INSTITUTE
for ADVANCED STUDY

REPORT

FOR THE ACADEMIC YEAR

1996 – 97

PRINCETON · NEW JERSEY

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OLDEN LANE
PRINCETON · NEW JERSEY · 08540-0631
609-734-8000
609-924-8399 (Fax)
http://www.ias.edu

Extract from the letter addressed by the Institute's Founders, Louis Bamberger and Mrs. Felix Fuld, to the Board of Trustees, dated June 6, 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 this founding principle for more than sixty-five 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 many more 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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REPORT OF THE CHAIRMAN

Last year the Board of Trustees and the Director, Phillip Griffiths, began the Decadal Review, a process of clarifying the Institute's mission and examining how the Institute might better fulfill that mission in the future. The Decadal Review was chaired by Richard B. Black and Helene L. Kaplan and was charged with addressing the following questions: 1) What will be the context, environment, and challenges for the world of research and scholarship? 2) Within that framework, what should be the mission of the Institute? 3) Through a combination of continuity and change, how can we best fulfill that mission?

I would like to summarize our thoughts as we conclude the Decadal Review process. We believe that the Institute should indeed continue to serve as a place for the fundamental research that contributes to the progress of knowledge. The Institute must maintain its leadership in the important areas of research, be a steward to the fields it studies, participate in emerging fields to which the Institute's strengths and traditions might make a contribution, and sustain in every way possible its visible commitment to research and to the universe of scholarship. At the same time, the Institute should explore partnerships both within and outside its community in order to create connective roles which will be advantageous to the advancement of scholarly research in mathematics, the sciences, humanities, and social sciences.

A major recommendation of the Decadal Review concerned increased flexibility within the institution. Knowledge itself is intrinsically fluid, dynamic, and somewhat unpredictable. To stay in the forefront of the several fields in which the Institute is involved, its structure must provide the flexibility to take advantage of new emphases, of emerging areas, and of the opportunity to investigate an interesting and intellectually valid possibility.

The establishment this year of the Institute Initiatives Fund has provided the Institute with this much-needed mechanism for change. I am deeply grateful to the Chairman of the Executive Committee of the Board, Leon Levy, and his wife Shelby White for their very generous lead gift in the establishment of this Fund. The Initiatives Fund will provide the Institute with the ability to explore a new scholarly field without, or prior to, making a permanent commitment to it. Some of the areas explored will become part of the ongoing activities of the Institute and others will not, but all should be important fields to which the Institute's strengths and traditions can make a significant contribution.

In fulfilling its responsibility, the Board requires a continuing link with the academic life of the institution. To strengthen that link, the Board established an Academic Affairs Committee so that the Trustees and Faculty may interact on academic and other matters in a more structured way. The Institute is fortunate to have distinguished academic Trustees who can form an essential component of such a committee. Through substantive communication, this committee will inform the Board more fully about academic issues, as well as provide a channel for evaluation and objective assessment of each of the Institute's components.

The permanent Faculty of the Institute are the leaders in realizing the Institute's mission, and every forum of the Decadal Review confirmed the fact that their excellence sets the standard for the quality of the Institute. "Excellence" is subtle and elusive, as complex as it is crucial. In the context of the Institute's Faculty, excellence indicates an intellectual stature which may go beyond scholarly reputation. Excellence includes breadth as well as depth, and the ability to provide leadership to a major area of scholarly activity as well as to conduct individual research. The Faculty has the ongoing responsibility of ensuring that appointments will continue to be made at the highest level.

Since its founding, the Institute has had an annually changing group of visiting Members who are invited to do their own research and pursue their own scholarship. These Members are highly qualified postdoctoral scholars who have applied for membership and are selected from universities and research institutions throughout the world. Through their own achievements and their association with the permanent Faculty while at the Institute, visiting Members almost always experience an extremely productive period which enables them to bring their reinvigorated scholarship and creativity back to their home institution.

A Member survey, conducted by Daniel Yankelovich and Barbara Lee as a part of the Decadal Review, confirmed overwhelmingly the satisfaction of present and former Members with their Institute experience. One of the few areas identified as needing improvement was renovation of the Member housing complex. Planning for this is now beginning.

To be complete, a ten-year review must also consider carefully the resources of the institution. The Institute's annual operating budget is financed primarily from endowment income and private contributions, supplemented by foundation and government grants. Because of careful, coherent financial management, a judicious budgetary process for fund allocation, and additional gifts to the endowment, the endowment has grown, allowing the Institute to retain its essential independent character and to continue its mission of supporting the expansion of basic scientific knowledge and scholarship in the sciences, mathematics, historical studies and social sciences. During the Decadal Review process, Price Waterhouse LLP helped to formulate a model to assist with financial projections, and the work of the Budget Committee will benefit substantially from this new tool.

However, the cost of continuing excellence into the twenty-first century is a challenge beyond anything that can be supported in a responsible way from current endowment income and traditional fundraising. Therefore, strategies must be developed to endow professorships in each of the Schools, endow funds for Member stipends, adequately capitalize the Institute Initiatives Fund, and provide for the improvements which must be made to the Institute's physical facilities.

The Decadal Review was undertaken to clarify the Institute's mission and to examine how it might better fulfill that mission in the future. The recommendations which have resulted from this wide-ranging review are addressed to the Board and the Faculty in their joint roles as guardians of its quality. In following these

recommendations, the Decadal Review Committee recognizes that the search for balance between the Institute's freedom and its responsibility, between its continuity of endeavor and flexibility of governance and style, between its separate constituencies and its common life, between the various needs of its Schools and its supporting infrastructure, will require the combined energies and vigilance of its Trustees, Faculty, and Administration. In addition, we will certainly need the help of our friends.

The Institute is exceptionally fortunate to have a dedicated group of Trustees. One of our very active Trustees is Michael Bloomberg, chairman and founder of Bloomberg Financial Markets. He chairs the Development Committee for the Institute, and I would like to quote him: "The Institute is one of the world's greatest theoretical and intellectual resources. Its continuing legacy of academic analysis and research is based on the generous support of Members, Trustees, and friends. Our ongoing patronage of this formidable institution is crucial to insure its success in the 21st century."

On behalf of the Board of Trustees and Faculty, I have the great pleasure of expressing our gratitude to Michael Bloomberg for his recent gift of $5 million to the Institute for Advanced Study. He has directed his gift to the School of Natural Sciences.

Michael has been an articulate spokesman of the importance of encouraging both formal and informal interactions which are a central part of scientific research as well as the educational experience for postdocs in the sciences. Recently the Institute decided to realize its long-held goal of being able, for the first time, to house the School of Natural Sciences in one building by physically connecting the existing Building C and Building E. The new building will bring together scholars in the different branches of physics research that are pursued at the Institute for Advanced Study, and it will facilitate both communication and collaboration. It is the privilege of the Board of Trustees to name the new building in Michael's honor: Bloomberg Hall. We look forward to initiating construction in the coming year.

The Martin L. Leibowitz Classroom in the School of Mathematics was named to honor Trustee Martin Leibowitz, vice chairman and chief investment officer of TIAA-CREF, for his generous gift to the Institute. Marty has his Ph.D. in mathematics and currently serves as president of the New York Academy of Sciences. This fall, Marty joined S.R. Srinivasa Varadhan in organizing a highly successful workshop at the Institute, "Mathematics and Finance." Leaders from Wall Street discussed with advanced students of mathematics various career opportunities in the financial industry as well as the kinds of mathematical problems which can be found in this field.

I am very pleased to welcome Charles Simonyi, Chief Architect of the Microsoft Corporation, as a new Trustee. Charles has been an active participant in Institute events for some time and is the donor of the Charles Simonyi Professorship in Theoretical Physics in the School of Natural Sciences. Born in Budapest, Hungary, Charles holds a bachelor of science degree in engineering mathematics from the University of California at Berkeley and a doctorate in computer

science from Stanford University. He worked for the Xerox Palo Alto Research Center from 1972-80, developing Bravo, the first WYSIWYG (what you see is what you get) editor. In 1981 he joined Microsoft to start the development of microcomputer application programs, and subsequently moved to Microsoft Research where he has been focusing on Intentional Programming. I have no doubt that Charles will add a wonderful dynamic to our Board.

On behalf of the Board I would like to thank Hyman Bass, Adrain Professor of Mathematics at Columbia University, for his outstanding service as Academic Trustee for the School of Mathematics since 1992. Hyman has been a faithful and eloquent interpreter of that fundamental domain to the Board, representing in his judicious comments balance, wide perspective, and generous appreciation of the Institute as a whole. Active in many professional organizations as well as the Institute's Park City Mathematics Institute Oversight Board, he has still found time to become informed about all aspects of the Institute and to formulate insightful commentaries which have been very helpful in developing the Institute's current effectiveness and future role. The Board expresses its deep appreciation for his service to the School of Mathematics and to the Institute, and we are pleased that Hyman will continue to serve on the Oversight Board of the IAS/Park City Mathematics Institute.

Succeeding Hyman as Academic Trustee for the School of Mathematics is James G. Arthur. Professor Arthur is University Professor in the Department of Mathematics at the University of Toronto, and has held positions at Duke, Yale, and Princeton universities. A Fellow of the Royal Society of London and the recipient of the CRM/Fields Institute Prize, he co-chaired at the Institute for Advanced Study last fall a celebration of the work of Robert P. Langlands, professor in the School of Mathematics at the Institute and winner of the Wolf Prize.

We are grateful to Trustee Emeritus Ralph E. Hansmann for agreeing to chair the new Institute Planned Giving Committee and to his co-chairs Rosanna and Charles Jaffin. The Planned Giving Committee formed the Einstein Legacy Society to honor all those who have made a planned gift to the Institute and all those who have included a gift to the Institute in their wills. The Society will meet annually at the Institute to recognize the donors who have manifested their belief in the continuing importance of the work of the Institute through their gifts to its endowment. The Trustees join me in expressing our gratitude to each and every member of the Einstein Legacy Society.

As J. Richardson Dilworth, past Chairman of the Institute, said during the Decadal Review, "Any society, no matter its form of governance, must create and nurture—if it is to survive, let alone prosper—a few foci of excellence." At the Institute for Advanced Study, we indeed have a center of excellence in which scholarship and research flourish. I express my deep gratitude to the Trustees, Friends, Members, foundations, and government agencies who have contributed both leadership and financial support to this important institution in the year past.

James D. Wolfensohn
Chairman

REPORT OF THE DIRECTOR

It is always an exciting and deeply satisfying moment when a long and complex process reaches a solution with results that are positive for everyone. We reached such a moment on March 31, 1997, when the Institute for Advanced Study sold the development rights on 589 acres of Institute Lands which are cherished by both the community and the Institute for historic and environmental reasons. These lands include the Institute Woods and adjacent farm fields.

Since serious talks about preserving the Institute Lands began in 1992, our Board of Trustees asked whether, if the development rights to the lands were sold and the tract preserved as open space, an agreement strong enough to guarantee their permanent preservation could be created. It was only if conservation of the property could ensure that future generations would enjoy and understand the Institute Lands as they currently exist, in their natural state, that they would agree to such a course.

It was this concern of our Trustees that led the Institute to seek protection for the Institute Lands under the New Jersey Agriculture Retention and Development Act, as well as to work with environmental and governmental groups on a conservation easement. All agreed that the easement must do the following: retain the viability of the Institute Woods for the sustenance of the important bird life that currently exists, as well as the studies of forest succession that have gone on in this natural laboratory for over 30 years; maintain the historic vistas which commemorate the Revolutionary War Battle of Princeton; and continue farming on the two existing farms that date back to pre-Revolutionary times.

Extraordinary cooperation was necessary for this process to arrive at a favorable resolution, and in fact a model public/private partnership evolved in terms of both community fundraising necessary for the purchase of the development rights and the creation of the conservation easement. This partnership started with the State of New Jersey Department of Environmental Protection's Green Acres Program, which granted the project an unprecedented package of grants and loans. Other government entities contributing to the project included Mercer County, the Township of Princeton, and Princeton Borough.

Absolutely critical to the process were individuals, and the Institute Lands Preservation Committee, a group of 12 non-profit organizations, including the Delaware & Raritan Greenway, the Friends of Princeton Open Space, and the Stony Brook-Millstone Watershed Association, led this effort. The J. Seward Johnson, Sr. Charitable Trusts underwrote the expenses for the project, which resulted in over 950 personal contributions. Individual contributions became tangible reflections of the tremendous community feeling for the Institute Lands.

We deeply appreciate the personal commitment of time, energy, and resources on the part of so many people in the community, but there is one person whom I want to single out. Frank E. Taplin, Jr., Trustee of the Environmental Defense

Fund and also Trustee Emeritus of the Institute for Advanced Study, felt strongly that these lands should be preserved. His generous gift in the spring of 1996 provided the needed stimulus to the private fundraising effort. "The Institute Lands are the pearl in the necklace of a whole series of protected lands that follow the D&R Canal and the Stony Brook," Frank noted. "If this land were to be developed, there would be a tremendous gap in the whole procession of protected greenways. From that point of view, it is not just the protection of 589 acres, it is the protection of thousands of acres that bear upon the quality of life in this central New Jersey area." In addition to his personal generosity, Frank worked tirelessly to attract other contributions to ensure that the Institute would be fairly compensated for this important asset and that preservation would occur.

At the end of this process, it is a great pleasure to report that the Institute Lands will remain in perpetuity in their natural state. I want to thank all of our Trustees who, since the founding of the Institute in 1930, have felt a strong responsibility to this institution. The Trustees have always taken very seriously their whole spectrum of obligations, including that of creating a tranquil and beautiful atmosphere conducive to scholarship. We all, in the Institute community and in the larger community, will continue to benefit from their foresight and commitment. The Institute has been a faithful steward of the Institute Woods and farmlands for more than 65 years, and we look forward to this new phase of stewardship.

As we begin the 1997-98 academic year, I am delighted to announce the appointment of two new permanent Faculty members: Patricia Crone to the School of Historical Studies and Nathan Seiberg to the School of Natural Sciences.

Patricia Crone's work focuses on one of the most basic and complex problems of the history of Late Antiquity and of the early Middle Ages: how, between ca. 630 and 900, a recognized Islamic culture appeared and came to dominate a huge area, from Spain to the frontiers of China and India. Dr. Crone, born in Denmark, completed her undergraduate and graduate work at the University of London, receiving a Ph.D. from the School of Oriental and African Studies at the University of London in 1974. Patricia Crone comes to the Institute from Cambridge University, where she has served most recently as University Lecturer in Islamic Studies and Reader in Islamic History. She has been named the Andrew W. Mellon Professor in the School of Historical Studies.

Nathan Seiberg is a particle physicist and a leader in the area of high energy theory. His areas of interest include field theory, particle physics, phenomenology, and string theory. Dr. Seiberg, born in Israel, received his B.Sc. from Tel Aviv University and, after military service, his Ph.D. from the Weizmann Institute of Science in Israel. He came to the Institute for Advanced Study as a postdoctoral Member after receiving his doctorate and was invited to stay on as a five-year Member. He subsequently returned to the Weizmann Institute for several years before accepting a professorship at Rutgers University in 1989.

In other news of the Faculty, Peter Paret, the Andrew W. Mellon Professor in the School of Historical Studies, retired in June. Professor Paret's latest book, *Imagined Battles: Reflections on War in European Art*, illustrates two of his principal research interests: art as a force in the history of culture and the place of war in the European past. In 1993 the American Philosophical Society awarded Professor Paret the Thomas Jefferson medal, the Society's highest honor for achievement in the arts and humanities. He will carry on his distinguished career as Professor Emeritus in the School of Historical Studies.

Sabine G. MacCormack, Professor of History and Classical Studies at the University of Michigan, completed her first year as the School of Historical Studies' Two-Year Visiting Mellon Professor. She conducted a seminar on sovereignty, comparing the theory and practice of government in Spain and in pre-Columbian and early colonial Spanish America.

The first year of "An Interdisciplinary Program in Mathematics and Physics," co-led by Professor Pierre Deligne, School of Mathematics, and Professor Edward Witten, School of Natural Sciences, was extraordinary. Programs of sustained, sophisticated interaction between mathematics and physics have not previously been attempted at the scientific level and with the intensity of interaction that has characterized this program. David Kazhdan of Harvard University, the 1996-1997 Distinguished Visiting Professor in the School of Mathematics at the Institute, a position in the School of Mathematics made possible by the Ambrose Monell Foundation, was an important force in the program, which also included a remarkable group of other distinguished mathematicians who are continuing the program this year. 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.

To mark the 60th birthday of Professor Robert Langlands, the School of Mathematics hosted a major conference from October 9-12, 1996, on Automorphic Forms, Geometry and Analysis. Organized by James Arthur of the University of Toronto, William Casselman of the University of British Columbia, and Robert Kottwitz of the University of Chicago, the conference drew an international audience of more than 200 participants. The goals of the conference were to present the fundamental ideas of automorphic forms to a wide mathematical audience, to review recent developments in the many areas in which Professor Langlands has worked, and to anticipate future directions in the web of problems and conjectures now known as the Langlands program.

The School of Social Science celebrated its 25th anniversary with a year-long focus on the social science disciplines in relation to some of the significant trends and transformations in modern society, the social world, and the academic world. The program culminated in a conference, "25 Years: Social Science and Social Change," held May 9-11, 1997. The symposium was designed, Clifford Geertz said in his opening remarks, "to look both backward at developments in the social sciences over the last quarter-century or so, and forward toward possibilities that

seem to be emerging, might emerge, might be made to emerge with respect to the next quarter-century." The conference drew many former Members and associates of the School, as well as other distinguished practitioners in a number of social science fields. I am especially pleased that one of my predecessors, Carl Kaysen, under whose directorship the School of Social Science was established, attended the conference. The conference was funded by the Russell Sage Foundation and the Gladys Krieble Delmas Foundation. The Institute also received contributions from the Rockefeller Foundation and Trustee Agnes Gund for the support of Members in the School of Social Science who were in residence throughout this special year. For this support, I extend our deep appreciation.

In March, pianist and scholar Robert Taub, Artist-in-Residence, completed his three-year project of performing and recording the Beethoven Piano Sonatas. Dr. Taub presented nine concert performances each year to full houses in the Institute's Wolfensohn Hall. He also lectured and wrote articles about Beethoven. In addition, the Institute made available to National Public Radio tapes of the concerts, segments of which aired nationwide on "Performance Today." Five double-CDs containing the entire series of performances have been recorded and the first four have been released. We are pleased that Robert Taub has accepted an invitation to remain as Artist-in-Residence for the academic year 1997-98, when he will organize a series of chamber music concerts here at the Institute.

The 1996 New Europe Prize was awarded to Eörs Szathmáry, Professor of Biology at Eotvos Lorand University in Budapest and permanent fellow at the Collegium Budapest, during a two-day gathering of directors of institutes at the Center for Advanced Study in the Behavioral Sciences in Stanford, California. At the ceremony, Professor Szathmáry described his plans to use the award to establish a program in theoretical biology in Budapest. The prize is part of a joint effort launched four years ago by six institutes for advanced study, three from the United States and three from Europe. The New Europe Prize is a part of the institutes' joint effort to support and strengthen the scholarly resources in Eastern Europe and the former Soviet Union.

From March 23-27, the Institute co-hosted with DIMACS, the Center for Discrete Mathematics and Computer Science at Rutgers University, a conference, "Statistical Physics Methods in Probability Theory, Combinatorics, and Theoretical Computer Science," which was funded by the National Science Foundation and attended by an international group of mathematical physicists, probabilists, combinatorists, and theoretical computer scientists. The conference was co-chaired by former Institute Members Jennifer Chayes and Dana Randall.

From May 12-22, Karen Uhlenbeck from the University of Texas at Austin and Chuu-Lian Terng of Northeastern University led the Institute's annual two-week mentoring program for women mathematicians. In 1997-98, Professor Uhlenbeck will be the Distinguished Visiting Professor in the School of Mathematics, and Professor Terng will be a Member in the School.

From June 29-July 19, the summer session of the IAS/Park City Mathematics Institute (PCMI) was held in Park City, Utah. This dynamic year focused on Symplectic Geometry and Topology. One of the special programs of interest was a panel on mathematics and music by Edward Rothstein of *The New York Times* and the Institute's Artist-in-Residence, Robert Taub. Dr. Taub also presented a concert in Park City, graciously sponsored by Institute Trustee Jon M. Huntsman, Jr. Among the guests at the summer session we were delighted to welcome two members of the PCMI Oversight Board: Institute Professor Robert MacPherson, who also lectured in this summer's program, and Elaine Wolfensohn. From the National Science Foundation, we were pleased to have Joseph Jenkins, Deborah Lockhart, and Samuel Stueckle. The PCMI and the Women's Mentoring Program receive major funding from the National Science Foundation, and we are indeed grateful for this support which makes possible an important program of integrating research and education in the mathematics community.

The presence of Director's Visitors, eminent scholars whose interests do not fall into the normal school structure of the Institute, contributed much to the richness of community life this year. During the past year these visitors included Paul Berg, Director, Beckman Center for Molecular and Genetic Medicine; Robert Bryant, Professor of Mathematics, Duke University; Maurizio Cornalba, University of Pavia; Lucas Hsu, University of Arizona; Maxine Singer, President, Carnegie Institution of Washington; and Vladimir Zakharov, Institute of Theoretical Physics, Moscow, and University of Arizona.

In conclusion, may I express my appreciation to a few of the people whose extraordinary contributions will profoundly change the Institute in the years to come. Michael Bloomberg's and Charles Simonyi's gifts to the School of Natural Sciences and Leon Levy and Shelby White's support of the Institute Initiatives Fund are major contributions that will, in each case, help to preserve the vitality of the Institute for Advanced Study and thereby allow this institution to better serve the larger scientific and scholarly communities. Helene Kaplan and Richard Black's leadership of the Decadal Review will likewise bear immense importance for the Institute in the years to come. I am most grateful.

To every donor and to each member of the Trustees, Faculty, Friends of the Institute, AMIAS, and staff, I also express my gratitude for your important leadership and support. You have provided the underlying strength for this institution, and I could not be more appreciative.

