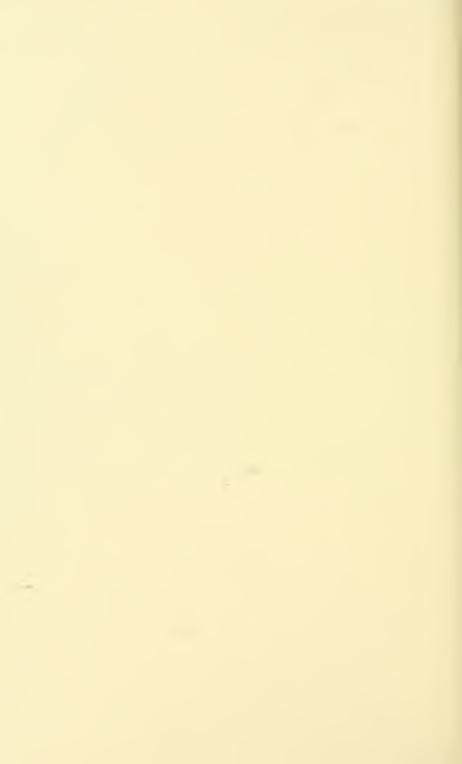# INSTITUTE
for ADVANCED STUDY

REPORT

FOR THE ACADEMIC YEAR

1995 – 96

PRINCETON · NEW JERSEY

INSTITUTE
for ADVANCED STUDY

REPORT

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Extract from the letter addressed by the Founders to the Institute's 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 is an independent, non-profit institution devoted to the encouragement of learning and scholarship. From its founding in 1930 it has been a community of scholars where intellectual inquiry can be pursued across a broad range of disciplines under the most favorable conditions. In the words of its original statement of mission, "The primary purpose is the pursuit of advanced learning and exploration in the 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." For nearly two-thirds of a century this founding principle has been sustained and has yielded an unsurpassed record of definitive scholarship.

Although small in scale, the Institute fills a unique role in postgraduate education and scientific and scholarly research. It is organized in four Schools: Historical Studies, Mathematics, Natural Sciences, and Social Science. Within each is found a spectrum of scholarly interests which transcends the usual divisions of academic subjects. This breadth of coverage and the opportunity it affords for independent, self-directed scholarship distinguish the Institute from most other centers for research and scholarship. So too does its permanent faculty, composed of twenty-one distinguished scholars who guide the work of the Schools and each year award fellowships to about 160 visiting Members from universities and research institutions throughout the world.

From its beginnings, the Institute has been international in composition and a community in character. More than half of today's Faculty began their scholarly careers outside the United States, and each year about a third to half of the Institute's Members come from abroad. This mix of cultures as well as disciplines and of senior and younger scholars greatly enriches the Institute experience, as does the Institute's residential housing, its outstanding dining, numerous lectures, concerts, and other cultural events.

The Institute was established with a major founding gift from New Jersey businessman and philanthropist Louis Bamberger and his sister, Mrs. Felix Fuld. They wished to use their fortunes to make a significant and lasting contribution to society. Abraham Flexner originated the concept from which the Institute took form, encouraged the Bambergers to provide resources for its realization, and served as the Institute's first Director. Through careful management and generous additional support, the Institute's endowment today produces nearly two-thirds of the annual operating budget. To underwrite the critical remaining portion of the budget, the Institute depends upon grants and gifts from individuals, foundations, corporations, and government agencies, including sources within and outside the United States. The Institute is governed by an elected Board of Trustees which appoints a Director to oversee the Institute's operations and guide its development.

Entirely independent in governance and administration, the Institute enjoys a close relationship with Princeton University, Rutgers University, and other academic, cultural, and research organizations. Working together, the Institute and these neighboring institutions have contributed to New Jersey's world-wide reputation in scholarship and science.

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My time at the Institute has been stimulating beyond any in my experience, and I'd prefer not to have to leave at all. I think the other members of the Medieval Seminar feel the same way. Several have commented to me that they haven't had a chance to learn so much so intensively since their graduate student days. And many of us have never had the opportunity to sit at a seminar table with the kind of scholars—remarkable both in caliber and in intellectual passion—the IAS gathers. Giles Constable's seminar was a true delight: his leadership is discreet, which is likely the secret to its success, but he manages to balance tolerance with shrewdness, and to give the whole experience an intellectual liveliness and continuity it would not otherwise have had.

What was especially exciting about the Medieval Seminar was to see an interdisciplinary seminar actually working—the range of methodologies and fields was quite wide, but everyone's approach was accommodated, and I think that including the Islamicists and the Renaissance scholars was especially fruitful....I want to stress the success of the Medieval Seminar because one of the important ways the IAS serves the larger academic community is through its unique ability to demonstrate the intellectual potential of interdisciplinary work—simply because, given its resources, it can do so without sacrificing either intellectual integrity or imagination.

Member, School of Historical Studies

REPORT OF THE CHAIRMAN

Over the years, Phillip Griffiths has reminded us of the insights of the Institute's first Director, Abraham Flexner, whose commitment to the preservation of intellectual and spiritual freedom led to the creation of the Institute for Advanced Study. While Flexner knew that much of the pure scholarship which would be engaged in at the Institute would not have immediate practical results, he also knew that discoveries of infinite importance to the human mind and spirit could ultimately evolve from advances in the progress of knowledge. The Institute's mission is to bring together eminent scholars and promising young postdoctoral scholars and allow them to pursue their own work in an environment of excellence. Sixty-six years after the founding of the Institute, it is clearer than ever before to the Board that there remains an urgent need to give scholars from around the world this refuge in which to pursue their interests at the highest possible level of excellence and to have the opportunity for collaboration and a cross-disciplinary exchange of ideas.

It is because of this commitment that the Board, in close coordination with the Faculty and Administration, is deeply engaged in a process of evaluation and projection, the Decadal Review. Through a series of round tables with distinguished guests and with the Faculty of each School of the Institute, the mission of the Institute for Advanced Study has been strongly reaffirmed. Individuals outside the Institute community have reported that the quality and impact of this institution, for its size, is unmatched. Its permanent faculty has a special value that distinguishes the Institute from other research institutions, and the Institute has a compelling role in intellectual leadership and in creating an environment that nurtures younger scholars.

Evaluators participating in the Decadal Review have also noted that, since the Institute transcends parochial interests and serves educational institutions and individual scholars from near and far, in the 21st century the world will need a place like the Institute even more. We are, therefore, engaged in the process of addressing what we must do to maintain our position of leadership and service. As Institute Trustee Vartan Gregorian began the round table on humanities and social science, he presented the following charge: *Examine the vision. Examine the mission. Change what should be changed. It's important not to be indifferent or passive and not to live on the laurels of the past. Let's scrutinize our own institution with the same historical objectivity we bring to scholarly pursuits.* I express the deep gratitude of the Board to Trustees Helene Kaplan and Richard Black for their leadership in this process. A summary of their report will appear in these pages next year.

The quality of the Institute relies on a distinguished Faculty. To each Professor and Professor Emeritus, I would like to acknowledge your distinguished scholarship and extend the appreciation of the Board of Trustees. It is your intellectual leadership

that allows the Institute to create a unique scholarly environment for Members and to fulfill the goals of our founders.

In January 1996, the Institute celebrated the creation of a new faculty position, an endowed chair in the School of Historical Studies to commemorate the extraordinary achievements of diplomat and scholar George F. Kennan. Each George F. Kennan Professor will, like Kennan himself, exemplify the importance of history for understanding contemporary affairs and may be chosen, as Kennan was, from the ranks of those who have earned their eminence outside the academic community. This is a term appointment of one to five years. The chair will also include visiting Members whose work is in the general subject area of the incumbent Kennan Professor; their work will thereby broaden and multiply the impact of the chair. The Institute is deeply grateful to the anonymous donor whose initial contribution provided the challenge and for the many other contributors whose admiration of Professor Kennan and personal generosity made possible this important new endowment of four million dollars.

I would also like to express the gratitude of the Board to Trustee Richard B. Black for his gift of $1.5 million to create the Richard Black Professorship in the School of Natural Sciences. Because support for basic research is being largely redirected to the applications of existing knowledge to meet specific short-term goals, the Board was asked by the School of Natural Sciences to expand its endowment for memberships as a way to bolster support for research with a long time horizon. Mr. Black's generous support and leadership of the campaign are a splendid manifestation of his long-standing interest in astronomy, technology, and education.

The Institute has been guided through the years by a dedicated Board of Trustees, and our Board has been enriched over the past year through the addition of seven new members.

Michael Bloomberg founded Bloomberg Financial Markets in 1981, turning an initial order from Merrill Lynch for twenty terminals into a company providing a high-tech, international system of business news and information and analysis for Wall Street and beyond. Prior to founding the company, Mr. Bloomberg was a General Partner at Salomon Brothers. He is a graduate of The Johns Hopkins University and Harvard Business School. In addition to serving on many other boards in the non-profit sector, he is Chairman of the Board of Trustees of Johns Hopkins.

Jon M. Huntsman, Jr. currently serves as Vice Chairman of Huntsman and serves on the boards of directors of all Huntsman companies. Mr. Huntsman has devoted himself to public service. At the time of his confirmation as United States Ambassador to the Republic of Singapore, he was the youngest U.S. Ambassador of this century. A graduate of the University of Pennsylvania, Mr. Huntsman serves on numerous corporate and non-profit boards and was recently named by the World Economic Forum in Switzerland as a Global Leader for Tomorrow.

Marie-Josée Kravis is an economist specializing in public policy analysis and strategic planning. She was Executive Director of the Hudson Institute of Canada Inc. from 1976 to 1994. In 1994, she became a Senior Fellow of the Hudson Institute Inc. (USA). Mrs. Kravis has worked extensively on problems in both the public and private sectors in Canada and the United States, as well as Europe and Africa. She obtained her M.A. in economics from the University of Ottawa and pursued doctoral studies at Columbia University.

Martin L. Leibowitz is Executive Vice President and Chief Investment Officer for TIAA-CREF Investments. Prior to joining TIAA-CREF, Mr. Leibowitz was Managing Director and Director of Research at Salomon Brothers, and he has written or co-authored over one hundred articles on a wide variety of topics. Dr. Leibowitz is President of the Board of Trustees for the New York Academy of Sciences and is on the Board of Overseers for New York University's Stern School of Business. Dr. Leibowitz received his B.A. and M.S. from the University of Chicago and his Ph.D. in mathematics from New York University.

David F. Marquardt received a BSME from Columbia University and an MBA from Stanford. Mr. Marquardt was a founding partner of Technology Venture Investors (TVI), a technology-based venture capital firm in Menlo Park, California, which, since its founding in 1980, has backed more than 95 companies, many of which have become industry leaders. Mr. Marquardt serves as director on many private and public technology company boards including Adaptec, Archive, Microsoft and Sun Microsystems.

James J. Schiro is Chairman and Senior Partner of Price Waterhouse LLP. He joined the firm in 1967 and became a partner in 1979. During his years with Price Waterhouse, Mr. Schiro served many large multinational corporations in a variety of industries. A graduate of St. John's University, Mr. Schiro is a member of the University's Board of Trustees. He is also a graduate of the Amos Tuck School Executive Program at Dartmouth College. Mr. Schiro is a recipient of the Ellis Island Medal of Honor and other awards.

Ruth J. Simmons became President of Smith College in July 1995. She has been involved in higher education for the greater part of her career, serving as Vice Provost of Princeton University and Provost of Spelman College prior to going to Smith. Dr. Simmons graduated from Dillard University in 1967 and attended the Université de Lyon as a Fulbright Scholar. She received both her A.M. and Ph.D. from Harvard University. Dr. Simmons' distinguished honors are many; most recently she accepted honorary Doctor of Laws degrees from Amherst College and Princeton University.

The Institute is fortunate to have the support of its past Members through AMIAS, the Association of Members of the Institute for Advanced Study, led by Professor Robert Doran of Texas Christian University. Providing a stimulat-

ing environment for all scholars, and especially nurturing the work of younger researchers, is a central part of the Institute's mission. I am always impressed by the Members themselves as they express the importance of their experience at the Institute. As one Member said, *Any postdoctoral fellowship would have allowed me to devote my time to research, but the position at the Institute made a clear difference when it came to pursuing ambitious projects with a long time scale*. We are grateful for the loyalty of AMIAS Members to the Institute and deeply appreciate your contributions for the support of current Members and your planned gifts which will assure the independence of the Institute in the future.

The Friends of the Institute continue to provide important unrestricted contributions to the Institute and to participate in many important ways in the life of this institution. With president Judith Ogden Thomson and her Executive Committee, the Friends are an important linkage of the Institute with the broader community, and for your critical support I am most grateful.

May I conclude with a quotation from Trustee Hyman Bass: *The 'Institute ensemble' is a configuration of Faculty, visiting Members, resources, and services that form an organic and functioning community. It is this ensemble—so totally dedicated to the advancement and celebration of culture, virtually relieved of pragmatic concerns and impediments, with unpretentious attention to the highest quality of its working environment—that perhaps most distinguishes the Institute from other scholarly centers.*

To all who make this possible, on behalf of the Board of Trustees, I express my deepest gratitude.

James D. Wolfensohn
Chairman

REPORT OF THE DIRECTOR

Fundamental scholarship — the original and often speculative thinking that is at the source of new knowledge — comprises a large part of the intellectual capital of our society. Like any form of capital, it must be renewed and added to if future generations are to have the tools and the intellectual environment they will need. The Institute for Advanced Study is among the very few institutions that enable this type of long-term investment. Essential to this process, we believe, is the presence of a permanent Faculty.

In addition to permanent Faculty, the Institute is greatly enriched by term appointments. I am delighted to announce that Jack F. Matlock, Jr. has begun a five-year appointment as the first George F. Kennan Professor. He served for 35 years in the American Foreign Service and from 1987-1991 was the last United States Ambassador to the Soviet Union. Professor Matlock came to the Institute from Columbia University where he was the Kathryn and Shelby Cullom Davis Professor in the Practice of International Diplomacy. Professor Matlock attended Duke University, where he completed his B.A. degree in 1950, and Columbia University where, in 1952, he received his M.A. and the Certificate of the Russian Institute.

I am also pleased to announce the appointment of Pawan Kumar to an eight-year Visiting Professorship in the School of Natural Sciences. Professor Kumar was formerly Assistant Professor of Physics at the Massachusetts Institute of Technology. He received his Ph.D. in astrophysics from the California Institute of Technology, and his M. Tech. in computer science and M.Sc. in physics from the Indian Institute of technology in Kanpur, India.

Over the past two years, Peter Schäfer of the Free University of Berlin was the Visiting Mellon Professor in the School of Historical Studies. Professor Schäfer, a distinguished historian of religion with a special interest in Judaic studies, explored themes which cut across many of the traditional boundaries of historical periods, disciplines, and methodologies, and which today continue to have significant manifestations in many cultures. He led seminars focused on magic and religion in 1994-95 and on messianism in 1995-96. The seminars, funded by the Andrew W. Mellon Foundation, were part of a series of programs intended to open windows on areas not previously represented at the Institute.

From 1996-1998, Sabine G. MacCormack, Professor of History and Classical Studies at the University of Michigan, will be the School of Historical Studies' Two-Year Visiting Mellon Professor. In her first year she will conduct a seminar on sovereignty, comparing the theory and practice of government in Spain and in pre-Columbian and early colonial Spanish America.

Luis Caffarelli, Professor in the Institute's School of Mathematics from 1986-1996, has been named the Frank Gould Professor in the Sciences at the Courant Insti-

tute of Mathematical Sciences. It is not coincidental that during his ten years at the Institute, the interests of the School of Mathematics broadened significantly into areas of applied mathematics, forging links between traditional mathematics and emerging areas. Professor Caffarelli also served on the Oversight Board of the IAS/Park City Mathematics Institute.

In the year past, the School of Social Science completed a three-year examination of social transitions. The third year focused on "modernization," probably this century's clearest picture of purposeful, goal-directed change. In 1996-97, the School will celebrate its 25th anniversary with a year-long focus on the social sci ence disciplines in relation to some of the significant trends and transformations in modern society, the social world, and the academic world. The program will culminate in a conference, "25 Years: Social Science and Social Change," in May.

The School of Natural Sciences began an exploration of theoretical questions inspired by the biological sciences which might provide an important and appropriate new direction for some of its activities in the future. Institute Professor Stephen Adler has been exploring issues in neuroscience and related computational questions, and he co-organized with Professor Steven Block of Princeton University a one-day seminar, "Thinking about Life: Emerging Themes in Theoretical Biology." Institute Professor Frank Wilczek, in close collaboration with Professor Stanislas Leibler of Princeton University, has run a journal club on self-assembly and control, which is now expanding to include seminars by distinguished outside speakers.

Since the mid-1970s the Institute's School of Mathematics has hosted special programs on topics at the forefront of mathematics. Each program is organized by a leading figure in the discipline together with a member of the permanent Faculty of the School and a selected group of visiting Members. A common and defining feature of these programs is the presence of promising young mathematicians in the first stages of their careers as research scientists working in close collaboration with well-established, senior mathematicians. This year's program was in algebraic number theory and was led by visiting Member Andrew Wiles from Princeton University, who, along with Institute Professor Robert Langlands, was awarded the Wolf Prize for their ground-breaking research in number theory and related areas. Two other distinguished number theorists, Professor Kazuya Kato, Tokyo Institute of Technology, and Institute Professor Enrico Bombieri, shared in the program's leadership.

The 1995 New Europe Prizes* were awarded to Istvan Rév and Piotr Sztompka in a ceremony which took place on November 16, 1995, at Uppsala University. Recipients of these prizes, initiated in 1991, use the award to strengthen their home institutions in Eastern Europe. Dr. Rév, an economic historian and a former visiting Member in the School of Social Science, has established a small research institute in Budapest for the study of Communism, especially in the post-World War II period in Eastern and Central Europe. Piotr Sztompka is a university pro-

fessor and Head of the Section on Theoretical Sociology at the Jagiellonian University at Krakow. Dr. Sztompka is creating a center affiliated with the Central and Eastern European Studies Program at the Jagiellonian University to study the social transformation of East-Central Europe in the wake of the revolution of 1989.

Pianist and scholar Robert Taub completed his second year as Artist-in-Residence. The Institute community's understanding and enjoyment of Beethoven has been greatly enhanced by Dr. Taub's presentation this past year of nine concert performances of selected Beethoven piano sonatas, in addition to lectures and articles about this composer. The entire series of performances is being recorded at the Institute's Wolfensohn Hall, and the first two double-CDs have been released. An additional double-CD will be issued in October of 1996.

From June 23-July 13, the Institute hosted the 1996 summer session of the IAS/Park City Mathematics Institute (PCMI). The PCMI is designed to improve mathematics education at all levels through the integration of research and education. A component of the PCMI is the Mentoring Program for Women in Mathematics, held at the Institute from June 10-20. The PCMI is sponsored by the Institute for Advanced Study and receives major support from the National Science Foundation and the Geraldine R. Dodge Foundation.

The Institute has been enriched in many ways in addition to those enumerated here. The presence of Director's Visitors, distinguished scholars whose interests frequently do not fall into the normal school structure of the Institute, contributes much to the vitality of the Institute community. During the past year these Visitors included Paul Berg, Director of the Beckman Center for Molecular and Genetic Medicine, Stanford University Medical Center; Maxine Singer, President, Carnegie Institution of Washington; Richard Cruess, M.D., McGill University; mathematician Qi-Keng Lu; Sylvia Nasar, *The New York Times*; and Sir John Thomson, GCMG.

Throughout the process of the Decadal Review, we have had the privilege of benefiting from the wisdom of academic, business, and foundation leaders, and I express my deep appreciation to all who have participated. Through their important insights, as well as those of our Faculty and visiting Members, the Institute has been able to undertake a comprehensive consideration of this institution's current and future role in the changing world of scholarship and to seek to ensure that the Institute's potential for contribution to future scholars and scholarship is realized.

As one of the Decadal Review roundtable participants, Sir John Elliott, Regius Professor of Modern History, Oxford University, commented, *It is vital that the Institute not lose confidence in itself and in its central purpose: the promotion of the integrity of scholarship, of scholarly values that are inherent in the humanist tradition. What it stands for is even more important than it was at the time of its founding in the 1930s.*

The Institute should remain a refuge for hard-pressed scholars from around the world, an opportunity for organic collaboration and cross-disciplinary exchange of a largely informal character, not available in other institutions. It should allow individual scholars to pursue their interests at the highest possible level of excellence, without external interference, without having to conform to criteria of utility.

Sir Michael Atiyah, Master of Trinity College, Cambridge University, reminded us that *There is no useless knowledge. All knowledge is useful, and there is a unity to it all. It is critical to maintain the integrity of intellectual pursuit, even if unfashionable. It is important to move with the times, but also to maintain a balance between traditional studies and the emerging fields of the future.*

Fulfilling the Institute's mission into the 21st century will be the result of the efforts of many. To all who create and those who support the Institute community, I am deeply grateful.

