budapest

May 13
Friends of the Institute
Walking tour of the Marquand Park
arboretum
SAMUEL J. deTURO, Jr., *Woodwinds*
Associates

May 20
Friends of the Institute
Annual Meeting and Picnic

June 7
Friends of the Institute
Chairman's Circle Dinner
Hosts: JAMES D. WOLFENSOHN,
President, The World Bank and Chairman,
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ACKNOWLEDGMENTS

BEQUESTS and PLANNED GIFTS

The Institute acknowledges with deep appreciation the generous bequest of Mary MacCono.

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The Einstein Legacy Society was established in 1996 to honor those who have made
a planned gift to the Institute for Advanced Study and those who have indicated that the Institute is
in their estate plans. The Institute acknowledges with gratitude new members of the Einstein Legacy
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THE SCHOOL OF HISTORICAL STUDIES

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GILES CONSTABLE
PATRICIA CRONE, *Andrew W. Mellon Professor*
OLEG GRABAR
CHRISTIAN HABICHT
IRVING LAVIN
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SABINE G. MacCORMACK

Professors Emeriti

MARSHALL CLAGETT
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PETER PARET
HOMER A. THOMPSON
MORTON WHITE

The School of Historical Studies is concerned principally with the history of Western and Near Eastern civilization. Within this wide area of study, a large range of topics has been explored at one time or another by Faculty and Members, but the emphasis has been particularly strong in the fields of Greek and Roman civilization, medieval, early modern and modern European history, Islamic culture, and the history of art, science and ideas.

The particular emphases of the School are a product of its own history. Two years after the opening of the School of Mathematics in 1933, a School of Economics and Politics and a School of Humanistic Studies were established. In Humanistic Studies, the first professor was Benjamin Dean Meritt, a specialist in Greek history and epigraphy, who was closely associated with excavations in the Athenian Agora. The second appointment to the Faculty of the School of Humanistic Studies was that of the German art historian, Erwin Panofsky. Panofsky ranged through the entire gamut of European art from the middle ages to motion pictures, but he was most closely associated with the development of the field of iconology.

Three additional appointments strengthened the field of classical and Near Eastern studies: Elias Avery Lowe, a Latin paleographer who worked on the handwriting of pre-ninth century manuscripts; Ernst Herzfeld, a Near Eastern archaeologist and historian, whose scholarly work comprised nearly 200 titles; and Hetty Goldman, one of the pioneering American women archaeologists, whose discoveries at Tarsus in Turkey were published in six volumes. Modern history was represented at the Institute from the

outset with the appointment of the military and political historian Edward M. Earle. Earle was an original member of the School of Economics and Politics, which merged in 1949 with the School of Humanistic Studies to become the School of Historical Studies.

After World War II, classical studies were further augmented by the appointments of Homer A. Thompson in Greek archaeology, Harold F. Cherniss in Greek philosophy, and Andrew Alföldi in ancient history and numismatics. Although Alföldi published tire- lessly on a wide range of subjects during his years at the Institute, he was mainly pre- occupied with the history of early Rome and that of Julius Caesar, on both of which sub- jects he wrote several books. Medieval history came to the Institute Faculty with Ernst Kantorowicz, whose interest stretched in time from the later phases of classical antiquity to the fifteenth and sixteenth centuries, and in space embraced both western Europe and the Byzantine and Islamic East. The art historical tradition was carried on by Millard Meiss, who was able to complete at the Institute his great work on late medieval manu- script painting in Burgundy.

Additions to the Faculty in modern history came with the appointments of Sir Ernest Llewelyn Woodward in British diplomatic history; George F. Kennan, former Ambassador to Russia, in Russian history and international relations; Felix Gilbert, in Renaissance as well as modern history; Morton White in the history of modern philosophy; and Peter Paret in modern European history. Roman military history and papyrology were represented by James F. Gilliam; medieval history of the Latin East, Venice, and the relations between the Papacy and the Levant, by Kenneth M. Setton; medieval science, especially the classical heritage, by Marshall Clagett.

While these traditions have remained strong in the School of Historical Studies, they have not excluded scholars working in other fields who have come here as Members. More than a thousand Members have come to the School since its founding. The articles and books resulting from their research at the Institute are witness to the quality and productivity of their scholarly activity here.

ACADEMIC ACTIVITIES

FACULTY

PROFESSOR GLEN BOWERSOCK went to Geneva in August of 1997 to contribute a paper on the *Vita Caesarum* to the Entretiens held at the Fondation Hardt on the topic of ancient biography. In the early autumn he gave a paper at the colloquium held in Princeton (at both the Institute and the University) on Jacob Burckhardt. His theme was Burckhardt's treatment of late antiquity. In November a panel at the meetings of the Society of Biblical Literature in San Francisco was devoted to a discussion of Professor Bowersock's book, *Fiction as History — Nero to Julian,* and he made a response on that occasion. At the invitation of the Cultural Foundation of the Bank of Cyprus he went to Nicosia in early April to deliver the annual lecture on the history of the island and to visit several of the more important ancient sites. He also delivered the annual Tracy Lecture at the University of Illinois in Chicago on Pushkin's surviving notes for Tacitus' *Annals*. He presented an abbreviated version of this lecture to the joint meeting of the Royal Swedish Academy and the American Philosophical Society in Stockholm in late May.

Professor Bowersock became the Président of the Conseil Scientifique of the Maison de l'Orient Méditerranéen in Lyon at the joint invitation of the French CNRS and the University of Lyon. He continued his service on various boards including the Council of the American Philosophical Society, the Comitato Scientifico di Consulenza della Scuola Normale Superiore di Pisa (Lettere e Filosofia), the editorial committee of *Arabian Archaeology and Epigraphy*, and the boards of both the Metropolitan Opera Association and Guild. As in the past he served as General Editor of the series *Revealing Antiquity* at the Harvard University Press. In the last year Professor Bowersock published seven articles on various subjects including Roman imperial history, Nabataean culture, and the classical tradition. He also completed the first of several studies devoted to late antique mosaics of the Near East as historical documents.

During the academic year 1997-98, PROFESSOR GILES CONSTABLE published three articles and two reviews. Two previously-published books appeared in corrected paperback editions. He spoke at meetings in honor of Leonard Boyle in October in Rome and in memory of Georges Duby in Paris in November. He also spoke at Ohio State University in February, at Notre Dame University in April (in honor of John Van Engen), at St Andrews in June (a conference in honor of Donald Bullough), and at the University of Edinburgh. He chaired sessions at the Princeton University Colloquium on Medieval and Early Modern Christian Spain and at the 33rd International Congress on Medieval Studies in Kalamazoo and attended meetings of the Columbia Medieval Seminar and at Fordham University. In December he organized a meeting of the Delaware Valley Medieval Association, at which several members of the Institute spoke.

PROFESSOR PATRICIA CRONE participated in the election of the Laudian professor of Arabic at the University of Oxford in December and January, delivered the Faculty Lecture at the Institute for Advanced Study in January, gave talks on early Islamic political thought at Salt Lake City in February, at the University of Pennsylvania in March and at the Nassau Club in Princeton in April, organized a seminar on warfare at the Institute from January to April, and participated in a workshop on Abbasid history convened by Matthew Gordon at Columbia University in New York. Two articles of hers appeared in print ("A Note on Muqatil b. Hayyan and Muqatil b. Sulayman," *Der Islam* 74, 1997, pp. 238-49; "The Abbasid Abna' and Sasanid Cavalrymen," *Journal of the Royal Asiatic Society* 8, 1998, pp. 1-19), along with a review (in *Arabica*). Her book with Fritz Zimmermann, *The Epistle of Salim b. Dhakwan*, an edition, translation, commentary and extended analysis of an early polemical work which was largely completed before her arrival in Princeton, has been accepted for publication by Oxford University Press. One article ("A Statement by the Najdiyya Kharijites on the Imamate," for *Studia Islamica*) and two entries for the *Encyclopaedia of Islam* ("Uthmaniyya," "Yazid b. Abi Muslim") have gone to press. She is now working on various projects, but mostly on a book on medieval Islamic political thought.

PROFESSOR OLEG GRABAR lectured or participated in seminars at the University of Utah, the Princeton Public Library, Middlebury College, Princeton University, University of Paris IV and Institut du Monde Arabe, Einstein Forum in Potsdam, New York Bible Society, and the University of Lyon. He continued to be a member of the scientific committee of the Max van Berchem Foundation in Geneva and was appointed a consultant to the Sabanci University in Istanbul. He was on a doctoral committee at the University of Toronto. His publications were:

1. "Rapport de Synthèse," *Sciences Sociales et Phénomènes Urbains dans le Monde Arabe* (Casablanca, 1997), pp. 295-298.
2. "Byzantine Court Culture from 829 to 1204," *Dumbarton Oaks Research Library and Collection* (Washington, D.C., 1997), pp. 115-129.
3. "The Mosque, a Grove of Columns," *Daidalos 65* (1997), pp. 80-85.
4. "Introduction," in F. Richard, *Splendeurs Persanes* (Paris, 1997).
5. A. Fernández-Puertas, *The Alhambra*, Times Literary Supplement (1997), pp. 12-13.

Together with Professor Michael Cook of Princeton University, and with the support of the Kress Foundation, he organized three seminars at the Institute. The meetings were held over one day and a half, attended by 30 to 40 people – faculty and members of the Institute for Advanced Study, faculty and students from Princeton University and else- where. (See the "Record of Events" for further details.)

PROFESSOR CHRISTIAN HABICHT saw his book *Athens from Alexander to Antony* published by the Harvard University Press; a Greek edition was published by Odysseas Publications in Athens. Work on a French and a Russian edition is under way. He wrote a new Preface to his *Pausanias' Guide to Ancient Greece* (The Sather Classical Lectures, vol. 50), of which a new edition is forthcoming this fall from the University of California Press. He also worked on unpublished documents from the island of Cos and submitted a major manuscript, to be published in *Chiron*, vol. 28, 1998. He gave lectures at the University of Colorado, Boulder, in September and at the annual convention of classicists at Chicago in December. At Princeton University he directed a session on Professor Ma's seminar on hellenistic epigraphy. He was invited to lecture at the British Academy in July 1998 and to give a series of seminars for junior colleagues at the *Kommission für Alte Geschichte und Epigraphik* (Munich) in October. He participated as one of several invited scholars from various countries in a two-day conference on "Efficiency and modernity of epigraphical studies at the turn of the 20th century," held in October 1997 at the Berlin- Brandenburgische Akademie der Wissenschaften.

He continued serving on editorial boards, on two committees of the American Philo- sophical Society, and on the board of supervisors for the *Inscriptiones Graecae*.

Besides his books, his publications included "Roman Citizens in Athens," in *The Roman- ization of Athens* (M. C. Hoff and S. Rotroff, Eds.), Exeter 1997, pp. 9-17; "Titus Flavius Metrobios, Periodonike aus Iasos," in *Festschrift Karl Christ*, 1998, and a review of *Cambridge Ancient History*, 2nd ed., vol. VI: The Fourth Century B.C., in *Gnomon* 70, 1998, 130-135.

He was elected as the first Life Member of the American Society of Greek and Latin Epigraphy and Honorary Counselor of the Archaeological Society at Athens, founded in 1837. His book *Athens from Alexander to Antony* was chosen by the London Hellenic Soci- ety as the winner of the Criticos Prize for 1997, the first year that award is being conferred.

PROFESSOR IRVING LAVIN continued to serve as a member of the National Commit- tee for the History of Art, of the Porter Prize Committee of the College Art Association of America, and of the Scientific Council of Modena Capitale, a year-long commemoration

of the quadricentennial of that city's elevation to capital of the D'Este dukedom. Among the projects he has helped to plan for Modena will be a structural fantasy designed by the architect Frank Gehry. He has also served as advisor to Gehry for a major museum of Coca-Cola memorabilia to be built near Louisville, KY. Professor Lavin gave a course of lectures at the Istituto Italiano per gli Studi Filosofici in Naples and gave a number of lectures and papers presented at symposia: at Florence, to celebrate the 700th anniversary of the founding of Florence Cathedral, and to celebrate the 150th anniversary of the founding of the German Art Historical Institute there; at Boston College in a symposium on Jesuit cultural contributions, at Harvard in a meeting on the art of Gianlorenzo Bernini, in Los Angeles at a conference of the International Society of Italianists, at the University of Pittsburgh, and at the Louvre in a series on nocturnal paintings in the Baroque. Professor Lavin also gave an interview on the sculpture of Bernini for National Public Television, on "The News Hour with Jim Lehrer." Lavin serves on the editorials boards of a number of scholarly journals, including *Quaderni d'italianistica*, *History of European Ideas*, *Art e Dossier*, *Palladio*, *rivista di storia dell' architettura e restauro*.

PROFESSOR SABINE MacCORMACK was at the Institute for the second year of her two year Mellon Visiting Professorship. Her book, *The Shadows of Poetry. Vergil in the Mind of Augustine* was published by the University of California Press. She also published two articles, "Sin, Citizenship and the Salvation of Souls: The Impact of Christian Priorities on Late-Roman and Post-Roman Society," *Comparative Studies in Society and History 39* (1997), 644-673, and "Time, Space and Ritual Action: The Inka and Christian Calendars in Early Colonial Peru," in *Native Traditions in the Postconquest World* (Dumbarton Oaks 1998), 295-343. During the academic year, she directed a seminar at the Institute on "Historical Thought in Spain and Spanish America," focusing on texts of the sixteenth and seventeenth centuries. The purpose of the seminar was to explore possible convergences between indigenous American, especially Inca ways of understanding and interpreting the past and European equivalents. Professor MacCormack gave lectures in the United States and Europe, and during the summer, continued archival research on her next book, which will deal with the creation of historical and historiographical traditions in the Andean world and in Spain during the sixteenth and seventeenth centuries. She also wrote articles about Inka imperial ceremonial, about late Inka and early colonial Cuzco, and about the Roman conquest of Spain as perceived by sixteenth century Spanish historians and antiquarians, as well as entries for the *Augustine Encyclopedia*. She returns to the University of Michigan in Ann Arbor as the Mary Ann and Charles R. Walgreen Professor, Professor of Classical Studies and Professor of History.

PROFESSOR JACK F. MATLOCK, Jr. delivered lectures at the University of Oklahoma, Michigan State University, the State University of Economics in Budapest, and at a workshop sponsored by Sit Investments in San Diego. He also addressed meetings of The American Philosophical Society, the American Association for the Advancement of Slavic Studies, the Council on Foreign Relations, and the Carnegie Endowment for International Peace. He participated in workshops and panels on the end of the Cold War and on current Russian-American relations sponsored by Brown University, The National Security Archives, the John F. Kennedy School of Government, and The Ohio State University. He testified before the U.S. Senate and spoke with members of Congress as well as the National Committee on American Foreign Policy regarding NATO expansion. He conducted numerous radio, television and press interviews regarding current U.S.-Russian relations.

His articles included "Success Story," on Georgian President Eduard Shevardnadze (*The New York Review of Books*, September 25, 1997); "Russia's Leaking Nukes," *The New York Review of Books*, February 5, 1998; "Why the Senate Should Reject NATO Enlargement," *MSNBC*, March 3, 1998; "Too Many Arms to Twist," *The New York Times*, March 22, 1998; and "Is Russia Part of the West?," *Post-Soviet Affairs*, January-March, 1998. He participated in an epistolary debate with Deputy Secretary of State Strobe Talbott regarding NATO expansion which appeared in SLATE magazine in February, 1998. He also spoke to several classes at Princeton and Harvard universities.

Professor Matlock organized and chaired an international conference at the Institute entitled "Understanding Nationalism," which focused on the current state of research on nationalism and its implications for nation and state building. The conference sought to identify promising directions for future research on issues related to nationalism.

Professor Matlock is a member of the American Academy of Diplomacy, the American Philosophical Society, the Council on Foreign Relations, the American Association for the Advancement of Slavic Studies, and the Washington Institute for Foreign Affairs. He participates on the boards or advisory councils of the Atlantic Council, the Ethnic-American Broadcasting Company and the Institute for the Study of Diplomacy of Georgetown University.

He continues his work on two books with the working titles *Understanding Russia* and *Reagan and Gorbachev: How the Cold War Ended*.

PROFESSORS EMERITI

PROFESSOR MARSHALL CLAGETT submitted to the American Philosophical Society the completed third volume of his on-going *Ancient Egyptian Science: A Source Book*, a volume that embraces Ancient Egyptian Mathematics. It has been accepted by the Society and its publication in the near future has been assured.

Professor Clagett also made a trip to the British Museum in London and to Switzerland and Italy for preliminary work on volume four.

A large part of PROFESSOR GEORGE KENNAN'S time over recent months has been taken up with the reading of several books written by friends or acquaintances who looked to him for critical appraisal, support, and encouragement of their efforts. He also took a leading part in both public and private discussions of the history of the American Foreign Service and the possibilities for its reform in the light of the requirements of the present age. One feature of this activity was his receipt of the annual "Excellence in Diplomacy" award from the American Academy of Diplomacy.

PROFESSOR PETER PARET continued to work on his manuscript, which he expects to complete by the end of 1998, on the function of art in German history from the early nineteenth century to the Second World War. In July 1997 he gave a talk at the Alte Nationalgalerie in Berlin to mark the 150th anniversary of the birth of the Berlin painter and Director of the Prussian Academy of Arts, Max Liebermann, and the opening of an exhibition of his works. The text appeared in the *Frankfurter Allgemeine Zeitung* and in the yearbook of the Berlin Museums. He published book reviews in the *American*

Historical Review, *Central European History*, *Forschungen zur brandenburgischen und preussischen Geschichte*, and *The New York Times Book Review*.

In September 1997 he and Professor J. Lionel Gossman of the Department of Romance Languages of Princeton University organized and chaired an Institute-University symposium on the work of the cultural historian Jacob Burckhardt. During the academic year he served on a dissertation committee of the Princeton History Department. With American and European colleagues he is working on two exhibitions, which will be held in Berlin and New York in 1999.

PROFESSOR HOMER A. THOMPSON has continued to supervise the publication program of the excavation of the Athenian Agora. In addition to frequent discussions with the authors, Professor Thompson has continued his study of the very intimate inter-relations between Athens and Pergamon in civic and religious architecture.

PROFESSOR MORTON WHITE has finished writing an autobiography entitled *A Philosopher's Story* that will be published in 1999. He has also completed an invited paper on the main philosophical ideas of the Enlightenment and their legacy; it will be delivered in Boston at the Twentieth World Congress of Philosophy in August, 1998, and will later be published in the *Proceedings* of the Congress. An Italian translation of Professor White's book *The Question of Free Will* has appeared under the title *Libero Arbitrio*. He has been elected to serve as a member of the Council of the American Philosophical Society in Philadelphia.

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Hellenistic World, Ancient Legal History
La Sorbonne · *f*

RONALD MELLOR
Ancient History
University of California, Los Angeles · *v*

VERNON MINOR
Art History of the Seventeenth and Eighteenth Centuries
University of Colorado

WOLFGANG MÜLLER
Medieval History
Institute for Advanced Study · *a*

CAROL NEUMAN DE VEGVAR
Early Western Medieval Art
Wesleyan University · *vf*

ALPAY ÖZDURAL
Islamic Architecture
Eastern Mediterranean University, Northern Cyprus · *s*

MALCOLM PARKES
Palaeography
University of Oxford · *f*

NORMAN PEREIRA
Russian History
Dalhousie University · *f*

WILLARD PETERSON
Chinese Intellectual History
Princeton University · *vs*

JAMES POWERS
Medieval Castile and Aragon - Military-Urban Art
College of the Holy Cross · *s*

SUSAN RAMIREZ
Andean History and Ethnohistory
DePaul University

CLAUDIA RAPP
Late Antiquity
University of California, Los Angeles

AMY REMENSNYDER
Medieval Europe and Latin America
Brown University

DWIGHT REYNOLDS
Arabic Literature, Folklore and Ethnomusicology
University of California, Santa Barbara

GEOFFREY RICKMAN
Roman Social and Economic History
University of St. Andrews · *s*

ERIKA RUMMEL
Renaissance and Reformation History
Wilfrid Laurier University · *vs*

HAYAT SALAM-LIEBICH
Architectural History
Geneva · *vf*

ALEXANDER SEDOV
Oriental Archaeology and Numismatics
Institute of Oriental Studies, Russian Academy of
Sciences

JANE SHARP
Twentieth-Century Art, Russian Modernism
University of Maryland, College Park

HENDRIK SPRUYT
Political Science, International Relations
Columbia University

MARIA SUBTELNY
Social and Economic History of Medieval Iran and
Central Asia
University of Toronto · *s*

DANIEL SZECHI
British History
Auburn University · *s*

GLEN VAN BRUMMELEN
History of Mathematics
The King's University College · *vf*

LEE WANDEL
Reformation
Yale University

ROB WEGMAN
Music History, Middle Ages
Princeton University · *vf*

f First Term · *s* Second Term | *v* Visitor · *a* Research Assistant

THE SCHOOL OF HISTORICAL STUDIES

RECORD OF EVENTS

The following is a calendar of events sponsored by
the School of Historical Studies

Academic Year 1997-98

October 1
Seminar: "Hadrian and the Poets"
EWEN BOWIE, *Corpus Christi College,*
Oxford University

Historical Studies Colloquium: "The Best
Way to Build a City"
LOTHAR HASELBERGER, *University of*
Pennsylvania

October 8
Historical Studies Colloquium: "Poetry and
Autobiography in the Babur-nama"
STEPHEN DALE, *Ohio State University*

Seminar on Historical Thought in Spain and
Spanish America: Discussion Group
SABINE MacCORMACK, *Visiting Mellon*
Professor, School of Historical Studies, Institute
for Advanced Study

October 15
Historical Studies Colloquium: "The Body in
the Eucharist"
LEE WANDEL, *Yale University*

October 19
Convivium Burckhardteanum
Chair: WILLIAM JORDAN,
Princeton University
"Jacob Burckhardt on the Study of Medieval
History"
PETER GANZ, *Oxford University*
"Burckhardt's Perspectives on Late Antiquity
from the *Konstantin* to the *Griechische*
Kulturgeschichte: Implications for Current
Scholarship"
GLEN BOWERSOCK, *Professor, School of*
Historical Studies, Institute for Advanced Study
"The New Burckhardt Edition"
ANDREAS CESANA, *Universität Mainz;*
Burckhardt Stiftung, Basel

"Images of Self: Burckhardt and Individuality"
JOACHIM WEINTRAUB, *University of*
Chicago

October 20
Weekly Informal Art History Colloquium:
"Russian Modernism"
JANE SHARP, *University of Maryland,*
College Park

October 22, 1998
Historical Studies Colloquium: "The Counter-
Reformation in France: A Counterculture?"
BARBARA DIEFENDORF, *Boston University*

Seminar on Historical Thought in Spain and
Spanish America: Discussion Group
SABINE MacCORMACK, *Visiting Mellon*
Professor, School of Historical Studies, Institute
for Advanced Study

October 23
Historical Studies Colloquium: "Beautiful
Deformities: Metamorphoses of the Body in
Romanesque Art"
THOMAS DALE, *Columbia University*

October 27
Weekly Informal Art History Colloquium:
"Medieval Drinking Horns"
CAROL NEUMAN de VEGVAR, *Wesleyan*
University

October 28
Medieval Seminar: Discussion of three papers
given in the School of Historical Studies
Colloquia Series:
"The Body in the Eucharist"
LEE WANDEL, *Yale University*
"The Counter-Reformation in France:
A Counterculture?"