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 1996-97

September 25
Friends of the Institute
Friends' Forum: "Russia After the Elections"
JACK F. MATLOCK, Jr., *Professor, School of Historical Studies, IAS*

September 27
Presentation and lunch for guests of the Board of Trustees
Host: RICHARD B. BLACK, *Chairman, ECRM Inc.*
Speaker: FRANK WILCZEK, *Professor, School of Natural Sciences, IAS*
"From Asymptotic Freedom to Unification to Supersymmetry"
Panelists:
MARK G. ALFORD, *School of Natural Sciences, IAS*
CHRISTOPHER F. KOLDA, *School of Natural Sciences, IAS*
JOHN MARCH-RUSSELL, *School of Natural Sciences, IAS*

October 25
Institute Lecture
"How the Sun Rings"
PAWAN KUMAR, *School of Natural Sciences, IAS*
"Wrinkles in the Primordial Universe"
WAYNE HU, *School of Natural Sciences, IAS*

October 30
Friends of the Institute
Lecture: "A Trip Through the Institute Archives"
ELLIOTT SHORE, *Librarian, Schools of Historical Studies and Social Science, IAS*

November 6
Institute Lecture
"Duality and String Theory"
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

November 11
Institute Concert Series
Pre-Concert Lecture: "Beethoven: The Piano Sonatas"
ROBERT TAUB, *Artist-in-Residence, IAS*

November 17
Friends of the Institute
Fireside Chat: "A Conversation with Leon Levy and Shelby White"
SHELBY WHITE, *author*, and LEON LEVY, *Partner, Odyssey Partners*

November 19, 22, 23
Institute Concert Series
Beethoven: The Piano Sonatas, Program VII
ROBERT TAUB, *Artist-in-Residence, IAS*

December 4
Friends of the Institute
Friends' Forum: "How Does the Sun Shine?"
JOHN N. BAHCALL, *Professor, School of Natural Sciences, IAS*

December 11
Presentation and lunch for guests of the Board of Trustees, New York, NY
Host: MARIE-JOSÉE KRAVIS, *Hudson Institute Inc.*
Speaker: FRANK WILCZEK, *Professor, School of Natural Sciences, IAS*
"From Asymptotic Freedom to Unification to Supersymmetry"

Institute Lecture
"Melding the Public and Private Spheres: Taking Commensality Seriously"
ALBERT HIRSCHMAN, *Professor Emeritus, School of Social Science, IAS*

January 13
Institute Concert Series
Pre-Concert Lecture: "Beethoven: The Piano Sonatas"
ROBERT TAUB, *Artist-in-Residence, IAS*

January 14, 17, 18
Institute Concert Series
Beethoven: The Piano Sonatas, Program VIII
ROBERT TAUB, *Artist-in-Residence, IAS*

January 15
Dinner for guests of the Board of Trustees, New York, NY
Host: JAMES J. SCHIRO, *Chairman, Price Waterhouse LLP,* and *Trustee, IAS*
Speaker: JAMES D. WOLFENSOHN, *President, The World Bank* and *Chairman, IAS*

January 29
Institute Lecture
"Randomness in Combinatorics and Computation: From Classical Theory to Future Challenges"
NOGA M. ALON, *School of Mathematics, IAS*

February 10
Dinner for New Jersey legislators and Institute Faculty
Hosts: PETER R. KANN, *Chairman and Publisher, The Wall Street Journal,* and *Trustee, IAS*
PHILLIP A. GRIFFITHS, *Director, IAS*

February 12
AMIAS
Reception for former Members in Oakland, California
Host: PHILLIP A. GRIFFITHS, *Director, IAS*
Speaker: JACK F. MATLOCK, Jr., *Professor, School of Historical Studies, IAS*

February 14
AMIAS
Reception for former Members in Los Angeles, California
Host: PHILLIP A. GRIFFITHS, *Director, IAS*
Speaker: JACK F. MATLOCK, Jr., *Professor, School of Historical Studies, IAS*

February 16
AMIAS
Reception for former Members in Seattle, Washington
Host: PHILLIP A. GRIFFITHS, *Director, IAS*
Speaker: JOHN N. BAHCALL, *Professor, School of Natural Sciences, IAS*

February 19
Friends of the Institute
Friends' Forum: "Yet Another New Germany?"
FRITZ STERN, *School of Historical Studies, IAS*

March 9
Friends of the Institute
Fireside Chat: "Vietnam: A Nation in Ascendancy"
MARY S. CROSS, *photojournalist-essayist*

March 12
Einstein Legacy Society
Inaugural meeting and lunch with performance by
ROBERT TAUB, *Artist-in-Residence, IAS*

Institute Lecture
"The Incas and Rome"
SABINE MacCORMACK, *School of Historical Studies, IAS*

March 17
Institute Concert Series
Pre-Concert Lecture: "Beethoven: The Piano Sonatas"
ROBERT TAUB, *Artist-in-Residence, IAS*

March 18, 21, 22
Institute Concert Series
Beethoven: The Piano Sonatas, Program IX
ROBERT TAUB, *Artist-in-Residence, IAS*

April 2
Friends of the Institute
Friends' Forum: "Wages, Bonuses and Sexual Favors: An Exploration of American Compensation Systems"
VIVIANA A. ZELIZER, *School of Social Science, IAS*

April 8
Friends of the Institute
Chairman's Circle Dinner hosted by
SHELBY WHITE and LEON LEVY, *Vice Chairman of the Board of Trustees, IAS*

April 14
Friends of the Institute
Reception for new Friends hosted by
PHILLIP A. GRIFFITHS, *Director, IAS*

April 17
Dinner for major donors to the preservation of the Institute Lands
Hosts: The Institute Lands Preservation Committee and the Institute for Advanced Study

May 2
Institute Lecture
"The Challenger Launch Decision"
DIANE VAUGHAN, *School of Social Science, IAS*

May 14
Friends of the Institute
Walking tour of the Institute's arboretum
SAMUEL J. deTURO, Jr.,
Woodwinds Associates

May 16
AMIAS Conference
Panel Discussion: "Science, Society and Values"
PAUL R. GROSS, *University of Virginia*
NORMAN LEVITT, *Rutgers University*
HELEN NISSENBAUM, *Princeton University Center for Human Values*
ROBERT PROCTOR, *Penn State University*
Moderator: MURRAY GERSTENHABER, *University of Pennsylvania*

May 17
AMIAS Conference
"Mathematics and Juggling: New Insights into an Old Pastime"
RONALD GRAHAM, *AT&T Research*

"Bernini's 'Speaking Marbles'"
IRVING LAVIN, *Professor, School of Historical Studies, IAS*

"A Trip Through the Institute Archives"
ELLIOTT SHORE, Librarian, *Schools of Historical Studies and Social Science, IAS*

May 21
Friends of the Institute
Annual Meeting and Picnic

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Diane Vaughan, School of Social Science
Peter Zarrow, School of Social Science
Viviana Zelizer, School of Social Science

National Science Foundation
Miguel Abreu, School of Mathematics
Julie Blum, School of Natural Sciences
Ralph Blumenhagen, School of Natural Sciences
Tom Braden, School of Mathematics
William Cherry, School of Mathematics
Stephen Choi, School of Mathematics
Radu Constantinescu, School of Mathematics
Daniel Eisenstein, School of Natural Sciences
Daniel Freed, School of Mathematics
Edward Frenkel, School of Mathematics
Dennis Gaitsgory, School of Mathematics
Galin Georgiev, School of Mathematics
William Graham, School of Mathematics
Andrei Gruzinov, School of Natural Sciences
Victor Gurarie, Schools of Mathematics and Natural Sciences
Amihay Hanany, School of Natural Sciences
Naoya Hata, School of Natural Sciences
Wayne Hu, School of Natural Sciences
Kenneth Intriligator, School of Natural Sciences
Nicholas Kapouleas, School of Mathematics
David Kazhdan, School of Mathematics
Markus Keel, School of Mathematics
Dmitry Kleinbock, School of Mathematics
Sergei Konyagin, School of Mathematics
Leonid Korogodsky, School of Mathematics
Plamen Krastev, School of Natural Sciences
Ai-Ko Liu, School of Mathematics
Peter Mayr, School of Natural Sciences

Frank Merle, School of Mathematics
David Morrison, Schools of Mathematics and Natural Sciences
Arvind Nair, School of Mathematics
Ursula Porod, School of Mathematics
David Reimer, School of Mathematics
Vladimir Sadov, Schools of Mathematics and Natural Sciences
Wilhelm Schlag, School of Mathematics
Savdeep Sethi, School of Natural Sciences
Nimish Shah, School of Mathematics
Matthew Strassler, School of Natural Sciences
Tibor Szabó, School of Mathematics
Yakov Varshavsky, School of Mathematics
Misha Verbitsky, School of Mathematics
Wenshang Wang, School of Mathematics
Jiahong Wu, School of Mathematics
Xin Zhou, School of Mathematics
Yi Zhou, School of Mathematics

NEC Research Institute
Noga Alon, School of Mathematics

State of New Jersey
Béla Bollobás, School of Mathematics
Christian Borgs, School of Mathematics
Anders Johansson, School of Mathematics
Narendra Karmarkar, School of Mathematics
Joel Spencer, School of Mathematics
Tibor Szabó, School of Mathematics
Gábor Tardos, School of Mathematics

The Rockefeller Foundation
Jiwei Ci, School of Social Science
Mohammed Naciri, School of Social Science

Seoam Scholarship Foundation
Insu Yi, School of Natural Sciences

The Sivian Fund
Naoya Hata, School of Natural Sciences
Burt Ovrut, School of Natural Sciences
Steven Strong, School of Natural Sciences
Hsiung Chia Tze, School of Natural Sciences

Alfred P. Sloan Foundation
Noga Alon, School of Mathematics
Jennifer Chayes, School of Mathematics
Anders Johansson, School of Mathematics
Narendra Karmarkar, School of Mathematics
Joel Spencer, School of Mathematics

Fritz Thyssen Stiftung
Almut Hintze, School of Historical Studies
Theo Kölzer, School of Historical Studies

United States Department of Energy
Mark Alford, School of Natural Sciences
K.S. Babu, School of Natural Sciences
Gerard Barkema, School of Natural Sciences
Keith Dienes, School of Natural Sciences
Gerard Jungman, School of Natural Sciences
Christopher Kolda, School of Natural Sciences
John March-Russell, School of Natural Sciences
Steven Strong, School of Natural Sciences
Donam Youm, School of Natural Sciences
Alberto Zaffaroni, School of Natural Sciences

The Oswald Veblen Fund
John Morgan, School of Mathematics
David Morrison, Schools of Mathematics and Natural Sciences
Paul Vojta, School of Mathematics

Edwin C. and Elizabeth A. Whitehead Fellowship
R. Bracht Branham, School of Historical Studies

The James D. Wolfensohn Fund
Siye Wu, School of Mathematics

THE SCHOOL OF HISTORICAL STUDIES

Faculty

GLEN W. BOWERSOCK
GILES CONSTABLE
OLEG GRABAR
CHRISTIAN HABICHT
IRVING LAVIN
JACK F. MATLOCK, Jr. *[George F. Kennan Professor]*
PETER PARET *[Andrew W. Mellon Professor]*

Two-Year Visiting Mellon Professor

SABINE G. MacCORMACK

Professors Emeriti

MARSHALL CLAGETT
GEORGE F. KENNAN
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 tirelessly on a wide range of subjects during his years at the Institute, he was mainly preoccupied with the history of early Rome and that of Julius Caesar, on both of which subjects 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 manuscript 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; and Morton White in the history of modern philosophy. 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

GLEN BOWERSOCK returned to Turkey in July 1996 to revisit the excavations at Aphrodisias in preparation for a contribution to a symposium of the Archaeological Institute of America on current work at the site. He took the opportunity also to examine ancient remains in the vicinity of the Çine Valley, especially at Alabanda, Alinda, Gerga (Gergoupolis), and Stratonicea. Later in the summer Professor Bowersock went to Russia at the invitation of the Russian Academy of Sciences. He lectured in St. Petersburg and in Moscow and had fruitful contacts with many scholars in both cities. At the end of October he flew to London to deliver a Davis Lecture on newly discovered mosaics in Jordan at the Courtauld Institute. In New York in

December, at the annual meeting of the American Philological Association, he spoke on Karl Julius Beloch and the rise of demography in ancient history.

At the invitation of the Collège de France, Professor Bowersock spent the entire month of March 1997 in Paris and delivered a series of four lectures as follows: "Le mystère de Grégoria et les mosaïques tardives du Proche-Orient: I Cartes, II Mythes, III Villes, IV Iconoclastes." During the month he was formally received into the Académie des Inscriptions et Belles-Lettres as "membre associé" of the Institut de France, and he also traveled to England to lecture in Cambridge and Oxford. In May he delivered the opening lecture ("La Patria di Strabone") at a symposium in Perugia on the geographer Strabo and Asia Minor.

During the academic year Professor Bowersock published eight articles, including a study of the extant fragments of two Greek historians of pre-Islamic Arabia, a survey of archaeological exploration in northwest Saudi Arabia, an examination of Greek communities in ancient imperial Italy, and an essay on Theodor Mommsen's understanding of the Roman Empire. Four of his books were recently reprinted in paperback. Japanese and Greek translations have been issued of his *Julian the Apostate* and *Hellenism in Late Antiquity* respectively. He continued his service on various boards, including the Council of the American Philosophical Society, the editorial committee of *Arabian Archaeology and Epigraphy*, the Comitato Scientifico di Consulenza della Scuola Normale Superiore di Pisa (Lettere e Filosofia), and the Board of Directors of the Metropolitan Opera Guild. He continues as General Editor of the series *Revealing Antiquity* at the Harvard University Press.

During the academic year 1996-97, GILES CONSTABLE published two books (one, the Trevelyan lectures at Cambridge University in 1985, entitled *The Reformation of the Twelfth Century* and the other a collection of articles), a contribution to the Festschrift for Hans E. Mayer, and a brief memoir of Robert L. Benson. He spoke at scholarly meetings in Stolpen (of which he was co-organizer with Professor Gert Melville), Cluny, Los Angeles, and Washington; gave public lectures at Arizona State University, Harvard (the Morton W. Bloomfield Lecture), Georgetown University, Dumbarton Oaks, Syracuse University, and Huron College; presided at sessions of the meetings of the American Historical Association in New York and the Medieval Academy of America in Toronto; and attended the Congress of Medieval Canon Law in Syracuse and the Commission internationale de diplomatique in Heidelberg. He organized a meeting of the Delaware Valley Medieval Association at the Institute in December and, during the spring term, while on sabbatical, served as Royden B. Davis Visiting Professor in Interdisciplinary Studies at Georgetown University, where he taught a course on the crusades.

During 1996-97 OLEG GRABAR gave papers, chaired or participated in discussion at meetings or symposia at the Institute for the History of Art in Moscow, the Victoria and Albert Museum in London, the American Schools of Oriental Research meeting in New Orleans, Dumbarton Oaks, and Humanities West in San Francisco.

He was Appleton Eminent Professor at Florida State University in Tallahassee during the second semester and Honors Convocation speaker at Texas Christian University in Fort Worth. He was elected to the Visiting Committee of the Getty Foundation's Center for the History of Art and member of a thesis jury at the University of Aix-Marseille.

Professor Grabar's books published in 1996 were: *Penser l'art islamique: Une esthétique de l'ornement* (Albin Michel, Paris); *L'Ornement: Formes et Fonctions dans l'Art Islamique* (Flammarion: Paris); *The Shape of the Holy* (Princeton University Press); *The Dome of the Rock* (with Saïd Nuseibeh) (Rizzoli).

His articles for 1996-97 were: "Jerusalem Elsewhere," *City of the Great King: Jerusalem from David to the Present* (Harvard University Press); "Pourquoi avoir construit la Coupole du Rocher," *Dédale 3 et 4: Multiple Jérusalem* (Paris); "Dissemination," *The Dictionary of Art* (London); "Islamic Art: Introduction," *The Dictionary of Art* (London); "Mafjar," "Qasr al-Hayr Sharqi," "Sauvaget," in *The Oxford Enclopedia of Archaeology in the Near East*, vols. 3 and 4 (Oxford); "Michael Meinecke and His Last Book," *Muqarnas* 13; "Philip Khûri Hitti," *Luminaries: Princeton Faculty Remembered* (Princeton, 1997).

CHRISTIAN HABICHT was occupied with the English edition of *Athens from Alexander to Antony*, scheduled to be published by the Harvard University Press in October. Editions in Russian and in Greek are presently underway. He lectured at the Bibliotheca Classica in St. Petersburg, Russia, and at an international colloquium in honor of P. Herrmann (member IAS 1974-75 and 1983-84) in Hamburg. He attended a conference in memory of Bruno Snell (born 1896) in Hamburg and the opening of the international symposium "Reuchlin and Italy" in Pforzheim, Reuchlin's place of birth.

He continued to serve on the membership committee of Class IV of the American Philosophical Society, on publication boards and on the boards of supervisors for the *Inscriptiones Graecae*. In this function, he attended a meeting in Berlin in January and accepted an invitation from the president of the Berlin-Brandenburgische Akademie der Wissenschaften to participate in a colloquium of experts on "Efficiency and modernity of epigraphical studies at the turn of the 20th century," scheduled for October 10 and 11.

A Japanese edition of his book *Cicero the Politician* was published by Iwanami Shoten Publishers, Tokyo, 1997. His publications of the year were as follows: "Divine honours for King Antigonus Gonatas in Athens," *Scripta Classica Israelica* 15, 1996, 131-134; "Neue Inschriften aus Kos," ZPE 112, 1996, 83-94; "Athens, Samos, and Alexander the Great," *Proceedings of the American Philosophical Society* 140, 1996, 397-405; "Prosopographica: Kyrene," *Libyan Studies* 27, 1996, 7-8; "Buleuten und Beamte der athenischen Kleruchie auf Samos" (with K. Hallof), *Athenische Mitteilungen* 110, 1995 (1997) 273-304; "Ein neues Zeugnis der athenischen Kavallerie" — "Zwei Familien aus Messene" — "Zu Kapitel 35 des *Periplus Maris Erythraei*," ZPE 115, 1997, 121-130. Other papers were accepted for publication.

IRVING LAVIN entered into a project to organize two major, complementary exhibitions of the work of Gianlorenzo Bernini, to commemorate the 400th anniversary of the artist's birth (1598-1680). One exhibition will be held in Rome, under the auspices of the Italian government, and the other will be held at the National Gallery of Art in Washington. He continued his services to several organizations and institutions, as a member of the Board of Directors of the College Art Association, as chairman of National Committee for the History of Art, and as a member of the executive committee of the International Committee for the History of Art. Professor Lavin gave lectures and participated in symposia at the annual meeting of the College Art Association of America, at the University of Ohio, Harvard University, New York University, Boston College, and at the Istituto Italiano per gli Studi Filosofici in Naples. He also lectured for the members of AMIAS at their annual meeting. Professor Lavin became art historical consultant and a member 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 planned will be a structural fantasy developed in consultation with Professor Lavin by the architect Frank Gehry. Professor Lavin also acted as consultant to Michael Graves, architect, in a proposal to rebuild the choir of the Cathedral of Florence, an international competition held to celebrate in 1997 the 700th anniversary of the founding of that church. Professor Lavin's publications included various articles and a new edition in paperback of his *Erwin Panofsky: Three Essays on Style*, MIT Press.

SABINE MacCORMACK was at the Institute for the first year of her two-year Mellon Visiting Professorship and was elected a member of the American Philosophical Society. She completed a manuscript, "The Causes of Things: Vergil and Augustine," which is being published by the University of California Press. The book is an expanded version of her 1993 Gauss Seminar at Princeton University, and studies the intellectual and religious encounter between Augustine of Hippo, teacher of rhetoric, Christian monk and bishop, and Vergil, the greatest and most influential Roman poet. During the academic year, she directed a seminar at the Institute on "Sovereignty in the Spanish World," which concluded with a symposium on "Person, Community and Empire: The Theory and Practice of Sovereignty." She gave lectures at universities in the United States and Canada, and presented the School of Historical Studies Faculty Lecture on "The Incas and Rome." Two articles have been accepted for publication, and her essay on "History and Law in Sixteenth-Century Peru: The impact of European Scholarly Traditions" has been published in ed. S. C. Humphreys, *Cultures of Scholarship* (Ann Arbor 1997), pp. 277-310. She serves on the Herbert Baxter Adams Prize committee for the American Historical Association, and as an editorial consultant for *Viator: Medieval and Renaissance Studies*.

JACK F. MATLOCK, Jr. delivered the Eliot S. Berkeley Lecture at the International Relations Council in Kansas City; the inaugural Cyril Black Lecture at Princeton University; the Royal D. Alworth, Jr., Memorial Lecture at the University of Minnesota, Duluth; the Mojmir Povolny Lecture at Lawrence University; the Colin Miller Memorial Lecture at the University of California, Berkeley; the Anthony J. Drexel Biddle, Jr., Lecture at Duke University; and the Tiffany Lecture at Wheaton College. He also addressed world affairs councils in Baltimore, San Francisco and Boston, and

delivered lectures at The New School in New York; the Executive Club/YMCA in Princeton; the Davis Center at Harvard University; the Association of the Bar of the City of New York; the annual meeting of the American Association for the Advancement of Slavic Studies; the West-West Agenda; the Brookings Institute; the University of Kansas; and Villanova University. He was a member of the American delegation to a trilateral conference in Moscow on security in the North Pacific, and participated in workshops and panels sponsored by the Russell 20-20 Association; the American Council on Germany; the Institute for East-West Studies; the National Defense University; the U.S. Institute of Peace; and the East-West Conference of Nashville, Tennessee. He conducted numerous radio, television, and press interviews regarding current and past U.S.-Russian relations.

His articles included "The Struggle for the Kremlin," *The New York Review of Books*, August 8, 1996, on the Russian presidential election; "Gorbachev: Lingering Mysteries," *The New York Review of Books*, December 19, 1996; "Yest' veshchi povazhneye, chem NATO," *Obshchaya gazeta* (Moscow), April 2, 1997; and several shorter pieces in U.S. and Russian periodicals. His book, *Autopsy on an Empire*, received the 1996 Marshall Shulman Prize for an outstanding monograph on Soviet or post-Soviet policy studies, and the American Academy of Diplomacy's second annual award for a book of distinction on American diplomacy.

He is a member of the American Academy of Diplomacy, 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 Kennan Institute, the International Research and Exchanges Board, the Institute for the Study of Diplomacy, the Atlantic Council, Helsinki Watch, the Ethnic-American Broadcasting Company, and American Friends of Georgia.

He is currently writing two books with the working titles *Understanding Russia* and *Reagan and the Russians*.

PETER PARET became Professor Emeritus on July 1, 1997. During the academic year his "extended essay," *Imagined Battles: Reflections on War in European Art*, was published by the University of North Carolina Press, and his study "Expressionism in Imperial Germany" appeared in the English and Italian editions of the catalogue of the expressionism exhibition of the Berlin State Museums and the Los Angeles County Museum of Art at the Palazzo Grassi in Venice. Two of his earlier essays were reprinted: his 1984 Leo Baeck Memorial Lecture on Max Liebermann as President of the Prussian Academy of Arts, in the catalogue of the Liebermann exhibition of the Alte Nationalgalerie in Berlin; and his 1964 comparative analysis "Colonial Experience and European Military Reform at the End of the 18th Century" in Warfare and Empires, ed. Douglas M. Peers, Variorum, Aldershot, 1977.

Professor Paret gave papers at the following conferences: "Die Wiedererweckung des Krieges aus dem Geist der Revolution" at the Berlin-Brandenburg Academy of

Sciences; "The History of Culture" at the University of Navarra; "The Legend of the Levée on Masse" at the Institute for Advanced Study; and "The Study of War," sponsored jointly by the University of North Carolina and Duke University. His papers are being published in the volumes resulting from these meetings. A talk he gave in May at the German Historical Institute in Washington, "Field Marshal and Beggar: Ernst Barlach during the First World War," is part of a work in progress on the function of art in German history between the first stages of industrialization and the end of the Second World War.

PROFESSORS EMERITI

On October 6th, 1996, MARSHALL CLAGETT received the International Galileo Galilei Prize at Pisa in the Great Hall of the University. It consisted of a statue by the Italian sculptor, Stefania Guidi, a gold plaque, and a Galileo Medal from the University of Pisa for his contribution to the history of Italian science.

Professor Clagett continued the preparation of Volume III of his *Ancient Egyptian Science* which now nears completion.

GEORGE F. KENNAN has continued to pursue his long-standing interest in the work and the future development of the Kennan Institute for Advanced Russian Studies, in Washington. In addition, he has discussed, in private correspondence or visits with others, a number of mutual scholarly interests. And on a few occasions he has contributed briefly to the public discussion of current problems of Russian-American relations. A small volume entitled *George Kennan and the Origins of Containment 1944-1946*, and published at the outset of 1997, was based on written exchanges between Professor Kennan and John Lukacs. The journal, *Foreign Affairs*, carried, in its 75th year anniversary issue, an article by Professor Keenan on the history of the American Foreign Service.

HOMER A. THOMPSON has continued to supervise the publication program of the Excavation of the Athenian Agora. In the course of the year three more volumes have been published in the major series on the results of the excavation of the Athenian Agora: The Red Figure Pottery, the Hellenistic Pottery, and The Inscriptions: the Decrees. In addition to frequent discussions with the authors, Professor Thompson has continued his study of the very intimate interrelations between Athens and Pergamon in civic and religious architecture.

MORTON WHITE completed a paper entitled "Peirce's *Summum Bonum* and the Ethical Views of C.I. Lewis and John Dewey" which is scheduled for publication in the journal *Philosophy and Phenomenological Research*. He has accepted an invitation to deliver a paper at the World Congress of Philosophy in Boston in 1998; the title of his address will be "The Ideas of the Enlightenment and their Legacy." During the past year Professor White continued to work on his memoirs, which are tentatively entitled *A Philosopher's Story*. A Japanese translation of Professor White's book *The Question of Free Will* appeared in the summer of 1997.