Phillip A. Griffiths
Director

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Hoi Fung Chau, School of Natural Sciences
Keith Dienes, School of Natural Sciences
Kenneth Intriligator, School of Natural Sciences
Hoi-Kwong Lo, School of Natural Sciences
Lev Rozansky, Schools of Mathematics and Natural Sciences
Vladimir Sadov, Schools of Mathematics and Natural Sciences

Alfred P. Sloan Foundation
Robert Beals, School of Mathematics
Alexander Dyachenko, School of Mathematics
Gil Kalai, School of Mathematics
Gyula Károlyi, School of Mathematics

THE SCHOOL OF HISTORICAL STUDIES

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 these 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

At its Stated Meeting in November 1995 GLEN BOWERSOCK delivered a lecture before the American Academy of Arts and Sciences on "The Vanishing Paradigm of the Fall of Rome." The lecture was subsequently published in the *Bulletin* of the Academy vol 49, no. 8 (May, 1996). He also delivered the Helen

Buchanan Seeger Lecture, under the auspices of the Hellenic Studies Program at Princeton University, on "The New Cavafy: Unfinished Poems 1918-1932." This lecture has appeared in *The American Scholar*, vol. 65, no. 2 (Spring 1996). At a conference in College Park, Maryland on religions and ethnic communities in later Roman Palestine Professor Bowersock delivered the keynote address on the subject, "The Greek Moses: Confusion of Ethnic and Cultural components in Later Roman and Early Byzantine Palestine."

Professor Bowersock also contributed papers to three European colloquia on the pre-Islamic Near East. He spoke in Pisa on "Perfumes and Power" at the concluding session of the symposium *I Profumi d'Arabia*. At a workshop held in Aix-en-Provence on *Civilisations de l'Arabie préislamique* he examined the history of the Arabian peninsula in relation to Palestine and Transjordan. In a seminar in Lyon he presented a paper on twentieth-century exploration of North-West Arabia and offered suggestions for a program of future surveys and excavation in the region. All three papers will be published in the proceedings of the conferences.

In addition to the foregoing contributions, Professor Bowersock published several articles and reviews, including a discussion of the Afrocentrist debate for the *New York Times* (Sunday Book Review, 25 February 1996). He approved a Greek translation of his *Hellenism in Late Antiquity* for publication in Athens. He continued to serve on various committees and boards of the American Academy of Arts and Sciences, the American Philosophical Society, the American Numismatic Society, the Metropolitan Opera Guild, The Harvard University Press, and several European scholarly journals.

During the academic year 1995-96 GILES CONSTABLE published five articles: 'Monks, Bishops, and Laymen in Rural Lombardy in the Twelfth Century', *Bullettino dell'Istituto storico italiano per il medio evo e Archivio Muratoriano;* 'The Many Middle Ages: Medieval Studies in Europe as Seen from America,' in the acts of the Congress of Medieval Studies held at Spoleto in 1993; and three more in the volumes in honor of Georges Duby, David Herlihy, and Avrom Saltman. He also published three reviews and a remembrance for Samuel Edmund Thorne. An abridged Russian translation of his introduction to the *Apologia de barbis* by Burchard of Bellevaux appeared in *Odysseus*. He gave talks at Tulane University; Notre Dame; the International Congress of Medieval Studies at Kalamazoo, where he also presided at two sessions; and at conferences in Beer-Sheva and Jerusalem. He presided at sessions of the meeting honoring Joachim Wollasch at the Westfälische Wilhelms-Universität in Münster and of the symposium on messianism at the Institute for Advanced Study. He attended scholarly meetings at the University of Notre Dame, Princeton University, the Universities of Missouri at Kansas City and of Kansas (the annual meeting of the Medieval Academy of America), the University of San Diego, and the University of California, Los Angeles. While at UCLA he spoke at the memorial

meeting for Robert Benson, a former member at the Institute, and at the con- ference honoring Eugen Weber. As usual, he organized the December meeting of the Delaware Valley Medieval Association at the Institute.

OLEG GRABAR gave papers and lectures at the International Congress of Turkish Art in Geneva, the College Art Association, a Colloquium on Writing as Art at Hofstra University, and a Colloquium on the History of Jerusalem in Jerusalem. He chaired a UNESCO mission to survey restoration work on the Great Mosque of Damascus. He also received the Levi della Vida medal at UCLA and gave three lectures there. His publications included: *Penser l'art islamique: Une esthétique de l'ornement* (Bibliothèque Albin Michel Idées: Paris, 1996); *L'Ornement:* (Paris, 1996), a revised version of his earlier *The Mediation of Ornament;* "About an Arabic Dioskorides Manuscript," *Byzantine East, Latin West; Art-Historical Studies in Honor of Kurt Weitzmann* (Princeton, 1995); "Le Temple Lieu de Conflit: Le Monde de L'Islam," *Les Cahiers du Cepoa; Éditions Peeters* (Leuven, 1995); "Flandin's Image of Iran," M. Bernardini et alii, *L'Arco di Fango, Studi in onore Eugenio Galdieri* (Rome, 1995), pp. 173-76; "Toward an Aesthetic of Persian Painting," *The Art of Interpreting: Papers in Art History* (Pennsylvania State University, 1995), pp. 129-139.

CHRISTIAN HABICHT addressed in July the graduating class of the Depart- ments of History and of Classics at the University of Hamburg. At the fall meeting of the American Philosophical Society he delivered a lecture on "Athens, Samos, and Alexander the Great," for which he was awarded the Soci- ety's 1995 Henry Allen Moe Prize. He participated during the year in Peter Schäfer's seminar on Messianism and gave a paper entitled "Messianic elements in the prechristian Greco-Roman World," with special emphasis on Virgil's Fourth Eclogue. In April of 1996, he participated in an International Confer- ence on "The Romanization of Athens," held at the University of Nebraska, Lincoln, where he gave the opening paper on "Roman citizens in Athens (228- 31 B.C.)." During the second term, he attended seven sessions of an informal seminar in Greek Epigraphy with visiting members (C. Mileta, G. Petzl, J. Vino- gradov), initiated by these members. Discussed were unpublished and published documents from the Black Sea area, Asia Minor, and Samos.

He continued to serve on several publication boards in this country and in Ger- many and on the board of overseers for the *Inscriptiones Graecae* of the Berlin- Brandenburgische Akademie der Wissenschaften; he attended meetings in Berlin in January. He was appointed to a third three-year term to the membership com- mittee of Class IV of the American Philosophical Society. At the University of Heidelberg he served on the jury for a *Habilitation* in Ancient History. He was elected a Corresponding Fellow of the British Academy.

His publications included *Athen. Die Geschichte der Stadt in hellenistischer Zeit* (Munich, Beck), 1995, 406 pp., of which an English edition is being prepared for

the Harvard University Press, and the following articles: "Ist ein `Honora-tiorenregime' das Kennzeichen der Stadt im späteren Hellenismus?," (*Stadtbild und Bürgerbild im Hellenismus*, ed. M. Wörrle and P. Zanker, Munich 1995, 87-92); "Eine verkannte Bauinschrift aus Megara des Publius Ampelius von 359/60" (*Hyperboreus* 1, 1994-95, 128-131); "Salamis in der Zeit nach Sulla" (*Zeitschrift für Papyrologie und Epigraphik* 112, 1996, 79-87); "Iulia Kalliteknos" (*Museum Helveticum* 53, 1996). Accepted for publication were other papers, to be published in *Athenische Mitteilungen* 110 (Berlin), *Proceedings of the American Philosophical Society* (Philadelphia), *Scripta Classica Israelica* 15 (Jerusalem) and *Libyan Studies* 27 (London).

IRVING LAVIN organized the symposium "Music and Art in the Renaissance," held at the Institute in March 1996; in the course of the year he also gave lectures and participated in symposia at the Walters Art Gallery, Baltimore, El Escorial (Spain), the Istituto Italiano per gli Studi Filosofici, Naples, and the universities of Barcelona, Ferrara, L'Aquila and Seville.

Professor Lavin continued to organize the series of colloquia in the history of art sponsored by the School of Historical Studies. He also continued his services to several organizations and institutions, specifically as chairman of the U.S. National Committee for the History of Art, as a member of the executive committee of the Comité International d'Histoire de l'Art and the Board of Directors of the College Art Association. He served on the advisory boards of several scholarly journals, including *Art e Dossier, The Journal of Medieval and Renaissance Studies, Palladio, rivista de storia dell'architettura e restauro,* and *Quaderni d'italianistica.*

Professor Lavin's publications included editing *Meaning in the Visual Arts: Views from the Outside. A Centennial Commemoration of Erwin Panofsky (1892-1968),* Princeton, 1995 and a number of essays: "Caravaggio rivoluzionario o l'impossibilità di vedere," *Quadri & Sculture,* III, No. 15, July-August 1995, "Why Baroque," in L. G. Corrin, ed., *Going for Baroque. 18 Contemporary Artists Fascinated with the Baroque and Rococo,* Baltimore, 1995, and "The Art of Art History," *Leonardo,* XXIX, 1996. A presentation of the Italian edition of his book *Passato e Presente nella storia dell'arte* (Turin, 1994) was held at the Accademia Nazionale dei Lincei in Rome, of which Professor Lavin is a foreign member.

During the academic year 1995-96, PETER PARET completed a manuscript, "Imagined Battles," in which he discusses war as a moral and social theme in European art from the Renaissance to the twentieth century. The study is a greatly expanded version of his 1993 Reckford Lecture in the Humanities at the University of North Carolina, and will be published by the University of North Carolina Press. He contributed an essay on the interaction of art and politics in Berlin before the first World War to the catalogue *Der Kampf um die Moderne* of the exhibition on this theme of the Berlin Nationalgalerie in Berlin and

Munich. Among his reviews and shorter pieces are an article on Felix Gilbert, Professor and Professor Emeritus in the School of Historical Studies from 1962 to 1991, in the *American National Biography*: and a "Biographical Memoir" on Kenneth Bourne, a member of the School in 1989, for the *Proceedings of the American Philosophical Society*.

Among his talks in this country and abroad were a paper, "The Discovery of the Common Soldier in Modern Art," at the 18th International Congress of His- torical Sciences in Montreal in the fall of 1995, a short version of which was published in the *Proceedings* of the Congress; the introduction and discussion of a session on the social and professional history of German artists that he chaired at the annual meeting of the German Studies Association in Chicago in Sep- tember; and a series of lectures and a faculty seminar at the College of Wooster in October. His lecture at the Institute on eighteenth- and early nineteenth- century images of women in war has been published as a pamphlet by the Insti- tute. He continued to serve on the Board of Editors of the *Journal of the History of Ideas,* on the Council of the American Philosophical Society, and as chair- man of two of the Society's committees. In May the College of Wooster award- ed him an honorary degree of Doctor of Humanities.

During the academic years 1994-95 and 1995-96 PETER SCHÄFER served as the Two-Year Visiting Mellon Professor. He organized two seminars, one on "Magic and Religion," and one on "Messianism"; both seminars were concluded by an international symposium. The proceedings of the seminars/symposiums will be published in the *Supplement to NUMEN* series (E.J. Brill, Leiden).

He published the first volume of his *Übersetzung der Hekhalot-Literatur* (Tübin- gen, 1995), the fourth volume of his *Synopse zum Talmud Yerushalmi,* (Tübingen, 1995), an English translation of his *Geschichte der Juden in der Antike (The His- tory of the Jews in Antiquity,* Luxembourg, 1995), a Spanish translation of his monograph *Der verborgene und offenbare Gott. Hauptthemen der frühen jüdischen Mystik (El Dios escondido y revelado,* Madrid 1995), and a Spanish translation of his *Kleines Lexikon des Judentums (Diccionario del Judaísmo,* Estella, Navarra, 1996). He also edited, together with G. Smith, *Gershom Scholem. Zwischen den Disziplinen* (Frankfurt a.M. 1995) and published five articles. His manuscript on so-called pagan anti-Semitism entitled *Judeophobia. Attitudes toward the Jews in the Greco-Roman World* has been accepted for publication by Harvard Universi- ty Press and is currently in press.

In 1994 Professor Schäfer received the Leibniz Prize and was elected a member of the Berlin-Brandenburgische Akademie der Wissenschaften and a correspond- ing fellow of the American Academy for Jewish Research; since 1995 he serves on the International Advisory Committee of the Center for Judaic Studies at the University of Pennsylvania. In 1995 he organized an international conference on "Jewish Studies in the Context of the Humanities" at the Berlin-Branden-

burgische Akademie der Wissenschaften. He gave lectures and seminars at several universities, among them the Nemer Lecture at the University of Southern California in February 1996. He continued to serve on the editorial board of *Texte und Studien zum Antiken Judentum*, *Texts and Studies in Medieval and Early Modern Judaism*, *Arbeiten zur Geschichte des Antiken Judentums und des Urchristentums*, and *Jewish Studies Quarterly*.

PROFESSORS EMERITI

In September of 1995, MARSHALL CLAGETT was awarded one of the two first Dondi dall'Orologio European Prizes at the University of Sassari in Sardinia for a lifetime work in the history of science. In March of 1996, he was informed that he had also won the International Galileo Galilei Prize to be awarded him in Pisa on October 5-6, 1996, for his contributions to the history of Italian science.

Professor Clagett continues work on Volume III of his *Ancient Egyptian Science*.

GEORGE KENNAN completed an article on the history of Russian-Soviet expansionism as the last item in his book, published in February, entitled *At a Century's Ending*. He wrote and published in the *New York Review of Books* a review of Jack Matlock's book *Autopsy of a Nation*. Professor Kennan wrote his part in an extensive exchange of letters with John Lukacs, which was published in *American Heritage*, under the title of "From World War to Cold War" and is shortly to appear as a book put out by the University of Missouri Press.

He received the prominent German political figure, Gov. Kurt Biedenkopf, who was then visiting Princeton and discussed with him at length matters of common interest. He attended a luncheon at the Council on Foreign Relations honoring former German President, Richard von Weizäcker, with whom he had a close acquaintance. He made remarks at the presentation to former Secretary of State Cyrus Vance by the National Committee on American Foreign Policy of the George F. Kennan Award which that Committee bestows annually. He attended and spoke at a dinner at the Institute marking the establishment of the George F. Kennan Professorship and the appointment of Jack Matlock as the first incumbent of this professorship. In the spring, he gave, at the publisher's request and in connection with the appearance of his recent book, interviews with an editor of *US News & World Report*, with Mr. David Gergen (for an appearance on the *Lehrer News Hour* program) and also with a staff member of the Princeton Packet. He also gave an interview to PBS for a 25-part mini-series on the Cold War which is scheduled to be aired in 1998.

President Lennart Meri of Estonia presented him with the order of The Grand Cross of the Cross of Terra Mariana, the highest award that Estonia gives to non-Estonians. It was given in recognition of special services rendered to the Republic of Estonia.

Beyond that, he has continued his writing but for private rather than public purposes.

HOMER A. THOMPSON has continued to supervise the publication program of the Excavation of the Athenian Agora.

MORTON WHITE's article, "Desire and Desirability: A Rejoinder to a Posthumous Reply by John Dewey", was published in the May 1996 issue of the *Journal of Philosophy*. This article was prompted mainly by the posthumous publication in the last volume of Dewey's *Collected Works* of a piece he wrote in 1950 in answer to some criticisms of his ethical views made by White in the latter's *Social Thought in America* of 1949. This exchange, which spans almost a half-century, might be one of the longer-running ones in the history of philosophy.

Professor White has recently written a foreword to a forthcoming Japanese translation of his book, *The Question of Free Will: A Holistic View.*

THE SCHOOL OF HISTORICAL STUDIES

MEMBERS, VISITORS AND RESEARCH STAFF

STEVEN E. ASCHHEIM
European Cultural History
Hebrew University of Jerusalem

MANGOL BAYAT
Modern Middle East and Islam
Universität Bonn · s

ANDREW BUTTERFIELD
Art History
New York University

JOHN WHITECLAY CHAMBERS II
Modern History
Rutgers University · v

CLAUDIA CIERIVIA
Art History
University of Rome · f

OWEN S. CONNELLY
French Revolution/Napoleonic Era
University of South Carolina · vf

JOSEPH DAN
Jewish Mysticism
Hebrew University of Jerusalem · f

MARGOT FASSLER
Medieval Musicology
Yale University

DIETER FLACH
Ancient History
Universität Paderborn · f

JOHANNES FRIED
Medieval History
Universität Frankfurt

PIERRE-LOUIS GATIER
History and Epigraphy of Greek, Roman, and
Byzantine Near East
Centre National de la Recherche Scientifique

JO-ANN GROSS
Medieval Islamic History
Trenton State College · s

NORMAN HOUSLEY
Messianism
University of Leicester · s

RONNIE PO-CHIA HSIA
Messianism
New York University · s

LILLY KAHIL
Iconographical Studies in Greek Art (9/1 to 9/9)
Paris · vf

KATHRYN KERBY-FULTON
Medieval English Literature
University of Victoria · s

CHRISTIANE KLAPISCH-ZUBER
Demography and Anthropology of Medieval Italy
École des Hautes Études en Sciences Sociales -
Centre National de la Recherche Scientifique · j

GENEVRA KORNBLUTH
Medieval Art History
Youngstown University · vf

HUBERTUS LUTTERBACH
Medieval History
Institute for Advanced Study · a

CHRISTIAN MILETA
Ancient History
Institute for Advanced Study · as

ANN E. MOYER
Renaissance Italy
University of Pennsylvania

SARA T. NALLE
Early Modern Spain/Catholicism
William Paterson College of New Jersey

ROBERT R. PALMER
18th Century European History
Newtown · v

MARKKU PELTONEN
Early Modern History
University of Helsinki

CARL F. PETRY
Middle Eastern (Islamic) History
Northwestern University · s

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

GEORG PETZL
Greek Epigraphy
Universität Köln

MELVIN RICHTER
History of Political Thought
Hunter College, City University of New York

KLAUS SCHREINER
Medieval History
Universität Bielefeld

HAGEN SCHULZE
Modern European History
Freie Universität Berlin · *vs*

GUNTER SCHWEIKHART
Art History
Universität Bonn · *f*

PHILIP M. SOERGEL
Early Modern European History
Arizona State University · *vf*

TONY SPAWFORTH
Roman Greece
University of Newcastle

LESLIE THREATTE
Greek Epigraphy
University of California, Berkeley · *f*

JURIJ VINOGRADOV
History and Epigraphym of the Black Sea Region
Russian Academy of Sciences

ALFORD T. WELCH
History of Religions/Islamic Studies
Michigan State University

REVA WOLF
History of Modern and Contemporary Art
Boston College

ELLIOT R. WOLFSON
Jewish Mysticism
New York University · *s*

THE SCHOOL OF MATHEMATICS

Faculty

ENRICO BOMBIERI *[IBM von Neumann Professor]*
JEAN BOURGAIN
LUIS A. CAFFARELLI
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 1995-96 academic year the School of Mathematics conducted a major program in algebraic number theory. This program focussed on Wiles' resolution to Fermat's conjecture and the more general Tatiyama-Weil conjectures. Enrico Bombieri and Pierre Deligne coordinated the program together with Kazuya Kato (Tokyo) and Andrew Wiles (Princeton University). Both Wiles and Kato spent the academic year at IAS. This was made possible through grants from the Ambrose Monell Foundation and The Fuji Bank, Limited. There were two or three seminars in algebraic number theory per week. Each seminar began at a sufficiently elementary level to be accessible to nonspecialists. These lectures drew a large audience of students, postdoctoral Members and faculty. Jean-Marc Fontaine and Kazuya Kato introduced the prerequisites of modular forms and p-adic Hodge theory. Later Wiles gave a seminar outlining his proofs. Other related seminars were given by Karl Rubin on "Iwasawa theory and Euler systems" and by Kazuya Kato on "Birch and Swinnerton-Dyer conjectures and Iwasawa theory of modular forms."

As its classical counterpart, p-adic Hodge theory gives a bridge, for algebraic varieties, between cohomology viewed in terms of differential forms, or in terms of Cech cochains. Particular cases are classical modular forms of weight 2, and Tate modules of Jacobians of modular curves. Takeshi Tsuji gave a series of lectures on his recent work: the case of varieties with stable reduction on p-adic fields. Thanks to A.J. de Jong, this is not as restrictive as it looks.

Combinatorics and computer science continued to be a major activity at IAS for a third consecutive year. This year Avi Wigderson and Gil Kalai ran a weekly combi-

natorics seminar in cooperation with DIMACS and Princeton University. These seminars were well attended by Members in such diverse fields as harmonic analysis and geometry. The strong presence in this area at IAS attracted strong researchers to come and spend some time here for collaboration in research. Among these were Laszlo Babai (Chicago), Michel Talagrand (Ohio State), Alexander Razborov (Moscow), Russell Impagliazzo (San Diego), David Zuckerman (Texas) and Yuri Rabinovich (Cornell).

There was active collaboration between short- and long-term visitors in Discrete Mathematics with many faculty and Members from other mathematical fields during this year. Some topics on which new results were obtained at IAS this year include:

Sharp bounds on threshold behavior for random graphs (uses some harmonic analysis);

Understanding flag numbers of polytopes (uses some algebraic topology);

Superpolynomial lower bounds for new monotone computational models (uses some algebraic geometry and number theory);

Deterministic amplification of the hardness of Boolean functions;

Exponential lower bounds on proof lengths for natural proof systems.

In applied mathematics the statistical theory of wave turbulence was developed in smaller but very interactive seminars by Vladimir Zakharov and Vladimir Malkin. The theory of wave turbulence has many applications, especially to the theory of water waves, plasmas and to lasers. Unlike fully developed turbulence, wave turbulence considers the case where the nonlinearity is weak and there is effectively a small parameter. However, as with many equations describing fluids, the long-time solutions are nevertheless too complex to describe deterministically, and it is natural to attempt a more statistical description. To first approximation, a set of kinetic equations are obtained which describe how waves statistically interact with each other. Zakharov emphasized that the physically relevant steady state of the kinetic equations should reflect energy transfer in the system. For example energy may be transported from large scales of the driving force to short scales where some form of dissipation takes place. The mathematical structure of these steady state measures is very interesting but different from those which appear in conventional equilibrium statistical mechanics.