BARBARA DIEFENDORF, *Boston University*
"Beautiful Deformities: Metamorphoses of the
Body in Romanesque Art"
THOMAS DALE, *Columbia University*

October 29
Historical Studies Colloquium: "Roman Law
and Jewish Matrilineage"
JOSEPH MÉLÈZE MODRZEJEWSKI,
La Sorbonne

October 30
Historical Studies Colloquium: "History,
Literature and Diplomacy: Virgilio Malvezzi
(1595-1654), an Italian at the Court of Philip
IV of Spain"
JOSÉ COLOMER, *Université de Lyon II*

November 3
Weekly Informal Art History Colloquium:
"Eighteenth-Century Sculpture in Rome"
VERNON MINOR, *University of Colorado*

November 5
Historical Studies Colloquium: "Varieties of
Medieval Religious Experience: Revivalism"
GARY DICKSON, *University of Edinburgh*

Seminar on Historical Thought in Spain and
Spanish America: Discussion Group
SABINE MacCORMACK, *Visiting Mellon
Professor, School of Historical Studies, Institute
for Advanced Study*

November 6
Historical Studies Colloquium: "Mary and
Mosques: The Conversion of Religious Space
on the Medieval Spanish Frontier"
AMY REMENSNYDER, *Brown University*

Informal Seminar: "Circus Magic in Late
Antiquity"
Guest speaker: FLORENT HEINTZ, *Harvard
University*

November 10
Weekly Informal Art History Colloquium:
"Piero della Francesca"
MARILYN AARONBERG LAVIN, *Princeton
University*

November 12
Historical Studies Colloquium: "Myth, history
and reason in Ancient Greece: the rhetorical
logic of Isocrates"
CLAUDE CALAME, *University of Lausanne*

November 17
Weekly Informal Art History Colloquium:
"Sacrament in the Reformation"
LEE WANDEL, *Yale University*

November 18
Medieval Seminar: Discussion of two papers
given in the School of Historical Studies
Colloquia Series:
"Varieties of Medieval Religious Experience:
Revivalism"
GARY DICKSON, *University of Edinburgh*
"Mary and Mosques: The Conversion of
Religious Space on the Medieval Spanish
Frontier"
AMY REMENSMYDER, *Brown University*

November 19
Historical Studies Colloquium: "Attitudes
Toward Work in Soviet Russia"
NORMAN PEREIRA, *Dalhousie University*

Seminar on Historical Thought in Spanish
America: Discussion Group
SABINE MacCORMACK, *Visiting Mellon
Professor, School of Historical Studies, Institute
for Advanced Study*

November 24
Weekly Informal Art History Colloquium:
"Cross of St. Cuthbert"
EMILY ROSE, *Princeton University*

November 26
Historical Studies Colloquium: "Prosperity
and Hard Times: Warfare and the Debate
Over the Economy of Renaissance Italy"
WILLIAM CAFFERO, *University of Tulsa*

December 1
Weekly Informal Art History Colloquium:
"Post-Revolutionary Parisian Monuments"
NEIL McWILLIAM, *University of East Anglia*

December 3
Historical Studies Colloquium: "Early South
Arabian Coinage"
ALEXANDER SEDOV, Russian Academy of
Sciences

Seminar on Historical Thought in Spain and
Spanish America: Discussion Group
SABINE MacCORMACK, Visiting Mellon
Professor, School of Historical Studies, Institute
for Advanced Study

December 4-6
Understanding Nationalism Workshop:
"A Survey of Nationalism in the Field"
Chair/Discussant: CLIFFORD GEERTZ,
Professor, School of Social Science, Institute for
Advanced Study
Panelists: RONALD SUNY, University of
Chicago
BRENDAN O'LEARY, University of London
GALINA SAROVOITOVA, Russian Duma
LIAH GREENFIELD, Boston University
"A Survey of State-Building and Nation-
Building"
Chair/Discussant: ROMAN SZPORLUK,
Harvard University
Panelists: ANDRÉ LIEBICH, Graduate
Institute of International Studies, Geneva
IAN LUSTICK, University of Pennsylvania
DAVID CROWE, Elon College
Rapporteur: CHARLES KING, Georgetown
University
"National Conflict in the Post-Communist
Regions"
Chair/Discussant: DANIEL C.
MATUSZEWSKI, International Research and
Exchanges Board
Panelists: MARK BEISSINGER, University of
Wisconsin
MICHAEL RYWKIN, City College of
New York
GEORGE KHUTSISHVILI, International
Center on Conflict and Negotiation, Tblisi
Rapporteur: DONALD ROTHCHILD,
University of California, Davis
"Characterizing Nationalism"
Chair/Discussant: ALEXANDER MOTYL,
Columbia University
Panelists: IAN BREMMER, Association for the
Study of Nationalities

RENÉO LUKIC, Université Laval
ADRIAN KARATNYCKY, Freedom House
SHEILA CROUCHER, Miami University
Rapporteur: LOWELL BARRINGTON,
Marquette University
"Implications for Future Research in
Academic & Policymaking Communities"
Moderators: JACK MATLOCK, Professor,
School of Historical Studies, Institute for
Advanced Study
IAN BREMMER, Association for the Study of
Nationalities
Panelists: GEORGE KOLT, National
Intelligence Council
WILLIAM COURTNEY, National Security
Council
DONALD ROTHCHILD, University of
California, Davis
CHARLES KING, Georgetown University
DOMINIQUE AREL, Brown University
LOWELL BARRINGTON, Marquette
University

December 10
Historical Studies Colloquium: "Russian
Encyclopedic and Information Books on the
United States and Russian-American
Relations"
EDWARD IVANIAN, Russian Academy of
Sciences

December 13
Meeting of The Delaware Valley Medieval
Association
"The Carolingians at War: Some Observa-
tions on the Military Demography of
Charlemagne's Armies"
BERNARD BACHRACH, University of
Minnesota
"Drinking Horns and Social Discourse in the
Early Medieval British Isles"
CAROL NEUMAN de VEGVAR, Wesleyan
University
"Latin and Oriental Christians in the Frank-
ish Levant"
BENJAMIN KEDAR, The Hebrew University
of Jerusalem

December 16

Medieval Seminar: Discussion of the paper given in the School of Historical Studies Colloquia Series
"Prosperity and Hard Times: Warfare and the Debate Over the Economy of Renaissance Italy"
WILLIAM CAFERRO, University of Tulsa

December 17

Historical Studies Colloquium: "Holy Bishops in Late Antiquity"
CLAUDIA RAPP, University of California, Los Angeles

Seminar on Historical Thought in Spain and Spanish America: Discussion Group
SABINE MacCORMACK, Visiting Mellon Professor, School of Historical Studies, Institute for Advanced Study

January 7

Historical Studies Colloquium: "Cam Ye O'er Frae France?: Exile and the Mind of Scottish Jacobitism, 1716-27"
DANIEL SZECHI, Auburn University

Seminar on Historical Thought in Spain and Spanish America: Discussion Group
SABINE MacCORMACK, Visiting Mellon Professor, School of Historical Studies, Institute for Advanced Study

January 14

Historical Studies Colloquium: "Arcadian Power: the Politics of Taste in Early Eighteenth-Century Rome"
VERNON MINOR, University of Colorado

January 15

Historical Studies Colloquium: "Arches and the Significance of their Use"
JOACHIM GANZERT, Fachhochschule Biberach/Rib Germany

January 19

Seminar on Warfare: Preliminary Meeting
PATRICIA CRONE, Professor, School of Historical Studies, Institute for Advanced Study

Weekly Informal Art History Colloquium:
"Betty Boop"
IRVING LAVIN, Professor, School of Historical Studies, Institute for Advanced Study

January 21

Historical Studies Colloquium: "Commemoration and the Politics of Iconoclasm: The Battle over Les Statues Dreyfusardes, 1908-1910"
NEIL McWILLIAM, University of East Anglia

Seminar on Historical Thought in Spain and Spanish America: Discussion Group
SABINE MacCORMACK, Visiting Mellon Professor, School of Historical Studies, Institute for Advanced Study

January 22

Historical Studies Colloquium: "Air Photography and Roman Archaeology in the Holy Land"
BENJAMIN ISAAC, Tel Aviv University

January 28

Historical Studies Colloquium: "The Municipal Judicial Duel as a Frontier Attribute: The Case of Twelfth Century Iberia"
JAMES POWERS, College of the Holy Cross

January 29

Historical Studies Colloquium: "Some observations on the historians craft with apologies to Marc Bloch"
BERNARD BACHRACH, University of Minnesota

February 2

Seminar on Warfare
PETER PARET, Professor Emeritus, School of Historical Studies, Institute for Advanced Study

Weekly Informal Art History Colloquium:
"Medieval Monsters"
THOMAS DALE, Columbia University

February 4

Historical Studies Colloquium: "The Beggars' Body: Intersections of Gender and Social Status in High Medieval Paris"
SHARON FARMER, University of California, Santa Barbara

Seminar on Historical Thought in Spain and Spanish America: Discussion Group
SABINE MacCORMACK, *Visiting Mellon Professor, School of Historical Studies, Institute for Advanced Study*

February 10

Medieval Seminar: Discussion of three papers given in the School of Historical Studies Colloquia series: "Some observations on the historians craft with apologies to Marc Bloch"
BERNARD BACHRACH, *University of Minnesota*
"The Beggars' Body: Intersections of Gender and Social Status in High Medieval Paris"
SHARON FARMER, *University of California, Santa Barbara*
"The Municipal Judicial Duel as a Frontier Attribute: The Case of Twelfth Century Iberia"
JAMES POWERS, *College of the Holy Cross*

February 11

Historical Studies Colloquium: "The Ebb of Empire: The Peaceful Dissolution of the USSR in Comparative Perspective"
HENDRIK SPRUYT, *Columbia University*

February 16

Seminar on Warfare
BERNARD BACHRACH, *University of Minnesota*

February 18

Historical Studies Colloquium: "Evolving Selves: Arabic and European Autobiographical Traditions Compared"
DWIGHT REYNOLDS, *University of California, Santa Barbara*

Seminar on Historical Thought in Spanish America: "The Huarochiri Manuscript"
FRANK SALOMON, *University of Wisconsin*

February 20-21

Islamic Seminar: "Geometry, Art and Culture"
Speakers: YVONNE DOLD-SAMPLONIUS, *University of Heidelberg*
DIMITRI GUTAS, *Yale University*
S. NOMAN-UL HAQ, *Rutgers University*
DAVID KING, *University of Frankfurt*

ALPAY ÖZDURAL, *Easter Mediterranean University, Northern Cyprus*
Respondents: ABDELHAMID SABRA, *Harvard University*
GÜLRÜ NECIPOGLU, *Harvard University*

February 24

Medieval Seminar: "The Enigma of Mounted Archery in Medieval Iberia and the West: A Problem in the Ambiguity of Artistic and Documentary Evidence"
JAMES POWERS, *College of the Holy Cross*

February 25

Historical Studies Colloquium: " 'You spread too much canvas.': The Balance of Trade as an Extension of Reasons of State"
JONATHAN HASLAM, *Cambridge University*

March 2

Seminar on Warfare
DANIEL SZECHI, *Auburn University*

March 4

Historical Studies Colloquium: "Eighteenth-Century Compilations of Travel Accounts: Colonial Spanish America and the History of Objectivity"
JORGE CAÑIZARES-ESGUERRA, *Illinois State University*

Seminar on Historical Thought in Spain and Spanish America: Discussion Group
SABINE MacCORMACK, *Visiting Mellon Professor, School of Historical Studies, Institute for Advanced Study*

March 10

Medieval Seminar: "From Sanctum Sepulchrum to Ecclesia Sanctae Resurrectionis: The Possible Meanings of a Major Frankish Change"
BENJAMIN KEDAR, *The Hebrew University of Jerusalem*

March 11

Historical Studies Colloquium: "The Fateful Alliance: The German Educated Elite and National Socialism"
HERMANN BECK, *University of Miami*

March 16
Weekly Informal Art History Colloquium:
"Jubilee of 1300"
GARY DICKSON, University of Edinburgh

March 18
Historical Studies Colloquium: "Czartoryski
and the case for Polish Statehood"
ANDRÉ LIEBICH, Graduate Institute of
International Studies, Geneva

Seminar on Warfare
JAMES POWERS, College of the Holy Cross

Seminar on Historical Thought in Spain and
Spanish America: Discussion Group
SABINE MacCORMACK, Visiting Mellon
Professor, School of Historical Studies, Institute
for Advanced Study

March 19
Historical Studies Colloquium: "A Meeting
Between Mathematicians and Artisans in
Tenth Century Baghdad"
ALPAY ÖZDURAL, Eastern Mediterranean
University, Northern Cyprus

March 20-21
Islamic Seminar: "Timurid Culture"
Speakers: STEPHEN DALE, Institute for
Advanced Study (Ohio State University)
ROBERT McCHESNEY, New York University
CHARLES MELVILLE, Princeton University
and Cambridge University
DAVID MORGAN, Dartmouth College and
University of London
PRISCILLA SOUCEK, New York University
MARIA SUBTELNY, Institute for Advanced
Study (University of Toronto)
Respondents: THOMAS LENTZ, Freer
Gallery of Art
RENATA HOLOD, University of Pennsylvania
PETER GOLDEN, Rutgers University

March 24
Medieval Seminar: "Twelfth-Century Castles
and the Architecture of Romance"
OLGA GRLIC, Independent Scholar

March 25
Historical Studies Colloquium: "Roman
Mining in Illyricum"
SLOBODAN DUŠANIĆ, Belgrade University

March 26
Historical Studies Colloquium: "A Quick Trip
Through Space-Time and the Geometrization
of Physics: from B. Riemann to H. Weyl and
Beyond. Some Historical and Epistemological
Reflections."
LUCIANO BOI, Université du Quebec

April 1
Historical Studies Colloquium: "'Futurism and
Blasphemy': Varieties of the Mondernist
informe in Late Imperial Russia"
JANE SHARP, University of Maryland,
College Park

Seminar on Warfare
WILLIAM CAFERRO, University of Tulsa

Seminar on Historical Thought in Spanish
America: "Giovanni Botero, Reason of State"
ANTHONY PAGDEN, Johns Hopkins
University

April 7
Medieval Seminar: "The Taxes of the Papal
Penitentiary, 1338-1569"
WOLFGANG MÜLLER, Institute for
Advanced Study

April 24-25
Islamic Seminar: "State and Culture in Early
Islamic Times"
Speakers: FRANÇOIS DÉROCHE, Ecole des
Hautes Etudes, Paris
DIMITRI GUTAS, Yale University
NUHA KHOURY, University of California,
Santa Barbara
EVERETT ROWSON, University of
Pennsylvania
Respondents: GLEN BOWERSOCK, Profes-
sor, School of Historical Studies, Institute for
Advanced Study
PATRICIA CRONE, Professor, School of His-
torical Studies, Institute for Advanced Study
FRANZ ROSENTHAL, Yale University
BABER JOHANSEN, Ecole des Hautes
Etudes, Paris

THE SCHOOL OF MATHEMATICS

Faculty

ENRICO BOMBIERI, *IBM von Neumann Professor*
JEAN BOURGAIN
PIERRE DELIGNE
ROBERT P. LANGLANDS, *Hermann Weyl Professor*
ROBERT D. MacPHERSON
THOMAS SPENCER

Professors Emeriti

ARMAND BOREL
ATLE SELBERG
ANDRÉ WEIL
(deceased August 6, 1998)

ACADEMIC ACTIVITIES

The largest program in the School of Mathematics for the 1997-98 academic year was the special year in geometric partial differential equations. This program was conducted by the School's Distinguished Visiting Professor, K. Uhlenbeck (The University of Texas at Austin), C.-L. Terng (Northeastern University), and J. Bourgain. Geometric partial differential equations is an interdisciplinary subject, touching on analysis, differential geometry, and topology. There were participants from each of these fields.

The program ran the whole year, and it consisted of two weekly seminars and a series of short courses. The first seminar was in geometric partial differential equations. It included talks by members in residence and invited speakers from outside. In the fall the main subject was wave phenomena; it included several lectures by J. Bourgain. During the spring the seminar emphasized gauge theory and Floer theory. The second seminar was on integrable systems. It was designed to give a good overview of the subject with speakers from both the analytic and the algebraic camps. Speakers were encouraged to give a one-hour expository talk and then follow it up by another hour of technical details. During the fall term a course on integrable systems was held. R. Palais started by giving some basic lectures; later lecturers included visitors N. Hitchin, D. Sattinger and members P. Miller, C.-L. Terng, K. Uhlenbeck. The course incorporated points of view, from applied mathematics, through algebraic geometry, analysis and geometry. It was very well attended, especially by Princeton students. Published notes for it are expected.

During the spring term a series of talks in mathematical physics was given primarily by D. Freed, who gave and wrote up his "Five lectures on supersymmetry." Talks were also given by P. Deligne and E. Witten.

This was the second year of the three-year program on "Algebraic and Geometric Aspects of Quantum Field Theory and Gauge Theory" run jointly with the School of Natural Sciences by Pierre Deligne and Edward Witten. Over the past few years the theoretical physics community has produced a number of remarkable mathematical conjectures. The aim of this program is for mathematicians to learn the physicists' thought processes that lead to these conjectures. The lecture series begun last year was continued in the form of monthly one-day meetings so that out-of-town participants, including P. Etingof, D. Kazhdan, J. Morgan, and D. Morrison, could conveniently attend. In addition, D. Freed was in residence for the year leading the team that is preparing the lecture notes for publication. Preliminary versions of these lecture notes have been available on the Institute's web site and are being used by mathematicians worldwide as a unique source for this material.

This program was made possible by grants from the National Science Foundation, the J. Seward Johnson Sr. Charitable Trusts, the Harmon Duncombe Foundation, and the Friends of the Institute for Advanced Study.

In the fall, M. Aizenman (Princeton) and D. Fisher (Harvard) joined R. Langlands and T. Spencer to create a small program in two-dimensional statistical mechanics. The participants of the program came from pure mathematics (H. Pinson), combinatorics (D. Wilson) and physics (J. Kondev). Critical phenomena, percolation, dimers, random surfaces and random media were the main topics of discussion from both mathematical and physical perspectives.

The activity in combinatorics and computer science was made possible by grants from the Alfred P. Sloan Foundation, the State of New Jersey and Institute Trustee Ladislaus von Hoffmann.

The leaders of the group of six members in these two areas were A. Wigderson for Term I and Noga Alon for Term II. M. Krivelevich was the recipient of a two-year joint IAS-DIMACS fellowship.

In addition to the traditional weekly seminar on these topics, which was well-attended with participants from Princeton University, Rutgers University and DIMACS, there were two mini-courses in the fall, one by D. Aharonov on the topic "Quantum Computation" and another by A. Wigderson on "Computational Pseudo-Randomness."

N. Alon also organized a workshop on "Probabilistic Methods in Discrete Mathematics."

Topics of research included quantum communication and computation, construction of polynomial-time algorithms arising from problems in statistics, imaging and engineering, extremal graph theory, probability methods in combinatorics with applications to mathematical physics, and algebraic combinatorics.

The twenty-fourth Hermann Weyl Lectures were given by Noam Elkies of Harvard University during March 18-25. The subject was "Curves and Representations of Finite Groups." These lectures included an account of Elkies remarkable examples of lattices with interesting symmetry groups.

The twenty-first Marston Morse Memorial Lectures were given by Victor Guillemin of MIT during January 19-22. The title was "Reduced Symplectic Manifolds and Morse Theory." The theme of these lectures was various forms of the "quantization commutes with symplectic reduction" principle, originally introduced by Guillemin and S. Sternberg.

Much of the academic activity of the School of Mathematics revolves around discussions and collaborations among the members and with the faculty. The School has several mechanisms designed to encourage these interactions. One is the traditional "Members Seminar" at which members give talks on their current work. This year, in addition, there were a series of short talks during the first week of the fall term by the postdoctoral members discussing their research interests.

In August 1997 Robert MacPherson became Chair of the National Research Council's Board on Mathematical Sciences.