THE SCHOOL OF HISTORICAL STUDIES

MEMBERS, VISITORS AND RESEARCH STAFF

ERNST BADIAN
Greek and Roman History
Harvard University · *vf*

BRIGITTE BEDOS-REZAK
Medieval History
University of Maryland at College Park

LEONID A. BELIAEV
Medieval Russian History and Archaeology
Russian Academy of Sciences, Moscow

HERACLIO BONILLA
Andean Social and Economic History
Universidad Industrial de Santander · *s*

R. BRACHT BRANHAM
Classics and Comparative Literature
Emory University · *f*

KOSTAS BURASELIS
Hellenistic and Roman History
University of Athens

PATRIZIA CASTELLI
Iconology
Università di Ferrara · *f*

FERNANDO CERVANTES
Cultural and Intellectual History of Spain and Latin America
University of Bristol

VASSILIOS CHRISTIDES
Graeco-Arabic and Graeco-African Studies
University of Ioannina · *vf*

LAURINDA S. DIXON
History of Art/Science
Syracuse University · *s*

DYAN ELLIOTT
Medieval History
Indiana University

JODY ENDERS
Medieval Literature
University of California, Santa Barbara · *vsj*

VALÉRIE GONZALEZ
History and Aesthetics of Islamic Art
Université d'Aix-Marseille

TAMAR HERZOG
Legal and Social History of Spanish Colonial Institutions
Universidad Autonoma, Madrid

ALMUT HINTZE
Indo-Iranian Studies
Freie Universität Berlin · *f*

CHRISTINE HUNEFELDT
Latin American History
University of California, San Diego · *s*

DONALD KELLEY
European History
Rutgers University

NINA KHRUSHCHEVA
Russian History
Institute for Advanced Study · *a*

DEBORAH KLIMBURG-SALTER
Asian Art History
Universität Wien

HENNING KÖHLER
German Political History
Freie Universität Berlin · *v*

THEO KÖLZER
Medieval History
Universität Bonn · *s*

EDMOND LÉVY
Ancient History
Université de Strasbourg · *vs*

DORE J. LEVY
Classical Chinese and Comparative Literature
Brown University

BETH IRWIN LEWIS
Modern European History
The College of Wooster · *vf*

f First Term · *s* Second Term · *v* Visitor · *a* Research Assistant · *j* Joint Appointment with School of Social Science

HARRY LIEBERSOHN
European Cultural History
University of Illinois at Urbana-Champaign

DAVID MARSH
Italian Humanism
Rutgers University · *vf*

DAVID NIRENBERG
Medieval History
Rice University · *v*

IKEM OKOYE
West African Art and Architecture
Northwestern University

BARBARA PACA
Landscape Architecture
Monkton, Maryland · *v*

MARK PEGG
Medieval History
Institute for Advanced Study · *a*

WALTER PREVENIER
Social History of the Middle Ages
University of Ghent · *f*

NASSER RABBAT
History of Islamic Architecture
Massachusetts Institute of Technology · *vs*

LELLIA CRACCO RUGGINI
Roman History
Università di Torino · *s*

FRANCIS X. RYAN
Roman Republican History
Strawberry Point, Iowa

CHARLOTTE SCHOELL-GLASS
History of Art/Iconography
Universität Hamburg

RICHARD SHARPE
Medieval History
University of Oxford · *s*

HAGITH SIVAN
Late Antiquity
University of Kansas

INEKE SLUITER
Ancient Linguistic Thought and its Cultural Content
Vrije Universiteit, Amsterdam

GERHARD THÜR
Greek Law
Karl-Franzens-Universität, Graz · *s*

STEPHEN TRACY
Greek History and Epigraphy
Ohio State University

JAMES TRILLING
Art History
Providence, Rhode Island · *v*

LINDA EHRSAM VOIGTS
Old and Middle English
University of Missouri-Kansas City · *vs*

DANIEL WOOLF
Early Modern British History
Dalhousie University

DAVID H. WRIGHT
History of Art
University of California, Berkeley · *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 1996-97

September 13 - 14, 1996
Seminar on Force in History
MICHAEL GEYER, *University of Chicago*
JOHN HORNE, *Trinity College, Dublin*
MARK VON HAGEN, *Columbia University*
ALAN FORREST, *University of York*
JOHN CHAMBERS, *Rutgers University*
PETER PARET, *Professor, School of Historical Studies, IAS*

October 2, 1996
Weekly Informal Art History Colloquium:
"Irish Garden Architecture"
BARBARA PACA, Landscape Architect

October 9, 1996
Weekly Informal Art History Colloquium:
"History of Physionomics"
PATRIZIA CASTELLI, *Università di Ferrara*

October 16, 1996
Weekly Informal Art History Colloquium:
"Theory of Alhambra Decorations"
VALÉRIE GONZALEZ, *Université d'Aix-Marseille*

October 22, 1996
Medieval Seminar: "Interpreting the Discourses on Violence on Women in Fifteenth-Century France and the Burgundian Netherlands"
WALTER PREVENIER, *University of Ghent*

October 23, 1996
Seminar on Sovereignty: Discussion Group
SABINE MacCORMACK, *Visiting Mellon Professor, School of Historical Studies, IAS*

Weekly Informal Art History Colloquium:
"Aby Warburg's Method"
CHARLOTTE SCHOELL-GLASS, *Universität Hamburg*

October 24, 1996
Islamic Seminar: "Colophon of an Arabic Manuscript"
MICHAEL COOK, *Princeton University*
"The Robe of Roger II"
OLEG GRABAR, *Professor, School of Historical Studies, IAS*

October 30, 1996
Seminar on Sovereignty: Discussion Group
SABINE MacCORMACK, *Visiting Mellon Professor, School of Historical Studies, IAS*

Weekly Informal Art History Colloquium:
"Twentieth Century Nigerian Architecture"
IKEM OKOYE, *Northwestern University*

November 5, 1996
Medieval Seminar: "'Love and do what you will.' The Medieval History of an Augustinian Precept"
GILES CONSTABLE, *Professor, School of Historical Studies, IAS*

November 6, 1996
Seminar on Sovereignty: Discussion Group
SABINE MacCORMACK, *Visiting Mellon Professor, School of Historical Studies, IAS*

Informal Art History Colloquium:
"Narrative in Tibetan Mural Painting"
DEBORAH KLIMBURG-SALTER, *University of Vienna*

November 13, 1996
Weekly Informal Art History Colloquium:
"Chinese Poetry, Visual and Verbal"
DORE LEVY, *Brown University*

November 14, 1996
Islamic Seminar: "The Knowledge and Awareness of Greeks Held by Arabs in the Early Middle Ages"
VASSILIOS CHRISTIDES, *University of Ioannina*

November 19, 1996
Medieval Seminar: "Sex, Pride, and Paradise in the Byzantine Heroic Poem Diogenis Akritas"
JAMES TRILLING, *Providence, Rhode Island*

November 20, 1996
Seminar on Sovereignty: Discussion Group
SABINE MacCORMACK, *Visiting Mellon Professor, School of Historical Studies, IAS*

Weekly Informal Art History Colloquium:
"Marble Decorations at Hagia Sophia"
JAMES TRILLING, *Providence, Rhode Island*

December 3, 1996
Medieval Seminar: "The Politics of Adultery in Late Antiquity"
HAGITH SIVAN, *University of Kansas*

December 4, 1996
Seminar on Sovereignty: Discussion Group
SABINE MacCORMACK, *Visiting Mellon Professor, School of Historical Studies, IAS*

Weekly Informal Art History Colloquium:
"The Vatican Virgil"
DAVID WRIGHT, *University of California, Berkeley*

December 7, 1996
Meeting of the Delaware Valley Medieval Association
"Hagia Sophia through Byzantine Eyes"
JAMES TRILLING, *Providence, Rhode Island*
"The Body of a Sinner, the Price of Piety: Women, Violence, and Public in Late Antiquity"
HAGITH SIVAN, *University of Kansas*
"Interpreting the Discourses on Violence on Women in Fifteenth-century France and the Burgundian Netherlands"
WALTER PREVENIER, *University of Ghent*

December 11, 1996
Weekly Informal Art History Colloquium:
"Motifs in Islamic Art"
OLEG GRABAR, Professor, *School of Historical Studies, IAS*

December 12, 1996
Islamic Seminar: "Imagining Balkh in the 16th Century"
ROBERT McCHESNEY, *New York University*

December 17, 1996
Medieval Seminar: "Seals and Signs in Pre-Scholastic Culture (Northern France, 1000-1200)"
BRIGITTE BEDOS-REZAK, *University of Maryland at College Park*

January 10, 1997
Seminar on Sovereignty: Discussion Group
SABINE MacCORMACK, *Visiting Mellon Professor, School of Historical Studies, IAS*

January 14, 1997
Medieval Seminar: "Problems in the Study of Medieval Heresy and the Inquisition"
MARK GREGORY PEGG, *IAS*

January 15, 1997
Weekly Informal Art History Colloquium:
"Chimabue's Life of the Virgin"
MARILYN ARONBERG LAVIN, *Princeton, New Jersey*

January 22, 1997
Weekly Informal Art History Colloquium:
"Onion Domes in Russian Architecture"
LEONID BELIAEV, *Russian Academy of Sciences*

February 4, 1997
Medieval Seminar: "The Rapturous Female Body"
DYAN ELLIOTT, *Indiana University*

February 5, 1997
Weekly Informal Art History Colloquium:
"Dürer's Image of Saint Jerome"
LAURINDA DIXON, *Syracuse University*

February 12, 1997
Seminar on Sovereignty: Discussion Group
SABINE MacCORMACK, *Visiting Mellon Professor, School of Historical Studies, IAS*

February 19, 1997
Weekly Informal Art History Colloquium:
"Irish Painted House Decoration"
BARBARA PACA, Landscape Architect

February 25, 1997
Medieval Seminar: "'...and all the Christians go there to kiss it.' Russian Pilgrim Art from the 12th to 15th Century"
LEONID BELIAEV, *Russian Academy of Sciences*

February 26, 1997
Lecture: "Schliemann's Trojan Treasure in Moscow"
MIKHAIL TREISTER, *Curator, Pushkin Museum*

Seminar on Sovereignty
SABINE MacCORMACK, *Visiting Mellon Professor, School of Historical Studies, IAS*

Weekly Informal Art History Colloquium:
"An Early Christian Silver Plate"
JAMES TRILLING, *Providence, Rhode Island*

March 4, 1997
Medieval Seminar: "The Brain"
LINDA VOIGTS, *University of Missouri - Kansas City*

March 5, 1997
Weekly Informal Art History Colloquium:
"Interpreting African Art"
IKEM OKOYE, *Northwestern University*

March 12, 1997
Seminar on Sovereignty: Discussion Group
SABINE MacCORMACK, *Visiting Mellon Professor, School of Historical Studies, IAS*

Informal Art History Colloquium
"Conference on Narrative in Art: Comparative Study of Examples from China, Tibet, India, Italy, England, France"
DEBORAH KLIMBURG-SALTER, *University of Vienna* and
DORE LEVY, *Brown University*

March 13, 1997
Islamic Seminar: "Eastern Impact on Medieval Russian Culture"
LEONID BELIAEV, *Russian Academy of Sciences*

March 19, 1997
Weekly Informal Art History Colloquium:
"Islamic Architecture"
NASSER RABBAT, *Massachusetts Institute of Technology*

March 21, 1997
Medieval Seminar: "A Glimpse into a Diplomatist's Study"
THEO KÖLZER, *Universität Bonn*

March 26, 1997
Seminar on Sovereignty: Discussion Group
SABINE MacCORMACK, *Visiting Mellon Professor, School of Historical Studies, IAS*

April 1, 1997
Medieval Seminar: "Reflections on Getting Published in the Twelfth Century"
RICHARD SHARPE, *University of Oxford*

April 7, 1997
Symposium: Person, Community and Empire: The Theory and Practice of Sovereignty
"Ego and Imago: Identity and Personal Authority in Pre-Scholastic France"
BRIGITTE BEDOS-REZAK, *University of Maryland at College Park*
"Sovereignty and the Bayeux Tapestry"
MILDRED BUNDY, Independent Scholar
"Boundaries: From Community to Nation in Late Medieval Castile"
TEOFILO RUIZ, *Brooklyn College* and *University of California, Los Angeles*
"The Spanish Empire and Italy"
J.N. HILLGARTH, Emeritus, *Pontifical Institute, Toronto*
"The Never Written Inca Theory of Empire"
JAN SZEMIŃSKI, *University of Jerusalem*
"Politics and History: Claiming Ife, Benin and Igbo Ukwu at the Turn of Two Centuries"
IKEM OKOYE, *Northwestern University*
"From Kurakas to Alcaldes and `Varas': The Transformation of the Andean Political System"
HERACLIO BONILLA, *Universidad Industrial de Santander Bucaramanga*

"Communal Construction and Boundary Formation in the Spanish Empire (17th and 18th Centuries)"
TAMAR HERZOG, *Universidad Autonoma Madrid*
"'Popular Liberalism' and the Religious Basis of Legitimacy"
FERNANDO CERVANTES, *University of Bristol*

April 9, 1997
Seminar on Sovereignty: Discussion Group
SABINE MacCORMACK, *Visiting Mellon Professor, School of Historical Studies, IAS*

Weekly informal Art History Colloquium:
"German Representations of America"
HARRY LIEBERSOHN, *University of Illinois*

April 16, 1997
Lecture: "The Scythian Rule over Asia and its Chronology: The Greek Tradition and the Historical Reality"
ASKOLD IVANTCHIK, *Russian Academy of Sciences/Center for Hellenic Studies, Washington*

April 23, 1997
Weekly Informal Art History Colloquium:
"Passion Motifs in Russian Sculpture"
LEONID BELIAEV, *Russian Academy of Sciences*

May 23–24, 1997
Seminar on Force in History
OWEN CONNELLY, *University of South Carolina*
ARTHUR WALDRON, *Brown University/ Naval War College*
GREG LOCKHART, *Australian National University*
JOHN HORNE, *Trinity College*
PETER PARET, *Professor, School of Historical Studies, IAS*

May 30, 1997
Weekly Informal Art History Colloquium:
"Mosaic Pavements in Jordan"
NASSER RABBAT, *Massachusetts Institute of Technology*

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

ACADEMIC ACTIVITIES

During the 1996-97 academic year, Pierre Deligne and Edward Witten, along with David Kazhdan (Harvard University, Distinguished Visiting Professor, IAS), conducted a remarkable program which brought together two apparently disjointed areas of science: on the one hand, algebraic geometry and topology—domains of pure mathematics—and on the other hand theoretical particle physics as described by quantum field theory and string theory. The title of the program was "Algebraic and Geometric Aspects of Quantum Field Theory and Gauge Theory."

Over the past few years the theoretical physics community has produced a string of fascinating mathematical conjectures and theorems. Perhaps the most notable among these is Seiberg and Witten's version of the Donaldson invariants. The primary goal of the Quantum Field program was to introduce mathematicians to new perspectives in geometry through the physics of supersymmetry and path integrals. The aim was to learn the physicist's modus operandi, to understand the bigger picture from which such conjectures emerge. This is an ambitious task since both the topics and the thought process of theoretical physics are foreign to most mathematicians. In particular, many of the ideas in physics have as yet no clear mathematical meaning.

To help overcome these barriers, there were three or four lectures of two hours or more per week. These were supplemented by evening sessions of additional explanations as well as homework and problem sessions.

The lecture series began with the basics: Joseph Bernstein lectured on supersymmetry, David Kazhdan on quantum field theory, Ludwig Faddeev on quantization and path integrals and Krzysztof Gawedski on conformal field theory. These lectures were followed by those of Edward Witten and David Gross on renormalized perturbation

theory and renormalization group methods with special emphasis on the beta function which governs the flow of the couplings under scale change.

In the spring Eric d'Hoker began a long series of lectures on string theory. Here basic definitions were lacking even more, but mathematicians could appreciate the miracles calling for explanation.

Lectures by Edward Witten had as their final aim an explanation of the Seiberg-Witten equations, and why they should give a new Donaldson theory—in a technically much simpler guise. Along the way we were treated to a tour of the more recent theories including duality theory and M branes and effective large scale descriptions of quantum field theories.

During the course of all these lectures, notes were taken by participants R. Bezrukavnikov, R. Constantinescu, P. Etingof, D. Gaitsgory, D. Freed, L. Jeffrey, and J. Morgan. These notes were distributed and made available on our website for all who might be interested.

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

In addition to the main program in quantum field theory, there were two smaller programs: one in combinatorics and computer science organized by Enrico Bombieri, and the other by Jean Bourgain in harmonic analysis and partial differential equations.

Bourgain's program concerned the study of equations governing non-linear wave dynamics. Some examples of physical systems described by these equations include plasmas, water waves, and lasers. In the fall Bourgain was joined by two senior colleagues, Carlos Kenig (University of Chicago) and Frank Merle (Université de Cergy-Pontoise).

One of the main goals of the program was to prove well posedness and study regularity for a wide class of hyperbolic equations. Much of this analysis involved the study of rough classes of initial data. Such data were studied by Wensheng Wang, Yi Zhou and for the inviscid limit of Navier-Stokes by Jiahong Wu. Markus Keel described his work on smoothness for classical Yang-Mills-Higgs systems. Another important theme of this program was the formation of the focusing singularity for critical nonlinear Schroedinger equations especially in view of Merle's recent results. Sijue Wu explained her interesting results for well posedness of the full water wave problem in both two and three dimensions.

The Combinatorics and Computer Science program, now in its fourth year at the Institute, is being run in collaboration with the DIMACS Center for Discrete Mathematics and Theoretical Computer Science. This year senior visitors included Noga Alon (Tel Aviv), Béla Bollobás (Cambridge, England), Christian Borgs

(University of Leipzig, Microsoft), Jennifer Chayes (UCLA, Microsoft), Narendar Karmarkar (Bell Laboratories) and Joel Spencer (Courant Institute, NYU). In addition, there were a number of junior members.

This year the main focus was on discrete probability—especially the study of monotone properties of large random graphs. Such graphs often have a sharp threshold which means that a certain property—say having a large component—occurs with probability zero below some probability threshold and has probability one above that threshold as the size of the systems get large. This is closely related to the theory of second phase transitions in statistical mechanics. In fact one of the goals of this program was to combine the ideas and problems of combinatorics with those of statistical mechanics and harmonic analysis.

More specifically, C. Borgs, J. Chayes and J. Spencer, together with H. Kesten (Cornell University), studied the largest component for percolation at percolation threshold in d dimensions. They showed that in a box of side N the largest connected cluster is proportional to N^d times the probability that the center is connected to the boundary of the box. The width of the threshold goes to zero like $N^{-1/\nu}$ where ν is the correlation length exponent. Bollobás, Borgs and Chayes are working on a similar analysis of directed graphs with a strong notion of connectedness. This is a version of the 2-Sat problem. Bollobás also obtained new results on general Tutte polynomials which yield invariants for combinatorial objects. In particular these invariants generalize the well-known Jones polynomial for knots. He also studied combinatorial questions associated with hybridized DNA sequences.

N. Alon developed a combinatorial version of the Nullstellensatz, and worked on approximate hypergraph colorings and linear hashing problems.

There were three workshops organized with DIMACS, entitled "Probabilistic Methods in Discrete Mathematics," October 14-18; "Statistical Physics Methods in Discrete Probability," March 22-27; and "Micro Surveys in Discrete Probability," June 2-6.

Our 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.

This year the Marston Morse Memorial Lectures were delivered February 25-27 by Peter Kronheimer of Harvard University. His lectures were entitled "Seiberg-Witten Monopoles and the Thurston Form," "Contact Structures and Foliation" and "The Genus Minimizing Problem in Dimension Four."

Robert Langlands' sixtieth birthday was celebrated with a special "Conference on Automorphic Forms, Geometry and Analysis" from October 9-12. Funded by the National Science Foundation and the National Security Agency, the conference covered Langlands' many contributions to automorphic forms, number theory, geometry, and more recently, to statistical mechanics. Langlands was recently awarded an honorary degree from the University of Montreal.

THE SCHOOL OF MATHEMATICS

MEMBERS AND VISITORS

MIGUEL ABREU
Symplectic Geometry and Topology
Stanford University

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

MAGDY ASSEM
Harmonic Analysis on p-adic Groups
University of Saskatchewan, Canada · *f*

ALEXANDER BEILINSON
Algebraic Geometry
Massachusetts Institute of Technology

GEORGIA BENKART
Representation Theory, Combinatorics
University of Wisconsin - Madison · *f*

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

ANTHONY BLOCH
Hamiltonian and Lagrangian Dynamics
University of Michigan · *s*

BÉLA BOLLOBÁS
Extremal and Probabilistic Combinatorics
University of Memphis · *f*

CHRISTIAN BORGS
Statistical Physics, Phase Transitions
Universität Leipzig · *s*

TOM BRADEN
Singularities of Algebraic Varieties; Perverse Sheaves
Massachusetts Institute of Technology

GASTAO BRAGA
Statistical Physics and Quantum Field Theory
Universidade Federal de Minas Gerais, Brazil · *v*

JENNIFER CHAYES
Mathematical Physics
University of California at Los Angeles · *s*

WILLIAM CHERRY
Complex and p-adic Analytic Geometry
University of Michigan

STEPHEN CHOI
Diophantine Approximation
University of Texas at Austin

JEANNE CLELLAND
Exterior Differential Systems
Duke University

RADU CONSTANTINESCU
Field Theory and Topology
Massachusetts Institute of Technology

RON DONAGI
Algebraic Geometry and Mathematical Physics
University of Pennsylvania · *j*

ROBERT DONLEY
Representation Theory
State University of New York at Stony Brook

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

VOLKER ENSS
Mathematical Physics
Rheinisch-Westfälische Technische Hochschule
Aachen, Germany · *vf* · *s*

PAVEL ETINGOF
Lie Groups and Generalizations
Harvard University · *f*

LIOUDVIG FADDEEV
Quantum Field Theory
Steklov Mathematical Institute (POMI), Russia

CHENTEH FAN
Lie Groups and Generalizations
Harvard University

DANIEL FREED
Geometry and Quantum Field Theory
University of Texas at Austin

EDWARD FRENKEL
Representation Theory; Mathematical Physics
Harvard University · *s*

DENNIS GAITSGORY
Geometric Langlands' Correspondence, D-modules
Tel-Aviv University, Israel

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

GALIN GEORGIEV
Representation Theory, Stochastic Analysis
Rutgers University · *f*

MARK GORESKY
Geometry and Automorphic Forms
Northeastern University · *v*

WILLIAM GRAHAM
Lie Groups, Algebraic Geometry
University of Chicago

VICTOR GURARIE
Quantum Field Theory, Turbulence
Princeton University · *j*

HOWARD JACOBOWITZ
Several Complex Variables
Rutgers University - Camden · *v*

LISA JEFFREY
Geometry and Low-dimensional Topology
McGill University, Canada

DIHUA JIANG
Automorphic Representations
Yale University · *f*

ANDERS JOHANSSON
Combinatorics
University of Umeå, Sweden

JAY JORGENSON
Arithmetic Geometry and Complex Geometry
Yale University · *f*

NICOLAOS KAPOULEAS
Minimal Surfaces, General Relativity
Brown University · *s*

NARENDRA KARMARKAR
Computational Mathematics
AT&T Bell Laboratories · *s*

DAVID KAZHDAN
Mathematical Physics, Geometry, Number Theory
Harvard University · *dvp*

MARKUS KEEL
Nonlinear Wave Equations
University of California at Los Angeles · *f*

CARLOS KENIG
Analysis
University of Chicago · *f*

DMITRY KLEINBOCK
Flows on Homogeneous Spaces, Diophantine Approximation
Yale University

SERGEI KONYAGIN
Harmonic Analysis
Moscow State University, Russia

LEONID KOROGODSKY
Quantum Groups
Massachusetts Institute of Technology

ANTONI KOSINSKI
Differential Topology
Rutgers University · *v*

ROBERT KUSNER
Variational Problems
University of Massachusetts at Amherst · *vf* · *s*

HAISHENG LI
Vertex Operator Algebras, Conformal Field Theory
University of California at Santa Cruz · *s*

AI-KO LIU
Seiberg-Witten Theory
Harvard University

GUOWU MENG
Low Dimensional Topology/geometry
Hong Kong University of Science and Technology, Hong Kong · *f*

FRANK MERLE
Partial Differential Equations
Université de Cergy-Pontoise, France · *f*

JOHN MORGAN
Gauge Theory; Four-dimensional Manifolds
Columbia University

DAVID MORRISON
Algebraic Geometry and String Theory
Duke University · *j*

ARVIND NAIR
Cohomology of Arithmetic Groups, Automorphic Forms
University of Michigan

f First Term · *s* Second Term · *v* Visitor · *dvp* Distinguished Visiting Professor
j Joint Appointment with School of Natural Sciences

HIROAKI NAKAMURA
Galois Representations in Profinite Fundamental Groups
University of Tokyo, Japan · *j*

KEN ONO
Modular Forms, Representation Theory, and Number Theory
Penn State University

URSULA POROD
Probability Theory
University of California at Berkeley

DAVID REIMER
Graph Theory
Rutgers University · *s*

VLADIMIR SADOV
Two-dimensional Field Theories and String Theory
Harvard University · *j*

WILHELM SCHLAG
Harmonic Analysis; Partial Differential Equations
California Institute of Technology

NIMISH SHAH
Lie Groups and Ergodic Theory
Tata Institute of Fundamental Research, India

STEPHEN SHATZ
Non-commutative Algebraic Geometry
University of Pennsylvania · *s*

JAN SOLOVEJ
The Mathematics of Atoms, Molecules and Matter
Aarhus University, Denmark · *v*

JOEL SPENCER
Probabilistic Methods
Courant Institute · *s*

TIBOR SZABÓ
Extremal Combinatorics
Ohio State University

LUCIEN SZPIRO
Number Theory
Université de Paris-Sud, France

GÁBOR TARDOS
Discrete Mathematics and Theoretical Computer Science
University of Toronto, Canada

ANDREY TODOROV
Moduli of Complex Manifolds
University of California at Santa Cruz · *s*

YAKOV VARSHAVSKY
Arithmetical Algebraic Geometry
Hebrew University of Jerusalem, Israel

LUIS VEGA
Fourier Analysis, Nonlinear Wave Equations
Universidad del Pais Vasco, Spain · *f*

MISHA VERBITSKY
Hyperkähler Geometry
Harvard University

PAUL VOJTA
Diophantine Geometry
University of California at Berkeley

WENSHENG WANG
Evolution Equations
University of Southern California

ANDREW WILES
Algebraic Number Theory
Princeton University · *f*

JIAHONG WU
Navier-Stokes Equations
University of Chicago

SIJUE WU
Fluid Dynamics; Applied Mathematics
Northwestern University

SIYE WU
Symplectic Geometry; Topological Field Theories
University of Adelaide, Australia · *s*

XIN ZHOU
Inverse Scattering Theory, Integrable Systems
Duke University · *s*

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

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

THE SCHOOL OF MATHEMATICS

RECORD OF EVENTS

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

Academic Year 1996-97

September 17
Supersymmetry Lecture: "Why Supersymmetry?"
JOSEPH BERNSTEIN, *Tel Aviv University*

September 19
Supersymmetry Lecture: "Supermanifolds"
JOSEPH BERNSTEIN, *Tel Aviv University*

September 24
Quantum Field Theory Seminar: "The Wightman's Axioms for the Scalar Boson Theory and the Example of the Free Quantum Field Theory. The Analytic Properties of the Wightman's Functions"
DAVID KAZHDAN, *Harvard University* and *IAS*

Quantum Field Theory Seminar: "Integration theory on supermanifolds. An example of supersymmetric sigma-models"
JOSEPH BERNSTEIN, *Tel Aviv University*

September 26
Quantum Field Theory Seminar: "Remedial Lecture on Spinors"
PIERRE DELIGNE, *Professor, School of Mathematics, IAS*