Some novel aspects of wave turbulence were explored: the effect of finite volume— these are particularly important in understanding numerical simulations and simple models of linear models with random space-time coefficients. Significant progress was made in both areas. Much more needs to be done to understand the nonequilibrium measures mentioned above.

Both the Combinatorics and the Applied Mathematics programs were generously supported by the Alfred P. Sloan Foundation.

A workshop on Mathematical Problems in Finance was held April 11-12 and 15-16. The focus of this workshop was on pricing, risk management and various aspects of computation and modeling in finance. This workshop was made possible by a grant from Bankers Trust Foundation.

Kapetalli Sreenivasan (Yale, IAS) organized a workshop on turbulence which featured mathematical results on driven Burgers equation and advection of passive scalar as well as recent experimental results.

In addition to the seminars mentioned above, there were weekly seminars in harmonic analysis and number theory and in mathematical physics. The Marston Morse lectures were delivered by Yakov Eliashberg (Stanford) and were entitled "Symplectic Geometry and Stable Morse Theory."

Robert Langlands was awarded the Wolf Prize, Enrico Bombieri was elected to the National Academy of Sciences and Pierre Deligne was made an Honorary Fellow of the Tata Institute of Fundamental Research. André Weil was selected as the Laureate of the 1994 Kyoto Prizes in Basic Science.

Luis Caffarelli has left the Institute to join the Faculty at the Courant Institute of Mathematical Sciences at New York University as the Frank Gould Professor in the Sciences.

THE SCHOOL OF MATHEMATICS

MEMBERS AND VISITORS

DOUGLAS ABRAHAM
Statistical mechanics
University of Oxford · s

ADEBISI AGBOOLA
Number theory: Galois modules and arithmetic geometry
University of California, Berkeley

JAMES AKAO
Computational fluid dynamics and statistical physics
University of California, Berkeley

ROBERT BEALS
Algorithms for finite groups, theoretical computer science
University of Oregon

MASSIMO BERTOLINI
Algebraic number theory and arithmetic geometry
Universitá di Pavia · s

SPENCER BLOCH
Algebraic geometry
University of Chicago · 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 · vs

MAURY BRAMSON
Probability theory
University of Wisconsin - Madison

KEVIN BUZZARD
Arithmetic of modular forms
University of Cambridge · f

HENG-HUAT CHAN
Analytic number theory
University of Illinois at Urbana-Champaign

MEI CHU CHANG
Algebraic geometry
University of California, Riverside

JEFF CHEEGER
Differential geometry, topology
Courant Institute · f

PAULA COHEN
Number theory and non-commutative geometry
CNRS - Collège de France

MORLEY DAVIDSON
Diophantine problems in algebraic number fields
University of Michigan

RAFAEL DE LA LLAVE
Dynamical systems, hydrodynamics
University of Texas at Austin · fv

FRED DIAMOND
Automorphic forms and modular Galois representations
University of Cambridge · f

ALEXANDER DYACHENKO
Free surface hydrodynamics, nonlinear optics
University of Arizona · f

NAJMUDDIN FAKHRUDDIN
Algebraic cycles
University of Chicago

IVAN FESENKO
Arithmetic algebraic geometry, number theory, K-theory
University of Nottingham · s

JEAN-MARC FONTAINE
Algebraic geometry and number theory
Université de Paris-Sud · f

JOHN FRIEDLANDER
Analytic number theory
University of Toronto · f

KIM FROYSHOV
Low-dimensional topology
University of Oxford

ANNA GÁL
Combinatorics and complexity
University of Chicago

f First Term · s Second Term · v Visitor

ROBERT GHRIST
Dynamical systems and low-dimensional topology
Princeton University · vf

APOSTOLOS GIANNOPOULOS
Convex bodies
University of Crete · f

EFIM GLUSKIN
Banach space theory, approximation theory
Tel Aviv University

MARK GORESKY
Geometry and automorphic forms
Northeastern University

GIAN MICHELE GRAF
Mathematical quantum mechanics
Eidgenössische Technische Hochschule · s

DAVID GROISSER
Yang-Mills Theory
University of Florida · vf

LI GUO
Algebraic number theory and arithmetic geometry
Ohio State University · vf

GIL KALAI
Combinatorics
Hebrew University · f

GYULA KÁROLYI
Discrete mathematics, computational geometry
DIMACS, Rutgers University

KAZUYA KATO
Algebraic number theory
Tokyo Institute of Technology · dvp

NICHOLAS KATZ
Arithmetic algebraic geometry
Princeton University · f · vs

THOMAS KERLER
Low-dimensional topology and braided tensor categories
Harvard University

MIHAIL KOLOUNTZAKIS
*Harmonic analysis; additive number theory;
probabilistic methods*
Stanford University

MASATO KURIHARA
Iwasawa theory and p-adic Hodge theory
Tokyo Metropolitan University · f

DETLEF LEHMANN
Many-Fermion systems
Eidgenössische Technische Hochschule

WERNER LÜTKEBOHMERT
Algebraic geometry
Universität Ulm · s

AKOS MAGYAR
Analysis
Princeton University

VLADIMIR MALKIN
Wave collapse, wave turbulence
University of Minnesota

WILLIAM McCALLUM
Arithmetic algebraic geometry
University of Arizona

LOÏC MEREL
Modular forms and Galois representations
Université Pierre et Marie Curie · f

WERNER MÜLLER
Global analysis, spectral theory
Universität Bonn · f

M. RAM MURTY
Elliptic curves, modular forms
McGill University · f

V. KUMAR MURTY
L-functions and automorphic forms
University of Toronto

HIROAKI NAKAMURA
Galois representations in profinite fundamental groups
University of Tokyo · s

CLAUDIA NEUHAUSER
Probability theory
University of Wisconsin - Madison · v

CHARLES NEWMAN
Statistical mechanics and related probability theory
Courant Institute · s

ANDREI OKOUNKOV
Toric varieties, combinatorial geometry
The Independent University of Moscow · s

ALEXANDER OLEVSKII
Harmonic and real analysis
Tel Aviv University · s

KEN ONO
Modular forms, representation theory, and number theory
University of Illinois at Urbana-Champaign

FLORIAN POP
Galois theory and arithmetic geometry
Heidelberg University

LONGDONG QIU
General relativity and fluid dynamics
Courant Institute

DANIEL ROCKMORE
Computational aspects of representation theory
Dartmouth College

LEV ROZANSKY
Quantum field theory and Witten's invariant
of 3-manifolds
University of Miami · j

KARL RUBIN
Algebraic number theory
Ohio State University

VLADIMIR SADOV
Two-dimensional field theories and string theory
Harvard University · j

SIDDHARTHA SAHI
Representations of semisimple Lie groups
Rutgers University

ALICE SILVERBERG
Algebraic number theory and arithmetic
algebraic geometry
Ohio State University · f

SAMARENDRA SINHA
Arithmetic of function fields
University of Minnesota

KATEPALLI SREENIVASAN
Turbulence, nonlinear dynamics, complex fluids
Yale University

GIGLIOLA STAFFILANI
Partial differential equations - harmonic analysis
University of Chicago

DANIEL TATARU
Linear-semilinear PDE's
Northwestern University

JEAN TAYLOR
Mathematical models for crystal growth
Rutgers University

KAI-MAN TSANG
The Riemann zeta-function, Dirichlet's divisor problem
University of Hong Kong · s

TAKESHI TSUJI
p-adic Hodge theory
Kyoto University

KAREN UHLENBECK
Nonlinear partial differential equations and geometry
University of Texas at Austin · f

KIRILL VANINSKY
Statistical mechanics, integrable systems
Kansas State University

WEIQIANG WANG
Representation theory
Massachusetts Institute of Technology

LAWRENCE WASHINGTON
Number theory
University of Maryland · s

AVI WIGDERSON
Computer science
Hebrew University

ANDREW WILES
Algebraic number theory
Princeton University

ROBERT WILLIAMS
Dynamical systems and symbolic dynamics
University of Texas at Austin · f

SIMAN WONG
Elliptic curves, modular forms and Galois representations
Massachusetts Institute of Technology

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

TONGHAI YANG
Derivatives of Eisenstein Series at the critical point and heights
University of Maryland

VLADIMIR ZAKHAROV
Nonlinear partial differential equations, applied mathematics
Landau Institute for Theoretical Physics · *f*

GAOYONG ZHANG
Convex geometry and geometric analysis
Temple University · *s*

SHAOWEI ZHANG
Algebraic number theory, elliptic curves, modular forms
Peking University

FANGYANG ZHENG
Complex differential geometry
Duke University · *s*

THE SCHOOL OF NATURAL SCIENCES

Faculty

STEPHEN L. ADLER *[New Jersey Albert Einstein Professor]*
JOHN N. BAHCALL
PIET HUT
FRANK WILCZEK
EDWARD WITTEN

Professor Emeritus

FREEMAN J. DYSON

ACADEMIC ACTIVITIES

With his Princeton University graduate student Andrew Millard, PROFESSOR STEPHEN L. ADLER has continued to study the properties of generalized quantum dynamics, the noncommutative dynamics he introduced several years ago. Millard found that this theory has a conserved operator closely related to the canonical commutator/anticommutator algebra, and building on this Adler and Millard were able to show that the statistical mechanics of generalized quantum dynamics takes the form of standard complex quantum field theory. This is the first time that anyone has found a "pre-quantum mechanical" theory that can give rise to relativistic quantum field theory, and it opens up a lot of interesting further questions and exciting possibilities, relating to both the problem of unifying the forces and to some of the foundational issues in quantum mechanics. With Professor Lawrence Horwitz, Adler has continued work on generalized dynamics, deriving the transformation between the microcanonical and canonical formulations of its statistical mechanics, and studying the algebraic properties of the conserved operators.

In another piece of work related to generalized forms of quantum mechanics, Adler wrote a short paper deriving the associativity condition for quaternionic projective group representations, and posing a structural question. Subesequently, Millard and a mathematician, Terry Tao, used this as the starting point for a complete structural classification of quaternionic projective group representations, and as a corollary answered the question Adler had raised.

In pattern recognition, working with Krishnan Ranganathan, an IAS postdoc, Adler applied the general theory of image normalization he developed last year to solve the previously unsolved problem of the affine normalization of partially occluded planar curves. Their method extracts all affine invariant information using only the first and second derivatives in a finite interval about a chosen

point on the curves, and leads to an efficient computer algorithm which they have implemented and are in the process of putting on the Internet.

The one day conference on theoretical biology which Professor Adler coorganized with Professor Steven Block of the Department of Molecular Biology at Princeton was successful; many people commented on the high quality of the talks. The issue of including the biological sciences within the SNS activities in some form is under discussion by the SNS Faculty. Professor Adler is also working with faculty in the School of Mathematics to plan cooperative activities in this area.

PROFESSOR JOHN BAHCALL. A new era in solar neutrino research began in 1996 with the first observations from the large new SuperKamiokande detector in the Japanese alps. This experiment began taking data on April 1, 1996. It accumulated more events in the first two months of operation than all of the four previously operating solar neutrino experiments obtained in the preceding 25 years.

Bahcall concentrated in the academic year of 1995-1996 on determining and refining the diagnostic power that can be expected from the three new solar neutrino experiments that are now coming into existence: SuperKamiokande (Japan, pure water, April 1996), SNO (Canada, heavy water, late spring 1997), and BOREXINO (Italy, organic scintillator, 1999?). These detectors will have much greater statistical accuracy than previous experiments and many authors have discussed in optimistic terms the great diagnostic power of SuperKamiokande, SNO, and BOREXINO. However, these discussions have only included the expected statistical uncertainties, which are small.

In a series of papers, with Eligio Lisi and Plamen Krastev (both of IAS), Bahcall refined the best-estimate theoretical calculations and made careful estimates of the unavoidable uncertainties in the calculations. He and his colleagues also included the expected systematic uncertainties and best-estimates for experimental quantities, as provided to them by the SuperKamiokande and SNO collaborations. Among the theoretical quantities for which the best-estimates have been improved and for which well-established uncertainties have been determined are the shape of the crucial 8B neutrino spectrum if no new neutrino interactions occur (collaborators included a number of experimentalists: D. E. Alburger, BNL, L. De Braeckeleer, U. Washington, S. J. Freedman, Berkeley, and J. Napolitano, Rensselaer), the neutrino-electron scattering cross-sections (with radiative corrections included, obtained in a collaboration with M. Kamionkowski, Columbia University and A. Sirlin, NYU), and the charged and neutral current neutrino interaction cross sections for deuterium (with Lisi).

The neutral current to charged current ratio for the SNO experiment has been shown, with detailed simulations by Bahcall and his collaborators, to be a deci-

sive test of whether or not new physics is the explanation of the solar neutrino problems. The diagnostic power of the measurements of the shape of the neutrino spectrum by SuperKamiokande and SNO are shown to be much reduced by theoretical uncertainties and by expected experimental systematic uncertainties compared to what had been previously estimated by many authors using just statistical (counting) errors.

The BOREXINO experiment will be the first solar neutrino experiment that will concentrate on measuring the interaction rate of a specific solar neutrino line, the fundamental 7Be solar neutrino line. Bahcall and Krastev showed what could be learned about new physics from measurements of the 7Be and pep neutrino lines.

In a separate study, Bahcall and Krastev derived the empirical limits on the individual solar neutrino fluxes that are established by a simultaneous analysis of the results of the four operating solar neutrino experiments. Very large ranges in the neutrino fluxes arriving at earth are permitted if neutrino oscillations, vacuum or MSW, are occurring.

In a surprising development, Bahcall, M. Fukugita (Kyoto and IAS), and Krastev showed that a large class of new solutions to the solar neutrino problems are possible—if flavor changing neutrino oscillations are occurring. In these new solutions, essentially none of the fundamental pp neutrinos are being measured in the operating gallium experiments. This set of solutions, which ignores all we know about solar physics except for the total luminosity, has more than 99% of the total luminosity of the sun coming from the CNO reactions. Previously, essentially everyone active in solar neutrino research (including Bahcall and his collaborators) had assumed that, *independent of solar models*, we knew that much or most of the experimental rate in the gallium experiments was coming from *pp* neutrinos. This class of solutions cannot be tested by SuperKamiokande or SNO; the BOREXINO experiment will be the first that can provide empirical information about the validity of this extreme (CNO) hypothesis. The end result of this analysis was to provide a better understanding of the interaction between theory (including detailed solar models) and experiments, with the bottom line being that a very wide range of possibilities are consistent with existing experiments if one hypothesizes that some new physics may be occurring and ignores what we know from solar models.

Are solar models sufficiently reliable to predict solar neutrino fluxes? Bahcall, M. Pinsonneault (Ohio State), and S. Basu and J. Christensen-Dalsgaard (Aarhus, Denmark) tested the predicted sound velocities of the best available solar models against the observations available from helioseismology. There is astoundingly good agreement: the discrepancies between models and observations are less than 0.2% throughout essentially the entire volume of the sun. These results show that the temperature and mean molecular weight profiles of

the standard solar models agree more accurately with the helioseismological measurements than is required for solar neutrino predictions. Bahcall and his collaborators demonstrate that the available helioseismological measurements are sufficiently accurate to rule out solar models that do not include element dif fusion or which do include a large amount of *ad hoc* mixing. P. Kumar and E. J. Quataert (MIT) and Bahcall showed that some claimed measurements of solar g-modes are inconsistent with other observations and made a plausible predic tion of the expected velocity amplitude (0.01 cm per sec) of low degree and low order g-modes.

In a series of papers, including his Heineman Prize lecture, Bahcall showed that that there are really three separate solar neutrino problems. These problems exist if one insists, in agreement with the predictions of the simplest version of standard electroweak theory, that neutrinos have zero masses and flavor chang ing neutrino oscillations do not occur. Of course, for the problems to exist one must also believe the reported results of the four operating solar neutrino exper iments. Bahcall showed that these assumptions imply three essentially indepen dent solar neutrino problems: the discrepancy between the predicted and observed absolute rates of the chlorine and water (Kamiokande) experiments; the apparent conflict between the observed rates in the chlorine and Kamiokande experiments if new physics does not change the shape of the 8B energy spectrum, and the absolute rate of the gallium experiments (GALLEX and SAGE).

Bahcall continued his Hubble Space Telescope work with a series of collabora tors. He analyzed star counts with A. Gould (Ohio State) and C. Flynn (Nordi ta), including a strong upper limit on the possible number of faint red stars from the Hubble Deep Field. With S. Kirhakos and K. Fisher (IAS) and D. Schnei der (U. of Pennsylvania), Bahcall completed a study of the environments of 20 of the most luminous known quasars in the nearby universe. The Hubble images showed many new results about the environments of quasars; it is hoped that these new results will constitute fruitful clues as to what makes the most lumi nous objects known in the universe, quasars, shine. Further results from the HST Quasar Absorption Line Key Project and from globular cluster photometry were published by Bahcall and his collaborators.

PROFESSOR PIET HUT has focused his research on various aspects of the dynamics of dense stellar systems. In an ongoing study of the "microphysics" of star clusters, he has determined cross sections for encounters between single stars and double stars, together with Douglas Heggie from Edinburgh and Steve McMillan from Drexel. This collaboration produced the first general expression for exchange cross sections for arbitrary mass ratios, a useful ingredient in recon structions of the formation histories of X-ray binaries, millisecond pulsars and other dynamically formed stellar objects.

A detailed study of the "macrophysics" of star clusters has recently become possible, through realistic simulations of these clusters on a star-by-star basis, using the GRAPE-4, a special-purpose computer developed at Tokyo University. When it became operational, in the Fall of 1995, it was at a speed of 1 Teraflops the fastest computer in the world. Together with Jun Makino, from Tokyo University, and Steve McMillan, Hut has continued to develop new algorithms on the GRAPE-4, in order to treat arbitrarily complex simultaneous encounters between multiple star systems in the core of a dense star cluster. Some of the first results, obtained this way, are reported in the proceedings of IAU Symposium 174, edited by Hut and Makino.

Professor Hut organized a workshop at the National Center for Supercomputing Applications in Champaign/Urbana, in December 1995, to discuss the scientific applications for the next-generation special-purpose computer, the GRAPE-6, planned to operate at a speed of 1 Petaflops, a thousand-fold increase over the current GRAPE-4. At the Petaflops Architecture Workshop, at Caltech in April 1996, the GRAPE team, including Hut, received a Petaflops Point Design Studies award, as one of the eight teams that had been chosen to receive funding from a combined initiative involving four government agencies (NSF, NASA, DARPA, and NSA), to stimulate advanced computing research.

At the Santa Fe Institute, Hut organized a workshop on Fundamental Sources of Unpredictability, together with James Hartle from UCSB, and Joseph Traub, from Columbia. This workshop formed one aspect of an ongoing program, sponsored by the Alfred P. Sloan Foundation, to explore the notion of 'limits to scientific knowledge'. As part of this program, Professor Hut continued his collaboration with cognitive psychologist Roger Shepard from Stanford. Together, they organized several workshops at Stanford, bringing together researchers from such diverse areas as computer science, cognitive science, and European and Japanese philosophy.

In the area of philosophy of science, Hut has started several collaborative projects, with Bas van Fraassen, from Princeton University, Ronald Bruzina, from the University of Kentucky at Lexington, Brian Smith from the University of Indiana at Bloomington, Yoko Arisaka, from the University of San Francisco, as well as several philosophers in Tokyo, Kyoto, Sendai, and Fukuoka. Some of these activities involve collaborations with the International Institute for Advanced Study in Kyoto, through Takeyuki Hida and Ryosuke Ohashi. These various projects all center around the role that science plays in shaping our world views.

Last year, Professor Hut was elected as Corresponding Member of the Royal Netherlands Academy of Arts and Sciences.

PROFESSOR FRANK WILCZEK has continued to investigate the occurrence of new sorts of quantum-mechanical effects in materials. As the technological capability to form and manipulate matter on an atomic scale becomes increasingly mature, fundamentally new kinds of effects have been, and continue to be, discovered; and effects which had previously been considered purely hypothetical can start to be realized. For example, it is increasingly possible to create materials in which the motion of electrons is effectively confined to two- or even one-dimensional structures, or to structures so small that they accommodate only a few electrons at a time (mesocopic systems). Among the most interesting discoveries is the possibility to create particles with exotic quantum statistics, beyond the Bose-Einstein, Fermi-Dirac statistics known for many years now, and even the somewhat less venerable anyons, in such systems. In his recent work Wilczek has demonstrated the occurrence of non-abelian statistics — that is, situations in which merely moving one particle in a circle around another changes the properties of that particle. He also proposed a theory of important aspects of the electronic behavior of the copper-oxide (high-temperature superconductor) materials which explains, and takes as its point of departure, recent observations indicating that the mobile electrons arrange themselves in one-dimensional structures within the bulk material. Wilczek plans to continue work in these directions, and also to apply some new theoretical techniques, developed in the context of studying black hole radiation, to study quantum processes (correlated tunneling, 'self-interaction') that are sensitive to the discrete nature of electrons, and are especially important in understanding the electronics of mesoscopic systems.

Wilczek contributed to theoretical developments in the quantum theory of black holes which have substantially advanced our understanding of the quantum mechanics of these objects, especially recently in the context of string theory. He plans in the immediate future to try to exploit this improved understanding by considering analogous problems where there are apparent singularities in time instead of space, i.e. the earliest moments of the big bang.