THE SCHOOL OF MATHEMATICS

MEMBERS AND VISITORS

MICHAEL AIZENMAN
Mathematical Physics
Princeton University

NOGA ALON
Combinatorics and Theoretical Computer Science
Tel Aviv University, Israel · s

MARTIN ANDLER
Representation Theory of Lie Groups
Université de Versailles Saint Quentin, France · vs

ERIC BABSON
Combinatorics
Mathematical Sciences Research Institute

ROBERT BAUER
Yang-Mills Theory
University of Illinois at Urbana-Champaign

ALEXANDER BEILINSON
Algebraic Geometry
Massachusetts Institute of Technology · v

MICHAEL BENNETT
Diophantine Approximations; Analytic Number Theory
University of Michigan

JOSEPH BERNSTEIN
Representation Theory and Algebraic Geometry
Tel Aviv University, Israel · f

ROMAN BEZRUKAVNIKOV
Representation Theory; D-modules
Tel Aviv University, Israel

DANIELLE CARR
Computational Fluid Dynamics
Bryn Mawr College

SUN-CHIN CHU
Differential Geometry
University of Minnesota

MIHAI CIUCU
Combinatorics
Mathematical Sciences Research Institute

JEANNE CLELLAND
Exterior Differential Systems
Duke University

BRIAN CONRAD
Elliptic Curves and Galois Representations
Princeton University

PIETRO CORVAJA
Diophantine Approximations
Università di Udine, Italy

GOTTFRIED CURIO
Mathematical Physics
Humboldt Universität Berlin, Germany · j

GEORGIOS DASKALOPOULOS
Mathematical Physics
Brown University

VLADIMIR DRINFELD
Automorphic Forms, Mathematical Physics
Institute of Low Temperatures (FTINT), Ukraine · s

JAN-HENDRIK EVERTSE
Diophantine Approximations
University of Leiden, The Netherlands · f

GREGORY FALKOVICH
Theory of Turbulence
Weizmann Institute · jf

ROBERTO FERRETTI
Arithmetic Geometry; Diophantine Approximations
Institut des Hautes Études Scientifiques, France · f

DANIEL FISHER
Statistical Physics
Harvard University · jf

f First Term · s Second Term · v Visitor
j Joint Appointment with School of Natural Sciences

DANIEL FREED
Geometry and Quantum Field Theory
University of Texas, Austin · j

EHUD FRIEDGUT
Combinatorics
Hebrew University of Jerusalem, Israel · f

TEPPER GILL
Mathematical Physics
Howard University

ALEXEI GLUTSUK
Ordinary Differential Equations
Independent University of Moscow, Russia · s

SONIA GOMES
Partial Differential Equations
Universidade Estadual de Campinas, Brazil

MARK GORESKY
Geometry and Automorphic Forms
Institute for Advanced Study

SIGURDUR HELGASON
Integral Geometry and Invariant Differential Operators
Massachusetts Institute of Technology · s

WERNER HOFFMANN
Automorphic Forms; Trace Formula
Humboldt Universität, Germany

LUCAS HSU
Differential Geometry and Calculus of Variations
University of Arizona · vs

DMITRY JAKOBSON
Quantum Chaos; Graph Theory
California Institute of Technology

SPYRIDON KAMVISSIS
Integrable Systems
Institute Henri Poincaré, France · vf

VITALI KAPOVITCH
Differential Geometry
University of Maryland

BORIS KHESIN
Poisson Geometry; Hydrodynamics
University of Toronto, Canada

MIKHAIL KHOVANOV
Quantum Groups; Low Dimensional Topology
Yale University

JULEE KIM
Representation Theory; Automorphic Forms
Yale University

JANÉ KONDEV
Statistical Physics
Brown University

MICHAEL KRIVELEVICH
Probabilistic Combinatorics; External Graph Theory
Tel Aviv University, Israel

TIAN-JUN LI
Seiberg-Witten Theory, Symplectic Manifolds
Yale University

ZHENGYU MAO
Automorphic Forms and Trace Formula
Ohio State University

GREG MARTIN
Sieve Methods
University of Michigan

PETER MILLER
Integrable Nonlinear Systems
The Australian National University, Australia

ROBERT MILSON
Systems of Partial Differential Equations
McGill University, Canada · f

MICHAEL MOVSHEV
Representation Theory and Symplectic Geometry
University of Pennsylvania · s

ANDREA NAHMOD
Harmonic Analysis and Partial Differential Equations
University of Texas, Austin

LUIS NARVÁEZ-MACARRO
D-module Theory
Universidad de Sevilla, Spain

ANDREW NICAS
K-theory; Algebraic and Geometric Topology
McMaster University, Canada · s

PETER OZSVATH
Gauge Theory in Dimensions Three and Four
California Institute of Technology

RICHARD PALAIS
Mathematical Visualization
Brandeis University

HUA PENG
Mathematical Physics; Integrable Systems
Brandeis University

HARU PINSON
Mathematical Physics
Kyoto University, Japan

DANIEL POLLACK
Differential Geometry and Nonlinear Partial Differential Equations
University of Washington · f

VLADIMIR PROTASOV
Convex Analysis
Moscow University, Russia · s

T. BENNY RUSHING
Geometric Topology, Dynamical Systems
University of Utah · v

PAUL SEIDEL
Floer Homology; Symplectic Geometry
Oxford University, England

RUDOLF SEILER
Mathematical Physics
Technische Universität Berlin, Germany · f

SAVDEEP SETHI
Mathematical, Particle Physics
Institute for Advanced Study · j

CHRISTOPHER SKINNER
Number Theory
Princeton University

STANISLAV SMIRNOV
Complex and Harmonic Analysis; Dynamical Systems
California Institute of Technology · s

ERIC SOMMERS
Representation Theory
Massachusetts Institute of Technology

ALEXANDER SOSHNIKOV
Random Matrices
Princeton University · f

DAVID STUART
Mathematical Physics
University of California, Davis · s

HSUAN-WEN SU
Mathematical Physics and Dynamical Systems
Brown University

TOSHIAKI SUZUKI
Metaplectic Forms
Ryukyu University, Japan · s

TIBOR SZABÓ
Extremal Combinatorics
University of Illinois at Urbana-Champaign · s

YUNG-SHENG TAI
Algebraic Geometry
Haverford College · v

JANET TALVACCHIA
Geometric Analysis
Swarthmore College

CHUU-LIAN TERNG
Geometry and Hamiltonian Systems
Northeastern University

LUBOS THOMA
Combinatorics and Quantum Groups
Rutgers University

RICHARD THOMAS
Geometry, Gauge Field Theories
University of Oxford, England

GANG TIAN
Differential Geometry
Massachusetts Institute of Technology · s

KAREN UHLENBECK
Nonlinear Partial Differential Equations
University of Texas, Austin · dvp

WEI-MIN WANG
Mathematical Physics
Orsay University, France · vf · s

AVI WIGDERSON
Combinatorics and Discrete Probability
The Hebrew University, Israel · f

ANDREW WILES
Algebraic Number Theory
Princeton University · s

ROBERT WILLIAMS
Dynamical Systems; Symbolic Dynamics
University of Texas, Austin

DAVID WILSON
Discrete Probability
Massachusetts Institute of Technology

OLEG ZABORONSKY
Quantum Field Theory
University of California, Davis

YI ZHOU
Partial Differential Equations
Fudan University, P.R.China · f

THE SCHOOL OF MATHEMATICS

RECORD OF EVENTS

The following is a calendar of events sponsored by
the School of Mathematics

Academic Year 1997-98

September 24
Quantum Field Theory Seminar: "Supersymmetric
Quantum Mechanics"
DAVID KAZHDAN, *Institute for Advanced Study*

Princeton/IAS/Rutgers Harmonic Analysis and
Number Theory Seminar: "Heights and Discreteness"
LUCIEN SZPIRO, *Institute for Advanced Study*

September 25
Quantum Field Theory Seminar: "Introduction to
Supergravity"
EDWARD WITTEN, *Professor, School of Natural Sci-
ences, Institute for Advanced Study*

Quantum Field Theory Seminar: "Introduction to
Monopoles"
JOHN MORGAN, *Columbia University*

September 29
Combinatorics, Complexity and Discrete Probability
Seminar: "Finding a Large Hidden Clique in a
Random Graph"
MICHAEL KRIVELEVICH, *Institute for Advanced
Study*

October 1
Geometric Partial Differential Equations Seminar:
"A Comparison of Techniques in Nonlinear Elliptic
and Hyperbolic Equations"
KAREN UHLENBECK, *Institute for Advanced Study*

October 2
Number Theory/Representation Theory Seminar:
"Weighted Orbital Integrals on the Real Rank 1
Groups"
WERNER HOFFMANN, *Institute for Advanced Study*

October 3
Integrable Systems Seminar: "The Logarithm of the
Derivative Operator and Universal KP-KdV-NLS
Hierarchy"
BORIS KHESIN, *Institute for Advanced Study*

October 6
Mini Course on Computational (Pseudo)
Randomness
AVI WIGDERSON, *Institute for Advanced Study*

Combinatorics, Complexity and Discrete Probability
Seminar: "An Efficient Quantum Algorithm for
Simulating Ferromagnetic Ising Systems"
UMESH VAZIRANI, *University of California, Berkeley*

October 7
Members Seminar: "The Quantum Hall Effect, an
Example of Geometry in Quantum Physics"
RUDOLPH SEILER, *Institute for Advanced Study*

October 8
Number Theory/Representation Theory Seminar:
"Galois Representations for Non-experts"
CHRISTOPHER SKINNER, *Institute for Advanced
Study*

Geometric Partial Differential Equations Seminar:
"The Harnack Estimate for the Ricci Flow on a
Surface"
SUN-CHIN CHU, *Institute for Advanced Study*

October 9
Statistical Mechanics Seminar: "Numerical
Experiments for Percolation and the Ising Model:
Purpose and Results"
ROBERT LANGLANDS, *Institute for Advanced
Study*

October 10
Integrable Systems Seminar: "Some Elements of
Integrable Systems: Equation Hierarchies and Exact
Solutions"
PETER MILLER, *Institute for Advanced Study*

October 13
Combinatorics, Complexity and Discrete Probability
Seminar: "Sampling from a Convex Body"
LASZLO LOVASZ, *Yale University*

Mini Course on Computational (Pseudo) Randomness
AVI WIGDERSON, *Institute for Advanced Study*

Turbulence Theory Seminar: "An Overview of the Present State of Turbulence Theory"
GREGORY FALKOVITCH, *Institute for Advanced Study*

Special Seminar: "Renormalization of Gauge Theories"
PAVEL ETINGOF, *Harvard University*

October 14
Quantum Field Theory Group Seminar: "Remarks on Dimensional Reduction"
EDWARD WITTEN, *Professor, School of Natural Sciences, Institute for Advanced Study*

Quantum Field Theory Group Seminar: "The Existence of Zero-brane Bound States"
SAVDEEP SETHI, *Institute for Advanced Study*

Quantum Field Theory Group Seminar: "BPS and All That"
DAVID MORRISON, *Duke University*

Members Seminar: "Supersymmetry and Localization"
OLEG ZABORONSKY, *Institute for Advanced Study*

October 15
Special Seminar: "Physics, Computational Complexity and Logic I, II"
MICHAEL FREEDMAN, *Microsoft Corporation*

Number Theory/Representation Theory Seminar: "The Quantitative Subspace Theorem: An Overview"
JAN-HENDRIK EVERTSE, *Institute for Advanced Study*

Geometric Partial Differential Equations Seminar: "A Survey of Results on the Caudry Problem for the Nonlinear Schroedinger Equation"
JEAN BOURGAIN, *Professor, School of Mathematics, Institute for Advanced Study*

October 16
Special Seminar: "Physics, Computational Complexity and Logic I, II (conclusion)"
MICHAEL FREEDMAN, *Microsoft Corporation*

Statistical Mechanics Seminar: "An Introduction to Percolation Models and their Continuum Limits"
MICHAEL AIZENMAN, *Institute for Advanced Study*

Expository Lecture Series in Geometry: "An Introduction to the Theory of Integrable Wave Equations, I"
RICHARD PALAIS, *Institute for Advanced Study*

Princeton/IAS/Rutgers Harmonic Analysis and Number Theory Seminar: "Modularity of the Rankin-Selberg Convolutions and Applications"
DINAKAR RAMAKRISHNAN, *California Institute of Technology*

October 17
Integrable Systems Seminar: "Hamiltonian Theory of Soliton Equations"
IGOR KRICHEVER, *Columbia University*

October 21
Members Seminar: "'Characters' of Non-admissible Representations of p-adic Groups on Elliptic Elements and Euler Characteristics"
ROMAN BEZRUKAVNIKOV, *Institute for Advanced Study*

October 22
Number Theory/Representation Theory Seminar: "Linear Equations with Unknowns from a Finitely Generated Multiplicative Group"
JAN-HENDRIK EVERTSE, *Institute for Advanced Study*

Geometric Partial Differential Equations Seminar: "Asymptotics, Pohozaev Invariants and Singular Yamabe Metrics"
DAN POLLACK, *Institute for Advanced Study*

October 23
Expository Lecture Series in Geometry: "An Introduction to the Theory of Integrable Wave Equations, II"
RICHARD PALAIS, *Institute for Advanced Study*

Statistical Mechanics Seminar: "Random Walks, Random Environments and Random Ising Models"
DANIEL FISHER, *Institute for Advanced Study*

October 24
Integrable Systems Seminar: "Hyperkahler Metrics on Cotangent Bundles"
NIGEL HITCHIN, *Oxford University*

October 27
Mini Course on Computational (Pseudo) Randomness
AVI WIGDERSON, *Institute for Advanced Study*

Combinatorics, Complexity and Discrete Probability Seminar: "Characterizing Limit Probabilities"
LUBOS THOMA, *Institute for Advanced Study*

Turbulence Theory Seminar: "Probability Density and Scaling Exponents of the Moments of Longitudinal Velocity Difference in Strong Turbulence"
VICTOR YAKHOT, *Princeton University*

October 28
Statistical Mechanics Seminar: "Introduction to Dimers in Two Dimensions"
DAVID WILSON, *Institute for Advanced Study*

Members Seminar: "Convergence of Manifolds with a Lower Curvature Bound"
VITALI KAPOVITCH, *Institute for Advanced Study*

October 29
Number Theory/Representation Theory Seminar: "Galois Representations for Non-experts: Eformations (continued)"
CHRISTOPHER SKINNER, *Institute for Advanced Study*

Geometric Partial Differential Equations Seminar: "Energy Estimates and the Wave Map Problem"
MANOUSSOS GRILLAKIS, *University of Maryland*

October 30
Expository Lecture Series in Geometry: "An Introduction to the Theory of Integrable Wave Equations, III"
RICHARD PALAIS, *Institute for Advanced Study*

Statistical Mechanics Seminar: "Liouville Field Theory of Fluctuating Loops"
JANE KONDEV, *Institute for Advanced Study*

Expository Lecture Series in Geometry: "Periodic Solitons and Pheta Functions"
PETER MILLER, *Institute for Advanced Study*

Princeton/IAS/Rutgers Harmonic Analysis and Number Theory Seminar: "On the Solubility of Diophantine Equations in Many Variables, and New Estimates for Exponential Sums"
TREVOR WOOLEY, *University of Michigan*

October 31
Integrable Systems Seminar: "Riemann-Hilbert Problems and Long Time Asymptotics for Soliton Equations"
SPIROS KAMVISSIS, *Institute for Advanced Study*

November 3
Mini Course on Computational (Pseudo) Randomness
AVI WIGDERSON, *Institute for Advanced Study*

Combinatorics, Complexity and Discrete Probability Seminar: "How Many Triangles Can You Build with a Million Edges?"
EHUD FRIEDGUT, *Institute for Advanced Study*

Expository Lecture Series in Geometry: "Algebraic Curves and Lax Pairs"
NIGEL HITCHIN, *Oxford University*

Quantum Field Theory Seminar: "Remarks on Anomalies"
DAN FREED, *Institute for Advanced Study*

November 4
Statistical Mechanics Seminar: "Introduction to Dimers in Two Dimensions (continued)"
DAVID WILSON, *Institute for Advanced Study*

Quantum Field Theory Seminar: "N = 4 Theories in 4D"
EDWARD WITTEN, *Professor, School of Natural Sciences, Institute for Advanced Study*

Quantum Field Theory Seminar: "Review of 4D N=2 Pure Yang-Mills"
JOHN MORGAN, *Columbia University*

Statistical Mechanics Seminar: "Large Deviations in 1D Asymmetric Exclusion"
BERNARD DERRIDA, *Ecole Normale Supérieure*

Members Seminar: "Diophantine Approximations on Projective Varieties"
ROBERTO FERRETTI, *Institute for Advanced Study*

November 5
Number Theory/Representation Theory Seminar: "Hecke Algebras of Classical Groups Over p-adic Groups and Admissible Representations"
JULEE KIM, *Institute for Advanced Study*

Geometric Partial Differential Equations Seminar: "Regularity and Breakdown in Geometric Field Theories"
SHADI TAHVILDAR-ZADEH, *Princeton University*

November 6
Statistical Mechanics Seminar: "Large Deviations in 1D Asymmetric Exclusion"
BERNARD DERRIDA, *Ecole Normale Supérieure*

Princeton/IAS/Rutgers Harmonic Analysis and Number Theory Seminar: "On the Nature of the Coefficients Occurring in Asymptotic Formulae for Mean Values of L-functions"
BRIAN CONREY, *Oklahoma State University*

November 7
Integrable Systems Seminar: "Differential Reductions in Integrable Systems"
VLADIMIR ZAKHAROV, *University of Arizona*

November 10
Combinatorics, Complexity and Discrete Probability Seminar: "The Computational Complexity of Knot and Link Problems"
JEFFREY LAGARIAS, *AT&T Labs*

Turbulence Theory Seminar: "Non-ergodicity and Critical Phenomena in 2D Decaying Turbulence"
MICHAEL ISICHENKO, *University of California, San Diego*

November 11
Statistical Mechanics Seminar: "Asymptotic Expansions of Matrix Integrals and Ribbon Graphs: A Review"
OLEG ZABORONSKY, *Institute for Advanced Study*

Members Seminar: "Toda Lattice, Matrix Models and Random Matrices"
HUA PENG, *Institute for Advanced Study*

November 12
Number Theory/Representation Theory Seminar: "An Introduction to Faltings' Product Theorem"
ROBERTO FERRETTI, *Institute for Advanced Study*

Geometric Partial Differential Equations Seminar: "Holomorphic Curves and the Hamiltonian Dynamics on Convex Energy Surfaces"
HELMUT HOFER, *Courant Institute*

November 13
Expository Lecture Series in Geometry: "An Introduction to Integrable Wave Equations and Solitons, III: Lax Pairs and Scattering Theory"
RICHARD PALAIS, *Institute for Advanced Study*

Statistical Mechanics Seminar: "Statistics of Compact Polymers: The Liouville Theory Approach"
JANE KONDEV, *Institute for Advanced Study*

Princeton/IAS/Rutgers Harmonic Analysis and Number Theory Seminar: "On a Question of Igusa"
BEN LICHTIN, University of Rochester

November 14
Integrable Systems Seminar: "Integrability Analysis of ODE's Using the Poly-Painleve Test"
RODICA COSTIN, *Math Sciences Research Institute*

November 17
Combinatorics, Complexity and Discrete Probability Seminar: "An Entropy Approach to the Hard-core Model on Bipartite Graphs"
JEFF KAHN, *Rutgers University*

Statistical Mechanics Seminar: "Asymptotic Expansions of Matrix Integrals and Ribbon Graphs: A Review (continued)"
OLEG ZABORONSKY, *Institute for Advanced Study*

Quantum Field Theory Seminar: "T Dualities"
RON DONAGI, *University of Pennsylvania*

November 18
Quantum Field Theory Seminar: "T Duality of Open Strings"
EDWARD WITTEN, *Professor, School of Natural Sciences, Institute for Advanced Study*

Quantum Field Theory Seminar: "Effective Actions and Matrix Theory"
DANIEL KABAT, *Institute for Advanced Study*

Members Seminar: "Folding Paper: The Geometry of Singular, 2-dimensional Metrics"
ROBERT MILSON, *Institute for Advanced Study*

November 19
Number Theory/Representation Theory Seminar: "Mumford's Degree of Contact and Diophantine Approximations"
ROBERTO FERRETTI, *Institute for Advanced Study*

Geometric Partial Differential Equations Seminar: "The Bilinear Hilbert Transform"
MICHAEL LACEY, *Georgia Institute of Technology*

November 20
Expository Lecture Series in Geometry: "An Introduction to Integrable Wave Equations and Solitons, IV: Scattering Theory (Part 2), The Zero Curvature Equation, and the ZS-AKNS Scheme"
RICHARD PALAIS, *Institute for Advanced Study*

Statistical Mechanics Seminar: "Elastic Interface in a Disordered Medium - So Many Shapes, So Little Time"
CHEN ZENG, *Rutgers University*

November 24
Combinatorics, Complexity and Discrete Probability Seminar: "Tic-tac-toe in Higher Dimensions — Problems and Results"
JOZSEF BECK, *Rutgers University*

Mini Course on Quantum Computation: "Algorithms, Error Corrections and Open Questions: First Lecture - Quantum Algorithms"
DORIT AHARONOV, *Institute for Advanced Study*

Turbulence Theory Seminar: "1D Burgers Equation with Random Force as a Model for Hydrodynamic Turbulence"
YAKOV SINAI, Princeton University

November 25
Members Seminar: "De Rham Cohomology and Infinite Order Linear Differential Operators"
LUIS NARVAEZ-MACCARO, Institute for Advanced Study

November 26
Number Theory/Representation Theory Seminar: "Wild Ramification and the Taniyama-Shimura Conjecture"
BRIAN CONRAD, Institute for Advanced Study

December 1
Mini Course on Quantum Computation: "Summary of Framework, Shor's Algorithm and Grover's Algorithm"
DORIT AHARONOV, Institute for Advanced Study

Turbulence Theory Seminar: "Instanton Formalism and Intermittency of Turbulence"
GRISHA FALKOVICH, Institute for Advanced Study

Turbulence Theory Seminar: "Breakdown of Weak Turbulence in Dimension"
V. ZAKHAROV, University of Arizona, Landau