Quantum Field Theory Seminar: "Wess-Zumino Model and Its Realization Using Flat Superspace"
JOSEPH BERNSTEIN, *Tel Aviv University*

September 30
Combinatorics, Complexity and Discrete Probability Seminar: "Colorings and Hereditary Properties of Graphs"
BELA BOLLOBAS, *IAS*

October 1
Differential Systems Seminar
PHILLIP GRIFFITHS, *Director, IAS*

Quantum Field Theory Seminar: "Free Quantum Field Theories"
DAVID KAZHDAN, *Harvard University* and *IAS*

Quantum Field Theory Seminar: "Wess-Zumino Model and Its Realization Using Flat Superspace"
JOSEPH BERNSTEIN, *Tel Aviv University*

October 2
Automorphic Forms/Representation Theory Seminar: "Classifying Representations of Semisimple Lie Groups"
ROBERT DONLEY, *IAS*

Applied Math/Math Physics Seminar: "Kolmogorov Spectra of Capillary Waves"
VLADIMIR ZAKHAROV, *Landau Institute*

October 3
Differential Systems Seminar
PHILLIP GRIFFITHS, *Director, IAS*

Quantum Field Theory Seminar: "The Haag-Ruelle Scattering Theory and the Relation Between the Wightman's Functions and the S-matrix"
DAVID KAZHDAN, *Harvard University* and *IAS*

Quantum Field Theory Seminar: "Simple Supergravity (d=4, N=1)"
JOSEPH BERNSTEIN, *Tel Aviv University*

Harmonic Analysis and Number Theory Seminar: "Modular Mahler Measures"
FERNANDO RODRIQUEZ-VILLEGAS, *Princeton University*

October 7
Combinatorics, Complexity and Discrete Probability Seminar: "On the Largest Bucket in Linear Hashing"
GABOR TARDOS, *IAS*

October 8
Quantum Field Theory Seminar: "Simple Functional Integrals for Free Theory in Geometric Background"
KRZYSZTOF GAWEDZKI, *IHES*

Quantum Field Theory Seminar: "Model for Supergravity (d=4, N=1). Nahm's Theorem on Supersymmetries in High Dimensions"
JOSEPH BERNSTEIN, *Tel Aviv University*

Quantum Field Theory Seminar: "Reminder of Basics of Quantum Mechanics Canonical Quantization for Hilbert Space"
LIOUDVIG FADDEEV, *IAS*
Analysis and PDE Seminar: "Invariant Gibbs Measures and PDE with Random Initial Data"
JEAN BOURGAIN, *Professor, School of Mathematics, IAS*

October 9
Conference on Automorphic Forms, Geometry and Analysis

Differential Systems Seminar
PHILLIP GRIFFITHS, *Director, IAS*

October 10
Conference on Automorphic Forms, Geometry and Analysis

October 11
Conference on Automorphic Forms, Geometry and Analysis

October 12
Conference on Automorphic Forms, Geometry and Analysis

October 15
Quantum Field Theory Seminar: "Toroidal Compactifications"
KRZYSZTOF GAWEDZKI, *IHES*

Quantum Field Theory Seminar: "Supersymmetric Theories in Different Dimensions"
JOSEPH BERNSTEIN, *Tel Aviv University*

Analysis and PDE Seminar: "Invariant Gibbs Measures and PDE with Random Initial Data" (continued)
JEAN BOURGAIN, *Professor, School of Mathematics, IAS*

October 16
Automorphic Forms/Representation Theory Seminar: "Generalized Temperley-Lieb Algebras and Some Irreducible Representations of Iwahori-Hecke Algebras"
KEN FAN, *IAS*

Differential Systems Seminar
PHILLIP GRIFFITHS, *Director, IAS*

Number Theory Seminar: "Small Points and the Unit Equation"
ENRICO BOMBIERI, *Professor, School of Mathematics, IAS*

October 17
Quantum Field Theory Seminar: "Scattering Theory"
DAVID KAZHDAN, *Harvard University and IAS*
Quantum Field Theory Seminar: "Quantum Mechanics" (continued)
LIOUDVIG FADDEEV, *IAS*

Joint Number Theory/Harmonic Analysis Seminar: "From Non-divergence of Unipotent Flows to Mahler's Conjecture"
DMITRY KLEINBOCK, *IAS*

October 21
Combinatorics, Complexity and Discrete Probability Seminar: "Birth of the Infinite Cluster: Finite-size Scaling in Percolation"
JENNIFER CHAYES, *University of California, Los Angeles*

Members Seminar: "Non-compact Quantum Groups and `Super-tendor' Products"
LEONID KOROGODSKY, *IAS*

October 22
Quantum Field Theory Seminar: "Combinatorics of Feynman Integrals"
DAVID KAZHDAN, *Harvard University and IAS*

Quantum Field Theory Seminar: "Free Fields in the Presence in External Source"
LIOUDVIG FADDEEV, *IAS*

Analysis and PDE Seminar: "Invariant Gibbs Measures and PDE with Random Initial Data" (continued)
JEAN BOURGAIN, *Professor, School of Mathematics, IAS*

October 23
Automorphic Forms/Representation Theory Seminar: "On Endoscopic Transfer of Unipotent Orbital Integrals"
MAGDY ASSEM, *IAS*

Differential Systems Seminar
PHILLIP GRIFFITHS, Director, *IAS*

Number Theory Seminar: "Small Points and the Unit Equation" (conclusion)
ENRICO BOMBIERI, *Professor, School of Mathematics, IAS*

Applied Math/Math Physics Seminar: "The Strong Coupling Polaron: A Problem in Field Theory and Condensed Matter Physics"
ELLIOTT LIEB, *Princeton University*

October 24
Quantum Field Theory Seminar: "Perturbative Renormalization"
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

Quantum Field Theory Seminar: "Axiomatics of CFT"
KRZYSZTOF GAWEDZKI, *IHES*

Joint Number Theory/Harmonic Analysis Seminar: "Heights and Discreteness"
LUCIEN SZPIRO, *IAS*

October 25
Princeton University/IAS/NECI Quantum Chaos Joint Seminar: "Introduction"
PETER SARNAK, *Princeton University*

October 28
Combinatorics, Complexity and Discrete Probability Seminar: "Even Cycles in Digraphs"
PAUL SEYMOUR, *Princeton University*

Members Seminar: "Topology of Symplectomorphism Groups"
MIGUEL ABREU, *IAS*

October 29
Quantum Field Theory Seminar: "Scattering Theory"
DAVID KAZHDAN, *Harvard University* and *IAS*

Quantum Field Theory Seminar: "Axiomatics of CFT" (continuation)
KRZYSZTOF GAWEDZKI, *IHES*

Analysis and PDE Seminar: "Various Results on Blow-up Solutions for Critical Nonlinear Schroedinger and Zakharov Equation"
FRANK MERLE, *IAS*

October 30
Automorphic Forms/Representation Theory Seminar: "A Generalization of Springer Theory Using Nearby Cycles"
MIKHAIL GRINBERG, *Harvard University*

Differential Systems Seminar
ROBERT BRYANT, *Duke University*

Number Theory Seminar: "Equidistribution of Small Points"
LUCIEN SZPIRO, *IAS*

Applied Math/Math Physics Seminar: "A Review of the Randomly Driven Burgers Equation"
VICTOR GURARIE, *IAS*

October 31
Quantum Field Theory Seminar: "Perturbative Renormalization" (continuation)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

Joint Number Theory/Harmonic Analysis Seminar: "Use of Differential Geometry and Superrigidity for a p-adic Uniformization of Shimura Varieties"
YAKOV VARSHAVSKY, *IAS*

November 4
Combinatorics, Complexity and Discrete Probability Seminar: "Investigating Special Families of Simple Closed Jordan Curves Using Graph Theory"
PETER HAMBURGER, *Purdue University and DIMACS*

Members Seminar: "Deformations of Trianalytic Subvarieties"
MISHA VERBITSKY, *IAS*

November 5
Quantum Field Theory Seminar: "Segal's Axioms"
KRZYSZTOF GAWEDZKI, *IHES*

Analysis and PDE Seminar: "Various Results on Blow-up Solutions for Critical Nonlinear Schroedinger and Zakharov Equation" (continuation)
FRANK MERLE, *IAS*

November 6
Automorphic Forms/Representation Theory Seminar: "Weighted Cohomology and Weighted L^2 Cohomology of Arithmetic Groups"
ARVIND NAIR, *IAS*

Differential Systems Seminar
PHILLIP GRIFFITHS, *Director, IAS*

Applied Math/Math Physics Seminar: "Well-posedness in Sobolev Spaces of the Full Water Wave Problem in 2D and 3D"
SIJUE WU, *IAS*

Number Theory Seminar: "$x^2 + y^4$ = prime, Part I"
HENRYK IWANIEC, *Rutgers University*

November 7
Quantum Field Theory Seminar: "Perturbative Renormalization" (continuation)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

Combinatorics, Complexity and Discrete Probability Seminar: "Erdos-type Problems in Combinatorial Geometry"
JANOS PACH, *Courant Institute*

Quantum Field Theory Seminar: "Singular Lagrangians"
LIOUDVIG FADDEEV, *IAS*

Joint Number Theory/Harmonic Analysis Seminar: "Are Solutions of Pell's Equation Mostly Square Free?"
PAUL VOJTA, *IAS*

November 8
Quantum Chaos Joint Seminar: "Quantum Chaos: Rigorous Results and Open Problems"
STEVEN ZELDITCH, *Johns Hopkins University*

November 11
Special Seminar: "Normal Differential Operators, Deformations and Ambient Cohomology"
HERB CLEMENS, *University of Utah*

Members Seminar: "General Wall Crossing Formula of Seiberg-Witten Theory and Its Application for $b^+_2 = 1$ Symplectic Four Manifolds"
AI-KO LIU, *IAS*

November 12
Quantum Field Theory Seminar: "Sigma-model"
KRZYSZTOF GAWEDZKI, *IHES*

Quantum Field Theory Seminar: "Quantization of Yang-Mills Fields"
LIOUDVIG FADDEEV, *IAS*

Analysis and PDE Seminar: "Polynomial Growth of H^s Norms of Solutions to Periodic Schroedinger and KdV Equations"
GIGLIOLA STAFFILANI, *Stanford University*

Analysis and PDE Seminar: "Well Posedness of Generalized Schroedinger Equations with Derivative Non-linearity"
CARLOS KENIG, *IAS*

November 13
Automorphic Forms/Representation Theory Seminar: "Towards a Representation Theory of Lie Algebras Graded by Finite Root Systems"
GEORGIA BENKART, *IAS*

Differential Systems Seminar
PHILLIP GRIFFITHS, *Director, IAS*

Applied Math/Math Physics Seminar: "Inviscid Limits for the Navier-Stokes Equations"
JIAHONG WU, *IAS*

Number Theory Seminar: "Measuring Local Positivity of Line Bundles on Abelian Varieties"
MICHAEL NAKAMAYE, *Harvard University*

November 14
Quantum Field Theory Seminar: "Sigma-model" (continuation)
KRZYSZTOF GAWEDZKI, *IHES*

Joint Number Theory/Harmonic Analysis Seminar: "Galois Representations and Ordinary Modular Forms"
CHRIS SKINNER, *Princeton University*

November 18
Combinatorics, Complexity and Discrete Probability Seminar: "The Competitive Sport of Bounding the Connective Constants of Self Avoiding Walks"
DORON ZEILBERGER, *Temple University*

Members Seminar: "Dynamical Quantum Groups"
PAVEL ETINGOF, *IAS*

November 19
Quantum Field Theory Seminar: "Beta Function for Sigma Models"
KRZYSZTOF GAWEDZKI, *IHES*

Quantum Field Theory Seminar: "Renormalization Groups"
DAVID GROSS, *Princeton University*

Analysis and PDE Seminar: "On the Schroedinger Maximal Function"
LUIS VEGA, *IAS*

November 20
Automorphic Forms/Representation Theory Seminar: "Periods and Theta Correspondences - Automorphic Forms on G_2"
DIHUA JIANG, *IAS*

Number Theory Seminar: "$x^2 + y^4$ = prime, Part II"
HENRYK IWANIEC, *Rutgers University*

Applied Math/Math Physics Seminar: "Well Posedness in Sobolev Spaces of 2D, 3D Full Water Wave Equation" (continuation)
SIJUE WU, *IAS*

Applied Math/Math Physics Seminar: "Inviscid Limits for the Navier-Stokes Equations" (continuation)
JIAHONG WU, *IAS*

November 21
Quantum Field Theory Seminar: "Constructive Conformal Field Theory"
KRZYSZTOF GAWEDZKI, *IHES*

Joint Number Theory/Harmonic Analysis Seminar: "On the L-norm of Exponential Sums and the Minima of Cosine Sums"
SERGEI KONYAGIN, *IAS*

November 25
Combinatorics, Complexity and Discrete Probability Seminar: "Randomness and Pseudo-randomness in Discrete Mathematics"
NOGA ALON, *IAS*

Distinguished Lecturer Series of DIMACS/IAS Focus on Discrete Probability: "Randomness and Pseudo-randomness in Discrete Mathematics"
NOGA ALON, *IAS*

Members Seminar: "Geometric Langlands Correspondence for GL(n): Geometric Realization of Whittaker Functions"
DENNIS GAITSGORY, *IAS*

November 26
Quantum Field Theory Seminar: "Chiral Anomaly"
LIOUDVIG FADDEEV, *IAS*

Quantum Field Theory Seminar: "Renormalization Groups" (continuation)
DAVID GROSS, *Princeton University*

November 27
Number Theory Seminar: "Some Remarks on the Brun-Titchmarsh Theorem"
JOHN FRIEDLANDER, *Scarborough, Toronto*

December 2
Combinatorics, Complexity and Discrete Probability Seminar: "An Exponential Lower Bound for Monotone Circuits and Prospects for Non-monotone Lower Bounds"
ARMIN HAKEN, *DIMACS*

December 3
Quantum Field Theory Seminar: "Renormalization Groups" (continuation)
DAVID GROSS, *Princeton University*

Analysis and PDE Seminar: "Nonlinear Schroedinger Equations with Derivative Nonlinearity" (continued)
CARLOS KENIG, *IAS*

December 4
Differential Systems Seminar
ROBERT BRYANT, *Duke University*

Automorphic Forms/Representation Theory Seminar: "Random walks: From Finite to Compact Lie Groups"
URSULA POROD, *IAS*

Number Theory Seminar: "Construction of Small Points"
LUCIEN SZPIRO, *IAS*

Applied Math/Math Physics Seminar: "Regularity Results for Classical Yang-Mills-Higgs"
MARKUS KEEL, *IAS*

December 5
Quantum Field Theory Seminar: "An Introduction to Renormalization and Scaling in Statistical Mechanics"
THOMAS SPENCER, *Professor, School of Mathematics, IAS*

Quantum Field Theory Seminar: "Scattering Theory"
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

Joint Number Theory/Harmonic Analysis Seminar: "Asymptotic Series for Double Zeta and Double Gamma Functions of Barnes"
KOHJI MATSUMOTO, *Nagoya University*

December 6
Analysis and Several Complex Variables Seminar: "Poisson Stratification and Analytic Hypo-ellipticity"
FRANCOIS TREVES, *Rutgers University*

Analysis and Several Complex Variables Seminar: "Obstructions to the Solvability of Systems of First Order Partial Differential Equations"
ABDELHAMID MEZIANI, *Florida International University*

Quantum Chaos Joint Seminar: "Beyond Random Matrix"
BORIS ALTSHULER, *NEC*

December 9
Combinatorics, Complexity and Discrete Probability Seminar: "Randomized Greedy Colourings"
ANDERS JOHANSSON, *IAS*

Members Seminar: "Explicit Sharp Upper Bounds on Spherical Derivatives"
WILLIAM CHERRY, *IAS*

December 10
Quantum Field Theory Seminar: "The Dirac Index on Manifolds and Loop Spaces"
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

Quantum Field Theory Seminar: "Renormalization Groups" (continuation)
DAVID GROSS, *Princeton University*

Analysis and PDE Seminar: "Sharp Local Existence Results for Non-linear Wave Equations"
MATEI MACHEDON, *University of Maryland*

December 11
Automorphic Forms/Representation Theory Seminar: "Log Convexity of Asymptotic Multiplicities"
WILLIAM GRAHAM, *IAS*

Applied Math/Math Physics Seminar: "Blow-up Solutions of Certain Periodic Nonlinear Schroedinger Equations"
WENSHENG WANG, *IAS*

December 16
Combinatorics, Complexity and Discrete Probability Seminar: "Loan Balancing in the Euclidean Norm"
RAVI BOPPANA, *Courant Institute*

Members Seminar: "On Some Recent Singular Perturbation Constructions in Geometry"
NICOLAOS KAPOULEAS, *IAS*

December 17
Quantum Field Theory Seminar: "The Dirac Index on Manifolds and Loop Spaces" (continuation)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

Quantum Field Theory Seminar: "Renormalization Groups" (continuation)
DAVID GROSS, *Princeton University*

December 20
Applied Math/Math Physics Seminar: "Contours of a Random Surface"
JANÉ KONDEV, *Brown University*

January 15
Applied Math/Math Physics Seminar: "Burgers System Driven by a Random Force"
YAKOV SINAI, *Princeton University*

January 16
Quantum Field Theory Seminar: "String Theory"
ERIC D'HOKER, *IAS*

Quantum Field Theory Seminar: "Field Theory"
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

January 20
Combinatorics, Complexity and Discrete Probability Seminar: "Asymptotic Isoperimetric Inequalities via Martingales"
JOEL SPENCER, *IAS*

Members Seminar: "$SL_n(R)/SL_n(Z)$ and Diophantine Approximation"
DMITRY KLEINBOCK, *IAS*

January 22
Special Seminar: "Some Progress on Value Distribution Theory and Its Applications"
C. C. YANG, *Hong Kong University*

Applied Math/Math Physics Seminar: "Uniform $W^{1,p}$ Estimates for Homogenization Problems"
LUIS CAFFARELLI, *Courant Institute*

January 23
Quantum Field Theory Seminar: "String Theory" (continuation)
ERIC D'HOKER, *IAS*

Quantum Field Theory Seminar: "Field Theory" (continuation)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

January 24
Quantum Chaos Joint Seminar: "Universality Conjecture and Riemann-Hilbert Techniques"
KENNETH McLAUGHLIN, *Princeton University*

January 27
Combinatorics, Complexity and Discrete Probability Seminar: "Sharp Threshold Intervals Under Group Symmetries"
JEAN BOURGAIN, *Professor, School of Mathematics, IAS*

Members Seminar: "Vanishing Theorems in the Cohomology of Moduli Spaces of Flat Connections on Riemann Surfaces"
LISA JEFFREY, *IAS*

January 29
Geometric Langlands Correspondence Seminar: "A Proof of the Geometric Langlands Correspondence for GL(2)" (after V. Drinfeld)
DENNIS GAITSGORY, *IAS*

Applied Math/Math Physics Seminar: "The Statistical Properties of Spectra of the Laplace-Beltrami Operators on Liouville Surfaces"
DENNIS KOSYGIN, *Princeton University*

January 30
Quantum Field Theory Seminar: "String Theory" (continuation)
ERIC D'HOKER, *IAS*

Quantum Field Theory Seminar: "Field Theory" (continuation)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

February 3
Combinatorics, Complexity and Discrete Probability Seminar: "Logarithmic Harnack Inequalities for Random Walks on Graphs"
FAN CHUNG, *University of Pennsylvania*

Members Seminar: "Building and Dualities for Representations of a p-adic Group"
ROMAN BEZRUKAVNIKOV, *IAS*

February 5
Geometric Langlands Correspondence Seminar: "A Proof of the Geometric Langlands Correspondence for GL(2)" (after V. Drinfeld) (continued)
DENNIS GAITSGORY, *IAS*

Joint Harmonic Analysis and Number Theory Seminar: "Sobolev Norms of Automorphic Functionals"
JOSEPH BERNSTEIN, *Tel-Aviv University*

Applied Math/Math Physics Seminar: "Simplified Models in Turbulent Diffusion"
PETER KRAMER, *Princeton University*

February 6
Quantum Field Theory Seminar: "String Theory" (continuation)
ERIC D'HOKER, *IAS*

Quantum Field Theory Seminar: "Field Theory" (continuation)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

Joint Harmonic Analysis and Number Theory Seminar: "The Beurling-Selberg Extremal Functions for a Ball in Euclidean Space"
JEFF VAALER, *University of Texas, Austin*

February 7
Analysis and Several Complex Variables Seminar: "Stability of Embeddings for Deformations of CR Structures"
CHARLES EPSTEIN, *University of Pennsylvania*

Analysis and Several Complex Variables Seminar: "Global Theory of Pseudoconcave CR Manifolds"
C. DENSON HILL, *SUNY Stony Brook*

February 10
Combinatorics, Complexity and Discrete Probability Seminar: "Isoperimetric Invariants for Product Markov Chains and Graph Products"
PRASAD TETALI, *Georgia Institute of Technology*

Members Seminar: "Canonical Singularities and Quantum Field Theories: Not the Same Old A-D-E"
DAVID MORRISON, *IAS*

February 11
Quantum Field Theory Seminar: "Vector Bundles and F-theory"
JOHN MORGAN, *IAS*

February 12
Geometric Langlands Correspondence Seminar: "A Proof of the Geometric Langlands Correspondence for GL(2)" (after V. Drinfeld) (continued)
DENNIS GAITSGORY, *IAS*

Applied Math/Math Physics Seminar: "Introduction to the Quantum Hall Effect"
VICTOR GURARIE, *IAS*

February 13
Quantum Field Theory Seminar: "String Theory" (continuation)
ERIC D'HOKER, *IAS*

Quantum Field Theory Seminar: "Field Theory" (continuation)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

February 17
Combinatorics, Complexity and Discrete Probability Seminar: "Fractional Graph Theory: A Rational Approach to the Theory of Graphs"
EDWARD SCHEINERMAN, *Johns Hopkins University*

Members Seminar: "Principal Bundles on Elliptic Fibrations"
RON DONAGI, *IAS*

February 18
Quantum Field Theory Seminar: "Vector Bundles and F-theory" (continuation)
JOHN MORGAN, *IAS*

February 19
Geometric Langlands Correspondence Seminar: "Whittaker Functions and Langlands Conjecture for GL(n)" (after G. Laumon)
EDWARD FRENKEL, *IAS*

Applied Math/Math Physics Seminar: "On Periodic Solutions of Nonlinear Wave Equations"
JEAN BOURGAIN, *Professor, School of Mathematics, IAS*

February 20
Quantum Field Theory Seminar: "String Theory" (continuation)
ERIC D'HOKER, *IAS*

Quantum Field Theory Seminar: "Field Theory" (continuation)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

Joint Harmonic Analysis/Number Theory Seminar: "Some Applications of Double Dirichlet Series"
JEFFREY HOFFSTEIN, *Brown University*

February 24
Combinatorics, Complexity and Discrete Probability Seminar: "Reducing the Complexity of Reductions"
STEVEN RUDICH, *Carnegie Mellon Institution*

Members Seminar: "Seiberg-Witten Invariants of Four-manifolds: A Survey"
JOHN MORGAN, *IAS*

February 25
Quantum Field Theory Seminar: "Vector Bundles and F-theory" (continuation)
JOHN MORGAN, *IAS*

February 26
Geometric Langlands Correspondence Seminar: "Whittaker Functions and Langlands Conjecture for GL(n)" (after G. Laumon) (continuation)
EDWARD FRENKEL, *IAS*

Applied Math/Math Physics Seminar: "On Periodic Solutions of Nonlinear Wave Equations" (continuation)
JEAN BOURGAIN, *Professor, School of Mathematics, IAS*

Applied Math/Math Physics Seminar: "Stability of Relativistic and Non-relativistic Matter in the Presence of Magnetic Fields"
JAN SOLOVEJ, *IAS*

February 27
Quantum Field Theory Seminar: "String Theory" (continuation)
ERIC D'HOKER, *IAS*

Quantum Field Theory Seminar: "Field Theory" (continuation)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

Joint Harmonic Analysis/Number Theory Seminar: "Ample Divisors, Automorphic Forms, and Shafarevich's Conjecture"
JAY JORGENSON, *IAS*

March 3
Combinatorics, Complexity and Discrete Probability Seminar: "Random Independent Sets and Matchings"
JEONG-HAN KIM, *AT&T Bell Labs*

Members Seminar: "A Tour through the Moduli Spaces of Constant Mean Curvature Surfaces"
ROBERT KUSNER, *IAS*

March 5
Geometric Langlands Correspondence Seminar: "Whittaker Functions and Langlands Conjecture for GL(n)" (continuation)
EDWARD FRENKEL, *IAS*

Applied Math/Math Physics Seminar: "Existence of Solutions of Hyperbolic Yang-Mills Equation: A Survey"
YI ZHOU, *IAS*

March 6
Quantum Field Theory Seminar: "String Theory" (continuation)
ERIC D'HOKER, *IAS*

Quantum Field Theory Seminar: "Field Theory" (continuation)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

March 7
Analysis and Several Complex Variables Seminar: "Local Solvability of Semi-linear Equations"
PAULO SANTIAGO, *Federal/Temple University*

Analysis and Several Complex Variables Seminar: "Stable Solutions of Elliptic Semi-linear Equations"
SAGUN CHANILLO, *Rutgers University*