Finally, Wilczek continues to be interested in the more phenomenological aspects of particle physics. He has been inspired by specific experimental developments, including notably various 'anomalies' reported in high-energy experiments, to explore — typically in collaboration with graduate students and Members at IAS — their possible implications for fundamental theory. Recently, special interest has focussed on implications of the idea that supersymmetry is not too badly broken, an idea greatly encouraged by the quantitative evidence for unification of couplings growing out of his previous work.

PROFESSOR EDWARD WITTEN's primary interests in 1995-96 were in developing and sharpening the non-perturbative understanding of string theory, a subject that developed rapidly during the year. Some of the highlights of Professor Witten's work in 1995-96 were as follows. With J. Polchinski, he gave the first convincing evidence for the equivalence of the two string theories

(heterotic and Type I) with SO(32) gauge group. With P. Horava, he determined the strong coupling limit of the ten-dimensional $E_8 \times E_8$ heterotic string, obtaining a rather surprising answer that involved eleven dimensions. In a third paper, "Small Instantons in String Theory," he uncovered a novel physical phenomenon that occurs in the SO(32) string theory when an instanton becomes small. Each of these three developments – and other, related ones that occurred in the course of the year – came quickly to be used by other researchers as a basis for further work.

PROFESSOR EMERITUS FREEMAN J. DYSON collaborated with visiting member Thibault Damour on a reexamination of the evidence for the constancy of the fine-structure constant. The strongest evidence comes from the isotope abundances observed in fission products associated with the ancient fission reactors at Oklo in Africa. The reactors were active about two billion years ago. The depletion of the isotope Samarium 149, for example, indicates that a thermal neutron resonance in the Samarium 150 nucleus has shifted by at most 0.12 electron volt over two billion years. Dyson and Damour analyzed this evidence, using recent optical isotope-shift measurements to set firm limits on the relation between the resonance energy and the fine-structure constant. The resulting estimate of the time-variation of the fine-structure constant is zero plus-or-minus 7 parts in 10^{17} per year, the plus-or-minus 7 being a three-sigma limit. This estimate agrees with earlier estimates but is much more firmly based. The work will be published in *Nuclear Physics*.

Apart from the work with Thibault, Dyson spent most of the year preparing lectures, and finishing the book "Imagined Worlds" which will be published in Spring 1997 by Harvard University Press. A volume of mathematical and physical papers, *Selected Papers of Freeman Dyson with Commentary*, was published in 1996 by the American Mathematical Society and International Press. This contains all the Dyson papers up to 1990 that he considers worth preserving.

During the year, Dyson received honorary degrees from the Swiss Federal Institute of Technology (ETH) in Zürich, and from the Scuola Normale Superiore in Pisa, Italy. He also gave lectures in both places.

THE SCHOOL OF NATURAL SCIENCES

MEMBERS AND VISITORS

MARK ALFORD
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MIRJAM CVETIC
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THIBAULT DAMOUR
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AMIHAY HANANY
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LAWRENCE HORWITZ
Particle Physics
Tel Aviv University · s

WAYNE HU
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University of California at Berkeley · m

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PLAMEN KRASTEV
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CHIARA NAPPI
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YOSSI NIR
Mathematical Physics
Weizmann Institute · *v*

MARTIN REES
Astrophysics
Institute of Astronomy · *v*

T. ANDREAS REISENEGGER
Astrophysics   ·
Institute for Advanced Study
(resigned December 1995)

HERB ROOD
Astrophysics
Institute for Advanced Study · *v*

LEV ROZANSKY
Mathematical Physics
University of Miami · *j*

VERA RUBIN
Astrophysics
Carnegie Institution of Washington · *v*

VLADIMIR SADOV
Mathematical Physics
Harvard University · *j*

ASHOKE SEN
Mathematical Physics
Tata Institute · *v*

LEONARD SUSSKIND
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Stanford University · *v*

CLAUDIO TEITELBOIM
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ELI WAXMAN
Astrophyics
Institute for Advanced Study · *m*

INSU YI
Astrophysics
Harvard University

ALBERTO ZAFFARONI
Particle Physics
International School for Advanced Studies

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m Member with Long-term Appointment · *s* Second Term · *v* Visitor · *j* Joint Appointment with School of Mathematics

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

INTERPRETIVE SOCIAL SCIENCE

Since its inception, the School has been committed to broadly humanistic, "interpretive" approaches to the social sciences. Interpretive social science embraces all the ways in which scholars make sense of the social world through empirical study, discussion within and across disciplinary communities, and the critical revision of accepted conceptions. The School is interested in cultural concepts as they shape the disciplines and, more generally, as they organize all forms of social activity. From this perspective, "interpretive social science" is the study of the ways in which human beings create their societies and make life within them meaningful.

With a Faculty of four, the School can hardly hope to cover all the relevant academic disciplines. Yet the presence of a permanent Faculty provides continuity and coherence for the program of the School over the years and in any single year. Faculty members have participated actively in the most important contemporary debates about the centrality of culture, language, ritual, and moral and aesthetic understandings in the study of society. And although each is rooted in his or her own discipline, all do work that cuts across disciplinary boundaries. It is the common interest in interpretation and in the construction of meaning that lends coherence to the School's program. The School is committed to bring to the Institute each year scholars who address issues of culture and meaning through concrete study and from different disciplinary backgrounds, as well as scholars who work in the same discipline as one or another Faculty member but differ in intellectual perspective. This results in a wide ranging membership that represents in any given year a more or less coherent set of arguments — the arguments through which, at the moment, the shape of scholarly work is being decided.

ACADEMIC ACTIVITIES

Nineteen scholars from the United States and abroad were invited to be part of the School's scholarly community as members and visitors for the 1995-96 academic year—from a pool of 223 individuals who applied for membership. Three research assistants also participated in the year's activities. Ford Foundation funds provided partial support for two Members; Mellon Foundation funds provided partial support for six of the fellows; and the National Endowment for the Humanities partially funded seven fellows.

Of the group of twenty-two scholars from Argentina, Bulgaria, France, Israel, the Netherlands, Nigeria and the United States, seven were women. Fields of inquiry of the group included anthropology, six; history, five; literature, two; philosophy, two; political science, four; and sociology, three.

In 1995-96 the School continued an examination of social transitions. This third year of the project focused on "modernization," probably this century's clearest picture of purposeful, goal-directed change. The older image of this process as a more or less unilineal pattern that governed the understanding of social change everywhere from the Soviet Union to India and Mexico, is, if not dead, certainly moribund; as is the notion that the course of "development," will proceed through similar stages and along similar tracks wherever it can be induced to occur; as is, again, the idea that the traditionalist starting point is everywhere the same. The seminar looked back on these familiar views, and considered also alternative accounts of where the "modernizing" countries are now and how they got there.

PROFESSOR CLIFFORD GEERTZ lectured in the Political Philosophy Colloquium at Princeton, at the American Association of Law Schools Annual Meeting in San Antonio, and at Brown and Georgetown Universities. He participated in a conference at the Rockefeller Center in Bellagio, Italy on "Ruling Chaos," and one at Copenhagen University, where he also delivered a public lecture, "Theatre in a Multicultural Society." A paper, "Reason, Religion, and Professor Gellner," appeared in H.R. Hoetink, ed., *The Limits of Pluralism: Neo-Absolutism and Relativism*, Praemium Erasmanium Foundation, Amsterdam and his book, *Welt in Stucken, Kultur und Politik am Ende des 20. Jahrnunderts*, is due shortly from the Institut fur Wissenschaften vom Menschen in Vienna.

PROFESSOR EMERITUS ALBERT O. HIRSCHMAN published A *Propensity to Self-Subversion*, Harvard University Press, in hard cover and paperback editions, 1995. This is a book of essays written since 1986. It consists of three parts; the first consists of essays where Hirschman qualifies or "complicates" ideas he put forward in previous books; the second part is autobiographical; and the third contains a variety of papers entitled "New Forays."

Professor Hirschman also published in 1996 an essay called "Politics" in a book entitled *The Ideas that Shaped Post-War Britain*, edited by David Marquand and Anthony Seldon (Fontana Press).

An interview with Professor Hirschman published in 1994 in Italy as *Passaggi di frontiera: I luoghi e le idee di un percorso di vita* (Trespassing: the Places and Ideas of a Life Course) was published in German in the quarterly journal *Leviathan* (Berlin), 1995, vol. 23, section 2, and in Spanish in *Desarrollo Económico* (Buenos Aires), January/March 1996, under the title "Interview with Albert O. Hirschman on his Life and Work." A French edition is being prepared.

In September 1995, the government of Colombia awarded Professor Hirschman the Order of San Carlos. The decoration was presented to him by the Ambassador of Colombia in Washington, D.C., and Professor Hirschman responded by giving a brief talk on his experiences in Colombia from 1952 to 1956.

Fernando Henrique Cardoso, the President of Brazil, invited Professor Hirschman to join him in San Francisco in March 1996, on the occasion of the endowment of a chair in Brazilian studies at Stanford University.

During the year Professor Hirschman spent a good part of his time preparing a paper to be delivered as the annual Patocka Lecture at the Institute for the Sciences of Man in Vienna, Austria. This lecture will deal with the sociology of the meal in historical perspective and is to be given in October 1996. In April 1996, he took part in a conference on "Economics, Values, and Organizations" at Yale University.

PROFESSOR JOAN WALLACH SCOTT published two books this year. *Only Paradoxes to Offer: French Feminists and The Rights of Man* was published by Harvard University Press. It will appear in French translation in 1997. A collection of essays she edited, *Feminism and History,* was published by Oxford University Press in its series, *Readings in Feminism,* directed by Teresa Brennan and Susan James.

Professor Scott was a member of the review panel for the World History Standards, organized by the Council for Basic Education. She chaired the AAUP Commission on Shared Governance and Affirmative Action, which looked into the regents' decision to end affirmative action in admissions and hiring in the University of California system. The Commission's report was issued in May 1996.

Professor Scott taught a graduate history course at Rutgers. She was an associate in the Humanities Center at Johns Hopkins and a Henry Luce Scholar at Yale's Whitney Humanities Center. She lectured at Brown University, the University

of Oregon, Oregon State University, Fordham University, Trenton State College, Wheaton College, and the University of Georgia. She gave a paper, "After History?" at a conference on "The Limits of Historical Interpretation" at Rice University which will be published in the journal *Common Knowledge* next fall.

In January, Professor Scott received the Nancy Lyman Roelker Mentorship Award from the American Historical Association for outstanding mentorship of graduate students.

During the academic year 1995-96, PROFESSOR MICHAEL WALZER served the second year (of a two year term) as president of the American Society for Political and Legal Philosophy. He gave the Castle Lectures at Yale University, the Frederick C. Wood Memorial Lecture at Vassar, and the Spindel Memorial Lecture at Bowdoin; he also lectured at Williams College, the New School for Social Research, and the London School of Economics. A conference on his work was held at Westminster University in London, where he responded to critics in panels on multiculturalism and pluralism and on war and intervention. He also lectured for the Agnelli Foundation in Turin, the Goethe University in Frankfurt, and the University of Lisbon. He chaired the third Locarno Conference on Politics and Society. Articles of his appeared in a number of new books, most importantly *Liberalism Without Illusions*, published by Chicago and *The Ethics of War and Peace*, published by Princeton. His book *The Company of Critics* was published in a French translation. At the Institute, he completed a draft of a little book on "toleration," and continued to work on the collaborative project on Jewish Political Thought, partially funded by a grant from NEH.

THE SCHOOL OF SOCIAL SCIENCE

MEMBERS, VISITORS AND RESEARCH STAFF

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Wesleyan University

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University of Pennsylvania

ALLEN WELLS
History
Bowdoin College

LINDA ZERILLI
Political Science
Rutgers University

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

THE LIBRARIES

The *Historical Studies-Social Science Library* [Dr. 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 third year of sponsorship of the IAS/Park City Mathematics Institute (PCMI), a multi-level mathematics program for researchers, graduate students, undergraduate students, 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 where high school teachers work in collaboration with university faculty.

In 1996, over two hundred participants attended the first PCMI summer session held at the Institute for Advanced Study. From June 23 to July 13, researchers, high school teachers, 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 1997 summer session will be held in Park City, Utah, from June 29 to July 19.

The research topic for the Graduate Summer School and Research Program was Probability, organized by Srinivasa Varadhan, Courant Institute, and Elton Pei Hsu, Northwestern University. The Undergraduate Program, designed to enhance students' interest in mathematics in general and the area of probability in particular, was organized by Gregory Lawler, Duke University, and Emily Puckette, Occidental College. 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 to all participants. A complete listing of courses, lectures and activities can be found beginning on page 90.

The computer lab, located in the Dilworth Room, was equipped with a variety of computer hardware and software. The lab was a valuable resource for educational and computational work as well as Internet access, and it was in use around the clock. Another popular resource, the Mathematics-Natural Sciences Library, provided a vast array of books and materials for participants and was a quiet place to read and study.

There were many opportunities for informal and social interaction throughout the summer session including dances, pizza parties, field trips to area attractions, a Casino Night and opening and closing barbecues. Participants especially enjoyed the delicious meals prepared by Institute Chef Franz Moehn and his

staff. Franz delayed his retirement in order to be part of the PCMI, an action warmly applauded by all participants. The Dining Hall was the favorite gathering place because of the wonderful food and the welcoming and relaxed atmosphere. Tea, served after the Cross Program Activity, provided another opportunity for social interaction and conversation about math. All of these resources and activities were designed to encourage casual interaction and promote a sense of community among participants. Many professional relationships and friendships were formed, and fostering these relationships throughout the mathematics community is perhaps one of PCMI's most important accomplishments.

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 1995-97 sites include Clark Atlanta University, Duke University, Idaho State University, Purdue University, Rice University and the University of Louisville. 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 PCMI to reflect the true breadth of the mathematical enterprise. In this regard, two initiatives were planned for the 1996 summer session: a pilot program for undergraduate faculty and a conference for mathematics educators. The Faculty Enhancement Program was designed to enhance the teaching ability of a small group of undergraduate faculty each year. Faculty attending gained experience with recent advances and experimental techniques in their fields and explored ways to incorporate these into their classroom instruction.

Joan Ferrini-Mundy, a member of the PCMI Steering Committee, organized a two-day conference for professional mathematics educators. The goal of the conference was to determine the feasibility of adding a mathematics education research component to the PCMI. Noting the powerful sense of community among the teachers and other participants, the visitors had three specific comments: PCMI teachers left the summer session feeling empowered; they felt their students could be excellent mathematics students; and they felt that they had made a contribution to the PCMI community.

On June 27, one hundred attendees of the Second Conference for African American Research Mathematicians (AARMS) joined PCMI participants for an afternoon of research talks and breakout sessions, followed by an evening banquet. The goals of the conference were to highlight current research by African-American mathematicians, facilitate working relations, identify common research interests and goals, and enhance the growth of mathematics among African-Americans.

On July 11, the Institute honored the National Science Foundation and its director, Neal Lane, with a day-long celebration of the NSF's commitment to excellence in mathematics and to the integration of research and education. Leaders in the public and private sectors, along with participants in the PCMI and the DIMACS Research and Education Institute, recognized the NSF's successful Regional Institutes in the Mathematical Sciences (RIMS) and acknowledged its long history of supporting developing mathematicians. A list of speakers and topics can be found on page 93.

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*, and Volume II, *Nonlinear Partial Differential Equations in Differential Geometry*, from the 1991 and 1992 programs, have already been published, and Volume III, *Complex Algebraic Geometry*, from the 1993 program, will be available in the fall. There are plans to publish material from the High School Teacher and Undergraduate Programs in the future. Through the PCMI Lecture Series, material generated during the summer session and academic year site program will 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, Director of Research, 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.

The Steering Committee plans and manages PCMI activities as follows:

Convener:
    John C. Polking, Professor, Rice University
1996 Organizers:
    Elton Pei Hsu, Professor, Northwestern University
    Srinivasa Varadhan, Professor, Courant Institute
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
    Gregory Lawler, Professor, Duke University
Editor, PCMI Lecture Series:
    Daniel S. Freed, Professor, University of Texas at Austin.

High School Teachers Program:

Joan Ferrini-Mundy, National Academy of Sciences

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

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 June 10-20. The program, organized by Chuu-Lian Terng, Northeastern University, and Karen Uhlenbeck, 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 thirty-five participants included graduate students, undergraduates, young postdoctoral scholars, and senior researchers. The undergraduate lecture was *An Introduction to Queueing Theory*, Anne Dougherty, University of Colorado; the graduate lecture was *Reflecting Brownian Motions and Queueing Networks*, Ruth Williams, University of California, San Diego and Vien Nguyen, MIT. In addition, there was a Women in Mathematics Seminar led by Karen Uhlenbeck. A complete listing of lectures and activities can be found beginning on page 89.

The Women's Program Committee assists the organizers in planning and pro moting the program and recruiting lecturers and participants. Members include: Fan Chung, Professor, University of Pennsylvania; Ingrid Daubechies, Professor, Princeton University; Irene Gamba, Professor, Courant Institute, New York University; Sarah Greenwald, Graduate Student, University of Pennsylvania; Nancy Hingston, Professor, Trenton State College; 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 support and interact with each other. The Women's Program has enabled the PCMI to increase the number of women participants by a significant factor, and it has provided the students with an opportunity to form professional friendships and collaborations that are further solidified dur ing the PCMI summer session.

RECORD OF EVENTS

The following is a calendar of events sponsored by the Schools of
Historical Studies, Mathematics, Natural Sciences and Social Science, by the
IAS/Park City Mathematics Institute and by the Office of the Director

Academic Year 1995-96

September 18
School of Natural Sciences
IAS-Princeton University Theoretical Physics
Seminar: "Chiral Duals of Non-chiral SUSY
Gauge Theories"
P. POULIOT, *Rutgers University*

September 26
School of Natural Sciences
Astrophysics Talk: "Non-Linear Damping of
Stellar Oscillations"
PAWAN KUMAR, *MIT*

September 26-June 4
School of Natural Sciences
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

September 29
School of Natural Sciences
IAS-Princeton University Theoretical Physics
Seminar: "Lattice Gauge Theory for the
Laptop"
MARK ALFORD, *IAS*

October 2
School of Mathematics
Combinatorics and Complexity Seminar:
"Broadcasting on Trees and the Ising Model"
YUVAL PERES, *University of California, Berke-
ley/The Hebrew University, Jerusalem*

October 3
School of Mathematics
P-Adic Hodge Theory Seminar: "Mod p Rep-
resentations of Galois Groups of Local Fields"
JEAN-MARC FONTAINE, *IAS*

Birch and Swinnerton-Dyer Conjectures and
Iwasawa Theory of Modular Forms Seminar:
Introduction
KAZUYA KATO, *IAS*

School of Natural Sciences
Astrophysics Talk: "Cascading of High Energy
Gamma-Rays on Cosmic Background Radia-
tion: Cosmological Implications"
PAOLO COPPI, *Yale University*

October 5
School of Historical Studies
Messianism Seminar: "Diversity and Interac-
tion: Messiahs in Early Judaism"
PETER SCHÄFER, *IAS*

School of Mathematics
Modular Forms and Elliptic Curves Seminar:
Introduction
ANDREW WILES, *IAS*

Harmonic Analysis and Number Theory Sem-
inar: "The Uniform Bogomolov Conjecture
on Multiplicative Groups"
ENRICO BOMBIERI, *Professor, School of Math-
ematics, IAS*

School of Social Science
Luncheon Seminar: "What Is Going On?
Reflections on American Politics"
MICHAEL WALZER, *Professor, School of Social
Science, IAS*

October 6
School of Mathematics
Statistical Properties of Solutions of Nonlin-
ear Wave Equations Seminar
VLADIMIR ZAKHAROV, *IAS*

October 9
School of Mathematics
Statistical Properties of Solutions of Nonlin-
ear Wave Equations Seminar: "On Space-
time Properties of Solutions for Nonlinear
Wave Equations with Random Initial Date"
K. L. VANINSKY, IAS

Combinatorics and Complexity Seminar:
"Lower Bounds on Arithmetic Circuits via
Partial Derivatives"
AVI WIGDERSON, IAS

Special Seminar: "On the Drinfeld-Kohno
Equivalence between Groups and Quantum
Groups"
R.A. ENGELDINGER, Munich

School of Natural Sciences
Theoretical Physics Seminar: "Fermion Num-
ber Violation via Collision Induced Decays of
Electroweak Solitons"
KRISHNA RAJAGOPAL, Harvard University

October 10
School of Mathematics
P-Adic Hodge Theory Seminar: "Lecture 2:
Mod p Representations of Galois Groups of
Local Fields"
JEAN-MARC FONTAINE, IAS

Birch and Swinnerton-Dyer Conjectures and
Iwasawa Theory of Modular Forms Seminar:
Lecture 2
KAZUYA KATO, IAS

School of Natural Sciences
Astrophysics Talk: "Duality for Astronomers"
EDWARD WITTEN, Professor, School of Natur-
al Sciences, IAS

October 11
Friends of the Institute
Tour and discussion of the Lessing J. Rosen-
wald Collection in the History of Science
ELLIOTT SHORE, Librarian, Schools of
Historical Studies and Social Science, IAS

School of Mathematics
Applied Math - Math Physics Seminar: "On
the Longtime Behavior of Smooth Solutions
of Hamiltonian PDE's"
JEAN BOURGAIN, Professor, School of Mathe-
matics, IAS

Statistical Properties of Solutions of Nonlin-
ear Wave Equations Seminar, continued
VLADIMIR ZAKHAROV, IAS

October 12
School of Mathematics
Modular Forms and Elliptic Curves Seminar:
Lecture 2
ANDREW WILES, IAS

Harmonic Analysis and Number Theory Sem-
inar: "Gross Zagier Formulae for Tate Curves"
H. DARMON, Princeton University