December 3
Number Theory/Representation Theory Seminar: "Trace Formula and Kloosterman Sums"
ZHENGYU MAO, Institute for Advanced Study

Geometric Partial Differential Equations Seminar: "Blow-up for Nonlinear Klein-Gordon; Endpoint Strichartz Estimates"
MARCUS KEEL, University of California, Los Angeles

December 4
Expository Lecture Series in Geometry: "Action-angle Variables and Completely Integrability"
DAVID SATTINGER, University of Minnesota

Princeton/IAS/Rutgers Harmonic Analysis and Number Theory Seminar: "Height Zeta Functions of Algebraic Varieties"
YURI TSCHINKEL, University of Illinois, Chicago

December 5
Integrable Systems Seminar: "Weak vs. Strongly Nonlinear Integrable Systems"
DAVID SATTINGER, University of Minnesota

December 8
Combinatorics, Complexity and Discrete Probability Seminar: "The Discrepancy of Some Square Matrices"
BERNARD CHAZELLE, Princeton University

Mini Course on Quantum Computation: "How to Correct Errors in a Quantum Computer"
DORIT AHARONOV, Institute for Advanced Study

Turbulence Theory Seminar: "Turbulence and Field Theory"
ALEXANDER POLYAKOV, Princeton University

Quantum Field Theory Seminar: "Strings on Orbifolds"
DAVID KAZHDAN, Harvard University

December 9
Quantum Field Theory Seminar: "Branes and Duality"
EDWARD WITTEN, Professor, School of Natural Sciences, Institute for Advanced Study

Quantum Field Theory Seminar: "String Amplitudes and Effective Actions"
DANIEL KABAT, Institute for Advanced Study

Special Statistical Mechanics Seminar: "Critical Temperature Reduction via Dilution in the Potts Model"
KEN ALEXANDER, University of Southern California

December 10
Number Theory/Representation Theory Seminar: "Smooth Values of Polynomials"
GREG MARTIN, Institute for Advanced Study

Geometric Partial Differential Equations Seminar
FRANK MERLE, Rutgers University

Geometric Partial Differential Equations Seminar: "New Results on Global Existence and Scattering for NLS"
JEAN BOURGAIN, Professor, School of Mathematics, Institute for Advanced Study

December 11
Expository Lecture Series in Geometry: "Adler-Kostant-Symes Theorem and Its Applications"
CHUU-LIAN TERNG, Institute for Advanced Study

December 12
Integrable Systems Seminar: "Riemann-Hilbert Problems in Pure and Applied Mathematics"
PERCY DEIFT, New York University

Statistical Mechanics Seminar: "Open Problems in Height Models"
CHRISTOPHER HENLEY, *Cornell University*

December 15
Combinatorics, Complexity and Discrete Probability Seminar: "Sixty Years of Ramsey R(3,k)"
JOEL SPENCER, *Courant Institute*

Expository Lecture Series in Geometry: "Adler-Kostant-Symes Theorem and Its Applications, II"
CHUU-LIAN TERNG, *Institute for Advanced Study*

December 16
Special Seminar: "On Feynman Integrals and Analytic Continuation"
MAXIM KONTSEVICH, *Institut des Hautes Etudes Scientifiques*

December 17
Geometric Partial Differential Equations Seminar: "Scattering Data Described via Loop Groups"
KAREN UHLENBECK, *Institute for Advanced Study*

December 18
Statistical Mechanics Seminar: "Geometrical Exponents in Two-dimensional Critical Systems"
BERTRAND DUPLANTIER, *Saclay/Institut Henri Poincaré, Paris*

December 22
Turbulence Theory Seminar: "Lagrangian Phenomenology for Turbulence Fluctuations"
BORIS SHRAIMAN, *Lucent Technologies*

January 14
Geometric Partial Differential Equations Seminar: "Seiberg-Witten Monopoles Over Seifert Fibered Spaces"
PETER OZSVATH, *Institute for Advanced Study*

January 16
Integrable Systems Seminar: "Tau Functions of Toda Lattice and KP Hierarchy, W Algebra and Matrix Models"
HUA PENG, *Institute for Advanced Study*

January 19
Statistical Mechanics Seminar: "Uniform Spanning Forests"
RUSSELL LYONS, *Indiana University*

January 19, 21 & 22
Marston Morse Memorial Lecture: "Reduced Symplectic Manifolds and Morse Theory"
VICTOR GUILLEMIN, *Massachusetts Institute of Technology*

January 22
"Nonlinear Dynamics of Collisionless Dissipative Alfven Waves, Alfvenic Turbulence and Particle Trapping"
MIKHAIL MEDVEDEV, *University of California, San Diego*

January 23
Integrable Systems Seminar: "A Construction of C-integrable Systems in Many Dimensions"
OLEG ZABORONSKY, *Institute for Advanced Study*

January 26
Combinatorics, Complexity and Discrete Probability Seminar: "Questions in Combinatorial Discrepancy"
JIRI MATOUSEK, *Charles University, Prague*

Statistical Mechanics Seminar: "Free Field Interacting with a Wall"
ERWIN BOLTHAUSEN, *University of Zurich*

January 28
Geometric Partial Differential Equations Seminar: "Higher Dimensional Gauge Theories and Virtual Moduli Cycles"
RICHARD THOMAS, *Institute for Advanced Study*

January 29
Expository Lecture Series in Geometry: "Lectures on Supersymmetry"
DANIEL FREED, *Institute for Advanced Study*

January 30
Integral Systems Seminar: "Mirror Symmetries"
SHING-TUNG YAU, *Harvard University* and
BONG LIAN, *Brandeis University*

February 2
Combinatorics, Complexity and Discrete Probability Seminar: "The WZ Theory of Hypergeometric Identities - An Overview, and Recent Progress"
HERBERT WILF, *University of Pennsylvania*

February 3
Members Seminar: "Limits of Eigenfunctions on Flat Tori and Some Related Questions in Harmonic Analysis"
DMITRY JAKOBSON, *Institute for Advanced Study*

February 4
Number Theory/Representation Theory Seminar: "Polynomial Values in Recurrence Sequences"
MICHAEL BENNETT, *Institute for Advanced Study*

Geometric Partial Differential Equations Seminar:
"Symplectic Floer Homology and the Mapping Class
Group"
PAUL SEIDEL, *Institute for Advanced Study*

February 5
Expository Lecture Series in Geometry: "Super-
symmetry II, Symmetry and Noether's Theorem"
DANIEL FREED, *Institute for Advanced Study*

February 6
Integrable Systems Seminar: "Calogero-Moser Sys-
tems and Supersymmetric Gauge Theories"
DUONG PHONG, *Columbia University*

Statistical Mechanics Seminar: "Chaos in Spin
Glasses"
DAVID HUSE, *Princeton University*

February 9
Combinatorics, Complexity and Discrete Probability
Seminar: "First Order Sentences and the Evolution of
Random Graphs"
GABOR TARDOS, *Mathematical Institute of the
Hungarian Academy of Sciences*

Special Seminar: "Non-trivial Flat Connections on
S³ and the Aarhus Integral of Rational Homology
Spheres"
DROR BAR-NATAN, *Hebrew University*

February 10
Members Seminar: "Stokes Operators via Limit Mon-
odromy of Generic Perturbation"
ALEXEI GLUTSUK, *Institute for Advanced Study*

February 11
Number Theory/Representation Theory Seminar:
"The Rank of Quotients of $J_0(N)$"
JEFFREY VANDERKAM, *Princeton University*

Geometric Partial Differential Equations Seminar:
"Self-dual Instantons and Calibrated Geometry"
GANG TIAN, *Institute for Advanced Study*

February 12
Expository Lecture Series in Geometry: "Supersym-
metry III, Supersymmetry in Various Dimensions"
DANIEL FREED, *Institute for Advanced Study*

Princeton/IAS/Rutgers Harmonic Analysis and
Number Theory Seminar: "Hyperelliptic Curves,
Hilbert Modular Forms and Fermat's Last Theorem"
HENRI DARMON, *McGill University*

February 13
Integrable Systems Seminar: "Quantum Cohomology
and Its Associativity"
GANG TIAN, *Institute for Advanced Study*

Turbulence Theory Seminar: "Velocity-difference
PDF's for Burgers Turbulence"
STAS BOLDYREV, *Princeton University*

Special Geometric Partial Differential Equations
Seminar: "Gradient Kahler-Ricci Solitons and
Periodic Orbits"
H.D. CAO, *Texas A&M*

February 16
One-day Workshop on Probabilistic Methods in Dis-
crete Mathematics:
"The Edge-expansion of Graphs"
NOGA ALON, *Institute for Advanced Study*
"Sylvester's Question: The Probability That N Points
are in Convex Position"
IMRE BARANY, *Mathematical Institute of the
Hungarian Academy of Sciences*
"Graph Colouring via the Probabilistic Method"
BRUCE REED, *Centre National de la Recherche
Scientifique*
"Coloring Pseudo-random Graphs"
BENNY SUDAKOV, *Tel Aviv University*

February 17
Expository Lecture Series in Geometry:
"Quantization"
PIERRE DELIGNE, *Professor, School of Mathematics,
Institute for Advanced Study*

Foundations on Physics Seminar: "Canonical Proper
Time Formulation of Relativistic Particle Theory and
Classical Electrodynamics"
TEPPER GILL, *Institute for Advanced Study*

February 18
Geometric Partial Differential Equations Seminar:
"Counting J-holomorphic Curves in Dimension 4"
TIAN-JUN LI, *Institute for Advanced Study*

February 19
Special Seminar: "Motivic Cohomology Over
Spec(Z)"
VLADIMIR VOEVODSKY, *Northwestern University*

February 20
Integrable Systems Seminar: "Inverse Scattering"
RICHARD BEALS, *Yale University*

February 23

Combinatorics, Complexity and Discrete Probability Seminar: "Loop-erased Random Walks, Random Spanning Trees, and Random Dimer Configurations"
DAVID B. WILSON, *Institute for Advanced Study*

February 24

Expository Lecture Series in Geometry: "Supersymmetry IV: Theories with Two Supersymmetries"
DANIEL FREED, *Institute for Advanced Study*

Foundations on Physics Seminar: "Bohmian Mechanics and the Meaning of Quantum Theory"
SHELLY GOLDSTEIN, *Rutgers University*

February 25

Number Theory/Representation Theory Seminar: "Some Interesting Numerical Invariants in Lie Theory"
ERIC SOMMERS, *Institute for Advanced Study*

Geometric Partial Differential Equations Seminar: "Complexification Dictionary and Holomorphic Linking Number"
BORIS KHESIN, *Institute for Advanced Study*

February 26

Princeton/IAS/Rutgers Harmonic Analysis and Number Theory Seminar: "Zeros on the Critical Line of Linear Combinations of L-functions"
ATLE SELBERG, *Professor Emeritus, School of Mathematics, Institute for Advanced Study*

February 27

Special Seminar: "Geometric Aspects of Topological Modular Forms"
M. HOPKINS, *Massachusetts Institute of Technology*

Turbulence Theory Seminar: "New Invariant and an Inverse Cascade in Passive-scalar Turbulence"
SERGEY NAZARENKO, *Warwick*

Math Physics Seminar: "Q-series Identities, Thermodynamic Bethe Ansatz and Integrable Perturbations of the Conformal Field Theory"
ALEXANDER BERKOVICH, *State University of New York*

March 2

Combinatorics, Complexity and Discrete Probability Seminar: "Noise Sensitivity of Boolean Functions and Relations to Percolation"
GIL KALAI, *Hebrew University of Jerusalem*

March 3

Expository Lecture Series in Geometry: "Supersymmetry V: Theories with More Supersymmetry"
DANIEL FREED, *Institute for Advanced Study*

Foundations on Physics Seminar: "Nonlinear Gauge Transformations, Quantum Mechanics, and Current Algebra"
GERALD GOLDIN, *Rutgers University*

March 4

Number Theory/Representation Theory Seminar: "Eisenstein Congruences and Elliptic Curves"
VINAYAK VATSAL, *University of Toronto*

Geometric Partial Differential Equations Seminar: "Resonances and Metastable States in Linear and Nonlinear Wave Equations"
MICHAEL WEINSTEIN, *University of Michigan*

March 5

Princeton/IAS/Rutgers Harmonic Analysis and Number Theory Seminar: "Gross-Zagier Formula for Hilbert Modular Forms"
SHOUWU ZHANG, *Columbia University*

March 6

Geometric Partial Differential Equations Seminar: "Uniqueness of Harmonic Maps with Small Energy"
MICHAEL STRUWE, *Eidgenössische Technische Hochschule, Zurich*

March 9

Combinatorics, Complexity and Discrete Probability Seminar: "Enumeration of Lozenge Tilings and Symmetry Classes of Plane Partitions"
MIHAI CIUCU, *Institute for Advanced Study*

March 10

Geometry/Topology Seminar: "The Symplectic Thom Conjecture for Negative Self-intersections"
ZOLTAN SZABO, *Princeton University*

Foundations on Physics Seminar: "The Impact of Topology and Group Theory on Future Progress in Electromagnetics"
TERENCE BARRETT, *BSEI, Virginia*

March 11

Number Theory/Representation Theory Seminar: "Companion Forms and Weight One Forms"
RICHARD TAYLOR, *Harvard University*

March 12
Expository Lecture Series in Geometry: "3D-filmstrip: An Interactive Gallery of Mathematical Objects and Processes"
RICHARD PALAIS, *Institute for Advanced Study*

March 13
Special Seminar: "A Combinatorial Approach to Invariants of Surfaces Embedded in 4-space"
MIKHAIL KHOVANOV, *Institute for Advanced Study*

Turbulence Theory Seminar: "On the Singularity Problem in Hydrodynamics"
RICHARD PELZ, *Rutgers University*

March 16
Combinatorics, Complexity and Discrete Probability Seminar: "Algorithms to Tile Abelian Groups with Finite Prototiles"
MARIO SZEGEDY, *AT&T Labs*

March 18
Number Theory/Representation Theory Seminar: "Toward Non Abelian Base Change, I"
LAURENT CLOZEL, *University of Paris, Orsay*

Hermann Weyl Lecture: "Curves and Representations of Finite Groups"
NOAM ELKIES, *Harvard University*

Geometric Partial Differential Equations Seminar: "Radial Smooth Solutions for the Heisenberg Model on R2"
JALAL SHATAH, *Courant Institute*

March 19
Number Theory/Representation Theory Seminar: "Toward Non Abelian Base Change, II"
LAURENT CLOZEL, *University of Paris, Orsay*

March 20
Integrable Systems Seminar: "Special Kahler Geometry"
DANIEL FREED, *Institute for Advanced Study*

Hermann Weyl Lecture: "Curves and Representations of Finite Groups (continued)"
NOAM ELKIES, *Harvard University*

March 23
Combinatorics, Complexity and Discrete Probability Seminar: "Approximation Schemes for NP-hard Geometric Problems"
SANJEEV ARORA, *Princeton University*
Hermann Weyl Lecture: "Curves and Representations of Finite Groups (continued)"
NOAM ELKIES, *Harvard University*

March 24
Expository Lecture Series in Geometry: "Integrability and Supersymmetric Gauge Theories in Four Dimensions"
EDWARD WITTEN, *Professor, School of Natural Sciences, Institute for Advanced Study*

Foundations on Physics Seminar: "Symmetry Properties of the Proper-time Maxwell Equations"
W.W. ZACHARY, *Howard University*

March 25
Hermann Weyl Lecture: "Curves and Representations of Finite Groups (conclusion)"
NOAM ELKIES, *Harvard University*

Geometric Partial Differential Equations Seminar: "Time-periodic Solutions of the Abelian Higgs Model and Rigid Rotation of Vortices"
DAVID STUART, *Institute for Advanced Study*

March 26
Princeton/IAS/Rutgers Harmonic Analysis and Number Theory Seminar: "Bessel Distribution and the Shimura-Waldspurger Correspondence"
ZHENGYU MAO, *Institute for Advanced Study*

March 27
Integrable Systems Seminar: "Riemann-Hilbert Problems, Orthogonal Polynomials and Random Matrices"
KENNETH McLAUGHLIN, *Princeton University*

March 30
Combinatorics, Complexity and Discrete Probability Seminar: "Quantum Computers Can Search Much Faster Than Classical Computers"
LOV GROVER, *Bell Labs, Lucent Technologies*

Turbulence Theory Seminar: "Reciprocal Symmetry of Intermittency Exponents in Developed Dydrodynamic Turbulence"
VLADIMIR MALKIN, *Princeton University*

Special Seminar: "Smoothness of Projected Measures, Bernoulli Convolutions and the Dimension of Exceptional Parameters"
WILHELM SCHLAG, *Princeton University*

March 31
Foundations on Physics Seminar: "How Inevitable is an Electroweak Force?"
ANDREW C. MILLARD, *Princeton University*

April 2
Princeton/IAS/Rutgers Harmonic Analysis and
Number Theory Seminar: "Quadratic Forms of
Signature (2,2) and Eigenvalue Spacings on
Rectangular 2-tori"
ALEX ESKIN, *University of Chicago*

April 6
Combinatorics, Complexity and Discrete Probability
Seminar: "Tutte's 3-edge-colouring Conjecture"
PAUL SEYMOUR, *Princeton University*

Special Seminar: "Quasi-periodic Schroedinger Equa-
tion and Analogue of Cartan's Estimate for Real
Algebraic Functions"
MICHAEL GOLDSTEIN, *University of Toronto*

April 10
Integrable Systems Seminar: "Huygens Principle and
Multitemporal Wave Equations"
SIGURDUR HELGASON, *Institute for Advanced
Study*

April 13
Combinatorics, Complexity and Discrete Probability
Seminar: "Recent Developments on Quasi-random
Graphs"
FAN CHUNG GRAHAM, *University of Pennsylvania*

Turbulence Theory Seminar: "Viscous Effects at
Infinite Reynolds Numbers"
KATERPALI SREENIVASAN, *Yale University*

April 14
Foundations on Physics Seminar: "Can Quantum
Field Theory be Derived as the Statistical Mechanics
of a Class of Matrix Models?"
STEPHEN ADLER, *Professor, School of Natural
Sciences, Institute for Advanced Study*

April 15
Geometric Partial Differential Equations Seminar:
"New Results on Global Wellposedness for NLS"
JEAN BOURGAIN, *Professor, School of Mathematics,
Institute for Advanced Study*

April 16
Princeton/IAS/Rutgers Harmonic Analysis and
Number Theory Seminar: "Sums Over Primes of
Algebraic Exponentials in Short Intervals"
PHILIPPE MICHEL, *University of Paris*

April 20
Turbulence Theory Seminar: "Chaotic Advection in
the System of Point Vortices"
GEORGE ZASLAVSKY, *Courant Institute*

April 22
Geometric Partial Differential Equations Seminar:
"Boundedness of Bilinear Operators with Nonsmooth
Symbols"
ANDREA NAHMOD, *Institute for Advanced Study*

April 27
Turbulence Theory Seminar: "Some Recent Results
on Intermittency in Turbulent Advection"
MICHAEL CHERTKOV, *Princeton University*

April 29
Integrable Systems Seminar: "The Permutability
Formula for 2 + 1 Solitons"
KAREN UHLENBECK, *Institute for Advanced Study*

April 30
Princeton/IAS/Rutgers Harmonic Analysis and
Number Theory Seminar: "Eigenvalues of Four-tori
and Values of Homogeneous Polynomials"
JEFFREY VANDERKAM, *Princeton University*

May 1
Integrable Systems Seminar: "Introduction to Exteri-
or Differential Systems and Conservation Laws for
Second-order Parabolic PDE's"
JEANNE CLELLAND, *Institute for Advanced Study*

May 5
Foundations on Physics Seminar: "How Well Do We
Understand Quantum Mechanics"
JURG FROHLICH, *Eidgenössische Technische
Hochschule/Institute for Advanced Study*

May 7
Special Geometry/Topology Seminar: "Bundles on K3
Fibrations, and Gromov-Witten Invariants"
RICHARD THOMAS, *Institute for Advanced Study*

May 8
Special Geometry/Topology Seminar: "Hamiltonian
S^1 Actions on 4 Dimensional Symplectic Orbifolds"
JANET TALVACCHIA, *Institute for Advanced Study*

May 11
Turbulence Theory Seminar: "Transport by Time
Dependent Stationary Flow"
LEONID KORALOV, *State University of New York,
Stony Brook*

May 13
Special Seminar: "Large N Limits"
EDWARD WITTEN, *Professor, School of Natural
Sciences, Institute for Advanced Study*

THE SCHOOL OF NATURAL SCIENCES

Faculty

STEPHEN L. ADLER, Particle Physics, *New Jersey Albert Einstein Professor*
JOHN N. BAHCALL, Astrophysics, *Richard Black Professor*
PIET HUT, Astrophysics
NATHAN SEIBERG, Theoretical Physics
FRANK WILCZEK, Theoretical Physics, *J. Robert Oppenheimer Professor*
EDWARD WITTEN, Mathematical Physics, *Charles Simonyi Professor*

Visiting Professor

PAWAN KUMAR, Astrophysics

Professor Emeritus

FREEMAN J. DYSON, Mathematical Physics and Astrophysics

ACADEMIC ACTIVITIES

Part of PROFESSOR STEPHEN ADLER's work this year involved a continuation of his study of generalized quantum or trace dynamics, in which an action principle based on a total trace leads directly to operator equations of motion. Earlier work with Millard and Horwitz showed that under certain assumptions, the statistical mechanics of trace dynamics can function as a pre-quantum mechanics, with the canonical commutation relations of quantum field theory arising as an emergent property. In a paper this year with Kempf, Adler discussed the corrections to the canonical commutation relations in the case of complex Hilbert space, with the fermions realized in the conventional way as Grassmann matrices. One interesting result that emerged is that a necessary condition for the corrections to the CCR to be small is that there be a balance between the numbers of fermionic and bosonic degrees of freedom, suggesting a connection with supersymmetry. Adler also wrote a paper discussing the problem of gauge fixing for the partition function in trace dynamics, deriving analogs of the De Witt-Faddeev-Popov procedure and of the BRST invariance familiar in the functional integral context. Additionally, Adler wrote a short paper showing that the emergence of quantum field theory from generalized quantum dynamics gives a framework for understanding how one can obtain a vanishing cosmological constant in the presence of scale invariance breaking; this essay won the second prize in the 1997 Gravity Research Foundation Essay Competition. Further work on these topics is planned. One long range goal is to try to analyze the quantum measurement problem in this framework, and another is to try to extend the trace dynamics formulation of global supersymmetry to the case of local supersymmetry.