Princeton University/IAS/NEC1 Quantum Chaos Joint Seminar: "Dynamical Localization"
J. BELLISARD, *University Sabatier, France*

March 10
Combinatorics, Complexity and Discrete Probability Seminar: "Long Increasing Subsequence Problems"
J. MICHAEL STEELE, *University of Pennsylvania*

Members Seminar: "An Elementary Approach to the Problems of Conjugation and p-adic Uniformization of Shimura Varieties"
YAKOV VARSHAVSKY, *IAS*

March 12
Quantum Field Theory Seminar: "String Theory" (continuation)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

Geometric Langlands Correspondence Seminar: "Quantization of Hitchin's Integrable System and Hecke Eigensheaves"
VLADIMIR DRINFELD, *IAS*

Applied Math/Math Physics Seminar: "Nonlinear Microlocal Analysis, Random Matrices, and Zero Dispersion KdV"
XIN ZHOU, *IAS*

March 13
Quantum Field Theory Seminar: "String Theory" (continuation)
ERIC D'HOKER, *IAS*

Joint Harmonic Analysis and Number Theory Seminar: "Cliques of Exceptional Units in Number Fields"
GERHARD NIKLASCH, *Rutgers University*

March 17
Combinatorics, Complexity and Discrete Probability Seminar: "Graph Constructions Based on Finite Fields"
TIBOR SZABO, *IAS*

Combinatorics, Complexity and Discrete Probability Seminar: "On Set Systems Not Containing (Weak) Delta-systems"
LUBOS THOMA, *DIMACS*

Geometric Langlands Correspondence Seminar: "Quantization of Hitchin's Integrable System and Hecke Eigensheaves"
VLADIMIR DRINFELD, *IAS*

Members Seminar: "Geometrical Aspects of the Dispersionless Toda Lattice Equations"
ANTHONY BLOCH, *IAS*

March 19
Joint Harmonic Analysis and Number Theory Seminar: "Challenges of Finite Characteristic Zeta Functions"
DINESH THAKUR, *University of Arizona*

Applied Math/Math Physics Seminar: "The Linearized Monge-Ampere Equation"
CRISTIAN GUTTIEREZ, *Temple University*

March 20
Quantum Field Theory Seminar: "String Theory" (continuation)
ERIC D'HOKER, *IAS*

Quantum Field Theory Seminar: "Field Theory" (continuation)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

Joint Harmonic Analysis and Number Theory Seminar: "Mean-value Estimates for Automorphic Representations"
EMMANUEL KOWALSKI, *Rutgers University*

March 25
Marston Morse Memorial Lecture: "Seiberg-Witten Monopoles and the Thurston Norm"
PETER KRONHEIMER, *Harvard University*

Applied Math/Math Physics Seminar: "Some Problems in Geometric Complexity Theory"
STEPHEN SEMMES, *Rice University & Courant Institute*

March 26
Quantum Field Theory Seminar: "Field Theory" (continuation)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

Marston Morse Memorial Lecture: "Contact Structures, Foliations and Floer Homology"
PETER KRONHEIMER, *Harvard University*

Joint Harmonic Analysis and Number Theory Seminar: "Trace Formula and Explicit Formulae in Number Theory"
ALAIN CONNES, *College de France, Paris*

Applied Math/Math Physics Seminar: "Stability of Non-relativistic QED"
CHARLES FEFFERMAN, *Princeton University*

March 27
Quantum Field Theory Seminar: "String Theory" (continuation)
ERIC D'HOKER, *IAS*

Marston Morse Memorial Lecture: "The Genus Minimizing Problem in Dimension Four"
PETER KRONHEIMER, *Harvard University*

March 28
Geometric Langlands Correspondence Seminar: "Quantization of Hitchin's Integrable System and Hecke Eigensheaves" (continuation)
VLADIMIR DRINFELD, *IAS*

March 31
Combinatorics, Complexity and Discrete Probability Seminar: "A Characterization of Span Program Size"
ANNA GAL, *Princeton University and DIMACS*

Members Seminar: "Number Theory, Nevanlinna Theory, Discriminants, and Multiple Zeroes"
PAUL VOJTA, *IAS*

April 2
Geometric Langlands Correspondence Seminar: "Quantization of Hitchin's Integrable System and Hecke Eigensheaves" (continuation)
VLADIMIR DRINFELD, *IAS*

Applied Math/Math Physics Seminar: "Finite-size Scaling and Scale Invariance in Percolation"
CHRISTIAN BORGS, *Microsoft Research*

April 3
Quantum Field Theory Seminar: "String Theory" (continuation)
ERIC D'HOKER, *IAS*

Joint Harmonic Analysis and Number Theory Seminar: "Shafarevich-Tate Groups of Non-square Order"
BJORN POONEN, *Princeton University*

April 4
Analysis and Several Complex Variables Seminar: "The Trace Problem for Vector Fields Satisfying Hormander's Condition"
ISAAC PESENSON, *Temple University*

April 7
Members Seminar: "An Elementary Approach to the Problems of Conjugation and p-adic Uniformization of Shimura Varieties"
YAKOV VARSHAVSKY, *IAS*

Combinatorics, Complexity and Discrete Probability Seminar: "Discrepancy Theory and Derandomization in Computational Geometry"
BERNARD CHAZELLE, *Princeton University*

Members Seminar: "An Elementary Approach to the Problems of Conjugation and p-adic Uniformization of Shimura Varieties"
YAKOV VARSHAVSKY, *IAS*

April 8
Quantum Field Theory Seminar: "N=2 Theories in Two Dimensions"
CUMRUN VAFA, *Harvard University*

Applied Math/Math Physics Seminar: "Nonlinear Instability Theory via Radiation Damping: The Case of the Wave Equation"
AVRAHAM SOFFER, *Rutgers University*

April 9
Geometric Langlands Correspondence Seminar: "Proof of Hecke Eigen Properties"
ALEXANDER BEILINSON, *IAS*

Number Theory Seminar: "The Self-intersection of the Dualizing Sheaf of $X_0(n)$"
E. ULLMO, *Université de Paris Sud, Orsay*

Applied Math/Math Physics Seminar: "Low Dimensional Models of Turbulent Flows"
PHILIP HOLMES, *Princeton University*

April 10
Quantum Field Theory Seminar: "String Theory" (continuation)
ERIC D'HOKER, *IAS*

Quantum Field Theory Seminar: "Field Theory" (continuation)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

Joint Harmonic Analysis and Number Theory Seminar: "Some Connections between Number Theory and Probability Theory"
JEAN-MARC DESHOUILLERS, *Bordeaux II*

April 15
Geometric Langlands Correspondence Seminar: "Proof of Hecke Eigen Property"
ALEXANDER BEILINSON, *IAS*

April 16
Quantum Field Theory Seminar: "String Theory" (continued)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

Applied Math/Math Physics Seminar: "Introduction to Sand Pile Models of Self Organized Criticality"
EVGENY IVASHKEVICH, *Laboratory Theoretical Physics, Moscow*

April 17
Quantum Field Theory Seminar: "N=2 Theories in Two Dimensions"
CUMRUN VAFA, *Harvard University*

Quantum Field Theory Seminar: "String Theory" (continued)
ERIC D'HOKER, *IAS*

Joint Harmonic Analysis and Number Theory Seminar: "On the Size of Differential Modules"
BERNARD DWORK, *Princeton University*

April 23
Applied Math/Math Physics Seminar: "Introduction to Homogenization and Some Problems in Statistical Mechanics"
THOMAS SPENCER, *Professor, School of Mathematics, IAS*

April 24
Joint Harmonic Analysis and Number Theory Seminar: "Special Values of Theta Functions of Genus 2"
EYAL GOREN, *Harvard University*

April 30
Quantum Field Theory Seminar: "String theory" (conclusion)
ERIC D'HOKER, *IAS*

May 1
Quantum Field Theory Seminar: "Kaluza-Klein Compactification, Supersymmetry and Calabi-Yau Spaces"
ANDREW STROMINGER, *University of California, Santa Barbara*

Quantum Field Theory Seminar: "Field Theory" (continuation)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

Joint Harmonic Analysis and Number Theory Seminar: "The Distribution of Primitive Roots mod p"
ALEXANDRU ZAHARESCU, *Massachusetts Institute of Technology*

May 2
Analysis and Several Complex Variables Seminar: "The Poisson Summation Formula"
LEON EHRENPREIS, *Temple University*

Analysis and Several Complex Variables Seminar: "On Solutions of Semilinear Equations that Blow Up at the Boundary"
SHIF BERHANU, *Temple University*

May 6
Quantum Field Theory Seminar: "Kaluza-Klein Compactification, Supersymmetry and Calabi-Yau Spaces" (continuation)
ANDREW STROMINGER, *University of California, Santa Barbara*

May 8
Quantum Field Theory Seminar: "N=2 Theories in Two Dimensions: The Superconformal Case"
CUMRUN VAFA, *Harvard University*

Quantum Field Theory Seminar: "Field Theory" (continuation)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

Joint Harmonic Analysis and Number Theory Seminar: "Periods of Automorphic Forms and Regularization"
JONATHAN ROGAWSKI, *Hebrew University*

May 15
Quantum Field Theory Seminar: "Introduction to D-branes"
CUMRUN VAFA, *Harvard University*

Quantum Field Theory Seminar: "Field Theory" (continuation)
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

THE SCHOOL OF NATURAL SCIENCES

Faculty

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[New Jersey Albert Einstein Professor]
JOHN N. BAHCALL, Astrophysics
PIET HUT, Astrophysics
FRANK WILCZEK, Particle Physics
EDWARD WITTEN, Mathematical Physics

Visiting Professor

PAWAN KUMAR, Astrophysics

Professor Emeritus

FREEMAN J. DYSON, Mathematical Physics and Astrophysics

ACADEMIC ACTIVITIES

Part of PROFESSOR STEPHEN L. ADLER's time last year was spent on clearing up some loose ends left over from writing his book on quaternionic quantum mechanics. With Jeeva Anandan, who visited IAS last May from the University of South Carolina, Adler wrote a paper working out the detailed theory of the nonadiabatic geometric phase in quaternionic quantum mechanics. With his Princeton University graduate student Andrew Millard, Adler wrote a paper generalizing the Perolomov construction of coherent states to quaternionic Hilbert space, and illustrating it with applications to the Weyl group (where the quaternionic states collapse to a complex embedding) and the rotation group (where the presence of intrinsically quaternionic irreducible representations leads to the first example of intrinsically quaternionic coherent states). In addition, Adler wrote a response to a comment by Gerard Emch (Mathematics Department, University of Florida, Gainesville) on Adler's paper of last year on quaternionic projective representations, and a joint paper with Emch clarifying the issues involved in the difference between Emch's older definition of quaternionic projective representations, and the broader definition that Adler introduced in his book and response. One satisfying aspect of these developments is that Adler's work, combined with that of Adler's student Andrew Millard and Millard's mathematics collaborator Terry Tao, shows that the theory of projective representations in standard, complex quantum mechanics can be derived from weaker starting assumptions than in the classic discussion of Bargmann: one only needs the condition defining the projective representation to hold on one basis, or complete set of states in Hilbert space, not on all states in Hilbert space.

These papers mark the end of Adler's foray into quaternionic quantum mechanics; the conclusion from this study is that there seems to be no natural mechanism in quaternionic Hilbert space for generating the color SU (3) group from a smaller Lie group, an issue that was one of the principal motivations for embarking on this project. At the same time, the generalized quantum dynamics (or trace dynamics, since it is based on a trace action principle) that Adler developed as part of the quaternionic study seems to have important potential applications that he is pursuing in the more conventional setting of complex Hilbert space. Adler wrote papers this spring on the use of trace dynamics to more efficiently do the matrix operator calculations in the "matrix model for M theory" (a subject of interest to string theorists), and on the extension of rigid supersymmetries to supersymmetries of matrix models, in which only cyclic permutation under the trace is used to verify supersymmetry and its consequences. He has in the works a paper with Achim Kempf (a short term IAS visitor from the Department of Applied Math in Cambridge) discussing the structure of corrections to canonical commutation relations emerging from the statistical mechanics of matrix models, extending the work done last year with Millard. The form of the results is suggestive of a relation between matrix models, as treated by statistical methods, and some of the results obtained in a string theory framework. Adler plans a continuing program directed at the study of trace dynamics models, both to explore their functioning as a kind of pre-quantum mechanics, and to see whether the results of his papers of this spring can be extended from rigid to local supersymmetry (i.e., to various types of supergravities.)

Again because the quaternionic approach did not lead in the end to new kinds of quark-lepton composite models, Adler took another look last summer at new forms of the Harari-Seiberg version of the Harari-Shupe compositeness rules. Harari and Seiberg interpreted the compositeness rules as a calculus of SU (3) trialities, but their specific model to implement the idea runs into trouble with chiral symmetries and cannot be physically realistic. Adler identified an intriguing model, based on an unconventional use of the group SU (4) as a hybrid grand unification-composite model (the quarks, leptons, and weak bosons are composites, while one U (1) electroweak gluon and the color gluons are elementary), which seems to have the right features to account for the emergence of the standard model as a low energy theory, with three quark lepton families. This proposal requires a chiral symmetry breaking chain that would have been thought inadmissible, until Seiberg in his classic work a few years ago produced examples of exactly solvable supersymmetric models which violate the so-called "most attractive channel" rule, suggesting that non-most attractive channel scenarios may lead to potentially interesting theories.

A prediction of the SU (4) model is that each of the three quark lepton families should have a heavy counterpart with the same quantum numbers somewhere in the electroweak mass range (that is, the three families result from the mixing in pairs of six initial families), a sharp contrast to the prediction of an "s" particle partner for each standard model particle in minimal supersymmetric unified models. Hence, if the expected supersymmetric partners do not show up at LHC, and

if hints of new phenomena at DESY turn out to be correct, the SU (4) model could have interesting phenomenological consequences. The group representations used in the model correspond to structures that appear in an N = 6 supergravity multiplet; a search for the corresponding field theory will be another of Adler's principal goals next year. If it exists, this could have interesting implications for the problem of unification of gravitation with the other forces.

PROFESSOR JOHN N. BAHCALL. Over the next several years, a number of precise measurements will be made on solar neutrinos. The principal new experiments that will provide data of high statistical significance are: in Japan, Super-Kamiokande nu-e scattering above 5 MeV; in Canada, SNO (charged current, only ν_e, absorption on deuterium, above 5 Mev; neutral current disintegration of deuterium); in Italy, BOREXINO ν-e scattering of the ^{7}Be line at 0.86 MeV), and GNO ν_e absorption by ^{71}Ga, threshold 0.23 MeV). Bahcall has decided to concentrate his research over the next several years in sharpening the comparison between solar neutrino measurements and theoretical calculations of standard models (minimal standard electroweak ((no neutrino oscillations)) and standard solar models).

New Neutrino Physics? During the past year, Bahcall and his collaborators have improved theoretical calculations of three of the principal "smoking gun" indicators of new physics, namely, the distortion of the energy spectrum of ^{8}B neutrinos, the ratio of the total neutrino flux to the flux in ν_e, and the regeneration in the earth of ν_e neutrinos from ν_μ (or ν_τ). All three phenomena are predicted by the so-called MSW resonant neutrino absorption, which is in many ways the simplest and most conservative extension of the minimal standard electroweak model. The observation of any one of these predicted effects would be evidence for new physics independent of solar model predictions.

Bahcall, Lisi (IAS), and a number of non-IAS experimental colleagues derived an improved energy spectrum for the ^{8}B neutrinos and also presented spectra that are $\pm 3\sigma$ different from the best-estimate. Preliminary comparison, by Krastev, Smirnov, and Bahcall, of the energy spectrum measured by Super-Kamiokande experimentalists, in the first year of operation of their detector, with the theoretical standard model spectrum shows an approximately 2σ discrepancy in the direction predicted by the favored small angle MSW effect. Over the next year, the Super-Kamiokande experimentalists will determine better the characteristics of their detector and will increase the statistics of their measurement.

What will SNO show? This question was addressed by Bahcall, Krastev, and Lisi, who showed that if the SNO experiment works as expected then the favored oscillation solutions all lie more than 15σ from the standard model solutions in a plane defined by the ratio of measured neutral-to-charged-current rates and the first moment of the energy distribution. The SNO experiment is expected to begin operation during the spring of 1998. It will take several years before definitive results are available.

What is the future of gallium solar neutrino experiments? The GNO (Gallium Neutrino Observatory) experiment will begin in early 1998 to take data for a planned lifetime of 22 years (two solar cycles). This new gallium experiment may eventually grow to 100 tons from the initial start with 30 tons. Steady progress is expected in reducing the statistical and systematic errors. To match the increased precision of the experiments, Bahcall recalculated with greater accuracy the absorption cross sections for a gallium detector, including a number of previously-neglected small effects. The solar model predictions over the last 30 years have been remarkably robust; the difference between the standard predictions and the observed rates in the pioneering gallium experiments constitute a strong argument that new physics is required—an inference that will be tested by the GNO observatory.

Most recently, Bahcall and Krastev have studied the question: "Does the Sun Appear Brighter at Night in Neutrinos?" They considered a wide range of models of the density distribution and chemical composition of the earth and performed precise numerical calculations of ν_e regeneration in the earth from incident ν_μ and ν_τ. Bahcall and Krastev defined and calculated accurately the expected dependence of the neutrino counting rate upon the solar zenith angle, both with and without earth regeneration. They found that the MSW solutions favored by the pioneering Homestake, Kamiokande, GALLEX, and SAGE experiments predict characteristic distortions of the solar zenith angle distribution to be measured by Super-Kamiokande and SNO that range from being unmeasurably small to > than 5σ after only a few years of observations.

In a speculative leap to very high energies, E. Waxman (IAS) and Bahcall showed that a large fraction of the energy in gamma ray bursts (more than 10%) will be converted by photo-meson production to a burst of 10^{14} eV neutrinos, provided the standard fireball model of the gamma-ray bursts is correct. A km square neutrino detector would observe at least several tens of events per year simultaneously with satellite-detected gamma ray bursts, and test for neutrino properties (e.g., flavor oscillations for which upward moving τ's would be a unique signature) with an accuracy many orders of magnitude better than is currently possible.

Solar Fusion Reactions. The neutrino predictions of standard solar models depend upon the rates of solar nuclear fusion reactions. Bahcall and his colleagues are refining the rates of the most important of these reactions that are used as input data for constructing standard solar models.

Bahcall, W. Haxton (University of Washington), P. Parker (Yale University), and H. Robertson (University of Washington) organized a workshop on "Solar Fusion Reactions" that was held at the Institute for Nuclear Theory, University of Washington, February 17-20. This workshop was attended by approximately 40 international experts on nuclear reactions and solar fusion rates. The experts examined critically all of the important solar fusion reactions and are in the process of writing a joint RMP paper analyzing what is known experimentally and theoretically about each of the reactions. Bahcall is the principal author responsible for organizing this material, which will recommend best-estimates and uncertainties for each of the important solar fusion reactions.

Gruzinov (IAS) and Bahcall solved numerically the equation for the evolution of the density matrix of a thermal electron in the field of a ^{7}Be ion and other ions and electrons in the solar plasma. The most powerful arguments for new physics from solar neutrino experiments relate to the ^{7}Be neutrino line formed by electron capture. Gruzinov and Bahcall showed that the formula given by Bahcall and Moeller in 1969 for the electron capture rate is accurate to 1%, the numerical precision in both calculations. The most important aspect of this calculation is that it does not require the specification of the quantum states of the plasma; all previous calculations have considered separately the bound and the continuum states of ^{7}Be in the solar plasma.

Bahcall, Chen (Columbia University) and Kamionkowski (Columbia University) have tested the standard Salpeter formulation for calculating electron screening corrections in stellar plasmas by solving numerically the Schroedinger equation for the fundamental proton-proton reaction. They show that the exact solution agrees with the usual Salpeter WKB approximation to within an accuracy of about one part in 10^4, much more accurately than required for solar neutrino calculations.

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

PROFESSOR PIET HUT continued his research on dynamics of dense stellar systems, such as star clusters and galactic nuclei, with an emphasis on large-scale computer simulations. Together with Jun Makino, from Tokyo University, and Steve McMillan, from Drexel University, he has refined and implemented algorithms for the treatment of simultaneous local interactions in the dense cores of such systems. These algorithms were subsequently applied on the GRAPE-4, a special-purpose computer developed at Tokyo University, and at a speed of 1 Teraflops one of the fastest computers in the world.

For a wider class of dynamical problems, Hut developed a new class of time symmetrization meta-algorithms, together with Yoko Funato from Tokyo University, and Makino and McMillan. As an example, they demonstrated how the standard fourth-order Runge-Kutta method can be symmetrized to yield a highly improved accuracy. For cosmological applications, a new group-finding algorithm, HOP, was developed in collaboration with Daniel Eisenstein, member of the School of Natural Sciences. This algorithm offers an efficient, adaptive, and coordinate-independent way to identify galaxies and clusters of galaxies in large-scale simulations of the origin of structure in the Universe.

Realistic astrophysical simulations of star clusters should include some approximate form of stellar evolution, in addition to gravitational dynamics. In a joint project with Simon Portegies Zwart from Amsterdam University, Frank Verbunt from Utrecht University, and Makino and McMillan, dynamical models were constructed with a correspondingly evolving Hertzsprung-Russell diagram (for an illustration, see the demonstrations at web site http://casc.physics.drexel.edu).

Professor Hut organized a workshop on "Smooth Particle Hydrodynamics: Models, Applications, and Enabling Technologies," sponsored by NASA's Goddard Space Flight Center, and held at IAS in June 1997. This workshop provided additional guidance for the design of the next-generation special-purpose computer, the GRAPE-6, planned to operate at a speed of 1 Petaflops. Together with Jeffrey Arnold and Thomas Sterling, from the Jet Propulsion Laboratory and the California Institute of Technology, Hut, Makino and McMillan held a smaller preparatory workshop in April, also at IAS, in order to study the feasibility of using reconfigurable hardware to extend the current GRAPE design.

During a visit to the Santa Fe Institute, Hut continued his work in the general area of the study of limits to scientific knowledge through a collaboration with mathematician David Ruelle, from Institut des Hautes Études Scientifiques, and computer scientist Joseph Traub, from Columbia. He also extended his ongoing collaboration with cognitive psychologist Roger Shepard, from Stanford University, to include philosopher of science Bas van Fraassen, from Princeton University, physicist Arthur Zajonc, from Amherst College, and writer Steven Tainer, from the University of California, Berkeley. With van Fraassen, he published a dialogue entitled "Elements of Reality," in which they discussed the central role of experience with respect to science and to human values.

During academic year 1996-97 PROFESSOR PAWAN KUMAR worked on several problems in theoretical astrophysics. These include tidal interaction between two stars, the rotation of the sun, and the activity in the centers of galaxies.

The study of tidal interactions among stars and planets is an old and yet an active area of current research because of its broad astrophysical implications. These include providing tests of the theory of stellar structure, tests of general relativity, and providing understanding of objects such as bright x-ray sources in the galaxy. Kumar has studied the tidal interaction in a binary star system which consists of a pulsar and an ordinary main sequence star of mass ten times the Sun. Because of the very accurate measurement of the arrival time of pulses from the pulsar, we know how the orbit of the binary system is changing with time, and the evolution appears to be much faster than the prediction of the standard tidal theory. Kumar has shown that the rapid evolution of the orbit can be understood provided that the energy in the tide is efficiently dissipated, and he has suggested such a mechanism that takes into consideration the differential rotation of the star. He has also made a compelling case that the sense of the rotation of the star is opposite to the motion of the star in its orbit. This can occur only if the supernova explosion that produced the pulsar was not spherically symmetric.

The rotation in the interior of the Sun has been mapped by helioseismology (measurement of oscillations at the solar surface), and we know that about two-thirds of the sun, by radius, is rotating at a uniform angular speed. This is a puzzling result considering that the sun is a gaseous object and thus is not required to

rotate like a solid body. Kumar has discovered that gravity waves generated in the outer, convective part of the sun are very efficient in redistributing angular momentum and enforcing solid body rotation in the solar interior that is stable against convection.

The centers of many galaxies, including our own, are observed to be bright over a wide range of wavelengths from radio to x-rays. In the extreme case of a quasar, more energy is radiated from a small region, whose size is of the order the solar system radius, that far exceeds the energy output of an entire galaxy. The luminosity of the source in all of these systems is believed to be due to the release of gravitational energy of inward falling gas. In a number of these systems, such as our galaxy and several Seyfert galaxies from which water maser emission is detected, we have good evidence that the gas near the center is cold and concentrated in clouds. Kumar has calculated the gravitational interactions among these clouds and finds that it leads to a net inward fall of gas at a rate that is consistent with the observed energy output of the central source.

PROFESSOR FRANK WILCZEK's activity over the past year has been quite diverse. Partly this reflects his desire to keep busy while acquiring some new tools and mulling over choices, among possible future directions, for more intensely focussed effort.