School of Social Science
Luncheon Seminar: "Organizations, Wealth
and Power"
CHARLES PERROW, IAS

October 13
School of Historical Studies
Historical Studies Seminar: "Deux types de
cursive latine à Byzance, d'après une nouvelle
inscription de Didymes (533 ap. J.-C.)"
DENIS FEISSEL, Collège de France

School of Natural Sciences
Lunchtime Physics Seminar: "Duality and
Holography"
L. SUSSKIND, IAS

October 16
School of Mathematics
Combinatorics and Complexity Seminar:
"Linear Time Erasure Codes with Nearly
Optimal Recovery"
MICHAEL LUBY, International Computer
Science Institute, Berkeley

Hermann Weyl Lecture: "Iwasawa Theory
and Euler Systems: I. Introduction and
Examples"
KARL RUBIN, IAS

October 17
School of Mathematics
P-Adic Hodge Theory Seminar: "Abelian
Varieties, BdR and Bcris"
JEAN-MARC FONTAINE, IAS

Hermann Weyl Lecture: "Iwasawa Theory
and Euler Systems: II. Selmer Groups and
Euler Systems"
KARL RUBIN, IAS

School of Natural Sciences
Astrophysics Talk: "A Three-Flavor Analysis
of Laboratory Neutrino Oscillation Searches"
ELIGIO LISI, IAS

October 18
School of Mathematics
Statistical Properties of Solutions of Nonlinear
Wave Equations Seminar: "A Normal Form
Approach to Resonant Wave Interactions"
URIEL FRISCH, Princeton University/Nice

Hermann Weyl Lecture: "Iwasawa Theory
and Euler Systems: III. Applications of
Euler Systems"
KARL RUBIN, IAS

Applied Math - Math Physics Seminar:
"Nonintegrability of Free Surface Deep Water
in the Gravity Field"
VLADIMIR ZAKHAROV, IAS

Friends of the Institute
Friends' Forum: "Contributions of Mathematics
to Economics"
SYLVIA NASAR, The New York Times

October 19
School of Mathematics
Modular Forms and Elliptic Curves Seminar:
Lecture 3
B. CONRAD, Princeton University

Hermann Weyl Lecture: "Iwasawa Theory
and Euler Systems: IV. Conjectures"
KARL RUBIN, IAS

Harmonic Analysis and Number Theory
Seminar: "Torsion of Elliptic Curves over
Number Fields"
LOIC MEREL, IAS

School of Social Science
Luncheon Seminar: "The Modern Veil: Islam
and Historical Consciousness in Java"
SUZANNE BRENNER, IAS

October 20
School of Mathematics
PDE Seminar: "Unique Continuation for
Solutions to PDE's"
DANIEL TATARU, IAS

Special Seminar: "Hidden Symmetries in the
Structure of High Dimensional Convex
Bodies"
VITALI MILMAN, Tel Aviv University

School of Natural Sciences
Condensed Matter Seminar: "Parity Fluctua-
tions between Coulomb Blockaded Super-
conducting Islands"
VINAY AMBEGAOKAR, Cornell University

October 23
School of Mathematics
Combinatorics and Complexity Seminar:
"The d-step Conjecture and Gaussian
Elimination"
JEFF LAGARIAS, Bell Labs

Members Seminar: "Crystal Surface Shapes,
in Equilibrium and Growth"
JEAN TAYLOR, IAS

October 24
School of Historical Studies
Islamic Seminar: "Movement and Transmis-
sion of People, Taste, Practice and Knowledge
across the Medieval Islamic World"
OLEG GRABAR, Professor, School of
Historical Studies, IAS and
MICHAEL COOK, Princeton University
Medieval Seminar: "Dice and Divination"
GENEVRA KORNBLUTH, IAS

School of Natural Sciences
Astrophysics Talk: "Signatures of the Forma-
tion of Objects in the Universe"
DANIEL EISENSTEIN, Harvard University
Center for Astrophysics

October 25
School of Mathematics
Statistical Properties of Solutions of Nonlinear Wave Equations Seminar: "Introduction to Statistical Theory of Nonlinear Wave Fields: 1. Heuristic Derivation of Kinetic Equations for Waves"
VLADIMIR MALKIN, IAS

Applied Math - Math Physics Seminar: "Remarks and Problems Related to Nekhoroshev Stability and KAM for Hamiltonian PDE"
JEAN BOURGAIN, Professor, School of Mathematics, IAS

School of Social Science
Modernization Seminar: Discussion of James Clifford, "Histories of the Tribal and the Modern"; Fred Myers, "Representing Culture: The Production of Discourse(s) for Aboriginal Acrylic Paintings"; and Clement Greenberg, "Avant Garde and Kitsch"
FRED MYERS, IAS

October 26
School of Historical Studies
Messianism Seminar: "Messianic and Millenarian Themes and Life Events in Seventeenth-Century Europe"
NATALIE DAVIS, Princeton University

School of Mathematics
Harmonic Analysis and Number Theory Seminar: "Mean-square Distribution of Primes in Arithmetic Progressions"
JOHN FRIEDLANDER, IAS

School of Social Science
Luncheon Seminar: "The Mixed Constitution After Liberalism"
GRAHAM WALKER, IAS

October 27
School of Mathematics
PDE Seminar: "Direct Sum Constructions for Solutions of the Yamabe Equation"
KAREN UHLENBECK, IAS

School of Natural Sciences
Lunchtime Physics Seminar: "Massive and Massless PBS States of N=4 String Vacua"
M. CVETIC, IAS

October 30
School of Mathematics
Combinatorics and Complexity Seminar: "A Brownian Bridge to Graph Enumeration"
JOEL SPENCER, Courant Institute

Members Seminar: "Spaces with Ricci Curvature Bounded Below"
JEFF CHEEGER, IAS

October 31
School of Mathematics
P-Adic Hodge Theory Seminar: "Potentially Semi-stable Galois Representations"
JEAN-MARC FONTAINE, IAS

Birch and Swinnerton-Dyer Conjectures and Iwasawa Theory of Modular Forms Seminar: Lecture 3
KAZUYA KATO, IAS

School of Natural Sciences
Astrophysics Talk: "Extracting Cosmological Parameters from the Microwave Background"
ARTHUR KOSOWSKI, Harvard University Center for Astrophysics

November 1
School of Mathematics
Statistical Properties of Solutions of Nonlinear Wave Equations Seminar: "Introduction to Statistical Theory of Nonlinear Wave Fields: 2. The Simplest Properties of Kinetic Equations for Waves"
VLADIMIR MALKIN, IAS
 Applied Math - Math Physics Seminar: "Scaling of Circulation and Other Quantities in Turbulence"
KATEPALLI SREENIVASAN, IAS

School of Natural Sciences
Institute Lecture: "Recent Discoveries with the Hubble Space Telescope"
JOHN N. BAHCALL, Professor, School of Natural Sciences, IAS

November 2
School of Mathematics
Modular Forms and Elliptic Curves Seminar:
"The Hecke Algebra TD"
FRED DIAMOND, IAS

Harmonic Analysis and Number Theory Seminar: "Partitions and the Existence of t-cores"
KEN ONO, IAS

School of Social Science
Luncheon Seminar: "The Democratic Symbolic: Reflections on the Statue of Liberty"
LINDA ZERILLI, IAS

November 3
School of Historical Studies
Seminar on Force in History:
"Historical Antecedents"
PETER PARET, Professor, School of Historical Studies, IAS
"Revolution and Empire"
ALAN FORREST, University of York
"Defining the Enemy: War, Law, and the Levée en Masse"
JOHN HORNE, Trinity College
"American Attitudes towards the Prussian Nation-in-Arms in the Franco-Prussian War"
JOHN CHAMBERS, IAS

November 4
School of Historical Studies
Seminar on Force in History:
"Myths of Liberation, Military Preparations for Landesverteidigung during the Weimar Republic and in the Third Reich"
MICHAEL GEYER, University of Chicago
"The Dilemmas of Conscription and Nation-Building in the Russian Empire and the Soviet Union"
MARK VON HAGEN, Columbia University
"Images of the levée in Germany"
BETH IRWIN LEWIS, College of Wooster
"The Algerian Civil War"
DOUGLAS PORCH, Naval War College
"The Vietnamese People's Army"
GREG LOCKHART, Australian National University
"The Philippine levée en masse of 1899: Conscription, Nationalism, and National Amnesia"
GLENN MAY, University of Oregon

"Reception and Influence of Jean Jaurès' L'armee nouvelle in China"
ARTHUR WALDRON, Naval War College

November 6
School of Mathematics
Combinatorics and Complexity Seminar:
"Threshold Phenomena under Symmetry"
GIL KALAI, IAS

Members Seminar: "Finite Type Invariants of Links and 3D Manifolds"
LEV ROZANSKY, IAS

November 7
School of Historical Studies
Medieval Seminar: "The Sanudo Diaries Project: Progress, Problems, and Pleasures"
PATRICIA LABALME, IAS

School of Mathematics
P-Adic Hodge Theory Seminar: "Semi-stable and Geometric Galois Representations"
JEAN-MARC FONTAINE, IAS

Birch and Swinnerton-Dyer Conjectures and Iwasawa Theory of Modular Forms Seminar:
Lecture 4
KAZUYA KATO, IAS

School of Natural Sciences
Astrophysics Talk: "Multi-Spin Galaxies"
VERA RUBIN, IAS

November 8
School of Mathematics
Statistical Properties of Solutions of Nonlinear Wave Equations Seminar: "Introduction to Statistical Theory of Nonlinear Wave Fields: 3. Naive Perturbative Derivation of Kinetic Equations for Waves"
VLADIMIR MALKIN, IAS
Applied Math - Math Physics Seminar:
"Introduction to the Renormalization Group in Many Fermion Systems"
DETLEF LEHMANN, IAS

School of Natural Sciences
Astrophysics Talk: "The Fate of Gas in Merging Disk Galaxies"
JOHN HIBBARD, Institute for Astronomy, Hawaii

The Raymond and Beverly Sackler Colloquium: "Inhomogeneous Cosmology or Why the Universe Is Not Boring: Past, Present and Future Perspectives"
DAVID SPERGEL, *Princeton University*

School of Social Science
Modernization Seminar: Discussion of Kwame Anthony Appiah, *In My Father's House: Africa in the Philosophy of Culture*; Olakunle George, "Modernity and the Promise of Reading"; Charles Taylor, *Philosophy and the Human Sciences*, *Philosophical Papers 2*
OLAKUNLE GEORGE, *IAS*

Friends of the Institute
Friends' Workshop: "Exploring the Web: An Introduction to Cyberspace"
ELLIOTT SHORE, *Librarian, Schools of Historical Studies and Social Science, IAS*

November 9
School of Historical Studies
Art History Colloquium: "Self-portraits of Women Artists in the Renaissance"
GUNTER SCHWEIKHART, *IAS*

Messianism Seminar: "Popular Messianism in 16th Century Spain"
SARA NALLE, *IAS*

Messianism Seminar: "Salvation through Philology. The Case of Quirlinus Kuhlmann"
WILHELM SCHMIDT-BIGGEMANN,
Princeton University

School of Mathematics
Modular Forms and Elliptic Curves Seminar: "The Commutative Algebra of Wiles' Proof"
HENRI DARMON, *Princeton University*
Modular Forms and Elliptic Curves Seminar: "Torsion of Elliptic Curves: Linear Independence of Hecke Operators"
LOÏC MEREL, *IAS*

Harmonic Analysis and Number Theory Seminar: "Mean Values and the Distribution of Zeros of the Zeta Function"
D. FARMER, *Rutgers University*

School of Social Science
Luncheon Seminar: "Why Do Empty Signifiers Matter to Politics?"
ERNESTO LACLAU, *IAS*

November 10
School of Mathematics
PDE Seminar: "Rigid Dynamical Systems"
RAFAEL DE LA LLAVE, *IAS*

School of Natural Sciences
Molecular Biology Conference: "Thinking about Life: Emerging Themes in Theoretical Biology"
STEVEN BLOCK, *Princeton University,* moderator
STEPHEN ADLER, *Professor, School of Natural Sciences, IAS,* moderator
"Protein Folding: A Perspective from Very Simple Models"
KEN DILL, *University of California, San Francisco*
"Tracking Mitotic Domains in Fruit Fly Embryos"
GARRETT ODELL, *University of Washington*
"Viruses and the Immune System"
MARTIN NOWAK, *Oxford University*
"Algorithms of High-Level Vision: Seeing is Computing"
JOSEPH ATICK, *Rockefeller University*
"Modeling Molecular Motors"
GEORGE OSTER, *University of California, Berkeley*
"Themes in Mitosis: Emerging Thoughts on Regulated Assembly"
STANISLAS LEIBLER, *Princeton University*
"Computing with Action Potentials"
JOHN HOPFIELD, *California Institute of Technology*

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

School of Mathematics
Combinatorics and Complexity Seminar: "How to Forget while Walking Randomly"
LASZLO LOVASZ, *Yale University*

Members Seminar: "Periods of t-motives and Transcendence"
SAMARENDRA K. SINHA, IAS

November 14
IAS Concert Series
Beethoven: The Piano Sonatas, Program IV
ROBERT TAUB, *Artist-in-Residence*, IAS

School of Mathematics
P-Adic Hodge Theory Seminar: "Constructing Crystalline Representations"
C. BREUIL, *École Polytechnique*

Birch and Swinnerton-Dyer Conjectures and Iwasawa Theory of Modular Forms Seminar: "Lecture 5: Generalized Explicit Reciprocity Law and p-adic Hodge Theory"
KAZUYA KATO, IAS

School of Natural Sciences
Astrophysics Talk: "The Faintest Radio Sources: Clues to the Evolution of Galaxies"
JAMES LOWENTHAL, *Lick Observatory*

November 15
School of Mathematics
Statistical Properties of Solutions of Nonlinear Wave Equations Seminar: "Introduction to Statistical Theory of Nonlinear Wave Fields: 4. Kolmogorov Spectra as Exact Stationary Solutions of Kinetic Equations for Waves"
VLADIMIR MALKIN, IAS

Applied Math - Math Physics Seminar: "Introduction to the Renormalization Group in Many Fermion Systems, Part II"
DETLEF LEHMANN, IAS

November 16
School of Mathematics
Modular Forms and Elliptic Curves Seminar: "Changing the Level"
ANDREW WILES, IAS

Modular Forms and Elliptic Curves Seminar: "Torsion of Elliptic Curves: Linear Independence of Hecke Operators (Continued)"
LOÏC MEREL, IAS

Harmonic Analysis and Number Theory Seminar: "Dominating Varieties by Smooth Varieties"
J. DE JONG, *Harvard University*

School of Social Science
Luncheon Seminar: "Literary Africa: The Case of Solomon T. Plaatje"
OLAKUNLE GEORGE, IAS

November 17
IAS Concert Series
Beethoven: The Piano Sonatas, Program IV
ROBERT TAUB, *Artist-in-Residence*, IAS

School of Mathematics
PDE Seminar: "On Local Well-posedness for Generalized KdV"
GIGLIOLA STAFFILANI, IAS

November 18
IAS Concert Series
Beethoven: The Piano Sonatas, Program IV
ROBERT TAUB, *Artist-in-Residence*, IAS

November 19
Friends of the Institute
Friends' Fireside Chat: "People, Celebrities and Pop Culture"
LANDON Y. JONES, *Managing Editor, People Magazine*

November 20
School of Mathematics
Combinatorics and Complexity Seminar: "Explicit Construction of Small Hitting Sets for Combinatorial Rectangles"
MICHAEL SAKS, *Rutgers University*

Members Seminar: "Relative Determinants of Laplacians and Scattering Theory"
WERNER MÜLLER, IAS

November 21
School of Historical Studies
Medieval Seminar: "The Case of Rigrannus of Le Mans"
GILES CONSTABLE, *Professor, School of Historical Studies*, IAS

School of Mathematics
P-Adic Hodge Theory Seminar: "Construct-
ing Semi-stable Galois Representations I"
C. BREUIL, École Polytechnique

Birch and Swinnerton-Dyer Conjectures and
Iwasawa Theory of Modular Forms Seminar:
"Lecture 6: Euler Systems"
KAZUYA KATO, IAS

November 22
School of Mathematics
Stochastic Properties of PDE Seminar: "How
Periodically Boundary Conditions Affect
Weak Turbulence"
V. E. ZAKHAROV, IAS

Applied Math - Math Physics Seminar: "Lin-
stedt Series, Ultraviolet Divergences and
Moser Theorem"
G. GALLAVOTTI, University of Rome

School of Natural Sciences
Condensed Matter Seminar: "Coulomb
Blocking of Tunneling: From Zero-Bias
Anomaly to Coulomb Gap"
L. S. LEVITOV, Massachusetts Institute of
Technology

November 27
School of Mathematics
Workshop on Discrete Isoperimetric Inequalities

School of Natural Sciences
Theoretical Physics Seminar: "Lattice Chiral
Gauge Theories and Finely-Grained Fermions"
RAMAN SUNDRUM, Harvard University

November 28
School of Mathematics
P-Adic Hodge Theory Seminar: "Construct-
ing Semi-stable Galois Representations II"
C. BREUIL, École Polytechnique

Birch and Swinnerton-Dyer Conjectures and
Iwasawa Theory of Modular Forms Seminar:
"Lecture 7: Selmer Groups"
KAZUYA KATO, IAS

School of Natural Sciences
Astrophysics Talk: "Cosmic Magnetic Field
Origin and Dynamos"
RUSSELL KULSRUD, Princeton University

November 29
School of Mathematics
Nonlinear Wave Equations Seminar: "Kol-
mogorov Spectra as Exact Stationary Solutions
of Kinetic Equations for Waves
(Continuation)"
VLADIMIR MALKIN, IAS

School of Social Science
Modernization Seminar: Discussion of C. E.
Black, The Dynamics of Modernization:
A Study in Comparative History; Roumen
Daskalov, "Building up a National Identity:
The Case of Bulgaria"; Alexander
Gerschenkron, "Reflections on the Concept
of 'Prerequisites' of Modern Industrialization";
David Mitrany, "The Populist Reaction"
ROUMEN DASKALOV, IAS

November 30
School of Historical Studies
Art History Colloquium: "Was There a Car-
olingian Renaissance? The Evidence of
Engraved Gems"
GENEVRA KORNBLUTH, IAS

Messianism Seminar: "Jewish Apocalyptic
Thinking and the Weimar Republic"
STEVEN ASCHHEIM, IAS

Messianism Seminar: "Lines, Circles, and
Points: Messianic Epistemology in Cohen,
Rosenzweig and Benjamin"
ROBERT GIBBS, Princeton University

School of Mathematics
Modular Forms and Elliptic Curves Seminar:
"Bounding the Selmer Group"
ANDREW WILES, IAS

Modular Forms and Elliptic Curves Seminar:
"Changing the Level, II"
FRED DIAMOND, IAS

Harmonic Analysis and Number Theory
Seminar: "Rigidity Theorems for Abelian
Varieties"
ALICE SILVERBERG, IAS

School of Social Science
Luncheon Seminar: "Tribes and the Print
Trade: Notes from the Margins of Literate
Culture in Jordan"
ANDREW SHRYOCK, IAS

December 1
School of Historical Studies
Historical Studies Seminar: "Political Econo-
my of the Roman Empire"
KEITH HOPKINS, King's College, Cambridge

School of Mathematics
PDE Seminar: "The Yang-Mills Heat Flow"
A. SCHLATTER, Princeton University

December 4
School of Mathematics
Combinatorics and Complexity Seminar:
"The Uniform Distribution of xp mod p2 and
Related Topics (after Heath-Brown)"
ENRICO BOMBIERI, Professor, School of Math-
ematics, IAS

Combinatorics and Complexity Seminar:
"Some Gems of Haken"
AVI WIGDERSON, IAS

Members Seminar: "On the Subspaces of Lp
Spanned by Sequence of Independent Identi-
cally Distributed Random Variables"
F. GLUSKIN, IAS

School of Natural Sciences
Condensed Matter Seminar: "The Physics of
Granular Materials"
HEINRICH JAEGER, University of Chicago

December 5
School of Mathematics
P-Adic Hodge Theory Seminar: "Geometric
Galois Representations"
JEAN-MARC FONTAINE, IAS

Birch and Swinnerton-Dyer Conjectures and
Iwasawa Theory of Modular Forms Seminar:
"On the Derivative of p-adic L-functions of
Modular Forms, I"
MASATO KURIHARA, IAS

School of Natural Sciences
Astrophysics Talk: "Cosmic Web Theory of
the Large-Scale Structure of the Universe"
DMITRY POGOSYAN, Canadian Institute for
Theoretical Astrophysics

December 6
School of Mathematics
Seminar: "Discrete Dyson's and Discrete
Kinetic Equations"
VLADIMIR ZAKHAROV, IAS

Solutions of Nonlinear Wave Equations Sem-
inar: "Introduction to Statistical Theory of
Nonlinear Wave Fields: 5. Generalized
Kolmogorov Spectra for Nonlinear
Schroedinger Turbulence"
VLADIMIR MALKIN, IAS

Friends of the Institute
Friends' Forum: "The Responsibility of
Knowledge"
OLEG GRABAR, Professor, School of
Historical Studies, IAS

December 7
School of Mathematics
Modular Forms and Elliptic Curves Seminar:
"The Complete Intersection Property"
ANDREW WILES, IAS

Modular Forms and Elliptic Curves Seminar:
"Modularity of mod 5 Representations"
KARL RUBIN, IAS

Harmonic Analysis and Number Theory Sem-
inar: "Gaussian Primes"
H. IWANIEC, Rutgers University