Most of Adler's time this year has been spent on a phenomenological follow up to last year's work on preonic models. Specifically, Adler has been studying extensions of the standard model in which the three families are differentiated, before spontaneous symmetry breaking, by a discrete chiral quantum number based on the cube roots of unity,

that is an exact symmetry of the low energy effective Lagrangian. This requires that the Higgs fields also come in families of three, differentiated by discrete chiral quantum numbers as well. A preliminary account of these ideas is given in a more complete discussion, in which models with one or two triples of Higgs doublets (i.e., with three or six Higgs doublets) are studied in detail in the tree approximation, is in preparation. The models naturally explain the dominance of mixing of the first and second family quarks over mixings with the third family, and link the mechanism for CP violation with that for generation of the second family masses. Further work along these lines is planned, including a study of scenarios for obtaining the three or six doublet phenomenological models from grand unified or composite theories at a higher energy scale.

PROFESSOR JOHN BAHCALL concentrated on trying to learn more about the elusive particles called neutrinos. He led a group of experts who determined the accuracy with which solar nuclear fusion rates are known. The nuclear fusion reactions are responsible for both the luminosity of the sun and for the solar neutrino fluxes that are measured on earth. In a related collaboration with S. Basu (IAS) and M. Pinsonneault (Ohio State), Bahcall showed that the uncertainties in the solar fusion rates cannot account for the discrepancies between standard model predictions and the results of the five solar neutrino experiments. Bahcall, P. Krastev (University of Wisconsin) and A. Smirnov (Trieste) used the dramatic new results from the SuperKamiokande (Japanese) experiment, in combination with the results of all the other solar neutrino experiments, to define the allowed range of neutrino masses and mixing angles. P. Krastev and Bahcall also called attention to the importance of a very rare, but poorly understood, neutrino producing reaction called 'hep' that may play a crucial role in the interpretation of one significant aspect of the new SuperKamiokande results. In a study of neutrinos of much different, much higher energies, Bahcall and E. Waxman (IAS) showed that observations of cosmic rays set a very stringent limit on the possible production of high energy neutrinos from cosmologically distant sources.

Bahcall continued his Hubble Space Telescope work with a series of collaborators.

PROFESSOR PIET HUT continued his work on large-scale computer simulations, using the GRAPE-4, a special-purpose computer developed by a group of astrophysicists at Tokyo University, headed by Jun Makino. His research centered on algorithmic developments aimed at refining the treatment of simultaneous local interactions in dense stellar systems, as well as including a host of non-gravitational effects. As an example of the latter, perturbations of the stellar evolution of double stars, due to interactions with other single and double stars, were modeled with increasing accuracy, in a collaborative project with Simon Portegies Zwart, from Tokyo, and Steve McMillan, from Drexel. Applying these methods to globular star clusters, Hut and coworkers have uncovered interesting and largely unexpected differences between simulations based on N-body methods and on Fokker-Planck methods.

Picking up again an old interest of his, tidal evolution in binary star systems, Hut engaged in a collaboration with Peter Eggleton and Ludmila Kiseleva, from Cambridge, UK. They made a considerable improvement upon the standard tidal bulge lag model, by deriving from first principles equations governing the quadrupole tensor of a star distorted by both rotation and the presence of a companion in a possibly eccentric orbit, together with equations governing the rates of change of the magnitude and direction of the stellar

rotation, and the orbital period and eccentricity, based on the concept of the Laplace-Runge-Lenz vector.

Professor Hut was co-organizer of a Symposium on "Supercomputing: New Horizons in Computational Science," held in Tokyo in September 1997. He also organized a workshop on "Recent Developments in N-Body Simulations," held at Amsterdam University in January 1998, together with colleagues from the Astronomy and Computer Science Departments there, in order to explore and compare possibilities for constructing special-purpose hardware for simulations in a variety of fields, from astrophysics to quantum chemistry, molecular dynamics and plasma physics.

During a visit at the Santa Fe Institute, Hut continued his work in the general area of the study of limits to scientific knowledge through a collaboration with theoretical biologists Brian Goodwin and Stuart Kauffman. He presented the results in a session on "Modeling Modeling" that he chaired at the Conference on Complex Systems, organized by the New England Complex Systems Institute at Nashua, NH, in September 1997.

Professor Hut continued his interdisciplinary collaborations with cognitive psychologist Roger Shepard, from Stanford, philosopher of science Bas van Fraassen, from Princeton University, physicist Arthur Zajonc, from Amherst College, and writer Steven Tainer, from Berkeley. In December 1997, they established the Kira Institute (web site: <http://www.kira.org>), to study the relation between science and human values. Their first activities resulted in a series of bimonthly workshops, sponsored by the Fetzer Institute, which were held throughout the academic year, in Berkeley, Concord, Kalamazoo, and Princeton.

During the period 1997-98 PROFESSOR PAWAN KUMAR worked on solar rotation and on accretion disks around nuclei of active galaxies. His work showed that long period gravity waves excited by the solar convection zone are absorbed in a thin layer below the convection zone producing strong differential rotation. The time scale for the build up of the layer is about 10 years which is approximately the time period for the magnetic sunspot cycle of the sun. At the end of 10 years the layer becomes unstable and mixes with the convection zone. This mixing could explain the discrepancy between the helioseismic measurement of the sound speed and theoretical models of the sun just below the convection zone. Solar magnetic field could also be generated in this layer and when the layer mixes with the convection zone the field would show up as sunspots.

The observations of water masers around the centers of several galaxies have been used to determine the black hole mass at their centers and the radius of the gas disk in these objects. Using this information Kumar has argued that the disk around at least one of these objects, a well known galaxy NGC 1068, can not be smooth and must be broken up in clumps. He has constructed a model for the interaction of these clumps and the feeding of gas onto the black hole.

During the last year PROFESSOR NATHAN SEIBERG continued his work on the exciting Matrix model proposal of Banks, Fischler, Shenker and Susskind. One of the outcomes of this investigation was the discovery of a new "non-critical string theory." This is a unitary Poincaré invariant theory in six dimensions which does not seem to be a standard local quantum field theory. One way of obtaining it is by considering the type II string theory with finite string tension in the limit of vanishing string coupling.

Further investigation of this Matrix model has led to a derivation of the proposal. In particular, the nature of the discrete light cone was clarified and a unified treatment of all known special cases was given.

This discrete light cone description of M theory has motivated a similar discrete light cone formulation of the interacting (0,2) conformal field theory in six dimensions and its new stringy extension which was mentioned above.

As a continuation of his earlier analysis of theories in various dimensions with eight supersymmetries Seiberg also analyzed the theories with (4,4) supersymmetry in two dimensions. This led to a relation between the A-D-E classification of symmetries and the A-D-E classification of modular invariants of affine $SU(2)$.

Finally, two reviews summarizing recent developments in supersymmetry and superstring theory were written.

Over the past year PROFESSOR FRANK WILCZEK continued investigating QCD in extreme conditions. The most striking results concern the slightly idealized case of three massless flavors, and Wilczek is thinking about possible implications for stellar explosions, neutron stars and heavy ion collisions. This work is being carried out together with Mark Alford, K. Rajagopal, and Anton Kapustin.

Wilczek continues to be interested in new forms of quantum statistics, especially the non-abelian and projective versions. He has been quite taken with the work of Kitaev on generalizing anyon ideas, with an eye toward quantum computation. He is also thinking about other possible physical realizations of quantum computation. As Lorentz Professor at Leiden this past spring he lectured on these subjects, and plans to write up the notes in some form.

Wilczek put forward some quite heretical but, he thinks, interesting and promising ideas about deriving gravity from an underlying gauge theory. He plans to follow this up in the directions of supersymmetry and construction of cosmological solutions, with an eye toward the cosmological constant problem, in coming months.

In addition, Wilczek accepted invitations to write on a regular basis for *Nature* and *Physics Today*; several pieces have already appeared. He wrote the entry on "Quantum Field Theory" for the centenary volume of the American Physical Society, and is well launched on a monograph on QCD for Princeton University Press.

Much of PROFESSOR EDWARD WITTEN'S work during 1997-98 was devoted to exploring a surprising conjecture by J. Maldacena according to which large N gauge theory is equivalent to string theory in Anti de Sitter space. This conjecture is potentially important for understanding gauge theory and gravity alike. Initially, the Maldacena proposal was a bit vague, and in Professor Witten's first paper on the subject ("Anti de Sitter Space And Holography") he recast it in a precise form, getting a precise correspondence between Kaluza-Klein harmonics and gauge theory operators, and showing among other things that this gauge theory description of gravity is holographic in the sense of Susskind and 't Hooft. In this and a subsequent paper ("Anti de Sitter Space, Thermal Phase Transition, And Confinement In Gauge Theories"), he used the mapping

to shed light on the entropy of black holes and on confinement and dynamical genera- tion of a mass gap in gauge theories. In a third paper on the subject ("Baryons and Branes In Anti de Sitter Space") he enriched the subject by showing the gauge theory interpre- tation of wrapped Type IIB threebranes and fivebranes.

Professor Witten studied several other problems during the year. For example, in "Toroidal Compactification Without Vector Structure," he reworked much of the theory of toroidal compactification of the heterotic string for the case of a topologically non- trivial $Spin(32)/Z_2$ bundle, with many pleasing results. As a byproduct, he was able to resolve an old puzzle concerning the computation of $Tr\ (-1)^F$ in four-dimensional gauge theories. The computation was expressed in terms of new mathematical formulas con- cerning commuting triples of elements of Lie groups; these formulas have subsequently been proved.

PROFESSOR FREEMAN DYSON spent most of the year working on two books. *The Sun, the Genome and the Internet*, to be published by the Oxford University Press in 1999, was finished in June 1998. It is a revised and expanded version of lectures given at the New York Public Library in January-February 1997. It is a popular account of some modern technologies and their social implications. The other book, *Origins of Life*, is a new edition of a book originally published in 1985. The new edition will be published by the Cambridge University Press in 1999. It is a more technical work, presenting some heretical views about the problem of life's origins.

During the year, Dyson gave lectures at many places including Potsdam, Germany and Potsdam, New York. At Potsdam, New York he received an honorary Doctor of Science degree, awarded by Clarkson University, together with his daughter Esther.

THE SCHOOL OF NATURAL SCIENCES

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j Joint Appointment with School of Mathematics · **2 months

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THE SCHOOL OF NATURAL SCIENCES

RECORD OF EVENTS

The following is a calendar of events sponsored by
the School of Natural Sciences

Academic Year 1997-98

September 12
IAS/Princeton University High Energy Theory Semi-
nar/Special Series: "Introduction to Matrix Theory"
LEONARD SUSSKIND, *Institute for Advanced Study*

September 23
Astrophysics Talk: "Constraining Omega with
Clusters of Galaxies"
NETA BAHCALL, *Princeton University*

September 26
IAS/Princeton University High Energy Theory
Lunchtime Seminar: "Color Superconductivity"
FRANK WILCZEK, *Professor, School of Natural
Sciences, Institute for Advanced Study*

September 26
IAS/Princeton University High Energy Theory Semi-
nar/Special Series: "Introduction to Matrix Theory"
LEONARD SUSSKIND, *Institute for Advanced Study*

September 30
Astrophysics Talk: "Turbulence and Transport in
Accretion Disks"
JOHN HAWLEY, *University of Virginia*

October 3
IAS/Princeton University High Energy Theory Semi-
nar/Special Series: "Inrroduction to Matrix Theory"
LEONARD SUSSKIND, *Institute for Advanced Study*

October 3
IAS/Princeton University High Energy Theory
Lunchtime Seminar: "Q-Balls in Theories With
Supersymmetry"
ALEXANDER KUSENKO, *Conseil Europeen pour la
Recherche Nucleaire*

October 6
IAS/Princeton University High Energy Theory
Seminar: "Positivity Constraints on Anomalies in
SUSY Gauge Theories - Evidence for a c-Theorem
in Four Dimensions"
DANIEL Z. FREEDMAN, *Massachusetts Institute of
Technology*

October 7
Astrophysics Talk: "The Impact of Hipparcos on
Distance Scale Indicators"
ANTHONY BROWN, *HIPPARCOS*

October 14
Astrophysics Talk: "How Many Geometric Distance
Measurements Are Wrong?"
ANDY GOULD, *Ohio State University*

October 17
IAS/Princeton University High Energy Theory
Lunchtime Seminar: "Are There Planck Energy
Accelerators?"
SHMUEL NUSSINOV, *Tel Aviv University*

October 20
IAS/Princeton University High Energy Theory
Seminar: "E_8 x E_8 Small Instantons in Matrix Theory"
DAVID LOWE, *Brown University*

October 28
Astrophysics Talk: "Applications of Photometric
Redshifts"
ALEX SZALAY, *Johns Hopkins University*

October 31
IAS/Princeton University High Energy Theory
Lunchtime Seminar: "Membrane Dynamics in
M(atrix) Theory"
DAN KABAT, *Institute for Advanced Study*

November 3
IAS/Princeton University High Energy Theory
Seminar: "Non-Perturbative Aspects of Four
Dimensional Supersymmetric Gauge Theories via
M Theory Fivebranes"
YARON OZ, *Lawrence Berkeley Laboratory*

November 4
Astrophysics Talk: "The Ly-alpha Forest Within the
Cosmic Web"
DICK BOND, *Canadian Institute for Theoretical
Astrophysics, Toronto*

November 11
Astrophysics Talk: "Celestial Mechanics in New
Planetary Systems"
SCOTT TREMAINE, *Princeton University*

November 12
IAS/Princeton University High Energy Theory
Seminar: "Quantum Field Theory in Curved Phase
Space"
EFIM FRADKIN, *Institute for Advanced Study and
P.N. Lebedev Physical Institute*

November 14
IAS/Princeton University High Energy Theory
Lunchtime Seminar: "Target Space Duality for (0,2)
Compactifications"
RALPH BLUMENHAGEN, *Institute for Advanced
Study*

November 17
IAS/Princeton University High Energy Theory
Seminar: "Six-Dimensional String Theories"
ANDY STROMINGER, *Harvard University*

November 25
Astrophysics Talk: "New Results on Cosmic
Microwave Background Anisotropy"
MAX TEGMARK, *Institute for Advanced Study*

December 1
IAS/Princeton University High Energy Theory
Seminar: "Duality Without Supersymmetry"
KEITH DIENES, *Conseil Europeen pour la Recherche
Nucleaire*

December 2
Astrophysics Talk: "Galaxies and Large Scale
Structure at $z \sim 3$"
CHUCK STEIDEL, *California Institute of Technology*

December 3
IAS/Princeton University High Energy Theory
Seminar: "Quantum Field Theory in Curved Phase
Space - Part II"
EFIM FRADKIN, *Institute for Advanced Study and
P.N. Lebedev Physical Institute*

December 12
IAS/Princeton University High Energy Theory
Lunchtime Seminar: "Earthquakes and Dynamical
Critical Phenomena"
DANIEL S. FISHER, *Institute for Advanced Study*

December 15
IAS/Princeton University High Energy Theory
Seminar: "Muon Physics and the Search for Super-
symmetry'"
BILL MARCIANO, *Brookhaven National Laboratory*

December 15
Astrophysics Talk: "Status of Neutrino Mass and
Mixing"
SAMOIL BILENKY, *Institute for Advanced Study and
Joint Institute for Nuclear Research, Dubna, Russia*

January 16
IAS/Princeton University High Energy Theory
Lunchtime Seminar: "Branes and Chiral Gauge
Theories"
AMIHAY HANANY, *Institute for Advanced Study*

January 26
IAS/Princeton University High Energy Theory
Seminar: "Large N Limit of Field Theories and
Gravity"
JUAN MALDACENA, *Harvard University*

January 30
IAS/Princeton University High Energy Theory
Lunchtime Seminar: "Model Building vs. Precision
Probes in Low-Energy Supersymmetry"
NIR POLONSKY, *Rutgers University*

February 3
Astrophysics Talk: "The Superworld"
NATHAN SEIBERG, *Professor, School of Natural Sci-
ences, Institute for Advanced Study*

February 10
Astrophysics Talk: "Quintessential Cosmology"
PAUL STEINHARDT, *University of Pennsylvania*

February 17
Astrophysics Talk: "Brown Dwarfs: Bridge Between
Planets and Stars"
SHRI KULKARNI, *California Institute of Technology*

February 20
IAS/Princeton University High Energy Theory
Lunchtime Seminar: "What Semiconductor Devices,
Random Matrices, Shot Noise, and Coulomb Gasses
Have in Common: "Non-Gaussian Statistics of
Fluctuations"
MICHAEL FOGLER, *Institute for Advanced Study*

February 23
IAS/Princeton University High Energy Theory
Seminar: "Some Issues in Orientifolds"
ZURAB KAKUSHADZE, *Harvard University*

February 24
Astrophysics Talk: "Massive Black Holes and Centers
of Galaxies"
DOUGLAS RICHSTONE, *Institute for Advanced
Study and University of Michigan*

March 3
Astrophysics Talk: "A New Look at Poor Groups of
Galaxies"
ANN ZABLUDOFF, *Lick Observatory, University of
California*

March 6
IAS/Princeton University High Energy Theory
Lunchtime Seminar: "QED at High Photon Intensity
and Quantum Effects of Strong Laser Fields"
YONG-SHI WU, *Institute for Advanced Study*

March 9
IAS/Princeton University High Energy Theory
Seminar: "Magnetic Charge and Anomalies in
M Theory"
DAN FREED, *University of Texas*

March 10
Astrophysics Talk: "Hipparcos and the Age of the
Universe"
NEILL REID, *California Institute of Technology*

March 17
Astrophysics Talk: "Gamma-Ray Bursts: Models
That Don't Work and Some That Might"
STAN WOOSLEY, *University of California, Santa
Cruz*

March 20
IAS/Princeton University High Energy Theory
Lunchtime Seminar
EDWARD WITTEN, *Professor, School of Natural
Sciences, Institute for Advanced Study*

March 23
IAS/Princeton University High Energy Theory
Seminar: "E-Strings and N=4 Topological
Yang-Mills"
CUMRUN VAFA, *Harvard University*

March 24
Astrophysics Talk: "Determining Star Positions with
Extremely High Accuracy From Space:
How and Why?
MICHAEL PERRYMAN, *Space Science Department,
European Space Agency, The Netherlands*

March 30
IAS/Princeton University High Energy Theory
Seminar: "String Cosmology"
GABRIELE VENEZIANO, *Conseil Europeen pour la
Recherche Nucleaire*

March 31
Astrophysics Talk: "Evolution of Binary Compact
Objects Which Merge"
GERRY BROWN, *State University of New York, Stony
Brook*

April 3
IAS/Princeton University High Energy Theory
Lunchtime Seminar: "Gamma-Ray Bursts,
Cosmic-Rays and Neutrinos"
ELI WAXMAN, *Institute for Advanced Study*

April 7
Astrophysics Talk: "The latest from the Macho
Project on Galactic Dark Matter"
CHARLES ALCOCK, *Lawrence Linermore National
Laboratory*

April 13
IAS/Princeton University High Energy Theory
Seminar: "Large N Gauge Theories, Black Holes,
and Strings"
IGOR KLEBANOV, *Institute for Advanced Study and
Princeton University*

April 14
Astrophysics Talk: "Cosmology, etc., with the Big
Throughput Camera"
TONY TYSON, *Lucent Technologies*

April 17
IAS/Princeton University High Energy Theory
Lunchtime Seminar: "Geometric Realizations of BPS
States in N=2 Theories"
ANDREI MIKHAILOV, *Princeton University*

April 21
Astrophysics Talk: "Interferometric Imaging of the
Sunyaev Zel'dovich Effect: the Age and Mass of the
Universe"
JOHN CARLSTROM, *University of Chicago*

April 24
Astrophysics Talk: "High-Z Supernovae"
ROBERT KIRSHNER, *Harvard-Smithsonian Center
for Astrophysics*

April 27
IAS/Princeton University High Energy Theory
Seminar: "Arithmetic and Attractors"
GREG MOORE, *Yale University*

April 28
Astrophysics Talk: "The Advanced X-ray
Astrophysics Facility (AXAF) Mission from the
Microwave Background"
HARVEY TANANBAUM, *Harvard-Smithsonian CfA*

May 1
IAS/Princeton University High Energy Theory
Lunchtime Seminar: "Solving N=2 Gauge Theories
by Compactification to 3 Dimensions"
ANTON KAPUSTIN, *Institute for Advanced Study*

May 5
Astrophysics Talk: "Protostellar Jets and Chondrite
Meteorites"
FRANK SHU, *University of California, Berkeley*

May 11
IAS/Princeton University High Energy Theory
Seminar: "Phenomenological Virtues of the
Green-Schwarz Anomalous U(1)"
PIERRE RAMOND, *University of Florida*

May 12
Astrophysics Talk: "Main Sequence Fitting and the
Hipparcos Distance to the Pleiades: A Conflict"
MARC PINSONNEAULT, *Ohio State University*

May 15
IAS/Princeton University High Energy Theory
Lunchtime Seminar: "Evidence for Fractional
Topological Charge in Lattice SU(2) Yang-Mills
Theory"
RAJAMANI NARAYANAN, *Florida State University*

May 19
Astrophysics Talk: "On Beyond Kepler: Pulsar Tim-
ing, Relativity, and Exotic Binaries"
STEVE THORSETT, *Princeton University*

May 20
IAS/Princeton University High Energy Theory
Seminar: "QCD Phase Shifts and Rising Total Cross
Sections"
HARRY C.S. LAM, *McGill University*

June 1
IAS/Princeton University High Energy Theory
Seminar: "QCD Dynamics from M Theory"
NICK EVANS, *Boston University*

June 8
IAS/Princeton University High Energy Theory
Seminar: "QCD Dynamics from M Theory"
NICK EVANS, *Boston University*

June 15
IAS/Princeton University High Energy Theory
Seminar: "Stable Non-BPS States In String Theory"
ASHOKE SEN, *Tata Institute*

THE SCHOOL OF SOCIAL SCIENCE

Faculty

CLIFFORD GEERTZ, *Harold F. Linder Professor*
JOAN WALLACH SCOTT
MICHAEL WALZER, *UPS Foundation Professor*

Professor Emeritus

ALBERT O. HIRSCHMAN

ACADEMIC ACTIVITIES

Eighteen scholars from the United States and abroad were invited to be part of the School's scholarly community as members and visitors for the 1997-98 academic year— from a pool of 183 individuals who applied for membership. Three research assistants also participated in the year's activities. The National Endowment for the Humanities partially or fully funded three fellows.