Phenomenology. Wilczek collaborated with the Institute's very lively and capable group of young, phenomenologically-oriented high-energy theorists in analyzing some topical questions stimulated by ongoing or imminent experiments. In particular, they proposed a minimal implementation of the idea that supersymmetry breaking is communicated from a relatively low energy "hidden sector," and analyzed its consequences in detail. They communicated frequently and directly with experimentalists on the CDF collaboration, and Wilczek believes their analysis aided the work. Also, they analyzed possible interpretations of the anomalous high-Q2 events recently reported at HERA. The special contribution of the IAS theorists was to emphasize and quantify the very special and particular sort of universality one must postulate in order to generate an acceptable flavor structure, within a broad class of extensions of the Standard Model that might accommodate the HERA anomaly.

Wilczek is also participating in quite a different sort of phenomenological investigation, with L. Krauss and K. Rajagopal. They have been analyzing the possibilites for using helium 3 at low temperatures as an analogue system for the QCD chiral phase transition. There is, it appears, a real chance to exhibit in this context the growth of low-momentum modes Rajagopal and Wilczek previously analyzed for QCD.

Black Holes and Cosmology. Wilczek wrote three papers with Larsen on black holes in string theory. The direct space-time approach used in these papers has been somewhat eclipsed by the use of D-brane technology, which when applicable is

much better controlled and understood. Their first paper, in particular, contains several important ideas that have been vindicated and extended in later investigations, and it preceded by several months the D-brane breakthrough in this subject.

Wilczek hopes now to bring the increasing understanding of quantum gravity within string theory to bear on problems of cosmology. A first move in this direction is his paper with F. Larsen, "Resolution of Cosmological Singularities" (*Phys.Rev.*, **D55**, 1977), but Wilczek is well aware that they remain several steps removed from any unique compelling picture, or even from usable algorithms for analyzing cosmological proposals in string theory. Wilczek has learned a lesson from the black hole experience, and is keeping a watchful eye on technical developments, with these interests in mind.

Wilczek's student, Maulik Parikh, is working on an improved quasi-macroscopic picture of black holes that captures non-thermal aspects of the radiation in a concrete form. This involves refinement of the "membrane paradigm" into an action principle, and in part builds on some of Wilczek's previous work with Per Kraus.

General Field Theory. Wilczek wrote a short paper, of which he is very proud, with another student, Lorenzo Cornalba. It presents theories that contain a remarkably economical and convincing embodiment of the idea that charge confinement can be caused by magnetic flux condensation. In many ways, these theories are the simplest non-trivial models of confinement. They are simple 2+1 dimensional quantum field theories closely related to those used in describing quantized Hall effect states.

Cornalba and Wilczek are preparing a short note on what they call "obstructed symmetry" and its spectral consequences. A particularly interesting application is to the obstruction of supergravity, again in 2+1 dimensions.

Condensed Matter. Wilczek already mentioned the cross-confinement concept, which he believes has profound long-term potential.

He is preparing, with Chetan Nayak, a survey of the whole field of non-abelian statistics, which was solicited for a book being put together by S. C. Zhang. This will bring together and make more accessible earlier work. Partly in connection with this, but also for more general purposes, Wilczek is planning to think further about direct space-time aspects of quasiparticle behavior since the experimental tools to investigate these seem to be maturing (recent work of Ashoori and of Yoo et al.)

Nayak and Wilczek wrote a short but incisive note showing how the energetics of 2-d Hubbard models could favor the emergence of 1-dimensional structures. He believes there is likely to be a large element of truth in this idea, but so far he has been unable to get much beyond the semi-quantitative discussions in two papers with Nayak — "Populated Domain Walls" (*Phys.Rev.Lett.*, **78**, 1997) and "Possible Electronic Structure of Domain Walls in Mott Insulators"

(*Int.J.Mod.Phys.*, B10, 1996. Next year Wilczek plans to take three sabbatical months as Lorentz Professor in Leiden, and will consult heavily with people there, who have been working on related ideas.

Together with Mark Alford, Wilczek has been exploring the possibility of exploring fermion systems at finite density by investigating them numerically at imaginary chemical potential. The advantage of imaginary chemical potential for numerical work is that in several systems of interest the fermion determinant is positive-definite, allowing the use of importance sampling. At the same time, pairing or confinement phenomena, leading to "even-odd" or "triality" effects, are directly reflected in the partition function at imaginary chemical potential. Wilczek and Alford have looked at some simple toy models with encouraging results, and plan to move on to the Hubbard model and ultimately, if things work out, to QCD.

Other Activity. This year Wilczek was called on to give a number of grand surveys, which was fun and rewarding, although time-consuming. He is actively working on a monograph treatment of QCD, to be published by Princeton University Press.

Together with Stan Liebler, Wilczek ran a journal club and lecture series on theoretical biology. He learned a lot, but at present has no concrete research planned in this area. He spent a lot of time learning to use and program comfortably in Mathematica, by doing several substantial model problems.

PROFESSOR EDWARD WITTEN. In work, much of which has been carried out at the Institute for Advanced Study in the last few years, string theory has been put in a wider context, now often called M theory, and it has become clear that this fascinating and still very mysterious theory is the candidate for supersymmetric unification of the laws of nature. In 1996-97, Professor Witten carried out a new analysis of the low energy or long wavelength limit of M theory, uncovering a number of subtle points that had been neglected previously and are important in understanding topological properties of the theory.

He also developed novel ways to use string theory and M theory techniques to answer longstanding (and by standard methods largely inaccessible) questions about the behavior of four-dimensional gauge theories.

Witten, together with R. Friedman and J. Morgan, also developed results about vector bundles on elliptically fibered manifolds that are of interest purely mathematically and, moreover, shed light on a few of the questions that arise in the new string theory developments.

Finally, in collaboration with G. Moore, Witten completed the computation of Donaldson invariants of four-manifolds via supersymmetric Yang-Mills theory (filling in some difficult cases that had been omitted previously), thereby in a sense bringing to term a project that has occupied his attention off and on in his decade at the Institute.

PROFESSOR EMERITUS FREEMAN J. DYSON spent most of the year preparing and delivering lectures at various places. A lecture series at the New York Public Library, with the title "Three Faces of Science," is to be expanded into a book to be published by the Oxford University Press. The book *Imagined Worlds*, based on the 1995 Harvard-Jerusalem lectures, was published by the Harvard University Press in April 1997. He is also preparing a second edition of the book *Origins of Life*, to be published by Cambridge University Press. Because much has happened in the twelve years since the first edition was published, the second edition will require extensive research and revision.

During the year, Dyson received honorary degrees from the University of Puget Sound in Tacoma and from the University of Oxford in England. He received the Antonio Feltrinelli International Prize from the Accademia Nazionale dei Lincei in Rome. He gave lectures at all three places.

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MEMBERS AND VISITORS

MARK ALFORD
Particle Physics
Institute for Advanced Study

K. S. BABU
Particle Physics
Institute for Advanced Study

GERARD BARKEMA
Computational Neuroscience
Institute for Advanced Study

JULIAN BIGELOW
Applied Mathematics
Institute for Advanced Study · *m*

JULIE BLUM
Particle Physics
Institute for Advanced Study

RALPH BLUMENHAGEN
Mathematical/Particle Physics
University of North Carolina

STEPHEN BOUGHN
Astrophysics
Haverford College

ANGELICA de OLIVEIRA-COSTA
Astrophysics
University of California, Berkeley · *v*

ERIC D'HOKER
Particle Physics/Mathematical Physics
University of California, Los Angeles · *s* · *ddvp*

KEITH DIENES
String Theory
Institute for Advanced Study

RON DONAGI
Mathematical Physics
University of Pennsylvania · *j*

DANIEL EISENSTEIN
Astrophysics
Harvard University

MICHAEL FLOHR
Particle Physics
CSIC, Instituto de Matematicas y Fisica Fundamental · *f*

MASATAKA FUKUGITA
Astrophysics
Kyoto University · *m*

REINHOLD GEBERT
Mathematical Physics
Universität Hamburg

PETER GOLDREICH
Astrophysics
California Institute of Technology · *v*

ANDREI GRUZINOV
Astrophysics
University of California, San Diego

VICTOR GURARIE
Mathematical Physics
Princeton University · *j*

BERTRAND HALPERIN
Condensed Matter
Harvard University · *s* · *ddvp*

AMIHAY HANANY
Particle Physics
Institute for Advanced Study

NAOYA HATA
Astrophysics
Ohio State University

WAYNE HU
Astrophysics
Institute for Advanced Study · *m*

KENNETH INTRILIGATOR
Particle Physics
Institute for Advanced Study · *m*

SATOSHI ISO
Condensed Matter/Mathematical and Particle Physics
University of Tokyo

KATHRYN JOHNSTON
Astrophysics
University of California

GERARD JUNGMAN
Mathematical/Particle Physics
Syracuse University

CHRISTOPHER KOLDA
Particle Physics
Institute for Advanced Study

PLAMEN KRASTEV
Astrophysics
Institute for Advanced Study

f First Team Member · *s* Second Term · *v* Visitor · *m* Long Term Member
j Joint Appointment with School of Mathematics · *ddvp* Dyson Distinguished Visiting Professor

OLAF LECHTENFELD
Mathematical/Particle Physics
Universität Hannover · *f*

JOHN MARCH-RUSSELL
Particle Physics/Condensed Matter
Institute for Advanced Study · *m*

PETER MAYR
String Theory
CERN, Geneva

DAVID MORRISON
Mathmatical Physics
Duke University · *j*

CHIARA NAPPI
Particle Physics
Institute for Advanced Study · *m*

RAMESH NARAYAN
Astrophysics
Center for Astrophysics, Harvard University · *ddvp*

BURT OVRUT
Particle Physics
University of Pennsylvania

SONIA PABAN
Physics
University of Texas, Austin · *v*

MARTIN REES
Astrophysics
Institute for Astronomy, Cambridge · *v*

SOO-JONG REY
Particle Physics
Seoul National University · *s*

HERB ROOD
Astrophysics
Institute for Advanced Study · *v*

PENNY SACKETT
Astrophysics
Kapteyn Astronomical Institute

VLADIMIR SADOV
Mathematical Physics
Institute for Advanced Study · *j*

SAVDEEP SETHI
Mathematical/Particle Physics
Harvard University

RYSZARD SIENKIEWICZ
Solar Neutrinos
N. Copernicus Astronomical Center · *v*

MATTHEW STRASSLER
Mathematical/Particle Physics
Rutgers University · *m*

STEVEN STRONG
Condensed Matter/Computational Neuroscience
NEC Research Institute

MAX TEGMARK
Astrophysics
Max-Planck-Institut Physik, Munich

CLAUDIO TEITELBOIM
Particle Physics
Centro de Estudios Científicos de Santiago · *m,d*

HSIUNG CHIA TZE
Mathematical and Particle Physics
Virginia Institute of Technology · *s*

ROELAND VAN DER MAREL
Astrophysics
Institute for Advanced Study

MIGUEL VAZQUEZ-MOZO
Particle Physics
Universidad Autonoma · *f*

ELI WAXMAN
Astrophyics
Institute for Advanced Study · *m*

INSU YI
Astrophysics
Institute for Advanced Study

DONAM YOUM
Mathematical/Particle Physics
University of Pennsylvania

ALBERTO ZAFFARONI
Particle Physics
Institute for Advanced Study

TONY ZEE
Particle Physics
University of California, Santa Barbara · *ddvp*

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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 1996-97

September 16
IAS/Princeton University High Energy Physics Seminar: "Aharonov-Bohm Effects in the Higgs Phase"
MARK de WILD PROPITIUS, *Université Pierre et Marie Curie*

September 17
Tuesday Lunch Seminars: Weekly lunchtime seminars serve as a clearinghouse for new ideas in astronomy and astrophysics
JOHN BAHCALL, *Professor, School of Natural Sciences, IAS, moderator*

Astrophysics Talk: "Probing Density Fluctuations at Low and High Redshift"
OFER LAHAV, *Institute of Astronomy, Cambridge University*

September 24
Astrophysics Talk: "Accretion Flows Around Black Holes"
RAMESH NARAYAN, *Harvard University Center for Astrophysics*

September 30
IAS/Princeton University High Energy Physics Seminar: "M"
TOM BANKS, *Rutgers University*

October 1
Astrohpysics Talk: "Fossil Signatures of Ancient Accretion Events in the Halo"
KATHRYN JOHNSTON, IAS

October 4
IAS/Princeton University Lunchtime Seminar: "Flux Quantization in M Theory"
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

The Raymond and Beverly Sackler Colloquium: "There's No Bits Like Show Bits"
BRAN FERREN, *Executive Vice President, Creative Technology/Research & Development, Walt Disney Imagineering, Inc.*

October 8
Astrophysics Talk: "Faint Galaxy Studies with Keck and HST"
DAVID HOGG, *California Institute of Technology*

October 9
John von Neumann Memorial Lecture: "Multiple Roles of T7 RNA Polymerase During Infection"
F. WILLIAM STUDIER, *Brookhaven National Laboratory*

October 11
Astrophysics Talk: "Magnetically Catalyzed Fusion"
JEREMY S. HEYL, *University of California, Santa Cruz*

October 14
IAS/Princeton University High Energy Physics Seminar: "Generalized Messengers of Supersymmetry Breaking"
STEPHEN MARTIN, *University of Michigan*

Informal Neuroscience Discussion Group Meeting
STEPHEN L. ADLER, *Professor, School of Natural Sciences, IAS, Moderator*
TRACEY SHORS, *Princeton University*, Speaker

October 15
Astrophysics Talk: "Gravitational Lenses"
PAUL SCHECHTER, *Massachusetts Institute of Technology*

October 16
IAS/Princeton University Joint Condensed Matter Seminar: "Quantization of Collective Excitations around Fermi Surface in (1 + 1) and (2 + 1) Dimensions"
SATOSHI ISO, *Institute for Advanced Study*

October 18
IAS/Princeton University Lunchtime Seminar: "Theoretical Implications of Solar Neutrinos"
NAOYA HATA, *IAS*

The Raymond and Beverly Sackler Colloquium: "The Parton Model and the Mössbauer Effect — From Crystals with Synchrotron Radiation to Heavy Quarks"
HARRY J. LIPKIN, *Argonne National Laboratory*

October 21
IAS/Princeton University Joint Physics Seminar:
"D-Branes and Geometry at Short Distances"
MICHAEL DOUGLAS, *Rutgers University*

October 22
Astrophysics Talk: "Formation of Disk Galaxies"
DAVID SPERGEL, *Princeton University*

October 23
John von Neumann Memorial Lecture: "How Proteolysis Drives the Cell Cycle"
MARC KIRSCHNER, *Harvard Medical School*

October 25
Astrophysics Talk: "How the Sun Rings"
PAWAN KUMAR, *Visiting Professor, School of Natural Sciences, IAS*

Astrophysics Talk: "Wrinkles in the Primordial Universe"
WAYNE HU, *IAS*

November 5
Astrophysics Talk: "Signature of Polarization in the Cosmic Microwave Background"
UROS SELJAK, *Harvard University Center for Astrophysics*

November 11
IAS/Princeton University Joint Physics Seminar:
"$(S_3)^3$ Theories of Flavor"
CHRIS CARONE, *Lawrence Berkeley Labs*

November 12
Astrophysics Talk: "Interacting Stars"
SIMON PORTEGIES ZWART,
University of Amsterdam

November 15
IAS/Princeton University Lunchtime Seminar:
"Towards Long-Time Dynamics of Disordered Materials"
GERARD BARKEMA, *Institute for Advanced Study*

November 19
Astrophysics Talk: "Black Holes: Where String Theory Meets Quantum Gravity"
FRANK WILCZEK, *Professor, School of Natural Sciences, IAS*

November 20
Special Lunch Seminar: "Middle East Peace Talks: Past, Present, and Future"
YAIR HIRSCHFELD, *University of Haifa*

John von Neumann Memorial Lecture: "Intracellular Protein Transport and the Assembly of Cellular Compartments"
JAMES E. ROTHMAN, *Sloan-Kettering Institute*

November 25
IAS/Princeton University Joint Physics Seminar:
"Knots and Solitons"
LUDWIG FADDEEV, *Institute for Advanced Study*

November 26
Astrophysics Talk: "Evidence for Asymmetric Supernova from the Orbital Evolution of a Pulsar Binary System in the SMC"
PAWAN KUMAR, *Visiting Professor, School of Natural Sciences, IAS*

December 3
Astrophysics Talk: "Where Does Dark Matter Become Important in Elliptical Galaxies?"
HANS-WALTER RIX, *University of Arizona*

December 6
Astrophysics Talk: "Gravitational Clustering and Weak Lensing by Large-scale Structure"
BHUVNESH JAIN, *Max Planck Institute*

IAS/Princeton University Lunchtime Seminar:
"The Strong Coupling Constant in Grand Unified Theories"
DAMIEN PIERCE, *SLAC*

December 9
IAS/Princeton University Joint Physics Seminar:
"Gauge and Gravity Mediated Supersymmetry Breaking"
SANDIP TRIVEDI, *Fermi National Accelerator Laboratory*

December 10
Astrophysics Talk: "Prospects for the Next Generation Space Telescopes"
JOHN MATHER, *NASA Goddard Space Flight Center*

December 13
IAS/Princeton University Lunchtime Seminar:
"Frustrated SU(4) as the Preonic Precursor of the Standard Model"
STEPHEN ADLER, *Professor, School of Natural Sciences, IAS*

January 10
Astrophysics Talk: "The Seismic Sun"
SARBANI BASU, *Aarhus University*

January 22
John von Neumann Memorial Lecture: "Actin Polymerization Based Motility"
TIM MITCHISON, *University of California, San Francisco*

January 24
IAS/Princeton University Lunchtime Seminar:
"Orientfolds and Twisted Strings"
JULIE BLUM, *Institute for Advanced Study*

January 28
Astrophysics Talk: "Solar Neutrinos: The Present Status"
JOHN BAHCALL, *Professor, School of Natural Sciences, IAS*

January 29
John von Neumann Memorial Lecture: "Polarity and Asymmetry in Yeast"
IRA HERSKOWITZ, *University of California School of Medicine, San Francisco*

January 31
The Raymond and Beverly Sackler Colloquium: "A Physicist's View on Collective Processes in the Cell"
STAN LEIBLER, *Princeton University*

February 5
John von Neumann Memorial Lecture: "The World's Smallest Motor? Structure, Assembly, and Function of the Bacterial Flagellum"
ROBERT M. MACNAB, *Yale University*

February 11
Astrophysics Talk: "Structure, Environment, and Evolution of Quasi Stellar Objects"
JOE MILLER, *Lick Observatory, University of California*

Special Seminar: "Three-Family Grand Unification in String Theory"
S.-H. HENRY TYE, *Cornell University*

February 12
John von Neumann Memorial Lecture: "Pathway that Lead to Cancer, Oncogenes and Tumor Suppressor Genes"
ARNOLD LEVINE, *Princeton University*

February 17
IAS/Princeton University High Energy Physics Seminar: "The Light Quark Masses from Lattice QCD"
PAUL MACKENZIE, *Fermilab*

February 21
IAS Lunchtime Seminar: "Massive and Massless Monopoles with Non-Abelian Magnetic Charges"
ERIK WEINBERG, *Columbia University*

The Raymond and Beverly Sackler Colloquium: "The Quantum Hall Effects: Quantized and Unquantized"
BERTRAND HALPERIN, *Harvard University*

March 3
IAS/Princeton University High Energy Theory Seminar: "Non-Supersymmetric String Duality"
OREN BERGMAN, *University of Florida*

March 4
Astrophysics Talk "Quasar Flows"
ROGER BLANDFORD, *California Institute of Technology*

March 5
John von Neumann Memorial Lecture: "An Introduction to Chemical Reaction Network Theory"
MARTIN FEINBERG, *University of Rochester*

March 7
HET Lunchtime Seminar: "Type IIB Superstrings, BPS Monopoles, and 3-Dimensional Gauge Dynamics"
AMIHAY HANANY, *Institute for Advanced Study*

The Raymond and Beverly Sackler Colloquium: "The Top Quark and Beyond"
HENRY FRISCH, *University of Chicago*

March 11
Astrophysics Talk: "Reionization and First Stars in the Universe"
JERRY OSTRIKER, *Princeton University*

March 17
IAS/Princeton University High Energy Theory Seminar: "String Duality, Automorphic Forms and Generalized Kac-Moody Algebras"
GREG MOORE, *Yale University*

March 18
Astrophysics Talk: "Deuterium and Helium Absorption at High Redshift: Mapping the Distribution, Abundance, and Ionization of Primordial Gas"
CRAIG HOGAN, *University of Washington, Seattle*

March 21
IAS/Princeton University Lunchtime Seminar: "Solutions of Four-Dimensional Field Theories via M-Theory"
EDWARD WITTEN, *Professor, School of Natural Sciences, IAS*

March 25
Astrophysics Talk: "More on the 'Dark Age' Beyond $z = 5$"
MARTIN REES, *Institute of Astronomy, Cambridge University*

April 1
Astrophysics Talk: "HST Observations of Black Holes in Galactic Nuclei"
ROELAND P. VAN DER MAREL, *IAS*

April 8
Astrophysics Talk: "Tides in Stars"
JEREMY GOODMAN, *Princeton University*

IAS/Princeton University High Energy Physics Seminar: "Generalized Uncertainty Relations Leading to UV Regularization"
ACHIN KEMPF, *Cambridge University*

April 14
IAS/Princeton University High Energy Physics Seminar: "Geometric Engineering"
CUMRUN VAFA, *Harvard University*

April 15
Astrophysics Talk: "Modified Dynamics Status Report"
MOTI MILGROM, *Weizmann Institute of Science*

April 18
IAS/Princeton University Lunchtime Seminar: "Type IIA Superstrings, Chiral Symmetry, and N=1 4D Gauge Theory Dualities"
JOHN H. BRODIE, *Princeton University*

The Raymond and Beverly Sackler Colloquium: "Black Holes as Probes of Relativistic Gravity"
MARTIN REES, *Royal Society Professor, Institute of Astronomy, Cambridge University*

April 22
Astrophysics Talk: "Protoplanetary Disks"
PETER GOLDREICH, *California Institute of Technology*

April 23
John von Neumann Memorial Lecture: "Feedback Circuits: The Wheels of Biological Regulation"
RENE THOMAS, *Rhode-Saint-Genese, Belgium*

April 24
John von Neumann Memorial Lecture: "How Cells and Scientists Look at Mitosis"
ANDREW MURRAY, *University of California, San Francisco*

April 28
IAS/Princeton University High Energy Physics Seminar: "New Mechanisms of Gauge Mediated Supersymmetry Breaking"
LISA RANDALL, *MIT*

April 29
Astrophysics Talk: "Sloan Digital Sky Survey Update"
JAMES GUNN, *Princeton University*

Astrophysics Talk: "The Apache Point Observatory 3.5-meter Telescope"
EDWIN TURNER, *Princeton University*

April 30
John von Neumann Memorial Lecture: "Modeling Biochemical Oscillations and Cellular Rhythms"
ALBERT GOLDBETER, *Universite Libre Bruxelles*

May 2
IAS/Princeton University High Energy Physics Lunchtime Seminar: "Heterotic M(atrix) Strings and Their Interactions"
SOO-JONG REY, *Institute for Advanced Study*

May 6
Astrophysics Talk: "Cosmological Fireballs: Gamma-ray Bursts, After-glow, High Energy Cosmic-Rays and Neutrinos"
ELI WAXMAN, *IAS*

May 7
John von Neumann Memorial Lecture: "Repeated Games and Evolutionary Dynamics"
KARL SIGMUND, *University of Vienna*

May 12
IAS/Princeton University High Energy Physics Seminar: "Deriving String Theory from Matrix Theory"
TOM BANKS, *Rutgers University*

May 16
IAS/Princeton University Friday Lunchtime Seminar: "Investigating the BPS Spectrum of Non-Critical E_n Strings"
NICK WARNER, *University of Southern California*

May 19
IAS/Princeton University High Energy Theory Seminar: "The Zero Temperature Chiral Phase Transition in SU(N) Gauge Theories"
JOHN TERNING, *UC-Berkeley/LBL*

May 22
IAS/Princeton University High Energy Theory Seminar: "SUSY Flavor Physics: From Colliders to Models"
JONATHAN FENG, *UC-Berkeley/LBL*

May 23
The Raymond and Beverly Sackler Colloquium: "Atoms Where You Want Them"
DON EIGLER, *Almaden Research Center*

June 2
IAS/Princeton University High Energy Physics Seminar: "Yukawa Textures in String Inspired Models with SU(4) x O(4) Symmetry"
B. C. ALLANACH, *Rutherford Appleton Laboratory*

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

Twenty scholars from the United States and abroad were invited to be part of the School's scholarly community as members and visitors for the 1996-97 academic year—from a pool of 224 individuals who applied for membership. Three research assistants also participated in the year's activities. Rockefeller Foundation funds provided partial support for two Members; Hansmann Membership funds provided support for two of the fellows; Agnes Gund Membership funds provided support for two of the scholars; the National Endowment for the Humanities partially or fully funded five fellows; and the Institute Friends funded one scholar.

Of the group of twenty scholars from China, Germany, Japan, Morocco, the Netherlands, and the United States, nine were women. Fields of inquiry of the group included anthropology, two; cognitive science, one; history, five; history of science, two; literature, one; philosophy, two; political science, three; and sociology, four.