School of Social Science
Luncheon Seminar: "Angry Artisans: The
Political Baptism of Yucatán's Urban Working
Classes (c. 1900)"
ALLEN WELLS, IAS

December 8
School of Mathematics
PDE Seminar: "Two Variational Problems"
M. WEINSTEIN, *Princeton University*

School of Natural Sciences
IAS-Princeton University Theoretical Physics
Seminar: "Generalized Quantum Dynamics as
Pre-Quantum Mechanics"
STEPHEN ADLER, *Professor, School of Natural
Sciences, IAS*

IAS-Princeton University Theoretical Physics
Seminar: "Duality"
EDWARD WITTEN, *Professor, School of
Natural Sciences, IAS*

December 9
School of Historical Studies
Delaware Valley Medieval Association Meeting
MARGOT FASSLER, *IAS*
GENEVRA KORNBLUTH, *IAS*
CHRISTIANE KLAPISCH-ZUBER, *IAS*

December 11
School of Historical Studies
Historical Studies Seminar: "Urban Planning
in Syria: from Antique Chaos to Islamic Order"
HUGH KENNEDY, *University of Saint Andrews*

School of Mathematics
Combinatorics and Complexity Seminar:
"Asymptotics for Edge Colorings"
JEFF KAHN, *Rutgers University*

Members Seminar: "Strichartz-type Estimates
for Large Time"
AKOS MAGYAR, *IAS*

School of Natural Sciences
IAS/Princeton University Theoretical Physics
Seminar: "Counting BPS States in N=2 Yang-
Mills Theories"
SAVDEEP SETHI, *Harvard University*

December 12
School of Historical Studies
Medieval Seminar: "Fubert of Chartres"
MARGOT FASSLER, *IAS*

School of Mathematics
P-Adic Hodge Theory Seminar: "Cohomolo-
gy and Deformations of Semi-stable Galois
Representations"
JEAN-MARC FONTAINE, *IAS*

Birch and Swinnerton-Dyer Conjectures and
Iwasawa Theory of Modular Forms Seminar:
"On the Derivative of p-adic L-functions of
Modular Forms, II"
MASATO KURIHARA, *IAS*

School of Natural Sciences
Astrophysics Talk: "Cosmic Chemical
Evolution and Background Radiation"
MICHAEL FALL, *Space Telescope Science
Institute, Johns Hopkins University*

December 13
Institute Lecture
"Michelangelo's Medici Madonna and the
Liturgy of Love"
IRVING LAVIN, *Professor, School of Historical
Studies, IAS*

School of Mathematics
Stochastic Properties of PDE Seminar: "Dis-
crete Kinetic Equation - Application to the
Problem of Fermi Acceleration of a Quantum
Particle"
VLADIMIR ZAKHAROV, *IAS*

Statistical Theory of Nonlinear Wave Equa-
tions Seminar: "Strong Wave Turbulence in
the Framework of 2D Schroedinger Equation
with Focusing Cubic Nonlinearity"
VLADIMIR MALKIN, *IAS*

School of Natural Sciences
Condensed Matter Seminar: "Scaling and
Dynamics of Interface Growth"
KENT B. LAURITSEN, *Boston University*

December 14
School of Historical Studies
Art History Colloquium: "Venus, Vulcan and
Mars: A Mythological Allegory by Tintoretto
in the Venetian Tradition"
CLAUDIA CIERI VIA, *IAS*
Messianism Seminar: "Armilus: The Jewish
Anti-Christ"
JOSEPH DAN, *IAS*

School of Mathematics
Harmonic Analysis and Number Theory
Seminar: "Exceptional Weil Classes on
Abelian Varieties"
Y. ZARHIN, *Pennsylvania State University*

School of Social Science
Luncheon Seminar: "The Struggle for
Economic Reform in Russia"
JOSEPH BLASI, *IAS*

December 18
School of Mathematics
Combinatorics and Complexity Seminar:
"Quasi-planar Graphs Have a Linear Number
of Edges"
RICHARD POLLACK, *Courant Institute*

School of Natural Sciences
IAS-Princeton University Theoretical Physics
Seminar: "A Class of Exactly Solvable Models
for (0,2) String Vacua"
RALPH BLUMENHAGEN, *University of
North Carolina*

January 8
School of Mathematics
Combinatorics and Complexity Seminar:
"Diminishing Our Reliance on Randomness
in Computation"
DAVID ZUCKERMAN, *University of Texas at
Austin*

January 11
School of Historical Studies
Messianism Seminar: "Messianic Elements in
the Prechristian Greco-Roman World"
CHRISTIAN HABICHT, *Professor, School of
Historical Studies, IAS*

"Messianic Movements in First-Century
Palestine: The Evidence of Josephus"
MARTHA HIMMELFARB,
Princeton University

School of Social Science
Luncheon Seminar: "Burnt Out Outback:
The Sociocultural Organization of the
Aboriginal Arts and Crafts Industry"
FRED MYERS, *IAS*

January 12
School of Natural Sciences
Lunchtime Physics Seminar: "String Solitons
& Supersymmetry"
R. KHURI, *CERN* and *McGill University*

January 15
IAS Concert Series
Pre-Concert Lecture: "Beethoven: The Piano
Sonatas"
ROBERT TAUB, *Artist-in-Residence, IAS*

School of Natural Sciences
IAS/Princeton University Theoretical Physics
Seminar: "Microscopic Origin of the
Beckenstein-Hawking Entropy"
CUMRUN VAFA, *Harvard University*

January 16
IAS Concert Series
Beethoven: The Piano Sonatas, Program V
ROBERT TAUB, *Artist-in-Residence, IAS*

January 17
School of Natural Sciences
Condensed Matter Seminar: "Using Optical
Tweezers to Study Biological Motors"
STEVEN M. BLOCK, *Princeton University*

January 18
School of Social Science
Luncheon Seminar: "Some Thoughts on
Colonialism and Philosophy: Berkeley to
Thoreau"
HENRY ABELOVE, *IAS*

January 19
IAS Concert Series
Beethoven: The Piano Sonatas, Program V
ROBERT TAUB, *Artist-in-Residence, IAS*

January 20
IAS Concert Series
Beethoven: The Piano Sonatas, Program V
ROBERT TAUB, *Artist-in-Residence, IAS*

January 22
School of Mathematics
Combinatorics and Complexity Seminar:
"Public vs. Private Coin Flips in One Round
Communication Games"
MARIO SZEGEDY, *AT&T Bell Labs*

Members Seminar: "Constructing Non-semisimple TQFT's"
THOMAS KERLER, IAS

January 23
School of Mathematics
Number Theory Seminar: "Zeta Values and Differential Operators on the Circle"
SPENCER BLOCH, IAS

January 24
School of Mathematics
Applied Math-Math Physics Seminar: "Singularity Formation for Nonlinear Schroedinger Equation and Self-focusing of Laser Beams"
VLADIMIR MALKIN, IAS

School of Social Science
Modernization Seminar: Discussion of Ernesto Laclau, "Subject of Politics, Politics of the Subject"; Aletta J. Norval, "Decolonization, Demonization and Difference: The Difficult Constitution of a Nation" and "Social Ambiguity and the Crisis of Apartheid"
ERNESTO LACLAU, IAS

January 25
School of Historical Studies
Messianism Seminar: "Islamic Messianism"
MICHAEL COOK, Princeton University

School of Social Science
Luncheon Seminar: "The Moral State: Religion, Nation, Empire in Victorian Britain and India"
PETER VAN DER VEER, IAS

January 26
School of Natural Sciences
Lunchtime Physics Seminar: "Modular Invariance in Logarithmic Conformal Field Theories"
MICHAEL FLOHR, IAS

January 29
School of Mathematics
Combinatorics and Complexity Seminar: "Extremal Bipartite Graphs and Superpolynomial Lower Bounds for Monotone Span Programs"
ANNA GAL, IAS

Members Seminar: "Double Complexes and Euler L Factors on Degenerations of Algebraic Varieties"
KATIA CONSANI, University of Chicago

School of Natural Sciences
IAS/Princeton University Theoretical Physics Seminar: "Evidence for the Role of Instantons in Light Hadron Structure from Lattice QCD"
JOHN NEGELE, Massachusetts Institute of Technology

January 30
School of Mathematics
Number Theory Seminar: "Comparison Between p-adic Etale and Crystalline Cohomologies in the Semi-stable Case"
TAKESHI TSUJI, IAS

Number Theory Seminar: "On Perrin-Riou's Exponential Map"
PIERRE COLMEZ, École Normale Supérieure

Applied Math-Math Physics Seminar: "Singularity Formation for Nonlinear Schroedinger Equation and Self-focusing of Laser Beams, Part II"
VLADIMIR MALKIN, IAS

School of Natural Sciences
Astrophysics Talk: "Unification of Active Galactic Nuclei"
INSU YI, IAS

January 31
Institute Lecture
"A Question of Numbers"
ANDREW WILES, IAS

School of Mathematics
Applied Math-Math Physics Seminar: "Spatial Inhomogeneity and Thermodynamic Chaos: How are the States of Realistic Spin Glasses Organized?"
CHARLES NEWMAN, IAS

School of Natural Sciences
Condensed Matter Seminar: "Quantum Hall
Effect and Magnetic-Field-Induced Spin-
Density Wave in Quasi-One-Dimensional
Organic Conductors"
VICTOR YAKOVENKO, *University of Maryland*

February 1
School of Social Science
Luncheon Seminar: "The Gestapo and the
Holocaust in the Memory of the German
Population"
ERIC JOHNSON, *IAS*

February 5
School of Mathematics
Members Seminar: "Explicit Formulas for the
Singular Vectors in the Verma Modules of a
Superloop Algebra"
WEIQIANG WANG, *IAS*

February 6
School of Mathematics
Number Theory Seminar: "Arithmetic Inter-
section in a Siegel Threefold"
FERNANDO VILLEGAS,
Princeton University

Number Theory Seminar: "Towards a Combi-
natorial Description of the Absolute Galois
Group"
LEILA SCHNEPS, *University of Franche-Comté
(Besançon)*

School of Natural Sciences
Astrophysics Talk: "Ionized Helium in the
Intergalactic Medium"
ARTHUR F. DAVIDSEN,
Johns Hopkins University

February 7
School of Natural Sciences
The Raymond and Beverly Sackler Colloqui-
um: "From Anderson Localization to Quan-
tum Chaos"
BORIS ALTSHULER, *NEC Research Institute
and Massachusetts Institute of Technology*

School of Social Science
Modernization Seminar: Discussion of
Norbert Elias, *The Society of Individuals*;
Michel Foucault, "Afterward. The Subject
and Power"; Max Weber, "Stammler's `Refu-
tation' of the Materialist Conception of
History"; Gérard Noiriel, "L'identification des
citoyens. Naissance de l'état civil républicain"
GÉRARD NOIRIEL, *IAS*

February 8
School of Historical Studies
Art History Colloquium: "Andy Warhol and
the History of the Interview with the Artist"
REVA WOLF, *IAS*

Messianism Seminar: "Political Aspects of
Jewish Messianism"
MICHAEL WALZER, *Professor, School of Social
Science, IAS* and
YAIR LORBERBAUM, *IAS*

School of Mathematics
Special Seminar: "Complete Description of
the Proof of the Comparison Theorem
between p-adic Etale and Crystalline Coho-
mologies in the Semi-stable Reduction Case"
TAKESHI TSUJI, *IAS*

School of Social Science
Luncheon Seminar: "Marriage, Family and
Faith: Women's Conversion to Islam"
MAYA SHATZMILLER, *Princeton University*

February 9
School of Mathematics
Applied Math-Math Physics Seminar:
"Anomalous Scaling for Randomly Advected
Passive Scalar"
ANTTI KUPIAINEN, *Rutgers University*

School of Natural Sciences
Lunchtime Physics Seminar: "String Theory
and the Path to Unification: A Review of
Recent Developments"
KEITH R. DIENES, *IAS*

February 12
School of Mathematics
Combinatorics and Complexity Seminar:
"The Size of Algebraic Decision Trees"
ANDREW YAO, *Princeton University*

Members Seminar: "D-branes on K3 Surfaces
and String-String Duality"
VLADIMIR SADOV, *IAS*

School of Natural Sciences
IAS/Princeton University Theoretical Physics
Seminar: "Some Properties of Open-String
Theories"
A. SAGNOTTI, *University of Rome*

February 13
School of Mathematics
Number Theory Seminar: "Heegner Elements
and p-adic L-functions, I"
MASSIMO BERTOLINI, *IAS*

Number Theory Seminar
MATTHIAS FLACH, *IAS*

School of Natural Sciences
Astrophysics Talk: "Gravitational Lens Mass
Distribution Constraints from Unlensing
Multiple Images"
J. A. TYSON, *AT&T Bell Labs*

February 14
School of Historical Studies
Islamic Seminar: "The Transmission of
Knowledge, Attitudes toward Knowledge, and
Implications of Both"
MICHAEL COOK, *Princeton University*

School of Mathematics
Applied Math-Math Physics Seminar: "Time
Dependent Resonance Theory"
A. SOFFER, *Rutgers University*

Friends of the Institute
Friends' Forum: "Fermat's Last Theorem"
KARL RUBIN, *IAS*

February 15
School of Mathematics
Special Seminar: "Coleman's Power Series
and Perrin-Riou's Logarithm"
PIERRE COLMEZ, *École Normale Supérieure*

Harmonic Analysis and Number Theory
Seminar: "Modular Forms of Weight 1"
W. DUKE, *Rutgers University*

School of Social Science
Luncheon Seminar: "Schelling and
Contingency"
SLAVOJ ZIZEK, *Institute of Sociology,
University of Ljublijana*

February 19
School of Mathematics
Combinatorics and Complexity Seminar:
"Ramsey Theoretic Problems on Geometric
Graphs"
GYULA KAROLYI, *IAS*

Members Seminar: "Random Matrices,
Frobenius Eigenvalues, and Monodromy:
Report on Joint Work with Peter Sarnak"
NICHOLAS KATZ, *IAS*

February 20
School of Mathematics
Number Theory Seminar: "Heegner Elements
and p-adic L-functions, II"
MASSIMO BERTOLINI, *IAS*

Number Theory Seminar: "A Higher Local
Reciprocity Map without Using K-groups"
IVAN FESENKO, *IAS*

School of Natural Sciences
Astrophysics Talk: "A Step toward Under-
standing whether Galaxies are Significantly
Biased"
HOUJUN MO, *IAS*

February 21
School of Mathematics
Marston Morse Memorial Lecture:
"Symplectic Geometry and Stable Morse
Theory 1. Morse Theory Symplectized"
YAKOV ELIASHBERG, *Stanford University*

School of Social Science
Modernization Seminar: Discussion of
Abdallah Laroui, *Islam et Modernité*; Nada
Tomiche, "Al-Tayyib Salih: Le révlateur le
plus sensible de l'acculturation. L'individu
contre le groupe"; Lilia Labidi, "Building
Morality"
LILIA LABIDI, *IAS*

February 22
School of Historical Studies
Messianism Seminar: "Messianism and Holy
War in Europe, 1260-1556"
NORMAN HOUSLEY, *IAS*

Messianism Seminar: "Political Messianism in
Weimar Culture and Politics"
KLAUS SCHREINER, *IAS*

School of Mathematics
Marston Morse Memorial Lecture:
"Symplectic Geometry and Stable Morse
Theory 2. Lagrangian Intersections and Other
Problems of Symplectic Topology"
YAKOV ELIASHBERG, *Stanford University*

Harmonic Analysis and Number Theory
Seminar: "Some Estimates on the Remainder
Term in the Dirichlet Divisor Problem"
KAI-MAN TSANG, *IAS*

School of Social Science
Luncheon Seminar: "Ideas of Modernization
in the Balkans"
ROUMEN DASKALOV, *IAS*

February 23
School of Mathematics
Marston Morse Memorial Lecture:
"Symplectic Geometry and Stable Morse
Theory 3. Topology of Groups of Symplecto-
morphisms & Parametric Morse Theory"
YAKOV ELIASHBERG, *Stanford University*

School of Natural Sciences
Lunchtime Physics Seminar: "Quantum
Corrections in 2D Heterotic Strings without
Space-Time SUSY"
MIGUEL VAZQUEZ-MOZO, *IAS*

February 26
School of Mathematics
Combinatorics and Complexity Seminar:
"Pure Math Problems of Computational Sig-
nificance"
AVI WIGDERSON, *IAS*

Members Seminar: "Computational Complex-
ity Theory - A Survey"
AVI WIGDERSON, *IAS*

School of Natural Sciences
Theoretical Physics Seminar: "Low-energy
SUSY: From the GUT Scale to the Weak
Scale and Back"
CHRIS KOLDA, *IAS*

February 27
School of Historical Studies
Medieval Seminar: "Raffaele Brandolini
'On Music and Poetry' (1513)"
ANN MOYER, *IAS*

School of Mathematics
Number Theory Seminar: "Heegner Elements
and p-adic L-functions, III"
MASSIMO BERTOLINI, *IAS*

Number Theory Seminar: "Multiple
Zp-extensions of Number Fields"
WILLIAM McCALLUM, *IAS*

School of Natural Sciences
Astrophysics Talk: "Distortions to
Microlensing Lightcurves"
MARC KAMIONKOWSKI,
Columbia University

February 28
School of Mathematics
Applied Math - Math Physics Seminar:
"Large Deviations in Ising and Related
Systems Below Tc"
AGOSTON PISZTORA, *Harvard University*

February 29
School of Mathematics
Harmonic Analysis and Number Theory
Seminar: "Derivatives of Eisenstein Series and
Heights"
S. KUDLA, *University of Maryland*

School of Social Science
Luncheon Seminar: "Writings, Ruins and Their Reading: The Dead Sea Discoveries as a Case Study in Scientific Interpretation"
EDNA ULLMANN-MARGALIT, IAS

March 4
School of Mathematics
Combinatorics and Complexity Seminar: "The Ramsey Number R(3,t) Has Asymptotic Order of Magnitude t2/log t"
JEONG HAN KIM, AT&T Bell Labs

Members Seminar: "Log-concavity of Multiplicities and Newton Polytopes of Projective Varieties"
ANDREI OKOUNKOV, IAS

March 5
School of Historical Studies
Medieval Seminar: "Conjugal Rights vs. Class Prerogatives: A Divorce Case in Mamluk Cairo"
CARL PETRY, IAS

School of Mathematics
Number Theory Seminar: "Glimpses of Grothendieck's Anabelian Geometry, I"
FLORIAN POP, IAS

Number Theory Seminar: "Modular Aspects of Nonarithmetic Triangle Groups"
PAULA COHEN, IAS

School of Natural Sciences
Astrophysics Talk: "Faint Galaxy Problem: Formation Epoch and Evolution of Field Galaxies"
MASATAKA FUKUGITA, IAS

March 6
School of Mathematics
Applied Math - Math Physics Seminar: "Wellposedness Results for Zakharov Equations"
JAMES COLLIANDER, University of Illinois/Urbana

School of Social Science
Modernization Seminar: Discussion of Albert O. Hirschman, "A Generalized Approach to Development, with Special Reference to Staples"; William Roseberry, "Introduction" to Coffee, Society and Power in Latin America; Allen Wells, "Henequen and the Hard Fibers Market: Hard Lessons from the Gilded Age"
ALLEN WELLS, IAS

March 7
School of Historical Studies
Messianism Seminar: "The Engenderment of Messianic Politics: Symbolic Significance of Sabbatai Sevi's Coronation"
ELLIOT WOLFSON, IAS

Messianism Seminar: "Between the Messiah and the Millennium: Christian-Jewish Polemics in Central Europe 1470-1570"
RONNIE PO-CHIA HSIA, IAS

School of Mathematics
Harmonic Analysis and Number Theory Seminar: "Diophantine Approximation on Gm p-adic Case"
PAULA COHEN, IAS

School of Social Science
Luncheon Seminar: "Debate over Death in the Contemporary Arab World"
LILIA LABIDI, IAS

March 8
School of Mathematics
Applied Math-Math Physics Seminar: "Fredholm Problems and Correlation Functions"
DOUGLAS ABRAHAM, IAS

School of Natural Sciences
Astrophysics Talk: "The MACHO Content of the Dark Halo: Preliminary Results from Two Years of LMC Data"
KIM GRIEST, University of California, San Diego

Lunchtime Physics Seminar: "D-Branes on D-Manifolds"
VLADIMIR SADOV, IAS

March 10
Friends of the Institute
Friends' Fireside Chat: "Adam Smith and Two
Pivots of Change: Israel and Russia"
GEORGE J. W. GOODMAN, Host and
Editor-in-Chief, Adam Smith

March 11
School of Historical Studies
Art History Colloquium: "Music and Art in
the Renaissance"
IRVING LAVIN, Professor, School of Historical
Studies, IAS, moderator
"Brunelleschi's Dome of Florence Cathedral"
MARVIN TRACHTENBERG, Institute of Fine
Arts, New York University
"Guillaume Du Fay's Nuper rosarum flores"
ALEXANDER BLACHLY, Notre Dame
University
"Donatello's High Altar of S. Antonio in
Padua"
SARAH BLAKE McHAM, Rutgers University
"Guillaume Du Fay's Missa Sancti Anthonii
de Padua"
ROB C. WEGMAN, Princeton University

School of Mathematics
Combinatorics and Complexity Seminar:
"Quantitative Oppenheim Conjecture"
GREGORY MARGULIS, Yale University