Of the group of eighteen scholars from Canada, France, Nigeria, and the United States, nine were women. Fields of inquiry of the group included anthropology, three; history, four; law, one; philosophy, one; political science, seven; and religion, two.

In 1997-98, as part of a three-year project, the School considered the process of globalization and different kinds of local resistance to it. We focused on cultural globalization (where "culture" was an inclusive term for everything from high art to public ritual to commercial music and styles of dress) and the reactions to it from religious and ethnic traditionalists in Asia, Africa, and Latin America, and from the movements they have inspired, as well as from established political leaders.

PROFESSOR CLIFFORD GEERTZ gave the William James Lecture at the Harvard Divinity School in April and was the Wells Visiting Professor at the University of Indiana, Bloomington, also in April. He was a commentator in a symposium on the work of George Stocking at the Meetings of the American Anthropological Association in Washington, D.C. as well as a Visiting Scholar at the Getty Center in Los Angeles from the end of April through mid-June.

Various papers, reviews, and prefaces were published, including one last summer entitled "What is a Country if it is Not a Nation?" in *The Brown Journal of World Affairs*, in honor of Vartan Gregorian.

In May Professor Geertz received an Honorary Doctorate in Letters from Georgetown University in Washington, D.C.

PROFESSOR ALBERT O. HIRSCHMAN worked on a new book which is to be published at the end of 1998 or early in 1999. It is to be titled *Crossing Boundaries–Selected Writings and an Interview* and contains largely a translation, from the Italian, of an interview that was published in 1994 in a small volume by Donzelli Editore, in Rome. In Italy, it appeared under the title *Passaggi di Frontiera* and had as subtitle "I luoghi e le idee di un percorso di vita" (the places and ideas of a life's course) and was also published in French under the title *La Morale Secrète de l'Économiste* by Les Belles Lettres in 1997. In 1998 the American publisher, Zone Books, proposed to publish the book and Professor Hirschman offered to translate it into English. Zone Books will publish in the same book Hirschman's article "Melding the Public and Private Spheres: Taking Commensality Seriously" published earlier in *Critical Review*. In addition Zone Books will publish a paper written by Albert Hirschman in 1997 on the occasion of the 50th Anniversary of the Marshall Plan, "Fifty Years After the Marshall Plan: Two Posthumous Memoirs and Some Personal Recollections," originally published in *French Politics and Society*, Summer 1997.

This year Albert Hirschman decided to translate a book of recollections written some years ago by his sister Ursula Hirschmann, from the Italian into English. This translation is being submitted to various American publishers.

From December 1997 to March 1998, the Jewish Museum of New York held a special exhibition in honor of the late Varian Fry who worked in Marseilles in 1940-1941 to rescue a large number of anti-Nazi, antifascist, and Jewish refugees. A group of surviving collaborators of Varian Fry's were asked to present their personal souvenirs about this period. As a member of this group, Albert Hirschman presented some personal recollections in December 1997.

In 1997-1998 Professor Hirschman was awarded the Arnold Toynbee Prize, which is presented biannually to "an outstanding scholar for his or her work in enriching the social sciences." The prize was presented on May 11, 1998, at Harvard University. Welcoming remarks dealing with his life and work were made by Professor Judith Tendler of MIT and Professor Charles Meyer of Harvard University.

In 1998 Professor Hirschman was also awarded a prize by the Presidency of the Council of Ministers of Italy as a "foreign personality who has operated for the diffusion of the Italian culture abroad," because of his "prestigious activity as a student and a profound awareness of the Italian economic-social reality."

A variety of translations of Hirschman's works were published:
1. *A Propensity to Self-Subversion*, Harvard University Press, was published in Italian.
2. *Exit, Voice, and Loyalty*, Harvard University Press, was published in Hungarian.
3. *The Passions and the Interests: Political Arguments for Capitalism before Its Triumph*, Princeton University Press, was published in Croatian.
4. *The Rhetoric of Reaction*, The Belknap Press of Harvard University, was published in Swedish.
5. Albert Hirschman's article "Melding the Public and Private Spheres: Taking Commensality Seriously," *Critical Review*, was translated into German under the title "Tischgemeinschaft: Zwischen öffentlicher und privater Sphäre." It was published in Austria.

PROFESSOR JOAN WALLACH SCOTT served on the faculty of the School of Criticism and Theory at Cornell University during its summer session in 1997. She gave lectures during the academic year at the City University of New York and the University of California, Los Angeles, at the meetings of the Law and Society Association, and in England at Warwick University and the London School of Economics. She gave the Linda Singer Memorial Lectures at the Miami University of Ohio in March.

Professor Scott was elected a Senior Fellow of the School of Criticism and Theory. She continues to serve on the Committee A (Academic Freedom) of the AAUP.

In January, her latest book, *Only Paradoxes to Offer: French Feminists and the Rights of Man* was published in French translation. For the occasion, she gave lectures and seminars at the University of Paris VIII, the Ecole des Hautes Etudes en Sciences Sociales, the Ecole Normale Supérieure, and the Center for the Study of International Relations of the Fondation Nationale des Sciences Politiques.

During the academic year 1997-98, PROFESSOR MICHAEL WALZER lectured at a UNESCO forum and at the Georges Pompidou Center in Paris. He received the Leopold Lucas Prize awarded by the Theological Faculty of the University of Tüebingen in Germany and delivered the prize lecture; he also gave the Horkheimer Lectures at Humboldt University in Berlin. On this side of the Atlantic, he lectured at the University of Toronto, at Chicago University, the University of Wisconsin at Madison, the New School for Social Research, and Yale Law School. A collection of his essays appeared in French under the title *Pluralisme et démocratie*, together with translations of *Spheres of Justice* and *On Toleration*; the latter book was also published in German. At the Institute, he continued to work on a collaborative project on Jewish Political Thought (volume one forthcoming from Yale University Press).

THE SCHOOL OF SOCIAL SCIENCE

MEMBERS, VISITORS AND RESEARCH STAFF

MUSA ABUTUDU
Political Science
University of Benin, Nigeria

ARI ACKERMAN
Political Science
Shalom Hartman Institute · *a*

ADAM ASHFORTH
Political Science
Baruch College, City University of New York

ANDREW BARSHAY
History
University of California, Berkeley

SHERI BERMAN
Political Science
Princeton University

SUSAN BRISON
Philosophy
Dartmouth College

DEBORAH DURHAM
Anthropology
Sweet Briar College

LESLIE DWYER
Anthropology
Princeton University · *a*

MARC EDELMAN
Anthropology
Hunter College

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History
Bowdoin College

ATINA GROSSMANN
History
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History
Université Laval, Québec

BERNARD M. LEVINSON
Religion
University of Minnesota

MARK LILLA
Political Science
New York University

LESLYE OBIORA
Law
University of Arizona · *vs*

JEFFREY RUBIN
Political Science
University of Campinas, Brazil

CHOON-LEONG SEOW
Religion
Princeton Theological Seminary

JEAN-FABIEN SPITZ
Political Science
Université de Paris-X, Nanterre · *vf*

THE SCHOOL OF SOCIAL SCIENCE

RECORD OF EVENTS

The following is a calendar of events sponsored by
the School of Social Science

Academic Year 1997-98

October 9
Social Science Thursday Luncheon Seminar: "'La
Querelle des Femmes' in Late Twentieth Century
France"
JOAN W. SCOTT; *Professor, School of Social Science*

October 15
Cultural Globalization Seminar: Organizational
Meeting
CLIFFORD GEERTZ; *Professor, School of Social Science*

October 16
Social Science Thursday Luncheon Seminar:
"Dress, Polyvalencey, and Multiple Consciousness:
The Predicament of Culture in Botswana"
DEBORAH DURHAM, *Sweet Briar College; Member,
School of Social Science*

October 23
Social Science Thursday Luncheon Seminar:
"The Concept of Reaction"
MARK LILLA, *New York University; Member, School
of Social Science*

October 29
Cultural Globalization Seminar: Discussion of
Andrew Barshay, *The Social Sciences in Japan:
A Textual and Political History, 1890-1990 (work in
progress)*, preface and Introduction.
ANDREW BARSHAY, *University of California,
Berkeley; Member, School of Social Science*

October 30
Social Science Thursday Luncheon Seminar:
"Where is Agency to Be Found? Words and the
Problem of the Subject at a Religious Frontier"
WEBB KEANE, *University of Michigan, Ann Arbor;
Member, School of Social Science*

November 6
Social Science Thursday Luncheon Seminar:
"Speech, Harm, and the Mind-Body Problem in First
Amendment Jurisprudence"
SUSAN BRISON, *Dartmouth College; Member,
School of Social Science*

November 12
Cultural Globalization Seminar: Discussion of Karl
Polyani, *The Great Transformation*.
SHERI BERMAN, *Princeton University; Member,
School of Social Science*

November 13
Social Science Thursday Luncheon Seminar: "Civil
Society and the Collapse of the Weimar Republic"
SHERI BERMAN, *Princeton University; Member,
School of Social Science*

November 20
Social Science Thursday Luncheon Seminar:
"Witchcraft and Democracy in South Africa"
ADAM ASHFORTH, *Baruch College/CUNY;
Member, School of Social Science*

December 3
Cultural Globalization Seminar: Discussion of
Manual Castells, *The Power of Identity*.
MARC EDELMAN, *Hunter College; Member, School
of Social Science*

December 4
Social Science Thursday Luncheon Seminar:
"Republics and the modern world:
Montesquieu's predicament"
JEAN-FABIEN SPITZ, *Univeristé de Paris-X,
Nanterre; Visitor, School of Social Science*

December 10
Cultural Globalization Seminar: Discussion of Riva
Kastoryano, *La France, l'Allemagne et leurs
immigrés: Négocier l'identité*, Introduction, Chapter 7,
and Conclusion.
RIVA KASTORYANO, *Centre d'Etudes et de
Recherches Internationales; Visitor, School of Social Science*

December 11
Social Science Thursday Luncheon Seminar:
"Theatricality and the French Revolution: the
Stagecraft of Modern Representative Democracy"
PAUL FRIEDLAND, *Bowdoin College; Member,
School of Social Science*

January 8
Social Science Thursday Luncheon Seminar:
"Politics and Passion"
MICHAEL WALZER; Professor, School of Social Science

January 15
Social Science Thursday Luncheon Seminar:
"Capitalizing Japan: Uno School Marxism and
Its Legacy"
ANDREW BARSHAY, University of California,
Berkeley; Member, School of Social Science

January 22
Social Science Thursday Luncheon Seminar: "Trau-
ma, Memory, and Motherhood: Germans and Jews in
Post-Nazi Germany, 1945-1949"
ATINA GROSSMANN, The Cooper Union and
Columbia University; Member, School of Social Science

January 29
Social Science Thursday Luncheon Seminar: "To
Feed and Be Fed: Cosmology and Legitimacy in the
Andes"
SUSAN RAMIREZ, DePaul University; Member,
School of Historical Studies

February 5
Social Science Thursday Luncheon Seminar:
"<<Nationalism>> in the Context of Globalization.
Addressing the Case of Quebec"
JOCELYN LÉTOURNEAU, Université Laval;
Member, School of Social Science

February 12
Social Science Thursday Luncheon Seminar:
"Decentering Regimes: Democracy and Grassroots
Innovation in Brazil and Mexico"
JEFFREY RUBIN; Member, School of Social Science

February 18
Cultural Globalization Seminar: Discussion of Cliff
Geertz, "The World in Pieces."
CLIFFORD GEERTZ; Professor, School of Social Science

February 19
Social Science Thursday Luncheon Seminar:
"Globalization, Civil Society, and the State:
Conflicting Agendas in the Reconstruction of the
Public Sphere in Nigeria"
MUSA ABUTUDU, University of Benin; Member,
School of Social Science

February 25
Cultural Globalization Seminar: Discussion of
Jocelyn Létourneau, "Mundializacíon e identitad
histórica de las regiones," Ciclos, 12 (1997), pp. 43-
58; "Mondialisation et identité historique des
régions," manuscript. "La nation des jeunes. Sure le

sentiment d'histoire et d'espace de la jeunesse con-
temporaine en contexte supposé de postmodernité et
de mondialité," manuscript. "Nationalism in the
Context of Globalization. Addressing the Case of
Quebec," manuscript. "Social Stratification in the
Global Era," (Figure 1); "The Politics of Identity in
the Global Era," (Figure 2).
JOCELYN LÉTOURNEAU, Université Laval;
Member, School of Social Science

February 26
Social Science Thursday Luncheon Seminar: "'You
Shall Not Add to It:': Canonical Paradoxes and
Religious Renewal in Ancient Israel"
BERNARD M. LEVINSON, University of Minnesota;
Member, School of Social Science

March 5
Social Science Thursday Luncheon Seminar: "'The
Pinch of Destiny': Religion as Experience, Meaning,
Identity, Power"
CLIFFORD GEERTZ; Professor, School of Social Science

March 11
Cultural Globalization Seminar: Discussion of L.
Amede Obiota, "Bridges and Barricades: Rethinking
Polemics and Intrasigence in the Campaign Against
Female Circumcision," Case Western Reserve Law
Review 47 (2), Winter 1997, pp. 275-332.
LESLYE OBIORA, University of Arizona; Visitor,
School of Social Science

March 12
Social Science Thursday Luncheon Seminar:
"Pessimism, Optimism, and Zeitgeist of Ecclesiastes"
CHOON-LEONG SEOW, Princeton Theological
Seminary; Member, School of Social Science

March 19
Social Science Thursday Luncheon Seminar: "Inter-
national Civil Society and Postmodern Peasants in
Post-War Central America"
MARC EDELMAN, Hunter College; Member, School
of Social Science

March 25
Cultural Globalization Seminar: Discussion of
Mohameden Ould-Mey, Global Restructuring and
Peripheral States: The Carrot and the Stick in
Mauritania. Preface, Chapters 2, 7, and 8.
MUSA ABUTUDU, University of Benin; Member,
School of Social Science

March 26
Social Science Thursday Luncheon Seminar: "Formal
Transitions: Change and Continuity in Gender
Experiences"
LESLYE OBIORA, *University of Arizona; Visitor,
School of Social Science*

April 22
Cultural Globalization Seminar: Discussion of
Deborah Durham, "Passports and Person: Displacing
State Power Across Southern Africa."
DEBORAH DURHAM, *Sweet Briar College; Member,
School of Social Science*

May 6
Cultural Globalization Seminar: Discussion of
Martha C. Nussbaum, "Human Capabilities, Female
Human Beings," *Women, Culture and Development: A
Study of Human Capabilities*, Clarendon, 1995;
Amartya Sen, "Gender Inequality and Theories of
Justice."
SUSAN BRISON, *Dartmouth College; Member,
School of Social Science*

May 20
Cultural Globalization Seminar: Discussion of Jeffrey
Rubin, "States and Mexico"; "Brazil and Social
Movements."
JEFFREY RUBIN; *Member, School of Social Science*

THE LIBRARIES

The Historical Studies-Social Science Library [Marcia Tucker, Librarian] contains some 100,000 volumes and has subscriptions to about 1,000 journals. The library is strongest in classical studies, ancient history and archaeology, but it contains basic document collections, reference works and important secondary works of scholarship in most fields of history and the social sciences. The journal collection is extensive, and fairly complete back runs exist to the founding of the Institute. The library has occupied its present building since 1964.

The Institute's rare book collection, the gift of Lessing J. Rosenwald, consists of about 2,000 volumes on the history of science and was compiled by Herbert M. Evans in the 1930's. The collection, which is housed in a special room, includes numerous first editions of important scientific works in mathematics, astronomy, physics and the life sciences.

The library has an extensive offprint collection that includes offprints received by Professors Andrew E. Z. Alföldi, Kurt Gödel, Ernst H. Kantorowicz, Elias Avery Lowe, Millard Meiss, Erwin Panofsky, and former Member Walter Kirchner.

The microfilm collections of the library include a large selection from Manuscripta, a collection of several thousand fifteenth- to nineteenth-century printed books from the Vatican Library. The Bavarian Academy has given the Institute a microfilm copy of slips presented for the Thesaurus Linguae Latinae. The library has microfilm copies of the papers of Albert Einstein, Kurt Gödel and Simone Weil.

The Historical Studies-Social Science Library houses the Institute archives. The papers in the collection date from the 1930's and include official correspondence of the Director's Office, minutes of meetings of the Faculty and the Board of Trustees, miscellaneous correspondence concerning past Faculty members, records of the Electronic Computer Project and other documents. The archives also include the Institute's extensive photograph collection.

The Mathematics-Natural Sciences Library [Momota Ganguli, Librarian] is located on the second floor of Fuld Hall and contains some 30,000 volumes (bound periodicals and monographs) plus subscriptions to nearly 200 journals. Its collection of older periodicals is housed in compact shelving on the lower level of the Historical Studies-Social Science Library. The subject areas covered by the library are pure and applied mathematics, astrophysics, and theoretical, particle and mathematical physics.

Both of the Institute's libraries participate in the shared cataloging system of the Research Libraries Group, which gives Institute scholars computerized access to a database that contains more than twenty-two million records. Searches of this database retrieve bibliographic information and identify the location of materials in all participating libraries. Access to electronically cataloged titles is available via Horizon, the Institute's web accessible online catalog. The Institute's libraries are participants in the JSTOR project, which makes available archival electronic versions of many core journals.

The Historical Studies-Social Science Library maintains a computer center with access to a variety of word processing packages for both PCs and Macintoshes, access to databases in the fields of Classical Studies, the History of Science, Islamic and French studies, and connection software to the Internet for additional information resources. The Mathematics-Natural Sciences Library has access to the Math-Sci Online database and the entire CD-ROM set of the Digitized Sky Survey.

All scholars affiliated with the Institute enjoy the same privileges as Princeton University faculty in the Harvey S. Firestone Memorial Library and the nineteen special-subject libraries in the Princeton University Library system and also in the Robert E. Speer Library of the Princeton Theological Seminary.

The librarians and the Faculties of all four Schools at the Institute warmly appreciate gifts of books and articles from former and current Members of the Institute.

INSTITUTE FOR ADVANCED STUDY/PARK CITY MATHEMATICS INSTITUTE

The Institute for Advanced Study is in its fifth year of sponsorship of the IAS/Park City Mathematics Institute (PCMI), a multi-level mathematics program for research mathematicians, graduate students, undergraduate students, mathematics education researchers, undergraduate faculty, and high school teachers. Seeking both to serve and advance the mathematical community as a whole, the PCMI is a unique program designed to strengthen mathematics education at all levels. By fostering dynamic interaction between education and research, the PCMI charts new territory in mathematics education reform and mathematics research.

A major activity of the PCMI is the annual three-week Summer Session held in Park City, Utah. Throughout the year, programs include the year-long High School Teacher Program, the Continuing Outreach Program, the Mentoring Program for Women in Mathematics, and the Publication Series. The PCMI receives major support from the National Science Foundation.

In 1998, over 225 participants attended the PCMI Summer Session held at the Inn at Prospector Square in Park City, Utah, from July 12-August 1. Six separate yet overlapping programs for researchers, high school teachers, undergraduate faculty, mathematics education researchers, and undergraduate and graduate students were held during this time.

The research topic for the Graduate Summer School and Research Program was Representation Theory of Lie Groups, organized by David Vogan of the Massachusetts Institute of Technology and Jeffrey Adams of the University of Maryland. The Undergraduate Program, designed to enhance students' interest in mathematics in general and understanding of representation theory in particular, was organized by Robert Bryant of Duke University. The high school teachers worked with researchers and educators to deepen their knowledge of mathematics and explore new methods of teaching. Teachers-in-residence, selected from alumni sites, and site directors also participated. In addition to the lectures and courses developed specifically for each group, there were Cross Program Activities and small-group discussions on topics of general interest, including the Third International Mathematics and Science Study (TIMSS), the National Council of Teachers of Mathematics (NCTM) Standards, and high school geometry curriculum content.

The interaction which is so integral to PCMI continues during the academic year in six regional, university-based sites where participating high school teachers work in collaboration with the site directors and other faculty. The 1997-99 sites include Purdue University, Rider University, Rhode Island College, the University of Cincinnati, the University of Louisville, and the University of Michigan. At these sites, the high school teacher participants work closely with university faculty in order to bring about curricular and pedagogical reform, first in their home districts, and then to the larger community around them.

Mathematics Education Research Program

In 1998 the PCMI unveiled its newest program, the Mathematics Education Research Program, organized by Timothy Kelly of Hamilton College with assistance from Joan Ferrini-Mundy. Six participants, including two lead researchers, worked intensively on research in pedagogical issues in modern mathematics education, collaborating closely with participants in both the High School Teacher Program and the Undergraduate Faculty Program. Interaction at PCMI has been greatly facilitated by the participants of its two newest programs, the undergraduate faculty and the mathematics education researchers, who work closely with the already established programs.