In 1996-97 the School celebrated its twenty-fifth year with a conference funded by the Russell Sage Foundation and the Gladys Krieble Delmas Foundation. Entitled "25 Years: Social Science & Social Change," the conference considered changes in the social science disciplines that have occurred over the last 25 years in relation to some of the significant trends and transformations in modern society. Former members were invited to reflect on their own work—its material conditions, disciplinary approaches, intellectual goals—in its social and academic contexts. Current members in the School also attended, as did scholars from other Institute schools and outside institutions. The conference drew several hundred participants who engaged in spirited discussions of the future of disciplines such as history, anthropology, and economics and of contemporary issues related to race, gender and the politics of identity. A book of the conference proceedings will be published jointly by the Russell Sage Foundation and Princeton University Press.

PROFESSOR CLIFFORD GEERTZ attended a seminar on "The Environment and Ethics," at The Beijer Institute, Royal Swedish Academy of Sciences, Stockholm, Sweden and participated in a workshop on Indonesia at the Johns Hopkins School of International Relations in Washington, D.C. He was keynote lecturer at the International Conference on Tourism and Heritage Construction at Yogyakarta, Indonesia, and his talk, "Cultural Tourism: Tradition, Identity, and Heritage Construction," will be published later this year in the conference proceedings. He also gave the Humanities Institute Lecture for 1997 at the University of California, Davis and spoke to the anthropology department at the University of Pennsylvania.

He published "Off Echoes: Some Comments on Anthropology and Law," in *PoLAR*; "Afterword," in K. Basso and S. Feld (eds.), *Senses of Place*; and "The Legacy of Thomas Kuhn: The Right Text at the Right Time," in *Common Knowledge*. In press are "On Paying Attention," in *Collected Essays of Harold Conklin* and "What is a Country if it is not a Nation?" in *The Brown Journal of Foreign Affairs*, special issue in honor of Vartan Gregorian.

In July he was awarded an Honorary Doctor of Letters by the University of Cambridge.

PROFESSOR EMERITUS ALBERT O. HIRSCHMAN published "Melding the Public and Private Spheres: Taking Commensality Seriously" in *Critical Review: an Interdisciplinary Journal of Politics and Society*, volume 10, no. 4, Fall 1996, pp. 533-550. This was the Jan Patocka Memorial Lecture given in October 1996 at the Institute for Human Sciences in Vienna and as the Institute for Advanced Study Faculty Lecture in December. Along with his trip to Vienna, he also passed through Bologna, Italy, where he participated in the annual session of the Italian Economic Association where new contributions to his book, *Exit, Voice, and Loyalty*, were discussed by Italian and U.S. economists. He also spent some time in Rome to participate in a bi-annual lecture in honor of Paolo Baffi, organized by the Bank of Italy.

Princeton University Press decided to celebrate the twentieth anniversary of his 1966 book, *The Passions and the Interests: Political Arguments for Capitalism before Its Triumph* (which was still in print), by issuing a special twentieth anniversary edition. The book was reprinted with a foreword by Amartya Sen (pp. ix-xix) and a new preface by Professor Hirschman (pp. xxi-xxiii).

His 1995 book, *A Propensity to Self-Subversion*, was published in Spanish (Mexico: Fondo de Cultura Económica), in French (Paris: Fayard), in German (Munich: Carl Hanser Verlag), and in Portuguese (São Paulo: Companhia das Letras). The Portuguese edition carried an introduction by Fernando Henrique Cardoso, currently the President of Brazil. This edition was a considerable success in Brazil and as a result, Professor Hirschman was invited to visit and lecture in Brazil in 1997 or 1998.

Professor Hirschman was invited to participate in the celebration of the fiftieth anniversary of Secretary of State George Marshall's commencement address at Harvard. This celebration took place in June 1997 at the Harvard Center for European Studies. In this connection, Professor Hirschman prepared a paper, "Fifty Years After the Marshall Plan: Two Posthumous Memoirs and Some Personal Recollections." The two posthumous memoirs are those of Robert Marjolin and Richard Bissell which were published in 1986 and 1996, respectively. The personal recollections were primarily those of Professor Hirschman with respect to the agreement on the European Payments Union in 1950. The paper prepared for these occasions was given as a public lecture at the Woodrow Wilson School of Public and International Affairs, Princeton University, April 29, 1997 and will be published in the *American Prospect*.

In May 1997 Professor Hirschman was invited by the investor George Soros for a discussion on Soros's article in the February 1997 issue of the *Atlantic Monthly*, "The Capitalist Threat." The discussion took place at Mr. Soros's estate in Bedford, New York.

PROFESSOR JOAN WALLACH SCOTT lectured at the University of Chicago, Dartmouth College, the New School for Social Research, the City University of New York Graduate Center, the Getty Center for the History of the Arts and Humanities, the University of North Carolina at Chapel Hill, and Teachers College of Columbia University. She was an associate in the Humanities Center at Johns Hopkins University. She gave a paper at the American Historical Association meetings and the keynote address at the meetings of the Society for French Historical Studies. She taught a graduate seminar in the History Department at Rutgers. Articles of hers appeared in *Common Knowledge and Signs*.

During the academic year 1996-97, PROFESSOR MICHAEL WALZER held the Kenneth Robinson Fellowship at the University of Hong Kong and gave three lectures there. He gave the inaugural lecture at the Yitzhak Rabin Center for Israel Studies in Tel Aviv, and also lectured at the University of Essex in England, at Stockholm and Gothenberg in Sweden, at a UNESCO conference on universal ethics in Paris, and at a conference in Berlin called "Philosophy Meets Politics," sponsored by the German Social Democratic Party. In the United States, he gave lectures at Princeton, Columbia, and Georgetown universities. A conference marking the 20th anniversary of the publication of his book *Just and Unjust Wars* was organized by the Carnegie Council on Ethics and International Affairs in New York; the proceedings appeared in volume 11 of the Council's journal, *Ethics and International Affairs*. His new book, *On Toleration*, was published by Yale University Press. Three of his earlier books appeared in new translations: *Revolution of the Saints* in Italian, *Thick and Thin* in German and Spanish, and *Interpretation and Social Criticism* in Japanese. A collection of his essays came out in Swedish under the title *Argument fran vanster* (Arguments from the Left). At the Institute, he continued to work on a collaborative project on Jewish Political Thought, which Yale will publish starting (probably) in 1998.

THE SCHOOL OF SOCIAL SCIENCE

MEMBERS, VISITORS AND RESEARCH STAFF

ARI ACKERMAN
Political Science
Shalom Hartman Institute · *a*

JIWEI CI
Philosophy
University of Hong Kong

ANGELA CREAGER
History of Science
Princeton University · *v*

JODY ENDERS
French Literature
University of California, Santa Barbara · *jv*

CARLOS FORMENT
History
Princeton University

THOMAS GIERYN
Sociology
Indiana University

ABDELMAJID HANNOUM
Anthropology
Princeton University · *a*

WILLIAM HAVER
History
Binghamton University

JENNIFER HOCHSCHILD
Political Science
Princeton University · *v*

DEBRA KEATES
Comparative Literature
Johns Hopkins University · *a*

MARTINA KESSEL
History
Free University of Berlin

JUNJI KOIZUMI
Anthropology
Osaka University

MICHÈLE LAMONT
Sociology
Princeton University · *v*

JAMES MCALLISTER
Philosophy
University of Leiden · *v*

MOHAMMED NACIRI
History
Hassan II Agronomic Institute, Morocco

MARGARET ROSSITER
History of Science
Cornell University

FRITZ STERN
History
Columbia University · *v*

MARK TURNER
Cognitive Science
University of Maryland

DIANE VAUGHAN
Sociology
Boston College

GRAHAM WALKER
Political Science
Catholic University · *v*

KAY WARREN
Anthropology
Princeton University

PETER ZARROW
History
Vanderbilt University

VIVIANA ZELIZER
Sociology
Princeton University

j · Joint appointment with Historical Studies · *a* Research Assistant · *v* Visitor

THE SCHOOL OF SOCIAL SCIENCE

RECORD OF EVENTS

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

Academic Year 1996-97

October 7, 1996
The Past and Future of Social Science Seminar: Organizational Meeting
MICHAEL WALZER, *Professor, School of Social Science, IAS*

October 10, 1996
Social Science Thursday Luncheon Seminar: "Multiple Markets: Multiple Cultures"
VIVIANA A. ZELIZER, *Princeton University and Member, School of Social Science*

October 17
Social Science Thursday Luncheon Seminar: "Extremity: AIDS, SM, and the Inventions of the Social"
WILLIAM HAVER, *SUNY Binghamton and Member, School of Social Science*

October 24
Social Science Thursday Luncheon Seminar: "The Goldenhagen Controversy"
FRITZ STERN, *Columbia University and Visitor, School of Social Science*

October 31
Social Science Thursday Luncheon Seminar: "Backstage Cognition and the Social Sciences"
MARK TURNER, *University of Maryland and Member, School of Social Science*

November 6
The Past and Future of Social Science Seminar: Discussion of Carlos Forment, "The Formation of Civil Society in Nineteenth Century Peru: Democratic or Disciplinary?"; Paul Ricoeur, "The Model of Text: Meaningful Action Considered as Text" (Chapter 7), *From Text to Action: Essays in Hermeneutics, II.*
CARLOS FORMENT, *Princeton University and Member, School of Social Science*

November 7
Social Science Thursday Luncheon Seminar: "After History?"
JOAN SCOTT, *Professor, School of Social Science, IAS*

November 14
Social Science Thursday Luncheon Seminar: "Where You Stand Depends on What You See: Facts, Values, and Policy Prescriptions"
JENNIFER HOCHSCHILD, *Princeton University and Visitor, School of Social Science*

November 20
The Past and Future of Social Science Seminar: Discussion of Algirdas Julien Greimas, "The Social Sciences: A Semiotic View;" and "On Meaning Selected Writings in Semiotic Theory;" Paul Ricoeur, "Time and Narrative;" Majid Hannoum, "Notes on Orientalism and Anthropology."
MAJID HANNOUM, *Princeton University and Research Assistant, School of Social Science*

November 21
Social Science Thursday Luncheon Seminar: "The Chiming of the Void: Poetry and Epiphany in the Chinese Novel The Story of the Stone"
DORE J. LEVY, *Brown University and Member, School of Historical Studies*

December 4
The Past and Future of Social Science Seminar: Discussion of Peter Zarrow, "Ritual and Rhetoric in the Short, Brief Reign of Yuan Shikai;" Catherine Bell, *Ritual Theory, Ritual Practice*, pp. 182-196, 227-234; and Clifford Geertz, "Centers, Kings, and Charisma," pp.13-38, in Sean Wilentz, *Rites of Power.*
PETER ZARROW, *Vanderbilt University and Member, School of Social Science*

December 5
Social Science Thursday Luncheon Seminar: "What Boredom Might Tell About Virtue: The Case of Nineteenth-century Germany"
MARTINA KESSEL, *Free University of Berlin and Member, School of Social Science*

December 11
The Past and Future of Social Science Seminar: Discussion of Margaret Rossiter, Introduction, "Protecting Home Economics, the Women's Field"

(Chapter 8), "Invisibility and Underrecognition" (Chapter 14), "The Path to Liberation" (Chapter 16), *Women Scientists in America: Before Affirmative Action 1940-1972*; Patricia A. Ostertag and J. Regis McNamara, "'Feminization' of Psychology: The Changing Sex Ratio and its Implications for the Profession," *Psychology of Women Quarterly*, 15 (1991).
MARGARET ROSSITER, *Cornell University and Member, School of Social Science*

December 12
Social Science Thursday Luncheon Seminar:
"Indigenous Movements and Their Critics: Pan-Mayanism and Ethnic Resurgence in Guatemala"
KAY WARREN, *Princeton University and Member, School of Social Science*

January 16, 1997
Social Science Thursday Luncheon Seminar:
"Politics out of Religion: the Jewish Experience"
MICHAEL WALZER, *Professor, School of Social Science, IAS*

January 22, 1997
The Past and Future of Social Science Seminar: Discussion of Tom Gieryn, "Balancing Acts: Science, Enola Gay and History Wars at the Smithsonian" and "Policing STS: A Boundary-Work Souvenir from the Smithsonian Exhibition on 'Science in American Life;'" Joan Scott, "After History?"
TOM GIERYN, *Indiana University and Member, School of Social Science*

January 23
Social Science Thursday Luncheon Seminar:
"Theory Elaboration, Historical Ethnography, and Organizational Analysis: The Challenger Launch Decision
DIANE VAUGHAN, *Boston College and Member, School of Social Science*

January 30
Social Science Thursday Luncheon Seminar:
"European Travelers and North American Indians, 1750-1850"
HARRY LIEBERSOHN, *University of Illinois at Urbana-Champaign and Member, School of Historical Studies*

February 5
The Past and Future of Social Science Seminar: Discussion of "Laws of Nature, natural history, and the description of the world;" and E.H. Gombrich, "The Use of Art for the Study of Symbols," *American Psychologist*.
JAMES McALLISTER, *University of Leiden and Vistior, School of Social Science*

February 6
Social Science Thursday Luncheon Seminar:
"Construction of Person and Time: Problems in Cultural Analysis and a Guatemalan Case"
JUNJI KOIZUMI, *Osaka University and Member, School of Social Science*

February 13
Social Science Thursday Luncheon Seminar:
"Viruses in Campaigns and Crystals: Wendell Stanley's Polio Research"
ANGELA N. H. CREAGER, *Princeton University and Visitor, School of Social Science*

February 19
The Past and Future of Social Science Seminar: Discussion of Adele E. Clarke, "A Social Worlds Research Adventure: The Case of Reproductive Science," in Susan E. Cozzens and Thomas F. Gieryn, eds, *Theories of Science in Society* (Bloomington: Indiana University Press, 1990), pp. 15-42; Jean-Paul Gaudillière, "Oncogenes as Metaphors for Human Cancer: Articulating Laboratory Practices and Medical Demands," in Ilana Löwy, ed. *Medicine and Change: Historical and Sociological Studies of Medical Innovation* (London and Montrouge: John Libbey Eurotext, 1993), pp. 213-247; Angela N.H. Creager and Jean-Paul Gaudillière, Introduction and Conclusions from "Meanings in Search of Experiments and Vice-Versa: The Invention of Allosteric Regulation in paris and Berkeley, 1959-1968," Historical Studies in the Physical and Biological Sciences 27:1 (1996): 1-5, 85-89; and Angela N.H. Creager, "Experimental Systems and Models in 20th Century Biology," draft manuscript, 10 pp.
ANGELA CREAGER, *Princeton University and Visitor, School of Social Science*

February 20
Social Science Thursday Luncheon Seminar: "Alexis de Tocqueville and Peripheral Peoples: Imagining Caste Democracy"
CARLOS FORMENT, *Princeton University and Member, School of Social Science*

February 27
Social Science Thursday Luncheon Seminar: "Is Beauty a Sign of Truth in Scientific Theories?"
JAMES McALLISTER, *University of Leiden and Visitor, School of Social Science*

March 5
The Past and Future of Social Science Seminar: Discussion of Michael N. Danielson and Jennifer Hochschild, "Can We Desegregate Public Schools and Subsidized Housing? Lessons from the Sorry

History of Yonkers, NY;" Jennifer Hochschild, *The New American Dilemma*, Chapters 1 and 3; U.S. Court of Appeals decision in USA and Yonkers v. New York State, September 1996.
JENNIFER HOCHSCHILD, *Princeton University and Visitor, School of Social Science*

March 6
Social Science Thursday Luncheon Seminar: "Retrospective Justice and Constitutionalism in Eastern Europe"
GRAHAM WALKER, *Catholic University and Visitor, School of Social Science*

March 13
Social Science Thursday Luncheon Seminar: "Disenchantment, Desublimation, and Demoralization: Some Cultural Conjunctions of Capitalism"
JIWEI CI, *University of Hong Kong and Member, School of Social Science*

March 19
The Past and Future of Social Science Seminar: Discussion of Mark Granovetter, "Economic Action and Social Structure: The Problem of Embeddedness;" Vivana Zelizer, "How Do We Know Whether a Monetary Transaction is a Gift, an Entitlement, or Compensation?" and "Payments and Social Ties."
VIVIANA A. ZELIZER, *Princeton University and Member, School of Social Science*

March 20
Social Science Thursday Luncheon Seminar: "Perfect Humans or Perfect Government? Modern Chinese Utopias"
PETER ZARROW, *Vanderbilt University and Member, School of Social Science*

March 27
Social Science Thursday Luncheon Seminar: "Place and Truth: Do Buildings Matter for Science? (and how)"
TOM GIERYN, *Indiana University and Member, School of Social Science*

April 2
The Past and Future of Social Science Seminar: Discussion of Jiwei Ci, "Justice and the Moral Bounds of Capitalism;" and Peter Koslowski, "The Ethics of Capitalism" from *Philosophical and Economic Foundations of Capitalism*, ed. Svetozar Pejovich, pp. 33-64.
JIWEI CI, *University of Hong Kong and Member, School of Social Science*

April 3
Social Science Thursday Luncheon Seminar: "North-African Immigrants Respond to French Racism: Demonstrating Equivalence Through Universalism"
MICHÈLE LAMONT, *Princeton University and Visitor, School of Social Science*

April 10
Social Science Thursday Luncheon Seminar: "Miscegnation: Ancient Perspectives on a Modern Problem"
HAGITH SIVAN, *University of Kansas at Laurence and Member, School of Historical Studies*

April 16
The Past and Future of Social Science Seminar: Discussion of Diane Vaughan, Guide to the Readings, Table of Contents, "The Social Organization of Dissent," Chapter 5, and "Signals and Interpretive Work," Skeleton/Collage of Chapter 3, from *Theorizing*; and Charles C. Ragin, "Introduction: Cases of 'What is a Case?'," *What is a Case? Exploring the Foundations of Social Inquiry*, Charles C. Ragin and Howard S. Becker (eds.) pp. 1-10.
DIANE VAUGHAN, *Boston College and Member, School of Social Science*

April 17
Social Science Thursday Luncheon Seminar: "Surviving George Sarton: Celebration and Friction in the History of Science, Mathematics, and Technology in the 1950s and 1960s"
MARGARET ROSSITER, *Cornell University and Member, School of Social Science*

April 24
Social Science Thursday Luncheon Seminar: "Politics and the Rule of Law in Latin America: A Framework for Analysis"
DAVID BECKER, *Dartmouth College*

April 30
The Past and Future of Social Science Seminar: Discussion of Clifford Geertz, 1962, "The Growth of Culture and The Evolution of Mind," reprinted in *The Interpretation of Cultures* (New York: Basic Books, 1973); and Mark Turner, "Notes on evolutionary theory of meaning."
MARK TURNER, *University of Maryland and Member, School of Social Science*

May 1
Social Science Thursday Luncheon Seminar: "Nietzsche's Zarathustra: Cultural Criticism and Historical Time"
BENJAMIN SAX, *University of Kansas and Visitor, School of Social Science*

May 9
25 Years: Social Science & Social Change:
"Political Theory"
QUENTIN SKINNER, *Christ's College* and
CHARLES TAYLOR, *McGill University*
Comment by JEAN ELSHTAIN, *University of Chicago*
"Society and Culture"
WILLIAM SEWELL, *University of Chicago* and
GEORGE MARCUS, *Rice University*
Comment by LAURA ENGELSTEIN, *Princeton University*

May 10
25 Years: Social Science & Social Change:
Interlude: "The Social Sciences in Europe since 1989"
WOLF LEPENIES, *Wissenschaftskolleg zu Berlin*
"Difference: Race and Gender"
ORLANDO PATTERSON, *Harvard University* and
JUDITH BUTLER, *University of California, Berkeley*
Comment by ANNA TSING, *University of California, Santa Cruz*
"Science Studies"
PETER GALISON, *Harvard University* and
ANDREW PICKERING, *University of Illinois, Urbana-Champaign*
"Political and Social Change"
MICHAEL RUSTIN, *University of East London* and
JANE MANSBRIDGE, *Harvard University*
Comment by GEOFFREY HAWTHORN, *Cambridge University*

May 11
25 Years: Social Science & Social Change:
"Economics and the Economy
KAUSHIK BASU, *Cornell University* and
GAVIN WRIGHT, *Stanford University*
Comment by MICHAEL McPHERSON, *Macalester College*

May 14
The Past and Future of Social Science Seminar: Discussion of Junji Koizumi, "Against Reductionism: Or How to Read the Civil-Religious Hierarchy of Middle America" (draft); "Construction of Person and Time: Problems in Cultural Analysis and a Guatemalan Case;" and Clifford Geertz, "Distinguished Lecture: Anti Anti-Relativism," (*American Anthropologist* 86: 263-278, 1984).
JUNJI KOIZUMI, *Osaka University and Member, School of Social Science*

May 28
The Past and Future of Social Science Seminar: Discussion of Kay Warren, *Indigenous Movements and Their Critics: Pan-Mayanism and Ethic Resurgence in Guatemala*, Acknowledgements, Chapter VIII, "Indigenous Activism Across Generations," and "Conclusions: Envisioning the 'Invisible Thread of Ethnicity.'"
KAY WARREN, *Princeton University and Member, School of Social Science*

June 11
The Past and Future of Social Science Seminar: Discussion of Michèle Lamont, Outline-in-progress, *"Not Enough People Like Us": Race, Class, and Morality in the World of Working Men*; "The Rhetorics of Racism and Anti-Racism in France and the United States;" "Above 'People Above'? Status and Worth among White and Black Workers."
MICHÈLE LAMONT, *Princeton University and Visitor, School of Social Science*

THE LIBRARIES

The *Historical Studies-Social Science Library* [Elliott Shore, Head 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 Kurt Gödel, Ernst H. Kantorowicz, Elias Avery Lowe, Millard Meiss, Erwin Panofsky, Andrew E. Z. Alföldi, 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 (prior to 1940) 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 cataloguing 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.

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 fourth year of sponsorship of the IAS/Park City Mathematics Institute (PCMI), a multi-level mathematics program for researchers, graduate students, undergraduate students, undergraduate faculty, and high school teachers. PCMI is based on the premise that interaction among these groups is essential to the optimal functioning of the mathematical enterprise. A major activity of the PCMI is an annual three-week summer session held in alternate years in Park City, Utah, and at the Institute for Advanced Study. The summer session is linked to a year-long program in six university-based sites throughout the country where high school teachers work in collaboration with university faculty.

In 1997, over 250 participants attended the PCMI summer session held at the Inn at Prospector Square in Park City, Utah. From June 29 to July 19, researchers, high school teachers, undergraduate faculty, and undergraduate and graduate students participated in distinct but overlapping programs, coming together as equal partners in an academic and social environment designed to enhance research, education, and communication at all levels. The 1998 summer session will be held at the same location from July 12 to August 1.

The research topic for the Graduate Summer School and Research Program was Symplectic Geometry and Topology, organized by Yakov Eliashberg of Stanford University and Lisa Traynor of Bryn Mawr College. The Undergraduate Program, designed to enhance students' interest in mathematics in general and symplectic geometry in particular, was organized by Robert Bryant of Duke University. The high school teachers worked with researchers and educators to widen their knowledge of mathematics and explore new methods of teaching. Teachers-in-residence, selected from alumni sites, and site directors also attended. In addition to the lectures and courses developed specifically for each group, there were Cross-Program Activities on topics of general interest. A complete listing of courses, lectures and activities for each program is as follows:

Graduate Summer School Lectures

Quantum Cohomology, Alexander Givental, University of California at Berkeley; *Holomorphic Curves and Dynamics and Topology in Dimension Three*, Helmut Hofer, Eidgen Technische Hochschule; *Hamiltonian Group Actions and Symplectic Quotients*, Lisa Jeffrey, McGill University; *Morse Theory and Singularities*, Robert MacPherson, Institute for Advanced Study; *Mechanics: Symmetry and Dynamics*, Jerrold Marsden, California Institute of Technology; *Introduction to Symplectic Topology*, Dusa McDuff, SUNY at Stony Brook; *Floer Homology*, Dietmar Salamon, University of Warwick; and *The Geometry of the Seiberg-Witten Invariants*, Clifford Taubes, Harvard University.

High School Teacher Program Courses
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*, James Carlson, University of Utah.

Research Talks
Casim Abbas, Eidgen Technische Hochschule
Miguel Abreu, Institute for Advanced Study
Denis Auroux, École Polytechnique
Paul Biran, Tel Aviv University
Maxim Braverman, Ohio State University
Jim Bryan, Mathematical Sciences Research Institute
Weimin Chen, Michigan State University
Georgios Daskalopolous, Brown University
Yakov Eliashberg, Stanford University
Mikhail Entov, Stanford University
Hansjorg Geiges, Eidgen Technische Hochschule
Vladimir Gershkovich, Melbourne University
Emmanuel Giroux, École Normale Supérieure de Lyon
Ko Honda, Princeton University
Michael Hutchings, Harvard University
Alexandre Kirillov, University of Pennsylvania
Yi-Jen Lee, Harvard University
Naichung Conan Leung, University of Minnesota
Veronique Lizan, École Normale Supérieure de Lyon
Gregor Masbaum, Institut de Mathematiques de Jussieu
Yoshihiko Mitsumatsu, Chuo University
Yong-Geun Oh, University of Wisconsin at Madison
Paul-Emile Paradan, Utrecht University
Leonid Polterovich, Tel Aviv University
Elisa Prato, Université de Nice
Garret Sobczyk, Universidad de las Americas
Timothy Swift, LSU Southampton
Margaret Symington, SUNY at Stony Brook/University of Texas at Austin
Tatsuru Takakura, Chuo University
Michael Thaddeus, Harvard University
Ron Wang, Hong Kong University of Science and Technology
Richard Wentworth, University of California at Irvine
Krzysztof Wysocki, Melbourne University

Undergraduate Program Courses
The Geometry of Differential Equations and Conservation Laws, Lucas Hsu, University of Arizona; *Symmetry and Symplectic Geometry*, Robert Bryant, Duke University; and *Computer Lab Session*, Richard Palais, Brandeis University.