Members Seminar: "Jack Polynomials"
SIDDHARTHA SAHI, IAS

Seminar on Symmetric Polynomials and
Springer Representations: "Some Puzzles
about Diagonal Harmonics"
CLAUDIO PROCESI, University of Rome

School of Natural Sciences
Theoretical Physics Seminar: "F-Theory,
Enhanced Gauge Symmetry, and Calabi-Yau
Manifolds"
DAVID MORRISON, Duke University

March 12
School of Historical Studies
Medieval Seminar: "The Guennol Triptych in
the Cloisters"
JOHANNES FRIED, IAS

School of Mathematics
Number Theory Seminar: "Glimpses of
Grothendieck's Anabelian Geometry, II"
FLORIAN POP, IAS

Number Theory Seminar: "Abelian Varieties
and Galois Module Structure"
ADEBISI AGBOOLA, IAS

School of Natural Sciences
Astrophysics Talk: "The PLANET Microlens-
ing Collaboration: Current Status, First
Results, and Future Prospects"
PENNY SACKETT, Kapteyn Astronomical Insti-
tute, University of Groningen

March 13
School of Historical Studies
Islamic Seminar: "The Naqshbandiyya in
Timurid Central Asia"
JO-ANN GROSS, IAS

School of Mathematics
Applied Math - Math Physics Seminar:
"Phase Portraits of the NLS Equations with
Applications to the Turbulence Problems"
S. KUKSIN, University of Arizona

March 14
School of Mathematics
Harmonic Analysis and Number Theory
Seminar: "Cuspidal Cohomology for GL(n)"
A. ASH, Ohio State University

School of Social Science
Luncheon Seminar: "Constitutionalism in
Twentieth Century Iran"
MANGOL BAYAT, Universität Bonn

March 15
School of Mathematics
Applied Math - Math Physics Seminar:
"Nongaussian Limiting Behavior of the
Percolation Threshold in a Large System"
LEONID BERLYAND, Pennsylvania State
University

March 17
School of Historical Studies
Symposium on Messianism: "Messiahs and their Followers"
JOHN GAGER, *Princeton University*
"Midrash and Messianism: A Holistic Approach"
MICHAEL FISHBANE, *University of Chicago*
"The Lubavitch Messianic Resurgence: The Historical and Mystical Background"
RACHEL ELIOR, *Hebrew University*
"Theodor Herzl and Political Messianism"
ROBERT WISTRICH, *Hebrew University*
"Sabbatian Messianism: A New Approach" (The Ronald O. Perelman Lecture)
MOSHE IDEL, *Hebrew University*

March 18
School of Historical Studies
Symposium on Messianism: "Patterns of the End: Textual Weaving from Qumran to Waco"
JAMES TABOR, *University of North Carolina-Charlotte*
"The Jews in the Christian Grammar of Apocalyptical Perceptions: On the Origins of Popular Antisemitism in Eleventh-Century Europe"
RICHARD LANDES, *Boston University*
"Jewish Messianic Expectations towards the Year 1240 and Christian Reactions"
YISRAEL YUVAL, *Hebrew University*
"The Ahmadiyya as a Messianic Movement"
YOHANAN FRIEDMANN, *Hebrew University*
"Salvation without a Messiah" (The Andrew W. Mellon Lecture)
PETER SCHAFER, *IAS*

School of Mathematics
Combinatorics and Complexity Seminar
LASZLO BABAI, *University of Chicago*

Seminar on Symmetric Polynomials and Springer Representations: "Some Puzzles about Diagonal Harmonics, II"
CLAUDIO PROCESI, *University of Rome*

March 19
School of Natural Sciences
Astrophysics Talk: "New View of the Lyman Alpha Forest"
ARLIN CROTTS, *Columbia University*

March 20
Institute Lecture
"Religion and Politics: Drawing the Line"
MICHAEL WALZER, *Professor, School of Social Science, IAS*

March 21
School of Social Science
Luncheon Seminar: "Immigration and National Identity in the Current French Historiography"
GÉRARD NOIRIEL, *IAS*

March 22
School of Natural Sciences
Lunchtime Physics Seminar: "Internal Structure of Black Holes"
FINN LARSEN, *Princeton University*

March 23
Princeton Chamber Symphony
"Mozart and the Mystery of Composition"
An Educational Concert for Institute Children and Families
MARK LAYCOCK, *Music Director, Princeton Chamber Symphony*

March 25
IAS Concert Series
Pre-Concert Lecture: "Beethoven: The Piano Sonatas"
ROBERT TAUB, *Artist-in-Residence, IAS*

School of Mathematics
Combinatorics and Complexity Seminar: "Random Constructions for Additive Problems in Number Theory"
MIHAIL KOLOUNTZAKIS, *IAS*

Members Seminar: "Generalized FFT's – Theory and Applications"
DANIEL ROCKMORE, *IAS*

Seminar on Symmetric Polynomials and Springer Representations: "Some Puzzles about Diagonal Harmonics, III"
CLAUDIO PROCESI, *University of Rome*

School of Natural Sciences
Astrophysics Talk: "Thinking Parallel in
Fortran 90"
BILL PRESS, *Harvard University Center for
Astrophysics*

March 26
IAS Concert Series
Beethoven: The Piano Sonatas, Program VI
ROBERT TAUB, *Artist-in-Residence*, IAS

School of Historical Studies
Medieval Seminar: "Frontier Societies and
Crusading in the Late Middle Ages"
NORMAN HOUSLEY, IAS

School of Mathematics
Special Seminar: "Burau Representation
inside the Universal R-matrix and Related
Properties of the Jones Polynomial and the
Witten-Reshetikhin-Turaev Invariant"
LEV ROZANSKY, IAS

School of Natural Sciences
Astrophysics Talk: "A Search for MACHO
Dark Matter towards M31"
AUSTIN TOMANEY, *Columbia University*

March 27
School of Mathematics
Applied Math - Math Physics Seminar:
"Invariant Measures for Inviscid Burgers
Equations with Random Forcing"
K. KHANIN, *Princeton University*

School of Natural Sciences
Condensed Matter Seminar: "Raman Scatter-
ing from Spinons in Magnetic Chains"
V. N. MUTHUKUMAR, *University of
Dortmund, Germany*

The Raymond and Beverly Sackler Colloqui-
um: "Bose-Einstein Condensation in an
Ultracold Gas"
CARL E. WIEMAN, *University of Colorado*

School of Social Science
Modernization Seminar: Discussion of "Pref-
ace" and "Modernity: A Different Time"
(Chap. 1) from Peter Osborne, *The Politics of
Time: Modernity and Avant-Garde*; Suzanne
Brenner, "A Neighborhood Comes of Age"
SUZANNE BRENNER, IAS

March 28
School of Mathematics
Harmonic Analysis and Number Theory Sem-
inar: "Maximally Complete Fields"
B. POONEN, *Princeton University*

School of Social Science
Luncheon Seminar: "Medieval Genealogies:
Language, Writing, Metaphors"
CHRISTIANE KLAPISCH-ZUBER, IAS

March 29
IAS Concert Series
Beethoven: The Piano Sonatas, Program VI
ROBERT TAUB, *Artist-in-Residence*, IAS

School of Natural Sciences
Lunchtime Physics Seminar: "Tree-Level
Nondecoupling and the Supersymmetric
Higgs Sector"
ERNEST MA, *University of California, Riverside*

March 30
IAS Concert Series
Beethoven: The Piano Sonatas, Program VI
ROBERT TAUB, *Artist-in-Residence*, IAS

April 1
School of Mathematics
Combinatorics and Complexity Seminar:
"Combinatorial Games and the Probabilistic
Method"
JOZSEF BECK, *Rutgers University*

Members Seminar: "Chow Groups of Abelian
Varieties - Some Examples"
NAJMUDDIN FAKHROUDDIN, IAS

Special Seminar: "A Generalization of
Springer Theory Using Nearby Cycles"
MIKHAEL GRINBERG, *Harvard University*

April 2
School of Historical Studies
Medieval Seminar: Round Table on Medieval
Intellectuals, East and West

School of Mathematics
Number Theory: "Galois Actions on the
Lickorish-Humphries Generators of the
Mapping Class Groups of Surfaces"
HIROAKI NAKAMURA, IAS

Special Seminar: "Localization of Modular
Representations on Loop Grassmannians"
IVAN MIRKOVIC, *University of Massachusetts*

April 4
School of Mathematics
Harmonic Analysis and Number Theory
Seminar: "The Modularity of Some Q-curves"
LAWRENCE WASHINGTON, *IAS*

April 8
School of Mathematics
Combinatorics and Complexity Seminar:
"Embeddings of Finite Metric Spaces: Lower
Bounds and New Connections"
YURI RABINOVICH, *Cornell University*

Members Seminar: "Analytical Problems
Related to Kakeya Sets"
JEAN BOURGAIN, *Professor, School of
Mathematics, IAS*

Special Seminar: "Highest Weight Theory for
Symmetric Group"
ANDREI OKOUNKOV, *IAS*

School of Natural Sciences
IAS-Princeton University Theoretical Physics
Seminar: "New Principles for String
Membrane Unification"
DAVID KUTASOV, *University of Chicago*

April 9
School of Historical Studies
Medieval Seminar: "Hildegard of Bingen and
the Male Reader: Textual Communities and
Their Boundaries in the Later Middle Ages"
KATHRYN KERBY-FULTON, *IAS*

School of Mathematics
Number Theory Seminar: "Galois Modules in
the Coherent Cohomology of Arithmetic
Varieties"
GEORGE PAPPAS, *Princeton University*

Special Applied Math - Math Physics Semi-
nar: "Spatial Structure in Diffusion Limited
Two-article Reactions"
MAURY BRAMSON, *IAS*

Number Theory: "Weight One Modular
Forms and the Rank of Class Groups"
SIMAN WONG, *IAS*

School of Natural Sciences
Astrophysics Talks: "Cosmology from Super-
novae: Measuring the Deceleration of the
Universe"
SAUL PERLMUTTER, *Lawrence Berkeley Labs*

April 10
School of Historical Studies
Islamic Seminar: "Translation"
BERNARD LEWIS, *Princeton University*

School of Mathematics
Applied Math - Math Physics Seminar:
"Kakeya Type Problems for Circles"
TOM WOLFF, *California Institute of
Technology/Princeton University*

School of Natural Sciences
Condensed Matter Seminar: "Some Instabili-
ties in Fluid Dynamics"
AMADOR MURIEL, *IAS*

The Raymond and Beverly Sackler
Colloquium: "Strong Interaction Physics on a
Laptop – The Fall and Rise of Lattice QCD"
PETER LEPAGE, *Cornell University*

School of Social Science
Modernization Seminar: Discussion of notes
on method; various authorities, old and new;
Brinkley Messick, "Genealogies of the Text";
Georg Simmel, "The Stranger"; Andrew
Shryock, "Popular Genealogical Nationalism:
History Writing and Identity among the
Balqa Tribes of Jordan"
ANDREW SHRYOCK, *IAS*

April 15
School of Mathematics
Combinatorics and Complexity Seminar:
"Polynomial Time Approximation Scheme for
Euclidean TSP and Other Geometric
Problems"
SANJEEV ARORA, *Princeton University*

School of Natural Sciences
IAS/Princeton University Theoretical Physics
Seminar: "Implications and Applications of
Confinement in Supersymmetric Gauge
Theories"
MATTHEW STRASSLER, *Rutgers University*

April 16
School of Natural Sciences
Astrophysics Talk: "Resonant Relaxation in
Stellar Systems"
SCOTT TREMAINE, *IAS*

April 17
School of Historical Studies
Islamic Seminar: "Translation"
JEROME CLINTON, *Princeton University*

School of Mathematics
Applied Math - Math Physics Seminar:
"Volume Inequalities for Sections of Convex
Bodies"
GAOYONG ZHANG, *IAS*

Applied Math - Math Physics Seminar:
"High Frequency Oscillations with Non-
smooth Phase"
ALEXANDER OLEVSKII, *IAS*

School of Natural Sciences
Astrophysics Talk: "The Latest from the
MACHO Project"
CHARLES ALCOCK, *Lawrence Livermore
National Laboratory*

April 18
School of Mathematics
Harmonic Analysis and Number Theory
Seminar: "On the Size of Certain Exponential
Sums"
PHILIPPE MICHEL, *Orsay*

April 19
School of Natural Sciences
Lunchtime Physics Seminar: "R(b) and R(c)
Anomalies at LEP: Hints for New Physics?"
K. S. BABU, *IAS*

April 22
School of Mathematics
Members Seminar: "Asymptotic Geometry"
MEI CHU CHANG, *IAS*

School of Natural Sciences
IAS/Princeton University Theoretical Physics
Seminar: "Inclusive Heavy Hadron Decays
in QCD"
ADAM FALK, *Johns Hopkins University*

April 23
School of Natural Sciences
Astrophysics Talk: "Neutrinos and Axions
from Supernovae: Impact of Nucleon Spin
Fluctuations"
GEORG RAFFELT, *Max Planck Institute for
Physics*

April 24
School of Natural Sciences
IAS-Princeton University Theoretical Physics
Seminar: "Old and New Vacua of M-theory"
SUNIL MUKHI, *IAS*

School of Social Science
Modernization Seminar: Discussion of Peter
van der Veer, "The Spirits of the Age: Spiritu-
alism and Political Radicalism"; Talal Asad,
"The Construction of Religion as an Anthro-
pological Category"; Peter Pels, "Spiritual
Facts and Super-visions: The 'Conversion' of
Alfred Russel Wallace"
PETER VAN DER VEER, *IAS*

Friends of the Institute
Friends' Workshop: "Exploring the Web II:
Research in Cyberspace"
ELLIOTT SHORE, *Librarian, Schools of
Historical Studies and Social Science*, *IAS*

April 25
School of Mathematics
Combinatorics and Complexity Seminar:
"On Groebner Proof Systems"
RUSSELL IMPAGLIAZZO, *University of
California, San Diego*

Harmonic Analysis and Number Theory
Seminar: "Some Estimates for the Remainder
Term in the Divisor Problem"
KAI-MAN TSANG, *IAS*

April 29
School of Mathematics
Members Seminar: "Ramanujan-Weber Class
Invariants and Watson's Empirical Process"
HENG-HUAT CHAN, *IAS*

April 30
School of Natural Sciences
Astrophysics Talk: "Fast Generation of
Magnetic Fields: Success and Problems in
Astrophysics"
SAMUEL VAINSHTEIN, *University of
Chicago*

May 1
Friends of the Institute
Friends' Forum: "Fundamentalism or Fashion?
Women and the Veil in Indonesia"
SUZANNE BRENNER, *IAS*

May 2
School of Mathematics
Harmonic Analysis and Number Theory
Seminar: "On the Class Number One
Problem for CM Fields"
S. LOUBOUTIN, *Paris*

May 3
Institute Lecture
"Witnesses to Life: Women and Infants in
Some Images of War, 1789-1830"
PETER PARET, *Professor, School of Historical
Studies*, IAS

School of Natural Sciences
IAS-Princeton University Theoretical Physics
Seminar: "Nonperturbative Superpotentials in
String Theory"
EDWARD WITTEN, *Professor, School of
Natural Sciences*, IAS

May 6
School of Mathematics
Combinatorics and Complexity Seminar:
"Interpolation Theorems in Propositional
Logic and Proveably Disjoint NP-pairs"
ALEXANDER RAZBOROV, *Steklov Institute*

May 7
School of Natural Sciences
Astrophysics Talk: "ICECUBE - The Rap on
a New Detector"
DAVE BESSON, *University of Kansas*

May 8
School of Natural Sciences
Astrophysics Talk: "The Palomar Digital
Sky Survey"
GEORGE DJORGOVSKI, *IAS*

School of Social Science
Modernization Seminar: Discussion of
Abdelhaï Diouri, "Of Leaven Foods: Ramadan
in Morocco"; Bernard Greenwood, "Cold or
Spirits? Choice and Ambiguity in Morocco's
Pluralistic Medical System"; Judith N. Lasker,
"The Role of Health Services in Colonial
Rule: The Case of the Ivory Coast"
ABDELHAI DIOURI, *IAS*

May 13
School of Mathematics
Combinatorics and Complexity Seminar:
"Random Walks and an $O^*(n5)$ Volume
Algorithm for Convex Bodies"
MIKLOS SIMONOVITS, *Hungarian Academy of
Sciences*

Members Seminar: "Uniform Bounds for
Waring's Problem in Number Fields"
MORLEY DAVIDSON, *IAS*

May 14
School of Natural Sciences
Astrophysics Talk: "Global Resurfacing and
Deformation of Venus"
JOHN SUPPE, *Princeton University*

May 17
School of Natural Sciences
IAS-Princeton University Theoretical Physics
Seminar: "Duality and Orbifolds"
ASHOKE SEN, *IAS*

May 19-21
School of Mathematics
Workshop on Turbulence

May 20
School of Mathematics
Combinatorics and Complexity Seminar:
"A Proof of Younger's Conjecture on Disjoint
Directed Circuits"
PAUL SEYMOUR, *Bellcore/Princeton University*

School of Natural Sciences
IAS-Princeton University Theoretical Physics
Seminar: "Black Hole Entropy in String
Theory"
ANDREW STROMINGER, *University of
California, Santa Barbara*

May 21
School of Natural Sciences
Astrophysics Talk: "Planet Formation"
JACK LISSAUER, *State University of
New York*

May 23
School of Natural Sciences
IAS-Princeton University Theoretical Physics
Seminar: "Lax-Phillips Theory and Irre-
versible Processes in Quantum Mechanics"
LARRY HORWITZ, *IAS*

May 24
School of Mathematics
Special Seminar: "Hilbert's 4th Problem:
Parametric Versions"
ROUBEN AMBARTZUMIAN,
Temple University

Special Seminar: "Hilbert's 4th Problem:
Symplectic Geometric Aspects"
JUAN C. ALVAREZ, *Rutgers University*

May 28
School of Mathematics
Combinatorics and Complexity Seminar:
"Visual Cryptography II: Improving the Con-
trast via the Cover Base"
MONI NAOR, *The Weizmann Institute*

School of Natural Sciences
Astrophysics Talk: "Large-Scale Structure
from Galaxy and Cluster Redshift Surveys"
LUIGI GUZZO, *Osservatorio Astronomico di
Brera*

May 29
School of Natural Sciences
Condensed Matter Seminar: "Spontaneous
Ordering of Steps on a Vicinal Interface:
The Step-density-wave Phase"
EUGENE KOLOMEISKY, *Cornell University*

June 5
School of Natural Sciences
Quantum Computation Talk: "The Power of
Quantum Computation"
PETER SHOR, *AT&T*

June 6
School of Natural Sciences
Astrophysics Talk: "Recent Advances in
Large-Scale Structure Statistics"
VICENT MARTINEZ, *University of Valencia*

Quantum Computation Talk: "Correcting
Quantum Errors"
PETER SHOR, *AT&T*

IAS/PARK CITY MATHEMATICS INSTITUTE
MENTORING PROGRAM FOR WOMEN IN
MATHEMATICS:
June 11-20
Undergraduate Lecture: "An Introduction to
Queueing Theory"
ANNE M. DOUGHERTY, *University of
Colorado at Boulder*
Graduate Lecture: "Reflecting Brownian
Motions and Queueing Networks"
VIEN NGUYEN, *Massachusetts Institute of
Technology*
RUTH WILLIAMS, *University of California,
San Diego*
Seminar: "Women in Science"
KAREN UHLENBECK, *University of Texas at
Austin*

June 12
"Maiden Voyage Through Complexity: Chaos
Theory and Fractal Geometry"
MARILYN SIMON, *Walden University*

June 13
"Some Mathematics of Neural Oscillations"
JANE SCANLON, *Rutgers University*

June 14
"Measure-Preserving Transformations on Path Spaces"
CAROLYN CROSS, *University of California, San Diego*

June 15
Panel Discussion: "What Path Did People Take to Get to Where They Are?"
SUZANNE WEEKES, *Texas A&M*
JOAN FEIGENBAUM, *AT&T Research*
RUTH WILLIAMS, *University of California at San Diego*
VIEN NGUYEN, *Massachusetts Institute of Technology*
DIANNE YUREK, *Rutgers University*

June 17
"The Integral Not Taken: Why Lebesque Instead of Riemann?"
SUSAN LEE, *New Mexico State University*

June 18
School of Natural Sciences
Astrophysics Talk: "Early Structure Formation in the Universe"
ABRAHAM LOEB, *Harvard University Center for Astrophysics*

"An Introduction to Percolation: The Standard Correlation Inequalities and Rescaling"
AMBER PUHA, *University of California, Los Angeles*
ELAINE MCDONALD, *University of California, Los Angeles*

"Modeling Telecommunications Systems: Problems and Paradoxes"
ILZE ZIEDENS, *AT&T Research*

June 19
"Pricing in a Speculating Market"
DONNA SALOPEK, *Carleton University*
"Euclidean Free-Field from Brownian Density Processes"
MIN-JEONG KANG, *Cornell University*

June 20
"A Few Words about Superprocesses"
GOSIA ROSLANOWSKA, *Hebrew University*

"Some Aspects of Entropy"
JULIA BRETTSCHNEIDER, *Humboldt Universität*

IAS/PARK CITY MATHEMATICS INSTITUTE SUMMER SESSION:
June 24
Cross Program Activity: "Random Walks, When Do They Return?"
DANIEL STROOCK, *Massachusetts Institute of Technology*

June 24 - June 28
Graduate Summer School: "Mathematical Finance"
MARCO AVELLANEDA, *Courant Institute*

June 24 - July 2
Graduate Summer School: "Stochastic Analysis on Space of Paths on a Reimannian Manifold"
DANIEL STROOCK, *Massachusetts Institute of Technology*