High School Teacher Program

The schedule of classes for the High School Teacher Program was changed in 1998 so that all coursework was covered in the mornings. Afternoons were devoted to presentations by the site groups, who are in the second year of their two-year cycle with PCMI, or to guest presentations. Courses were: *Building Mathematics in the Classroom*, Naomi Fisher, University of Illinois at Chicago, and Cynthia Hays, McCallum High School, Austin, Texas; *Technology for Teaching Mathematics*, James King, University of Washington; and *Advanced Mathematics: Symmetry*, Robert Stingley, Rice University. Guest speakers included Gail Burrill, University of Wisconsin and past-president of the National Council of Teachers of Mathematics; Allen Knutson, Massachusetts Institute of Technology; and John Polking, Rice University.

Undergraduate Faculty Program

There were 13 participants in the Undergraduate Faculty Program, now in its second year. This year's focus was *Linear Algebra*, and a variety of activities took place under the guidance of Daniel Goroff, Harvard University. Small working groups met to discuss curriculum and the publishing of textbooks, and to experiment with technology. Guest presentations were made by Guershon Harel, Purdue University and PCMI Site Director; Wilfried Schmid, Harvard University and PCMI Research Program participant; Daniel Goroff, Harvard University; John Polking, Rice University; Roger Howe, Yale University; William Barker, Bowdoin College; and Joan Ferrini-Mundy, National Research Council.

Undergraduate Program

In previous years the participants of the Undergraduate Program have been split into introductory and advanced sections, with classes running concurrently each day. At the suggestion of the undergraduate lecturers, the 1998 schedule was restructured so that all of the participants could attend both of the daily lectures if they wished. As a result, nearly 100% of the undergraduates attended both of the offered courses each day. There was a significant number of visitors from the other programs observing these lecture as well. The course titles and lecturers were: *Continuous Symmetry*, William Barker, Bowdoin College; and *Introduction to the Representations of Lie Groups*, Roger Howe, Yale University.

Graduate Summer School

The Graduate Summer School met for three formal lectures and one problem session each day. This year's lecturers and their course titles were: *Representations of Semisimple Lie Groups*, Anthony Knapp, SUNY at Stony Brook (due to illness, Professor Knapp's lectures were delivered by Peter Trapa, Massachusetts Institute of Technology); *Representation Theory and Dolbeault Cohomology*, Roger Zierau, Oklahoma State University; *Theta Correspondences and Dual Pairs*, Jian-Shu Li, University of Maryland; *The Method of Coadjoint Orbits*, David Vogan, Massachusetts Institute of Technology; and *Topological Methods in Representation Theory*, Kari Vilonen, Brandeis University.

Research Program

The Research Program included one or two organized seminars each day. Researchers also attended Graduate Summer School lectures and Undergraduate Program advanced lectures, participated in working groups with the Undergraduate Faculty, and participated in the small group discussions on geometry curriculum. Titles for 1998 research seminars were:

The Theory of Types for P-adic Groups: Plancherel Theorem and Conductors, Philip Kutzko, University of Iowa

Characters of Covers of SL(n), Jeffrey Adams, University of Maryland

The Schwartz Space for the Hypergeometric Fourier Transform, Patrick Delorme, Institut de Mathematiques

Minimal Orbits and Associated Representations, Pierre Torasso, Université de Poitiers

Poles of Intertwining Operators Via L-functions and Endoscopy, Freydoon Shahidi, Purdue University

Types and Hecke Algebras: construction, Julee Kim, Institute for Advanced Study

Duality and Hecke Algebras, Anne-Marie Aubert, École Normale Supérieure

Double Fibration Transforms, Joseph Wolf, University of California at Berkeley

On Classifications of Square-Integrable Representations, Gordon Savin, University of Utah

Analytic Structure of Compactifications of Symmetric and Locally Symmetric Spaces, Lizhen Ji, University of Michigan

Geometry and Computation in Coxeter Groups, William Casselman, University of British Columbia

Bernstein Degree and Characteristic Cycles, Kyo Nishiyama, Kyoto University

The Barbasch-Vogan Conjecture, Wilfried Schmid, Harvard University

Tensor Products of Singular Representations, Alexander Dvorsky, Rutgers University

A Comparison of Zeros of L-functions, Ravi Raghunathan, California Institute of Technology

Orbital Varieties, Weyl Group Representations, and Robinson-Schensted Algorithms, Peter Trapa, Massachusetts Institute of Technology

Positivity of Littlewood-Richardson Coefficients; or, the Discovery of Tensor Products Among the Bees, Allen Knutson, Massachusetts Institute of Technology

Construction of Minimal Representations for Complex Classical Groups, Alexander Astashkevich, University of California at Davis

Generalized Spherical Functions on Symmetric Spaces, Jing-Song Huang, Hong Kong University of Science and Technology

Gelfand Pairs Associated with Heisenberg Groups, Gail Ratcliff, University of Missouri at St. Louis

First Occurrence for the Dual Pairs U(p,q), U(r,s), Annegret Paul, University of California at Berkeley
Group Actions on Central Simple Algebras, Daniel Sage, University of Utah
Langlands Parameters and Derived Functor Modules, Paul Friedman, Aarhus University
Equivariant D-modules on a Semisimple Lie Algebra and a Homomorphism of Harish-Chandra; Markus Hunziker, Brandeis University
The (Symplectic) Geometry of Mackey Theory, Francois Ziegler, Pennsylvania State University
The Differential Operator for the Double Fibration Transform: An Example, Jodie Novak, University of Northern Colorado
Classification Theorems for Unitary Representations, Susana Salamanca-Riba, New Mexico State University.

Cross Program Activities

Held four times each week, this year's Cross Program activities were structured around three themes: the Third International Mathematics and Science Study (TIMSS), the NCTM Standards, and geometry curriculum. In addition, one formal presentation each week was on a mathematics theme. Formal presentations were as follows: *Lie Groups and Geometry*, Roger Howe, Yale University; *Policy Implications from the Third International Mathematics and Science Study (TIMSS)*, William H. Schmidt, Michigan State University; *The Mathematics of Juggling Patterns*, Allen Knutson, Massachusetts Institute of Technology, (Research Program participant) and Greg Warrington, Harvard University (Graduate Summer School participant); *Setting the Stage for Standards*, Gail Burrill, University of Wisconsin, past-president of National Council of Teachers of Mathematics (NCTM); *Tilings, Quasi-Crystals and Continuous Symmetry*, Lorenzo Sadun, University of Texas at Austin (Undergraduate Faculty Program participant); *How to Read Your PCMI T-Shirt*, Robert Bryant, Duke University, PCMI Steering Committee. Each week on Thursday there were small group discussions on the topics of TIMSS, NCTM Standards, or Geometry Course Curriculum, and these small groups made presentations to the larger group during the Cross Program Activity on Fridays.

The computer lab, under the direction of James King of the University of Washington, was equipped with a variety of computer hardware and software, providing Windows, Macintosh, and Linux platforms for participants' use. The lab was a valuable resource for educational and computational work as well as Internet access, and it was in use around the clock.

This year the computer lab was used to test new technology specifically designed by the Microsoft Corporation for the use of mathematicians and mathematics educators. The project, known as MathWorld, is still in development; however components of it were available during the PCMI Summer Session, specifically V-chat and Netmeeting. Microsoft generously donated all of the development for the technology, as well as the software and the server from which it was run. In addition, they sent several people to PCMI to assist with setting up the lab and provided funding for an on-site technical support person for the entire three weeks.

Participants had numerous opportunities for informal and social interaction throughout the summer session, including pizza parties, field trips to area attractions, barbecue dinners, and daily breakfast and lunch. An outdoor tent served as the

dining area and was a popular venue for both social and academic gatherings. All of these resources and activities were designed to encourage casual interaction and promote a sense of community among the participants. The professional relationships and friendships formed in this way, extending throughout the mathematics community, are among PCMI's most important goals.

On Tuesday, July 21, through the generous sponsorship of the Huntsman Foundation, PCMI hosted a concert by Robert Taub, Artist-in-Residence at the Institute for Advanced Study. PCMI participants and community members attended the piano concert at the Park City Community Church. The program for the evening included works by Beethoven, Brahms, and Scriabin. On the preceding Sunday evening, Robert Taub presented a pre-concert lecture for PCMI participants.

Publication Series
Progress continues on the publication of the lecture notes from each year's Graduate Summer School in the PCMI Lecture Series. This past year saw the publication of Volume 4, *Gauge Theory and Four Manifolds*, from the 1994 Graduate Summer School. This volume joins Volume 1, *Geometry and Quantum Field Theory*, Volume 2, *Nonlinear Partial Differential Equations in Differential Geometry*, and Volume 3, *Complex Algebraic Geometry*, from the 1991, 1992, and 1993 programs, respectively. Volume 5 is expected to be published before the end of 1998, and Volumes 6 and 7 will be in production by the end of the year. There are plans to publish material from the High School Teacher and Undergraduate Programs. The PCMI Lecture Series allows material generated during the summer session and academic year site program to be shared with a wider audience.

Oversight Board
The IAS/Park City Mathematics Institute is governed by an Oversight Board which consists of:

Board Members:
Hyman Bass, Adrain Professor of Mathematics, Columbia University
Ronald L. Graham, Chief Scientist, AT&T Research
Phillip A. Griffiths, Director, Institute for Advanced Study
Shirley A. Hill, Professor Emeritus, University of Missouri-Kansas City
Leo F. Klagholz, New Jersey Commissioner of Education
Robert D. MacPherson, Professor, School of Mathematics, Institute for Advanced Study
William A. Schreyer, Chairman Emeritus, Merrill Lynch & Co., Inc.
Elaine B. Wolfensohn, Washington, DC

Steering Committee
Members of the Steering Committee plan and manage the activities of the PCMI as follows:

Convener:
      John C. Polking, Professor, Rice University
1998 Organizers:
      David Vogan, Professor, Massachusetts Institute of Technology
      Jeffrey Adams, Professor, University of Maryland
Editor, PCMI Lecture Series:
      Daniel S. Freed, Professor, University of Texas at Austin
Graduate Summer School:
      David R. Morrison, Professor, Duke University
High School Teachers Program:
      Naomi Fisher, Co-Director, Mathematics Education Reform Network,
      University of Illinois at Chicago
      Cynthia Hays, Teacher of Mathematics and Department Chairperson,
      McCallum High School Austin, Texas
High School Teachers/Computer Program:
      James R. King, Professor, University of Washington
Mathematics Education Research Program:
      Joan Ferrini-Mundy, National Research Council
      Timothy Kelly, Professor, Hamilton College
Recruitment:
      Nathaniel Whitaker, Professor, University of Massachusetts at Amherst
Research Program:
      John Morgan, Professor, Columbia University
Research Program/Women's Program:
      Karen Uhlenbeck, Professor, University of Texas at Austin
Undergraduate Faculty Program:
      Daniel Goroff, Harvard University
Undergraduate Program:
      Robert L. Bryant, Professor, Duke University

MENTORING PROGRAM FOR WOMEN IN MATHEMATICS

Many of the women undergraduate and graduate students participating in the IAS/Park City Mathematics Institute Summer Session attended a preliminary workshop at the Institute for Advanced Study from May 11-21. The program, organized by Chuu-Lian Terng of Northeastern University and Karen Uhlenbeck of the University of Texas at Austin, emphasized the content and culture of mathematics and included lectures, seminars, working problem groups, mentoring and networking sessions and the opportunity to meet and interact with leading mathematicians. The 33 participants included graduate students, undergraduates, postdoctoral scholars, and senior researchers. The Women's Program is funded by the National Science Foundation.

The undergraduate lecture series, *Representations of Finite Symmetry Groups*, was given by Lisa Mantini, Oklahoma State University. The graduate lecture series, *Theory of Unitary Representations*, was given by Leticia Barchini, Oklahoma State University, Rebecca Herb, University of Maryland, and Susana Salamanca-Riba, New Mexico State University. Guest lecturers were Mark Goresky, Member, Institute for Advanced Study, and Sigurdur Helgason, Massachusetts Institute of Technology, and Member, Institute for Advanced Study.

Karen Uhlenbeck led a Women in Science Seminar, a daily informal discussion group which included biographical readings on women mathematicians including Emmy Noether and Evelyn Fox Keller. Special guests at the Women in Science Seminar were Bhama Srinivasan, University of Illinois at Chicago, LaVerne Gill, Princeton Theological Seminary, and Joan Feigenbaum and Anna Gilbert, both of AT&T Research.

The IAS/Park City Mathematics Institute and the Mentoring Program for Women in Mathematics mutually support and interact with each other. The Women's Program has enabled the PCMI to increase significantly the number of female participants in its Summer Session. It has also provided female students with an opportunity to form professional friendships and collaborations that develop further during the PCMI Summer Session, thus encouraging these women to stay in the field of mathematics.

The Women's Program Committee assists the organizers in planning and promoting the program and recruiting lecturers and participants. Members include: Fan Chung, Professor, University of Pennsylvania; Ingrid Daubechies, Professor, Princeton University; Antonella Grassi, Professor, University of Pennsylvania; Sarah Greenwald, Graduate Student, University of Pennsylvania; Nancy Hingston, Professor, The College of New Jersey; Rhonda Hughes, Professor, Bryn Mawr College; Robert MacPherson, Professor, Institute for Advanced Study; Jane Scanlon, Professor, Rutgers University; Diane Souvaine, Professor, Rutgers University; and Lisa Traynor, Professor, Bryn Mawr College.

Lecture Series

Representations of Finite Symmetry Groups, Lisa Mantini, Oklahoma State University
Theory of Unitary Representations, Leticia Barchini, Oklahoma State University
Rebecca Herb, University of Maryland; and Susana Salamanca-Riba, New Mexico State University
Theta Correspondence, Anne-Marie Aubert, École Normale Supérieure; Annegret Paul, University of California at Berkeley
Peter-Weyl Theorem with motivation, Sigudur Helgason, Massachusetts Institute of Technology and Institute for Advanced Study
SL(2,R) - Introduction to infinite dimensional representations, Sigurdur Helgason, Massachusetts Institute of Technology and Institute for Advanced Study
Classification of Lie Groups, Mark Goresky, Institute for Advanced Study

Seminars

Eigenvalues of Invariant Operators Associated with Multiplicity Free Actions, Gail Ratcliff, University of Missouri at St. Louis
Geometric Interpretation of Macdonald Polynomials and N! Conjecture, Carol Chang, University of California at San Diego
On the Plancherel Formula for Hecke Algebras, Anne-Marie Aubert, École Normale Supérieure
Howe Duality and Unbounded Realizations of Symmetric Domains, Christina Leslie, University of California at Berkeley
First Occurrence in the Theta Correspondence for Real Dual Pairs, Annegret Paul, University of California at Berkeley
Creating Female-Friendly Classrooms, Gail Ratcliff, University of Missouri at St. Louis
Cells and Representations of Symmetric Groups, Bhama Srinivasan, University of Illinois at Chicago
Representations of Graded Hecke Algebras, Cathy Kriloff, Idaho State University
The Orbit Method and P-adic Lie groups, Monica Nevins, Massachusetts Institute of Technology
Twisted Torsion on Compact Hyperbolic Spaces – a Vanishing Result, Maria Fung, Cornell University
Regular Functions on Nilpotent Orbits, Dana Pascovici, Massachusetts Institute of Technology
Realizing Representations with the Penrose Transform, Jodie Novak, University of Northern Colorado
Feminism vs. the Working Woman Scientist, Women-in-Science Seminar
College Teaching as a Career; Women in Science Seminar Panel Discussion; moderator: Janet Talvacchia, Institute for Advanced Study; panelists: Nancy Hingston, College of New Jersey; Rhonda Hughes, Bryn Mawr College; Stephanie Frank Singer, Haverford College; Aimee Johnson, Swarthmore College; Cynthia Curtis, Princeton University; and Antonella Grassi, University of Pennsylvania

INDEPENDENT AUDITORS' REPORT

The Board of Trustees,
  Institute for Advanced Study -
    Louis Bamberger and Mrs. Felix Fuld Foundation

We have audited the accompanying balance sheet of Institute for Advanced Study
- Louis Bamberger and Mrs. Felix Fuld Foundation (the "Institute") as of June 30,
1998, and the related statements of activities and cash flows for the year then
ended. These financial statements are the responsibility of the Institute's manage-
ment. Our responsibility is to express an opinion on these financial statements
based on our audit.

We conducted our audit in accordance with generally accepted auditing standards
and the standards applicable to finanical audits contained in *Government Auditing
Standards* issued by the Comptroller General of the United States. Those standards
require that we plan and perform the audit to obtain reasonable assurance about
whether the financial statements are free of material misstatement. An audit
includes examining, on a test basis, evidence supporting the amounts and disclo-
sures in the financial statements. An audit also includes assessing the accounting
principles used and significant estimates made by management, as well as evaluat-
ing the overall financial statement presentation. We believe that our audit pro-
vides a reasonable basis for our opinion.

In our opinion, such financial statements present fairly, in all material respects, the
financial position of the Institute at June 30, 1998, and the results of its activities
and its cash flows for the year then ended in conformity with generally accepted
accounting principles.

In accordance with *Government Auditing Standards*, we have also issued our report
dated September 30, 1998, on our consideration of the Institute's internal control
over financial reporting and our tests of its compliance with certain provisions of
laws, regulations, contracts, and grants.

As discussed in Notes A and B to the financial statements, effective July 1, 1996,
the Institute changed its method of accounting for certain investments to conform
with Statement of Financial Accounting Standards (SFAS) No. 124.

Deloitte & Touche LLP

September 30, 1998

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BALANCE SHEET
JUNE 30, 1998 (WITH COMPARATIVE TOTALS FOR 1997)

ASSETS	1998	1997
CASH	$ 23,979	$ 557,951
ACCOUNTS RECEIVABLE	97,290	108,004
GOVERNMENT GRANTS AND CONTRACTS RECEIVABLE	2,013,779	1,658,133
ACCRUED INCOME ON INVESTMENTS	1,850,178	1,449,532
PREPAID AND OTHER ASSETS	290,134	292,339
CONTRIBUTIONS RECEIVABLE-NET	2,288,517	2,714,696
SHORT-TERM INVESTMENTS (Note B)	25,998,238	962,297
UNAMORTIZED DEBT ISSUANCE EXPENSE	779,139	89,110
LAND, BUILDINGS AND IMPROVEMENTS, EQUIPMENT AND RARE BOOK COLLECTION-NET (Note C)	23,663,420	22,467,671
INVESTMENTS (Note B)	339,978,980	314,042,932
TOTAL ASSETS	$396,983,654	$344,342,665

See notes to financial statements.

LIABILITIES AND FUND BALANCES	1998	1997
ACCOUNTS PAYABLE AND ACCRUED EXPENSES	$ 7,178,041	$ 6,068,773
REFUNDABLE ADVANCES	2,649,193	1,985,437
TRUST FUND OBLIGATIONS	1,591,714	1,588,434
LONG-TERM DEBT (Note D)	42,356,135	15,640,260
NOTE PAYABLE (Note C)	1,193,094	1,218,800
ACCRUED INVESTMENT MANAGEMENT FEES	1,204,773	1,218,746
Total liabilities	56,172,950	27,720,450

NET ASSETS:

Unrestricted	233,561,262	216,204,545
Temporarily restricted	24,016,293	21,904,151
Permanently restricted	83,233,149	78,513,519
Total net assets	340,810,704	316,622,215
TOTAL LIABILITIES AND NET ASSETS	$396,983,654	$344,342,665

STATEMENT OF ACTIVITIES (WITH COMPARATIVE TOTALS FOR 1997)
YEAR ENDED JUNE 30, 1998

	UNRESTRICTED	TEMPORARILY RESTRICTED
REVENUES, GAINS AND OTHER SUPPORT:		
Private contributions and grants	$ 6,224,092	$ 1,824,561
Government grants	-	4,403,453
Income on long-term investments	7,293,083	3,300,607
Net realized and unrealized gains on long-term investments (includes $9,598,973 and $7,475,780 in unrealized gains in 1998 and 1997, respectively)	15,812,284	1,694,071
Gain on sale of capital assets	999,171	-
Net assets released from restrictions- Satisfaction of program restrictions	10,430,546	(9,110,550)
Gain on sale of land development rights	-	-
Total revenues, gains and other support	40,759,176	2,112,142
EXPENSES AND LOSSES:		
School of Mathematics	4,762,545	-
School of Natural Sciences	4,736,059	-
School of Historical Studies	3,600,218	-
School of Social Science	1,696,062	-
Libraries and other academic expenses	3,725,423	-
Administration and general	4,473,824	-
Auxiliary activity-tenants' housing expenses, net of unrestricted revenue	408,328	-
Total expenses and losses	23,402,459	-
CUMULATIVE EFFECT OF A CHANGE IN ACCOUNTING PRINCIPLE	-	-
CHANGES IN NET ASSETS	17,356,717	2,112,142
NET ASSETS, BEGINNING OF YEAR	216,204,545	21,904,151
NET ASSETS, END OF YEAR	$233,561,262	$24,016,293

1998		
PERMANENTLY RESTRICTED	TOTAL	TOTAL 1997
$ 457,735	$ 8,506,388	$ 5,390,985
-	4,403,453	4,667,104
-	10,593,690	2,222,763
5,581,891	23,088,246	35,814,704
-	999,171	6,155
(1,319,996)	-	-
-	-	10,292,909
4,719,630	47,590,948	58,394,620
-	4,762,545	4,564,629
-	4,736,059	4,723,013
-	3,600,218	3,257,217
-	1,696,062	1,710,303
-	3,725,423	3,706,704
-	4,473,824	4,400,568
-	408,328	298,760
-	23,402,459	22,661,194
-	-	11,677,717
4,719,630	24,188,489	47,411,143
78,513,519	316,622,215	269,211,072
$83,233,149	$340,810,704	$316,622,215

STATEMENT OF CASH FLOWS
YEAR ENDED JUNE 30, 1998

CASH FLOWS FROM OPERATING ACTIVITIES:	
Change in net assets	$ 24,188,489
Adjustments to reconcile change in net assets	
to net cash used in operating activities:	
Depreciation	1,937,516
Increase in accrued income	(400,646)
Increase in accounts and grants receivable	(344,932)
Decrease in contributions receivable	426,179
Increase in accounts payable	1,083,562
Decrease in prepaid and other assets	2,205
Increase in refundable advances	663,756
Decrease in accrued management fees	(13,973)
Net realized and unrealized gains on long-term investments	(23,088,246)
Net gain on sale of land, buildings and improvements and	
equipment	999,171
Net cash provided by operating activities	5,453,081
CASH FLOWS FROM INVESTING ACTIVITIES:	
Purchase of buildings and improvements and equipment	(4,132,436)
Proceeds from sale of investments	520,455,018
Purchase of investments	(526,581,165)
Net cash used in investing activities	(10,258,583)
CASH FLOWS FROM FINANCING ACTIVITIES:	
Increase in trust fund obligations	3,280
Increase in unamortized debt service expense	(690,029)
Increase in long-term debt	26,715,875
Increase in investment receivable-bond issue	(21,757,596)
Net cash provided by financing activities	4,271,530
NET DECREASE IN CASH	(533,972)
CASH, BEGINNING OF YEAR	557,951
CASH, END OF YEAR	$ 23,979

See notes to financial statements.

A. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

The Institute for Advanced Study (the "Institute"), an independent, private institution devoted to the encouragement, support and patronage of learning, was founded in 1930 as a community of scholars where intellectual inquiry could be carried out in the most favorable circumstances.

Focused on mathematics and classical studies at the outset, the Institute today consists of the School of Historical Studies, the School of Mathematics, the School of Natural Sciences and the School of Social Science. Each School has a small permanent faculty, and some 160 fellowships are awarded annually to visiting members from other research institutions and universities throughout the world.

The objectives of the Institute were described as follows in the Founders' original letter to the first Trustees: "The primary purpose is the pursuit of advanced learning and exploration in fields of pure science and high scholarship to the utmost degree that the facilities of the institution and the ability of the faculty and students will permit."

Basis of Presentation - The accompanying financial statements are prepared on the accrual basis and are presented in accordance with recommendations contained in Audits of Certain Nonprofit Organizations issued by the American Institute of Certified Public Accountants. Certain prior year amounts presented for comparative purposes have been reclassified to conform to the current year presentation.

During November 1995, the Financial Accounting Standards Board issued Statement of Financial Accounting Standards No. 124, "Accounting for Certain Investments Held by Not-for-Profit Organizations" ("SFAS No. 124"). It requires that investments in equity securities with readily determinable fair values and all investments in debt securities be reported at fair value with gains and losses included in a statement of activities. This statement is effective for fiscal years beginning after December 15, 1995. The cumulative effect of a change in accounting principle of $11,677,717 has been recognized in the accompanying financial statements for the year ended June 30, 1997.

Use of Estimates - The preparation of financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements. Estimates also affect the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

Fund Accounting - The accounts of the Institute are maintained in accordance with the principles of "fund accounting." This is the procedure by which resources for various purposes are classified for accounting and reporting purposes into funds that are in accordance with activities or objectives specified. Separate accounts are maintained for each fund; however, in the accompanying financial statements, funds that have similar characteristics have been combined into fund groups.

Fund balances restricted by outside sources are so indicated and are distinguished from unrestricted funds allocated or designated to specific purposes by action of the governing board. Externally restricted funds may only be utilized in accordance with the purpose established by the grantor of such funds. In contrast, the governing board retains full control over unrestricted funds to be used in achieving any of the Institute's objectives.

True endowment funds are subject to the restrictions of the gift instruments which require that the principal be invested in perpetuity; only income earned on such funds may be utilized. Quasi-endowment funds have been established by the governing board to function as endowment funds and any portion of these funds may be expended. Unrestricted quasi-endowment funds have no external restrictions. However, certain of these funds have been internally designated to support specific needs of the Institute.

All gains and losses arising from the sale, collection, or other disposition of investments and other non-cash assets are accounted for in the fund which owned such assets. Ordinary income earned on investments and receivables is generally accounted for in the fund owning such assets. However, unrestricted income earned on investments of endowment and similar funds is accounted for as revenue in unrestricted operating funds, and restricted income is accounted for as deferred restricted revenue until used in accordance with the terms of the restriction or transferred to endowment and similar funds.

Plant Assets and Depreciation - Uses of operating funds for plant acquisitions and principal debt service payments are accounted for as transfers to plant funds. Proceeds from the sale of plant assets, if unrestricted, are transferred to operating funds, or, if restricted, to deferred amounts restricted for plant acquisitions. Depreciation is provided over the estimated useful lives of the respective assets on a straight-line basis (buildings and capital improvements 20-40 years, equipment 3-6 years). Interest expense, net of related interest income, is capitalized on construction in progress of qualifying assets.

B. INVESTMENTS

Effective July 1, 1996, the Institute adopted the provisions of Statement of Financial Accounting Standards No. 124, "Accounting for Certain Investments Held by Not-for-Profit Organizations" ("SFAS No. 124"). SFAS No. 124 requires that investments in equity securities with readily determinable fair values and all investments in debt securities be reported at fair value with gains and losses included in the statement of activities. Previously, investments purchased by the Institute were recorded at cost; investments received by gift were recorded at the fair market value at the date of donation.

The cumulative effect of a change in accounting principle of $11,677,717 has been recognized in the accompanying statement of activities for the year ended June 30, 1997. The unrealized gain recorded in the accompanying statements of financial position, activities and cash flows for the year ended June 30, 1998 was $9,598,973.

Endowment and similar funds investments at June 30, 1998 are comprised of the following:

	CARRYING VALUE	MARKET VALUE
Pooled investments:		
Equity securities	$199,512,072	$251,121,632
Debt securities	132,665,798	132,709,482
Mortgages		
from faculty and staff	3,010,243	3,010,243
Investment accounts receivable	9,144,562	9,144,562
Investment accounts payable	(4,418,750)	(4,553,357)
Total pooled investments	339,913,925	391,432,562
Funds invested separately:		
Equity securities	65,055	94,005
Total	$339,978,980	$391,526,567

Marketable debt and equity securities are carried at market value. Realized gains and losses are computed based on the average cost of the investment. Market values are determined utilizing quoted market prices.

Equity securities include the Institute's interests in certain limited partnerships with a carrying value of approximately $84,765,410 and a market value of approximately $84,028,004 at June 30, 1998. The Institute accounts for these investments under the equity method and, accordingly, recognizes its proportionate share of ordinary income and net realized gains attributable to the investments of the partnerships. The Institute's proportionate share of ordinary gain and net realized gain was $138,641 and $12,273,541, respectively, for the year ended June 30, 1998.

In addition, equity securities include the Institute's interests in five open-ended investment funds (the "Funds") incorporated in the Cayman Islands with carrying values of $91,717,740 and market values of $144,064,706 at June 30, 1998. The Institute accounts for these investments at the lower of cost or market value. Market value is determined as the number of shares held by the Institute multiplied by the net asset value for such shares. Net asset value, as determined by the Funds, reflects the underlying assets held by the Funds and any investment gain or loss. Realized gains and losses are computed based on the actual cost of the investment.

The Institute's interests in limited partnerships and Funds represent 24.9% and 27.0%, respectively, and 51.9% collectively of total investments held by the Institute at June 30, 1998. These instruments may contain elements of both credit and market risk. Such risks include, but are not limited to, limited liquidity, absence of regulatory oversight, dependence upon key individuals, emphasis on speculative investments (both derivatives and nonmarketable investments) and nondisclosure of portfolio composition.

Substantially all of the assets of endowment and similar funds are pooled with each individual fund subscribing to or disposing of units on the basis of the market value per unit, determined on a quarterly basis.

The following table summarizes the investment return and its classification in the statement of activities for the year ended June 30, 1998:

	UNRESTRICTED	TEMPORARILY RESTRICTED	PERMANENTLY RESTRICTED	TOTAL
Dividends and interest	$ 7,293,083	$ 3,300,607	-	$ 10,593,690
Realized gain (loss) on investments reported at fair value	$(142,741)	$(15,322)	$(51,402)	$(209,465)
Realized gain on investments reported at other than fair value	9,368,463	1,029,811	3,300,464	13,698,738
Total realized gain	9,225,722	1,014,489	3,249,062	13,489,273
Total unrealized gain	6,586,562	679,582	2,332,829	9,598,973
Total realized and unrealized gain	$15,812,284	$1,694,071	$5,581,891	$23,088,246

Investments, beginning of year		$314,042,932
Investment puchases		525,349,579
Investment sales		(522,501,777)
Investment returns:		
Realized gains	$ 13,489,273	
Unrealized gains	9,598,973	
Total return on investments		23,088,246
Investments, end of year		$ 339,978,980

Investments, beginning of year		$ 314,042,932
Gifts available for investment:		
Gifts creating a permanent endowment		7,111,286
Gifts creating trust funds		6,994
Investment returns:		
Dividends and interest	$ 10,593,690	
Realized gains	13,489,273	
Unrealized gains	9,598,973	
Total return on investments		33,681,936
Amounts appropriated for current operations		(14,645,330)
Annuity trust income payment		(218,838)
Investments, end of year		$ 339,978,980

The participation in the pool and ownership of the other investments at June 30, 1998 is shown in the table below:

Permanently restricted net assets	$82,614,892
Temporarily restricted net assets	24,138,508
Unrestricted net assets	233,225,580
	$339,978,980

C. PHYSICAL PLANT

Physical plant and equipment are stated at cost at date of acquisition, less accumulated depreciation. Library books, other than rare books, are not capitalized.

A summary of plant assets at June 30, 1998 follows:

Land and improvements	$ 1,014,189
Buildings and improvements	36,547,381
Equipment	12,734,840
Rare book collection	203,508
Joint ownership property	921,717
Total	51,421,635
Less accumulated depreciation	(27,758,215)
Net book value	$23,663,420

During 1997, the Institute entered into a Deed of Pathway and Conservation Easement (the "Easement") whereby the Institute has received $11,794,600 in cash and $1,274,196 in contributions receivable at June 30, 1997, in consideration for the sale of land development rights for certain Institute properties. The Easement requires that those properties, set forth therein, be preserved to the greatest extent possible in their existing natural, scenic, open, wooded and agricultural state and be protected from uses inconsistent therewith.

Of the $11,794,600 in cash received by the Institute, $5,625,000 represents monies received from the New Jersey Green Acres Fund to be repaid by the parties to the Easement. The Institute's pro rata share of $1,193,094 has been recorded as a note payable in the accompanying statement of financial position at June 30, 1998. The note payable bears interest at a rate of two percent and requires semi-annual payments through January 8, 2017. The current portion of the note payable was $52,187 at June 30, 1998.

The Institute has recorded a gain on sale of land development rights of $10,292,909 in the accompanying statement of activities for the year ended June 30, 1997.

D. LONG-TERM DEBT

A summary of long-term debt at June 30, 1998 follows:

Series F & G 1997 - NJEFA	$42,875,000
Less unamortized bond discount	(518,865)
Total long-term debt	$42,356,135

Interest expense on long-term debt for the year ended June 30, 1998 was approximately $1,800,000.

In November 1997 the Institute received proceeds of the New Jersey Educational Facilities Authority offering of $16,310,000 Revenue Bonds, 1997 Series F and

$26,565,000 Revenue Bonds, 1997 Series G of the Institute for Advanced Study Issue. A portion of the proceeds ($16,969,355) was used to retire the existing Revenue Bonds, 1991 Series. The remainder of the proceeds is to be used for renovation of members' housing, construction of a new academic building and additional capital projects.

The bonds bear interest at rates ranging from 4% to 5%, payable semi-annually, are subject to redemption at various prices and require principal payments and sinking fund installments through July 1, 2028. The obligation to pay the Authority on a periodic basis, in the amounts sufficient to cover principal and interest due on the bonds, is a general obligation of the Institute.

The bonds are repayable as follows at June 30, 1998:

1999	$ —
2000	955,000
2001	1,140,000
2002	1,195,000
2003	1,250,000
Through 2028	38,335,000
Total	$42,875,000

E. PENSION PLANS AND OTHER POST RETIREMENT BENEFITS

Separate voluntary defined contribution retirement plans are in effect for faculty members and eligible staff personnel, both of which provide for annuities which are funded to the Teachers Insurance and Annuity Association and/or the College Retirement Equities Fund. Contributions are based on the individual participants' compensation in accordance with the formula set forth in the plan documents on a nondiscriminatory basis. Contributions for the year ended June 30, 1998 totaled approximately $952,020.

In addition to providing pension benefits, the Institute provides certain health care and life insurance benefits for retired employees and faculty. Substantially all of the Institute's employees may become eligible for these benefits if they meet minimum age and service requirements. The Institute accrues these benefits over a period in which active employees become eligible under existing benefit plans.

The component of the periodic expense for these postretirement benefits for 1998 is as follows:

Postretirement Benefit Costs:

Service Cost - benefits attributable to service during the year	$ 119,919
Interest Cost on Accumulated Postretirement Benefit Obligation	266,081
Total	$ 386,000

The actuarial and recorded liabilities for these benefits, none of which have been funded, are as follows at June 30, 1996 (a recomputation of the accumulated postretirement benefit obligation as of June 30, 1998 was not performed due to the immaterial change from the prior measurement date):

Accumulated Postretirement Benefit Obligation	
Retirees	$1,810,053
Fully Eligible Active Plan Participants	604,638
Other Active Plan Participants	948,829
Total	$3,363,520

For measurement purposes, a 13.0% Pre-62 trend rate was used for 1997 health care costs, with the rate decreasing ratably until the year 2006, then remaining constant at 5.50% thereafter. In addition, a 10.0% Post-62 trend rate was used for 1997, declining ratably to 5.50% in 2006 and remaining constant thereafter. The health care cost trend rate assumption has a significant effect on the amounts reported. For example, a 1% increase in the health care trend rate would increase the accumulated postretirement benefit obligation by $672,501 at June 30, 1997 and the net periodic cost by $115,444 for the year. The weighted average discount rate used in determining the accumulated postretirement benefit obligation was 7.5%.

F. CHANGES IN DEFERRED RESTRICTED REVENUE

Restricted receipts, which are recorded initially as deferred restricted revenue, are reported as revenues when expended in accordance with the terms of the restriction or transferred to quasi-endowment funds. Changes in deferred restricted revenue amounts are as follows:

	Total Deferred Restricted Revenue
Balance at June 30, 1997	$1,985,437
Additions:	
Contributions, grants, etc.	6,981,526
Restricted endowment income	3,360,946
Quasi-endowment funds utilized	1,215,053
Total additions	11,557,525
Deductions:	
Funds expended from contributions, grants, etc.	6,317,770
Funds expended from restricted endowment	4,575,999
Total deductions	10,893,769
Balance at June 30, 1998	$2,649,193

G. FUNDS HELD IN TRUST BY OTHERS

The Institute is the residuary beneficiary of a trust and, upon the death of the life ten-ant, will be entitled to receive the corpus thereof. The approximate market value of the trust's assets, as reported by the administrator of the trust, aggregated $3,209,322 as of June 30, 1998, and is not included in the accompanying financial statements.

H. FUNCTIONAL ALLOCATION OF EXPENSES

The costs of providing the various programs and other activities have been summarized on a functional basis in the statement of activities and cash flows. Accordingly, certain costs have been allocated among the programs and supporting services benefited. The net costs incurred by the Institute in operating both the Dining Hall ($464,197 net of $374,980 in revenues) and members' housing ($121,988, net of $1,087,768 in revenues) have been allocated among the programs and supporting services benefited. An over-head charge is allocated to certain schools generally based upon their ability to recover such costs under the terms of various grants and contracts. Overhead allocated from administration and general expenses to various programs totaled $2,817,774 for the year ended June 30, 1998.

Interest expense on plant fund debt, net of interest income on short-term investments, is allocated to schools based upon their occupancy of academic buildings funded with such debt. Allocated interest expense totaled $1,854,772 and allocated interest income totaled $725,243 for the year ended June 30, 1998.

I. TAX STATUS

The Institute is exempt from Federal income taxes pursuant to Section 501(c)(3) of the Internal Revenue Code and is listed in the Internal Revenue Service Publication 78.

J. TEMPORARILY AND PERMANENTLY RESTRICTED ASSETS

The Institute reports gifts of cash and other assets as restricted support if they are received with donor stipulations that limit the use of the donated assets. When a donor restriction expires, that is, when a stipulated time restriction ends or purpose restriction is accomplished, temporarily restricted net assets are reclassified to unrestricted net assets and reported in the statement of activities as net assets released from restrictions.

The Institute reports gifts of buildings and equipment as unrestricted support unless explicit donor stipulations specify how the donated assets must be used. Gifts of long-lived assets with explicit restrictions that specify how the assets are to be used and gifts of cash or other assets that must be used to acquire long-lived assets are reported as restricted support. Absent explicit donor stipulations about how long those long-lived assets must be maintained, the Institute reports expirations of donor restrictions when the donated or acquired long-lived assets are placed in service.

Temporarily restricted net assets are available for the following purposes:

	1998
Academic Services:	
Educational Programs	$24,016,293

Permanently restricted net assets are restricted to:
Investments to be held in perpetuity, the income from which is
expendable to support academic services — $83,233,149

Net assets were released from donor restrictions by incurring expenses satisfying the restricted purposes or by occurrence of other events specified by donors. Purpose restrictions accomplished:

	1998
Program expenses:	
School of Mathematics	$ 2,979,878
School of Natural Sciences	2,238,031
School of Historical Studies	1,270,932
School of Social Science	1,465,867
Academic support costs:	
Libraries and other academic	1,857,198
Computing	61,400
Administration and general:	
Fund raising	11,335
Tenants' housing	204,585
Equipment acquired and placed in service	122,000
Trust fund disbursements	219,320
Total restrictions released	$10,430,546

K. FUNCTIONAL EXPENSES

The Institute provides academic services to a community of scholars, including permanent faculty and visiting members. Expenses related to providing these services are as follows:

	1998
Expenses incurred were for:	
Salaries, wages, and benefits	$10,753,940
Stipends	4,165,755
Honoraria	107,249
Grants to other organizations	660,536
Supplies and travel	2,443,350
Services and professional fees	1,811,823
Depreciation	1,937,514
Interest	1,522,292
Total expenses	$23,402,459

L. DISCLOSURES ABOUT FAIR VALUE OF FINANCIAL INSTRUMENTS

The Institute is required by SFAS No. 107, "Disclosure About Fair Value of Financial Instruments," to disclose the estimated fair value of financial instruments, both assets and liabilities recognized and not recognized in the statement of financial position, for which it is practicable to estimate fair value. The estimated fair value amounts in the following disclosure have been determined by the Institute using available market information and appropriate valuation methodologies. The estimates are not necessarily indicative of the amounts the Institute could realize in a current market exchange, and the use of different market assumptions or methodologies could have a material effect on the estimated fair value amounts.

June 30, 1998	Carrying Amount	Estimated Fair Value
Assets:		
Cash	$ 23,979	$ 23,979
Investments	339,978,980	391,526,567
Grant/Contributions Receivable	4,302,296	4,302,296
Mortgages Receivable from Faculty and Staff	3,010,243	3,010,243
Liabilities:		
Long-term debt	42,356,135	42,356,135
Note payable	1,193,094	485,000

The fair value of investments is based on quoted market prices. The fair market valuation of grant/contributions receivable was estimated based on past cash collection experience. For long-term debt, the fair value is estimated to approximate carrying value based upon its recent issuance in November 1997 and its scheduled repayment terms. The estimated fair value of mortgages for faculty and staff is based upon similar terms at which similar institutions would provide as part of an overall compensation package to such individuals. The estimated fair value of the note payable is based on the discounted value of the future cash flows expected to be paid under the note.

The fair value estimates presented are based on information available to the Institute as of June 30, 1998, and have not been revalued since that date. While the Institute is not aware of any significant factors that would affect the estimates since that date, current estimates of fair value could differ significantly from the amounts disclosed.

M. DISCLOSURES OF PROMISES TO GIVE

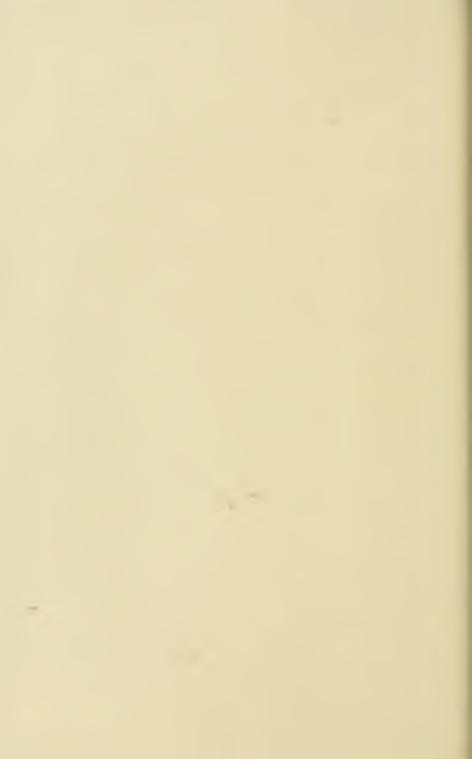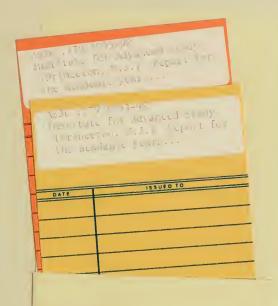|	June 30, 1998
Unconditional promises to give:	
Less than one year	$1,381,210
One to five years	907,307

* * * * * *

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