Cross-Program Activities

What Is Symplectic Geometry?, Robert Bryant, Duke University; *Panel on the Ph. D. Job Market*, Judith Arms, University of Washington, Jim Bryan, MSRI, James Carlson, University of Utah, and Luis O'Shea, Cornell University; *Third International Mathematics and Science Study (TIMSS)*, Daniel Goroff, Harvard University; *Upper Bounds for the Writhing of Knots and the Helicity of Vector Fields*, Dennis DeTurck, University of Pennsylvania; *The Use of Discovery Method Teaching in Undergraduate Courses*, Virginia Warfield, University of Washington; *Pre-Collegiate Mathematics Education Around the World*, Moderator: Naomi Fisher, University of Illinois at Chicago; Panelists: Veronique Lizan, École Normale Supérieure de Lyon, Richard Hind, Stanford University, Hansjorg Geiges, Eidgen Technische Hochschule, Tadashi Tokeida, McGill University, and Donald Davenport, University of Michigan Site; *The Language of Mathematics and K-16 Mathematics Education*, Stephanie Frank Singer, Haverford College; *The Mathematics of the Rainbow*, David Fried, Boston University; *Mathematics and Music*, Edward Rothstein, The New York Times, and Robert Taub, Institute for Advanced Study; *Marsden's Toys*, Jerrold Marsden, California Institute of Technology; *The Connection Between High School Mathematics and Collegiate Mathematics*, Moderator: John Polking, Rice University; Panelists: Andrew McInerny, Bronx Community College (CUNY), Kimya Moyo, School for Creative and Performing Arts, Cincinnati, Jennifer Slimowitz, SUNY at Stony Brook, Ronald Stern, University of California at Irvine, Mark Tomforde, Gustavus Adolphus College, and Christopher Sinclair, University of Arizona.

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 Macintosh, Windows, and UNIX 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. Other popular resources included the library, video library, and a collection of over 75 preprints contributed by participants during the three-week session.

Participants had numerous opportunities for informal and social interaction throughout the summer session, including dances, pizza parties, field trips to area attractions, and opening and closing barbecues. An outdoor tent served as the dining area and became a popular venue for both social and academic gatherings. Tea, served after the Cross-Program Activity, provided another opportunity for social interaction and conversation about mathematics. 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 one of the PCMI's most important accomplishments.

Such cross-program interaction also inspired a prize-winning entry in Park City's annual July 4 Parade. Participants from all programs joined together to form the "Human Legendrian Wave Front" and to design the "Bubble Mobile" (a car covered with balloons of every shape and color), among other attractions. In addition to

being a semi-serious demonstration of knot theory, the design of the entry grew out of intense collaborations and mathematical discussions. In recognition of this effort, parade officials bestowed the "Most Creative" award upon the PCMI.

Interaction 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. During the academic year, teachers translate what they have learned into more effective pedagogy in their own classrooms and work with university site directors to become leaders of reform in their schools, school districts, and communities.

Since the formation of the PCMI, the leaders have planned to broaden the program to reflect the true breadth of the mathematical enterprise. This year, seven participants took part in the new Undergraduate Faculty Program, under the guidance of Daniel Goroff of Harvard University and the White House Office of Science and Technology Policy. This program was designed to enhance the teaching ability of a small group of undergraduate faculty. Those attending gained experience with recent advances in their fields and explored ways to incorporate these into their classroom instruction.

On July 15, through the generous sponsorship of the Huntsman Foundation, PCMI hosted a concert by pianist Robert Taub, Artist-in-Residence at the Institute for Advanced Study. PCMI participants, local government and business leaders, and community members attended a concert at the Park City Community Church. The program for the evening included works by Beethoven, Brahms, Chopin, and Liszt.

The day also included an invitation to local business, school, and government officials to spend an afternoon at PCMI to attend classes and lectures and get a first-hand look at the PCMI's innovative structure. On July 14, Taub joined Edward Rothstein of *The New York Times* to give a presentation entitled "Mathematics and Music."

Progress continues on the publication of the lecture notes from each year's Graduate Summer School in the PCMI Lecture Series. Volume I, Geometry and Quantum Field Theory, Volume II, Nonlinear Partial Differential Equations in Differential Geometry, and Volume III, Complex Algebraic Geometry, from the 1991, 1992, and 1993 programs, respectively, are currently available. 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.

The IAS/Park City Mathematics Institute is governed by an Oversight Board that consists of Hyman Bass, Trustee, Institute for Advanced Study and 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, 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.; and Elaine B. Wolfensohn, New York, New York.

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

Convener:
John C. Polking, Professor, Rice University
1997 Organizers:
Yakov Eliashberg, Professor, Stanford University
Lisa Traynor, Professor, Bryn Mawr College
Research Program:
John Morgan, Professor, Columbia University
Research Program/Women's Program:
Karen Uhlenbeck, Professor, University of Texas at Austin
Graduate Summer School:
David R. Morrison, Professor, Duke University
Undergraduate Program:
Robert L. Bryant, Professor, Duke University
High School Teachers Program:
Naomi Fisher, Co-Director, MER Network, University of Illinois at Chicago
Cynthia Hays, High School Teacher of Mathematics, Austin, Texas
High School Teachers/Computer Program:
James R. King, Professor, University of Washington
Undergraduate Faculty Program:
Daniel Goroff, Harvard University
Research Program in Mathematics Education:
Joan Ferrini-Mundy, National Academy of Sciences
Tim Kelly, Professor, Hamilton College
Editor, PCMI Lecture Series:
Daniel S. Freed, Professor, University of Texas at Austin
Continuing Outreach:
Herbert C. Clemens, Professor, University of Utah

MENTORING PROGRAM FOR WOMEN IN MATHEMATICS

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 12-22. 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 participants included graduate students, undergraduates, young postdoctoral scholars, and senior researchers. The undergraduate lecture, *Classical Mechanics and Symplectic Geometry*, was given by Stephanie Frank Singer of Haverford College; the graduate lecture, *Classification Problems in Symplectic Geometry*, was given by Lisa Traynor of Bryn Mawr College, Sue Tolman of Princeton University, and Yael Karshon of Hebrew University. In addition, Karen Uhlenbeck led a Women in Mathematics Seminar during which readings on the life and work of Sonia Kovaleskaia were discussed. A complete listing of lectures and activities can be found beginning on page 101.

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; Irene Gamba, Professor, University of Texas at Austin; 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.

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, and it has provided female students with an opportunity to form professional friendships and collaborations that develop further during the PCMI summer session.

IAS/PARK CITY MATHEMATICS INSTITUTE
MENTORING PROGRAM FOR WOMEN IN MATHEMATICS

RECORD OF EVENTS

The following is a calendar of events sponsored by the Mentoring Program for Women in Mathematics

Academic Year 1996-97

Monday, May 12 - Thursday, May 22
Undergraduate Course: "Classical Mechanics and Symplectic Geometry"
STEPHANIE FRANK SINGER, *Haverford College*

Graduate Course: "Classification Problems in Symplectic Geometry"
YAEL KARSHON, *Hebrew University*
SUE TOLMAN, *Princeton University*
LISA TRAYNOR, *Bryn Mawr College*

Seminar: "Women in Science"
KAREN UHLENBECK, *University of Texas at Austin*

Saturday, May 17
Panel Discussion: "What Path Did People Take To Get To Where They Are?"
SARAH GREENWALD, *University of Pennsylvania*, Moderator
MARSHA BERGER, *New York University*
ANTONELLA GRASSI, *University of Pennsylvania*
ELENY IONEL, *Massachusetts Institute of Technology*
STEPHANIE FRANK SINGER, *Haverford College*

Tuesday, May 20
Research Seminar: "Flag Varieties and Equivariant Cohomology"
REBECCA GOLDIN, *Massachusetts Institute of Technology*

Research Seminar: "Basic Notions in Contact Geometry"
CARMEN YOUNG, *Massachusetts Institute of Technology*

Wednesday, May 21
Research Seminar: "Hirzebruch Surfaces"
SEMA SALUR, *Michigan State University*
SUNITA VATUK, *Princeton University*

Wednesday, May 21
Research Seminar: "Convexity of Moment Image and Connectedness of Moment Fibers"
KATHERINE CROWLEY, *Rice University*
HEATHER JOHNSTON, *Rutgers University*
LAURA TAALMAN, *Duke University*

Wednesday, May 21
Guest Lecture:
DUSA MCDUFF, *SUNY at Stony Brook*

I am extremely grateful to the Institute for Advanced Study for its warm hospitality during the past academic year. The stimulating environment and the wonderful working conditions provided by the School of Mathematics, in which I was a Member, have been crucial in the development of my research projects.

A major component of my research activity has been my participation in the Program on Mathematical Structures of Quantum Field Theory. The Program has gone very much beyond the established interaction between geometers, topologists, and theoretical physicists — we mathematicians were introduced to some of the most recent developments in quantum field theory and string theory, including the new approach of Professors Seiberg and Witten to supersymmetric gauge theories in four dimensions. The mathematical problems raised within the Program could easily fill my research agenda for the next couple of years!

Member, School of Mathematics

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, 1997 and the related statements of activities and cash flows for the year then ended. These financial statements are the responsibility of the Institute's management. 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 *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 disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides 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, 1997 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 reports dated September 30, 1997 on our consideration of the Institute's internal control structure and on its compliance with laws and regulations.

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, 1997

BALANCE SHEET
JUNE 30, 1997 (WITH COMPARATIVE TOTALS FOR 1996)

ASSETS	1997	1996
CASH	$ 557,951	$ 603,940
ACCOUNTS RECEIVABLE	108,004	101,283
GOVERNMENT GRANTS AND CONTRACTS RECEIVABLE	1,658,133	1,410,193
ACCRUED INCOME ON INVESTMENTS	1,449,532	1,274,806
PREPAID AND OTHER ASSETS	292,339	367,311
CONTRIBUTIONS RECEIVABLE-NET	2,714,696	1,729,000
SHORT-TERM INVESTMENTS (Note B)	962,297	947,302
UNAMORTIZED DEBT ISSUANCE EXPENSE	89,110	98,369
LAND, BUILDINGS AND IMPROVEMENTS, EQUIPMENT AND RARE BOOK COLLECTION-NET (Note C)	22,467,671	24,188,354
INVESTMENTS (Note B)	314,042,932	265,383,383
TOTAL ASSETS	$344,342,665	$296,103,941

See notes to financial statements.

LIABILITIES AND FUND BALANCES	1997	1996
ACCOUNTS PAYABLE AND ACCRUED EXPENSES	$ 6,068,773	$ 5,781,987
REFUNDABLE ADVANCES	1,985,437	1,929,491
TRUST FUND OBLIGATIONS	1,588,434	744,905
LONG-TERM DEBT (Note D)	15,640,260	16,086,312
NOTE PAYABLE (Note C)	1,218,800	-
ACCRUED INVESTMENT MANAGEMENT FEES	1,218,746	2,350,174
Total liabilities	27,720,450	26,892,869
NET ASSETS:		
Unrestricted	216,204,545	183,349,711
Temporarily restricted	21,904,151	20,880,418
Permanently restricted	78,513,519	64,980,943
Total net assets	316,622,215	269,211,072
TOTAL LIABILITIES AND NET ASSETS	$344,342,665	$296,103,941

STATEMENT OF ACTIVITIES (WITH COMPARATIVE TOTALS FOR 1996)
YEAR ENDED JUNE 30, 1997

	UNRESTRICTED	TEMPORARILY RESTRICTED
REVENUES, GAINS AND OTHER SUPPORT:		
Private contributions and grants	$ 1,171,329	$ 1,682,416
Government grants	-	4,667,104
Income on long-term investments	1,541,581	681,182
Net realized and unrealized gains on long-term investments (includes $7,475,780 and $-0- in unrealized gains in 1997 and 1996, respectively)	24,449,980	2,613,510
Gain/(loss) on sale of capital assets	6,155	-
Net assets released from restrictions-Satisfaction of program restrictions	10,070,079	(9,530,739)
Gain on sale of land development rights	10,292,909	-
Total revenues, gains and other support	47,532,033	113,473
EXPENSES AND LOSSES:		
School of Mathematics	4,564,629	-
School of Natural Sciences	4,723,013	-
School of Historical Studies	3,257,217	-
School of Social Science	1,710,303	-
Libraries and other academic expenses	3,706,704	-
Administration and general	4,400,568	-
Auxiliary activity-tenants' housing expenses, net of unrestricted revenue of $234,138	298,760	-
Provision for postretirement benefits expense	-	-
Total expenses and losses	22,661,194	-
CUMULATIVE EFFECT OF A CHANGE IN ACCOUNTING PRINCIPLE	7,983,995	910,260
CHANGES IN NET ASSETS	32,854,834	1,023,733
NET ASSETS, BEGINNING OF YEAR	183,349,711	20,880,418
NET ASSETS, END OF YEAR	$216,204,545	$21,904,151

See notes to financial statements.

1997		
PERMANENTLY RESTRICTED	TOTAL	TOTAL 1996
$ 2,537,240	$ 5,390,985	$ 6,842,246
-	4,667,104	3,952,451
-	2,222,763	171,846
8,751,214	35,814,704	39,967,512
-	6,155	(11,662)
(539,340)	-	-
-	10,292,909	-
10,749,114	58,394,620	50,922,393
-	4,564,629	4,802,836
-	4,723,013	4,172,367
-	3,257,217	2,902,103
-	1,710,303	1,832,615
-	3,706,704	3,029,332
-	4,400,568	4,170,847
-	298,760	276,644
-	-	3,722,391
-	22,661,194	24,909,135
2,783,462	11,677,717	-
13,532,576	47,411,143	26,013,258
64,980,943	269,211,072	243,197,814
$78,513,519	$316,622,215	$269,211,072

STATEMENT OF CASH FLOWS
YEAR ENDED JUNE 30, 1997

CASH FLOWS FROM OPERATING ACTIVITIES:	
Change in net assets	$ 47,411,143
Adjustments to reconcile change in net assets to net cash used in operating activities:	
Cumulative effect of a change in accounting principle	(11,677,717)
Depreciation	1,924,893
Contribution-unrestricted	(695,000)
Increase in accrued income	(174,726)
Increase in accounts and grants receivable	(254,661)
Decrease in contributions receivable	188,500
Increase in accounts payable	286,786
Decrease in prepaid and other assets	74,972
Increase in refundable advances	55,946
Decrease in accrued management fees	(1,131,428)
Net realized and unrealized gains on long-term investments	(35,814,704)
Gain on sale of land development rights	(10,292,909)
Net gain on sale of land, buildings and improvements and equipment	(6,155)
Net cash used in operating activities	(10,105,060)
CASH FLOWS FROM INVESTING ACTIVITIES:	
Proceeds from sale of land development rights	11,794,600
Proceeds from sale of buildings and improvements and equipment	33,743
Purchase of buildings and improvements and equipment	(993,885)
Proceeds from sale of investments	580,624,511
Purchase of investments	(581,806,634)
Net cash provided by investing activities	9,652,335
CASH FLOWS FROM FINANCING ACTIVITIES:	
Increase in trust fund obligations	843,529
Decrease in unamortized debt service expense	9,259
Payments on long-term debt	(446,052)
Net cash provided by financing activities	406,736
NET DECREASE IN CASH	(45,989)
CASH, BEGINNING OF YEAR	603,940
CASH, END OF YEAR	$ 557,951
SUPPLEMENTAL DATA:	
Noncash investing and financing activities:	
Gift of building	$ 695,000
Income taxes paid on other business income	12,000

In connection with the sale of land development rights, the Institute entered into a $1,218,800 note payable and recorded contributions receivable of $1,174,196, net of a $100,000 allowance.

See notes to financial statements.

NOTES TO FINANCIAL STATEMENTS
YEAR ENDED JUNE 30, 1997

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.

In March 1995, the Financial Accounting Standards Board issued Statement of Financial Accounting Standards No. 121, "Accounting for the Impairment of Long-Lived Assets and for Long-Lived Assets to be Disposed of" ("SFAS 121"). SFAS 121 requires assets held and used by an entity to be reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of the assets may not be recoverable. Asset impairment is required to be recognized if the sum of the expected future net undiscounted cash flow is less than the carrying amount of the asset. This statement is effective for fiscal years beginning after December 15, 1995. The adoption of this statement has not had a material effect on the financial statements.

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 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 or statement of cash flows. 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 124"). SFAS 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, 1997 was $7,475,780.

Endowment and similar funds investments at June 30, 1997 are comprised of the following:

	CARRYING VALUE	MARKET VALUE
Pooled investments:		
Equity securities	$218,409,850	$253,325,476
Debt securities	92,607,838	92,979,120
Mortgages from faculty and staff	2,139,262	2,139,262
Investment accounts receivable	2,360,526	2,360,526
Investment accounts payable	(1,532,748)	(1,557,785)
Total pooled investments	313,984,728	349,246,599
Funds invested separately:		
Equity securities	58,204	82,579
Total	$314,042,932	$349,329,178

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 $108,248,857 and a market value of approximately $113,151,511 at June 30, 1997. 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 $852,389 and $18,689,518 respectively, for the year ended June 30, 1997.

In addition, equity securities include the Institute's interests in three open-ended investment funds (the "Funds") incorporated in the Cayman Islands with carrying values of $79,195,328 and market values of $106,208,299 at June 30, 1997. 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 34.5% and 25.2%, respectively and 59.7% collectively of total investments held by the Institute at June 30, 1997. 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, 1997:

	UNRESTRICTED	TEMPORARILY RESTRICTED	PERMANENTLY RESTRICTED	TOTAL
Dividends and interest	$ 1,541,581	$ 681,182	-	$ 2,222,763
Realized gain on investments reported at fair value	$ 6,357,693	$ 679,587	$2,275,566	$ 9,312,846
Realized gain on investments reported at other than fair value	12,988,722	1,388,392	4,648,964	19,026,078
Total realized gain	19,346,415	2,067,979	6,924,530	28,338,924
Total unrealized gain	5,103,565	545,531	1,826,684	7,475,780
Total realized and unrealized gain	$24,449,980	$2,613,510	$8,751,214	$35,814,704

Short-term investments within the plant fund represent the semi-annual loan payment due July 1, 1997 of the 1991 NJEFA bonds. Such funds are invested in U.S. Government obligations with maturities of less than one year. At June 30, 1997, the market value of such securities approximates their carrying value.

Investments, beginning of year		$265,383,383
Cumulative effect of a change in accounting principle		11,677,717
Investment purchases		581,791,639
Investment sales		(580,624,511)
Investment returns:		
Realized gains	$ 28,338,924	
Unrealized gains	7,475,780	
Total return on investments		35,814,704
Investments, end of year		$ 314,042,932

Investments, beginning of year		$ 265,383,383
Cumulative effect of a change in accounting principle		11,677,717
Gifts available for investment:		
Gifts creating a permanent endowment		2,908,414
Gifts creating trust funds		1,137,134
Investment returns:		
Dividends and interest	$ 2,222,763	
Realized gains	28,338,924	
Unrealized gains	7,475,780	
Total return on investments		38,037,467
Proceeds from sale of land development rights		11,794,600
Amounts appropriated for current operations		(16,738,138)
Annuity trust income payment		(157,645)
Investments, end of year		$ 314,042,932

The participation in the pool and ownership of the other investments at June 30, 1997 is shown in the table below:

Permanently restricted net assets	$ 86,196,748
Temporarily restricted net assets	25,957,791
Unrestricted net assets	201,888,393
	$314,042,932

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, 1997 follows:

Land and improvements	$ 1,014,189
Buildings and improvements	34,224,846
Equipment	11,835,983
Rare book collection	214,109
Joint ownership property	921,717
Real estate deposit	303,359
Total	48,514,203
Less accumulated depreciation	(26,046,532)
Net book value	$22,467,671

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 $1,218,800 has been recorded as a note payable in the accompanying statement of financial position at June 30, 1997. 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 $25,706 at June 30, 1997.

Contributions receivable of $1,274,196 at June 30, 1997 represent monies to be received from various donors for which a reserve of $100,000 has been established.

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, 1997 follows:

6.275%, 1991 - NJEFA	$15,855,000
Less unamortized bond discount	214,740
Total long-term debt	$15,640,260

In September 1991, the Institute received proceeds of the New Jersey Educational Facilities Authority (NJEFA) offering of $17,895,000 Revenue Bonds, 1991 Series B, the Institute for Advanced Study Issue. The proceeds were used for the construction of a new academic building and debt retirement. A portion of the proceeds totaling $7,677,232 were used to retire the existing Revenue Bonds, 1980 Series A.

The bonds are dated September 1, 1991, bear interest, payable semi-annually, at the net average annual rate of 6.275%, are subject to redemption at various prices, and require principal payments and sinking fund installments through June 30, 2021. Bond principal in the amount of $480,000 (1998) and $510,000 (1999), $535,000 (2000), $570,000 (2001), $605,000 (2002) will mature in each of the designated years. The remaining balance of $13,155,000 is payable in semi-annual installments through June 30, 2021. 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.

At June 30, 1997, the estimated fair value of the Institute's long-term debt was $16,528,362.

Interest expense on long-term debt for the year ended June 30, 1997 was $1,046,164.

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, 1997 totaled approximately $1,005,500.

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. Effective July 1, 1995, the Institute adopted the provisions of Statement of Financial Accounting Standards No. (SFAS) 106, "Employers' Accounting for Postretirement Benefits Other Than Pensions." SFAS 106 changed the accounting for postretirement health care and life benefits to a method that accrues these benefits over a period in which active employees become eligible under existing benefit plans. Previously, such benefits were generally expensed as paid.

The Institute elected to fully recognize the SFAS 106 Transition Obligation in the accompanying statements of financial position, activities, and cash flows for the year ended June 30, 1996. The component of the periodic expense for these postretirement benefits for 1997 is as follows:

Postretirement Benefit Costs:	
Service Cost - benefits attributable to service during the year	$ 111,491
Interest Cost on Accumulated Postretirement Benefit Obligation	247,380
Total	$ 358,871

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, 1997 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, 1996	$1,929,491
Additions:	
Contributions, grants, etc.	6,453,082
Restricted endowment income	2,009,200
Quasi-endowment funds utilized	1,839,851
Total additions	10,302,133
Deductions:	
Funds expended from contributions, grants, etc.	6,397,137
Funds expended from restricted endowment	3,849,050
Total deductions	10,246,187
Balance at June 30, 1997	$1,985,437

G. FUNDS HELD IN TRUST BY OTHERS

The Institute is the residuary beneficiary of a trust and, upon the death of the life tenant, 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 $2,796,772 as of June 30, 1997, 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 ($474,797 net of $420,767 in revenues) and members' housing ($222,908, net of $1,134,700 in revenues) have been allocated among the programs and supporting services benefited. An overhead 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 $2,573,312 for the year ended June 30, 1997.

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 $1,046,164 and allocated interest income totaled $8,933 for the year ended June 30, 1997.

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:

	1997
Academic Services:	
Educational Programs	$21,904,151

Permanently restricted net assets are restricted to:

Investments to be held in perpetuity, the income from which is expendable to support academic services	$78,513,519

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:

	1997
Program expenses:	
School of Mathematics	$ 2,761,763
School of Natural Sciences	2,364,295
School of Historical Studies	1,015,586
School of Social Science	1,559,686
Academic support costs:	
Libraries and other academic	1,888,401
Computing	49,000
Administration and general:	
Fund raising	6,131
Tenants' housing	162,646
Equipment acquired and placed in service	104,450
Trust fund disbursements	158,121
Total restrictions released	$10,070,079

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:

	1997
Expenses incurred were for:	
Salaries, wages, and benefits	$10,700,065
Stipends	4,325,488
Honoraria	212,889
Grants to other organizations	657,674
Supplies and travel	1,817,967
Services and professional fees	2,338,149
Depreciation	1,545,262
Interest	1,063,700
Total expenses	$22,661,194

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, 1997	Carrying Amount	Estimated Fair Value
Assets:		
Cash	$ 557,951	$ 557,951
Investments	314,042,932	349,329,178
Grant/Contributions Receivable	4,372,829	4,372,829
Mortgage Receivable from Faculty and Staff	2,139,262	2,139,262
Liabilities:		
Long-term debt	15,640,260	16,528,362
Note payable	1,218,800	427,494

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 values are estimated using the interest rates currently offered for debt with similar terms and remaining maturities. 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 received from the note.

The fair value estimates presented are based on information available to the Institute as of June 30, 1997, 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, 1997
Unconditional promises to give:	
Less than one year	$1,110,602
One to five years	1,700,556
More than five years	3,538

The Institute has recorded an allowance for uncollectible promises receivable in the amount of $100,000 at June 30, 1997.

N. SUBSEQUENT EVENT

Subsequent to year-end, the Institute increased its interests in limited partnerships and Funds by $9,989,854 and $15,000,000, respectively.

* * * * * *

INSTITUTE FOR ADVANCED STUDY
OLDEN LANE
PRINCETON, NEW JERSEY 08540-0631