June 24 - July 3
Graduate Summer School: "Independent and Dependent Percolation"
JENNIFER CHAYES, *University of California, Los Angeles*
High School Teacher Program: "Probability"
VIRGINIA WARFIELD, *University of Washington*

June 24 - July 12
Undergraduate Program: "Random Walk Simulations"
LESTER COYLE, *Duke University*

Undergraduate Program: "Contemporary Probability"
GREGORY LAWLER, *Duke University*
Undergraduate Program: "Random Walk"
EMILY PUCKETTE, *Occidental College*
High School Teacher Program: "Technology for Teaching Mathematics"
JAMES KING, *University of Washington*
High School Teacher Program: "Building Mathematics in the Classroom"
NAOMI FISHER, *University of Illinois at Chicago*
CYNTHIA HAYS, *McCallum High School, Austin, Texas*

June 25
High School Teacher Program: "Discussion on Linear Algebra"
GUERSHON HAREL, *Purdue University*
Cross Program Activity: "Geometry and Elementary Probability"
ROBERT BRYANT, *Duke University*
Cross Program Activity: "Education Seminar #1: Pedagogical Principles and the Teaching of Mathematics with Particular Reference to the Teaching of Linear Algebra"
GUERSHON HAREL, *Purdue University*
Cross Program Activity: "CBL (Calculator Based Laboratory) Demonstration"
DENNIS DONOVAN, *Rice University*

June 26
Research Talk: "Metastability of 3-Dimensional Ising Model at Low Temperatures"
GERARD BEN AROUS, *École Normale Supérieure*
High School Teacher Program: Teachers-in-Residence Presentation
SHARON HEGEWALD, *Auburn, Washington*
DOUG O'ROARK, *Chicago, Illinois*

June 27
Research Talk: "On Conditioned Large Deviation Limit Theorems"
VLADIMIR VINOGRADOV, *University of Northern British Columbia*
High School Teacher Program: Discussion on Modeling
JAMES HIRSTEIN, *University of Montana*

Conference for African American Researchers in the Mathematical Sciences
"A Decomposition Theorem for Ordered Sets and Other Musings"
JONATHAN D. FARLEY, *MSRI*
"The Role of Selberg's Trace Formula in the Computation of Casimir Energy for Certain Clifford-Klein Space-Times"
FLOYD WILLIAMS, *University of Massachusetts at Amherst*
"Yesterday, Today, and Tomorrow"
LEE LORCH, *York University*

June 28
Research Talk: "Malliavin's Calculus for Markov Processes with Jumps"
JEAN PICARD, *Université Blaise Pascal*
High School Teacher Program: "Math Modeling and Other Aspects of SIMMS"
JAMES HIRSTEIN, *University of Montana*
Cross Program Activity: Panel Discussion "The Ph.D. Job Market"
JOHN C. POLKING, *Rice University,* Moderator
GERARD BEN AROUS, *École Normale Supérieure,*
ELIZABETH BROOKS, *Duke University,*
JENNIFER CHAYES, *University of California, Los Angeles,*
MIKE CRANSTON, *University of California, San Diego,*
CAROLYN CROSS, *University of California, San Diego*
Cross Program Activity: "Education Seminar #2: Students' Proof Schemes"
GUERSHON HAREL, *Purdue University*

July 1
Research Talk: "Logarithmic Sobolev Inequalities on Loop Groups"
BRUCE DRIVER, *University of California, San Diego*
Research Talk: "Solomyak's Proof of an Erdös Problem"
ELIZABETH HOUSWORTH, *University of Minnesota*
Undergraduate Program: "A Problem"
JOHN SASSER, *University of Cincinnati*
Cross Program Activity: "On the History of the Institute and the School of Mathematics"
ARMAND BOREL, *Professor Emeritus, School of Mathematics, IAS*
Cross Program Activity: "Teaching Seminar: Student Attitudes and Calculus Reform"
JACK BOOKMAN, *Duke University*

July 2
Research Talk: "Some Questions and Techniques Involving Random Processes and Finite Graphs"
MARTIN HILDEBRAND, *University of Texas at Austin*

INSTITUTE FOR ADVANCED STUDY

Research Talk: "On Some Notions of Size in Graphs and their Covers"
SAM NORTHSHIELD, SUNY - *Plattsburgh*
Cross Program Activity: "Investigating the Complexity of Learning and Teaching"
CAROLYN A. MAHER, *Rutgers University*
Cross Program Activity: "Probability with Infinitesimals"
GREGORY LAWLER, *Duke University*

July 2 - July 12
Graduate Summer School: "Scaling Limit of Interacting Particle Systems"
HORNG-TZER YAU, *Courant Institute*

July 3
Research Talk: "Degenerate Diffusions"
JEREMY QUASTEL, *University of California, Davis*
Research Talk: "Relaxation of Stochastic Ising Model Near Multi-Phase Region"
NOBUO YOSHIDA, *Massachusetts Institute of Technology*
High School Teacher Program: "Particles and Fluids"
SRINIVASA VARADHAN, *Courant Institute*
Cross Program Activity: "Electronic Publication: An Informal Discussion"
RENE CARMONA, *Princeton University*
GREGORY LAWLER, *Duke University*
Cross Program Activity: "Investigating the Complexity of Learning and Teaching, Part II - Participant Interaction"
CAROLYN A. MAHER, *Rutgers University*

July 3 - July 12
Graduate Summer School: "Stochastic Spatial Models"
RICHARD DURRETT, *Cornell University*

July 4
Research Talk: "Upper Bounds on Derivatives of the Logarithm of the Heat Kernel"
JAMES TURETSKY, *Harvard University*
Research Talk: "The Total Size of a Nearly Critical Epidemic or of a Component in a Random Graph"
ANDERS MARTIN-LOF, *Stockholm University*
High School Teacher Program: Teacher-in-Residence Presentations
KATHERINE KANIM, *Seattle, Washington*
PAT WADECKI, *Buffalo Grove, Illinois*

July 4 - July 12
Graduate Summer School: "Stochastic Analysis on Path and Loop Spaces"
ELTON PEI HSU, *Northwestern University*

July 5
Research Talk: "Boltzmann-Grad Limit for a Particle System in Continuum"
JAMES TARVER, *University of California, Berkeley*
Research Talk: "On a Theorem by Cramer and Some Unlikely Applications"
THEODORE THEODOSOPOLOUS, *Baybank Systems, Inc.*
High School Teacher Program: "Paradoxes"
NIKHIL SHAH, *Cornell University*
Cross Program Activity: Panel Discussion "The Rossi Questions"
AMBER PUHA, *University of California, Los Angeles,*
JAMES EBERT, *Duke University Site,*
FAITH PARDUE, *University of Houston,*
BRUCE DRIVER, *University of California, San Diego*

July 8
Research Talk: "Probability and Combinatorial Optimization"
JOSEPH YUKICH, *Lehigh University*
Research Talk: "Holomorphic Diffusions and Boundary Behavior of Harmonic Functions"
ZHENG-QING CHEN, *Cornell University*
Undergraduate Program: "The Mathematics of Phase Transitions"
JENNIFER CHAYES, *University of California, Los Angeles*
Cross Program Activity: "Content Characteristics of Eighth Grade Mathematics Classes: A Three Nation Study"
ALFRED MANASTER, *University of California, San Diego*
Cross Program Activity: "Poincaré and the Improbable: Historical Interlude on Randomness and Determinism"
DANIEL GOROFF, *Harvard University*

July 8 - 12
High School Teacher Program: "Geometry of the Sphere"
JOHN C. POLKING, *Rice University*

July 9
Research Talk: "Directed Polymers in Strong
Random Environments"
RENMING SONG, University of Michigan,
Ann Arbor
Research Talk: "Dynamic Random Walk in
Random Sceneries"
NADINE GUILLOTIN, Université de Rennes
Research Talk: "Brownian Exit Time Func-
tionals on Hypersurfaces in Euclidean Space"
KIMBERLY KINATEDER, Wright State University
Research Talk: "Magnetic Heat Kernel Estimates"
LASZLO ERDÖS, Courant Institute
High School Teacher Program: Teacher-in-
Residence Presentations
GREG MURRAY, St. George, Utah
LAURA MOSS, Austin, Texas
Undergraduate Program: "Branching Processes"
VLADIMIR VINOGRADOV, University of
Northern British Columbia
Cross Program Activity: "Pictures of Particle
Systems"
RICHARD DURRETT, Cornell University
Cross Program Activity: "Rice University
School Math Project"
ANNE PAPAKONSTANTINOU,
Rice University

July 10
Research Talk: "Brownian Motion and
Spherical Uniqueness for Multiple Trigono-
metric Series"
GANG WANG, DePaul University
Research Talk: "Local Equilibrium and Large
Deviations in an Irreversible Lattice Gas"
GERARD VISSER, University of California,
Berkeley

July 11
A Celebration of Mathematics and a Salute
to the National Science Foundation
Welcome: PHILLIP A. GRIFFITHS, Institute for
Advanced Study
Remarks: LEO F. KLAGHOLZ, New Jersey
Commissioner of Education,
JAKE GARN, United States Senate-Utah
(Retired)
Keynote Address: "Integration of Research and
Education: Vision, Value, and Vulnerability"
NEAL LANE, National Science Foundation

Remarks: "NSF Regional Institutes in the
Mathematical Sciences"
JOHN C. POLKING, IAS/Park City Mathematics
Institute,
DAVID P. DOBKIN, DIMACS Research and
Education Institute
Panel Discussion: "A Cornerstone for the
Future: Connecting Mathematics Researchers
and Educators"
HYMAN BASS, Columbia University,
Moderator
JUDY ANN BROWN, DREI Teacher
Program/DIMACS Leadership Program,
MARGARET COZZENS, National Science
Foundation,
JOAN FERRINI-MUNDY, National Academy of
Sciences,
CYNTHIA HAYS, IAS/Park City Mathematics
Institute,
DONALD J. LEWIS, National Science
Foundation,
FRED S. ROBERTS, DIMACS
Concert: ROBERT TAUB, Artist-in-
Residence, IAS

July 12
Research Talk: "Large Deviations from a
Kinetic Limit"
FRAYDOUN REZAKHANLOU, University of
California, Berkeley
Research Talk: "Asymptotic Properties of
Some Infinite Dimensional Processes"
ALEJANDRO RAMIREZ, Courant Institute
High School Teacher Program: "Percolation
and Phase Transitions"
JENNIFER CHAYES, University of California,
Los Angeles

I have greatly enjoyed working and talking with many people here at the Institute for Advanced Study. Throughout the course of my research, I have found the intellectual atmosphere at the Institute to be a strong benefit and stimulating influence. Not only have I formed research collaborations with several Members, but I have also greatly benefitted from discussions with the permanent Faculty and the other Members as well as the rich array of invited seminar speakers. I simply cannot imagine a more ideal environment in which to conduct research.

Member, School of Natural Sciences

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, 1996
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 responsi-
bility 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 assur-
ance 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 finan-
cial 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 finan-
cial position of the Institute at June 30, 1996 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 20, 1996 on our consideration of the Institute's internal control structure and
on its compliance with laws and regulations.

As discussed in Note A to the financial statements, effective July 1, 1995, the Institute
changed its method of accounting for postretirement benefits other than pensions and
changed its method of accounting for contributions received and its basis of financial
statement presentation to conform with Statements of Financial Accounting Standards
(SFAS) Nos. 106, 116 and 117, respectively, and restated the 1995 financial statements
for the changes related to SFAS Nos. 116 and 117.

Deloitte & Touche LLP

Parsippany, New Jersey
September 20, 1996

BALANCE SHEET
JUNE 30, 1996 (WITH COMPARATIVE TOTALS FOR 1995)

ASSETS	1996	1995
CASH	$ 603,940	$ 209,496
ACCOUNTS RECEIVABLE	101,283	146,755
GOVERNMENT GRANTS AND CONTRACTS RECEIVABLE	1,410,193	1,205,876
ACCRUED INCOME ON INVESTMENTS	1,274,806	1,343,451
PREPAID AND OTHER ASSETS	367,311	419,580
CONTRIBUTIONS RECEIVABLE	1,729,000	341,000
SHORT-TERM INVESTMENTS (Note B)	947,302	7,306
UNAMORTIZED DEBT ISSUANCE EXPENSE	98,369	107,629
LAND, BUILDINGS AND IMPROVEMENTS, EQUIPMENT AND RARE BOOK COLLECTION - NET (Note C)	24,188,354	25,338,888
INVESTMENTS, AT COST (Note B)	265,383,383	238,091,685
TOTAL ASSETS	$296,103,941	$267,211,666

LIABILITIES AND FUND BALANCES	1996	1995
ACCOUNTS PAYABLE AND ACCRUED EXPENSES	$ 5,781,987	$ 1,042,446
REFUNDABLE ADVANCES	1,929,491	2,700,836
TRUST FUND OBLIGATIONS	744,905	421,841
LONG-TERM DEBT (Note D)	16,086,312	16,502,365
ACCRUED INVESTMENT MANAGEMENT FEES	2,350,174	3,346,364
Total liabilities	26,892,869	24,013,852
NET ASSETS:		
Unrestricted	183,349,711	171,021,336
Temporarily restricted	20,880,418	19,467,024
Permanently restricted	64,980,943	52,709,454
Total net assets	269,211,072	243,197,814
TOTAL LIABILITIES AND NET ASSETS	$296,103,941	$267,211,666

STATEMENT OF ACVITIVIES (WITH COMPARATIVE TOTALS FOR 1995)
YEAR ENDED JUNE 30, 1996

	UNRESTRICTED	TEMPORARIL RESTRICTEL
REVENUES, GAINS AND OTHER SUPPORT:		
Private contributions and grants	$ 181,336	$ 1,872,343
Government grants	-	3,952,451
Income on long-term investments	121,403	50,443
Net realized gains on long-term investments	27,583,065	4,474,719
Gain/(loss) on sale of capital assets	(11,662)	-
Net assets released from restrictions - Satisfaction of program restrictions	9,363,368	(8,936,562)
Total revenues, gains and other support	37,237,510	1,413,394
EXPENSES AND LOSSES:		
School of Mathematics	4,802,836	-
School of Natural Sciences	4,172,367	-
School of Historical Studies	2,902,103	-
School of Social Science	1,832,615	-
Libraries and other academic expenses	3,029,332	-
Administration and general	4,170,847	-
Auxiliary activity - tenants' housing expenses, net of unrestricted revenue of $182,510	276,644	-
Provision for postretirement benefits expense	3,722,391	-
Total expenses	24,909,135	-
TOTAL EXPENSES AND LOSSES	24,909,135	-
CHANGES IN NET ASSETS	12,328,375	1,413,394
NET ASSETS, BEGINNING OF YEAR	171,021,336	19,467,024
NET ASSETS, END OF YEAR	$183,349,711	$20,880,418

See notes to financial statements.

1996

PERMANENTLY RESTRICTED	TOTAL	TOTAL 1995
$ 4,788,567	$ 6,842,246	$ 4,470,928
-	3,952,451	3,811,288
-	171,846	4,804,016
7,909,728	39,967,512	13,108,632
-	(11,662)	24,380
(426,806)	-	-
12,271,489	50,922,393	26,219,244
-	4,802,836	4,243,898
-	4,172,367	4,365,113
-	2,902,103	3,160,223
-	1,832,615	1,860,083
-	3,029,332	2,813,002
-	4,170,847	3,748,209
-	276,644	-
-	3,722,391	273,738
-	24,909,135	20,464,266
-	24,909,135	20,464,266
12,271,489	26,013,258	5,754,978
52,709,454	243,197,814	237,442,836
$64,980,943	$269,211,072	$243,197,814

STATEMENT OF CASH FLOWS
YEAR ENDED JUNE 30, 1996

CASH FLOWS FROM OPERATING ACTIVITIES:	
Change in net assets	$ 26,013,258
Adjustments to reconcile change in net assets	
to net cash used in operating activities:	
Depreciation	1,951,247
Decrease in accrued income	68,645
Increase in accounts and grants receivable	(158,845)
Increase in contributions receivable	(1,388,000)
Increase in accounts payable	4,739,541
Decrease in prepaid and other assets	52,269
Decrease in refundable advances	(771,345)
Decrease in accrued management fees	(996,190)
Net realized gains on long-term investments	(39,967,512)
Net cash used in operating activities	(10,456,932)
CASH FLOWS FROM INVESTING ACTIVITIES:	
Purchase of equipment	(800,713)
Proceeds from sale of investments	633,575,750
Purchase of investments	(621,839,932)
Net cash provided by investing activities	10,935,105
CASH FLOWS FROM FINANCING ACTIVITIES:	
Increase in trust fund obligations	323,064
Decrease in unamortized debt service expense	9,260
Payments on long-term debt	(416,053)
Net cash used in financing activities	(83,729)
NET INCREASE IN CASH	394,444
CASH, BEGINNING OF YEAR	209,496
CASH, END OF YEAR	$ 603,940
SUPPLEMENTAL DATA:	
Noncash investing and financing activities:	
Gifts of books	$ 10,601
Income taxes paid on other business income	77,013

See notes to financial statements.

A. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

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

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

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

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

The Institute adopted the provisions of Statement of Financial Accounting Standards ("SFAS") No 106, "Employers' Accounting for Postretirement Benefits Other Than Pensions," effective January 1, 1995. The provisions of SFAS 106 generally require the accrual of other postretirement benefits during periods of active service. Previously, expense was recognized when claims were paid. The projected benefit obligation of $3,722,391 relating to prior service cost has been recognized in the accompanying financial statements for the year ended June 30, 1996.

In June 1994, the Financial Accounting Standards Board issued Statement of Financial Accounting Standards No. 116, "Accounting for Contributions Received and Contributions Made" ("SFAS 116"). SFAS 116, effective for fiscal year 1996, establishes new guidance for reporting of contributions. Contributions received are to be recognized as revenues when received, at fair value. Contributions made are to be recognized as expenses when made, at fair value. Not-for-profit entities, such as the Institute, are required to categorize contributions received as affecting permanently restricted net assets, temporarily restricted net assets, or unrestricted net assets and to recognize the expiration of donor restrictions when they expire. The Institute has presented contributions received in the accompanying statement of financial position, statements of

activities, and cash flows for the year ended June 30, 1996 to conform to the provisions of SFAS No. 116.

In June 1994, the Financial Accounting Standards Board issued Statement of Financial Accounting Standards No. 117, "Financial Statements of Not-for-Profit Organizations" ("SFAS 117"). SFAS 117, effective for fiscal year 1996, requires not-for-profit organizations to provide a statement of financial position, a statement of activities, and a statement of cash flows. It also requires that the amounts for each of three classes of net assets - permanently restricted, temporarily restricted and unrestricted - be displayed in statements of activities and changes in net assets. Reclassifications have been made in the accompanying statements of financial position, activities, changes in net assets and cash flows for the year ended June 30, 1996 to conform to the provisions of SFAS No. 117.

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. SFAS 121 is effective for the Institute for fiscal 1997. The Institute has not yet determined what effect the adoption of SFAS 121 will have on its 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 operations or statement of changes in net assets. This statement is effective for fiscal years beginning after December 15, 1995. The Institute has not yet determined what effect the adoption of SFAS 124 will have on its financial statements.

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 use 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

Investments purchased by the Institute are recorded at cost; investments received by gift are recorded at the fair market value at the date of donation.

Endowment and similar funds investments at June 30, 1996 are comprised of the following:

	CARRYING VALUE	MARKET VALUE
Pooled investments:		
Equity securities	$201,704,752	$228,942,523
Debt securities	62,465,349	62,442,510
Mortgages		
from faculty and staff	2,412,652	2,943,506
Investment accounts receivable	4,299,692	4,299,692
Investment accounts payable	(5,543,244)	(6,288,148)
Total pooled investments	265,339,201	292,340,083
Funds invested separately:		
Equity securities	44,182	44,182
Total	$265,383,383	$292,384,265

Marketable debt and equity securities are carried in the aggregate at lower of cost (amortized, in the case of debt securities) or market. Realized gains and losses are computed based on the average cost of the investment.

Equity securities include the Institute's interest in certain limited partnerships with a carrying value of approximately $75,420,806 and a market value of approximately $79,619,897 at June 30, 1996. 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 $620,175 and $10,010,492, respectively, for the year ended June 30, 1996.

In addition, equity securities include the Institute's interests in two open-ended investment funds (the "Funds") incorporated in the Cayman Islands with carrying values of $56,195,328 and market values of $66,111,015 at June 30, 1996. 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.

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 changes in carrying and market values of the pooled investment portfolio.

| | INVESTMENT PORTFOLIO | | |
	MARKET VALUE	CARRYING VALUE	UNREALIZED APPRECIATION
June 30, 1995	$257,972,901	$238,091,685	$19,881,216
June 30, 1996	292,384,265	265,383,383	27,000,882
Increase in unrealized appreciation for the year ended June 30, 1996			7,119,666
Realized net gain for the year ended June 30, 1996			39,967,512
Realized net gain and increase in unrealized appreciation for the year ended June 30, 1996			$47,087,178

Short-term investments within the plant fund represent the semi-annual loan payment due July 1, 1996 of the 1991 NJEFA bonds. Such funds are invested in U.S. Government obligations with maturities of less than one year. At June 30, 1996, the market value of such securities approximates their carrying value.

Investments, beginning of year		$238,091,685
Gifts available for investment:		
Gifts creating permanent endowment		2,939,434
Gifts creating trust funds		999,988
Investment returns:		
Dividends and interest	$ 171,846	
Realized gains	39,967,512	
Total return on investments		40,139,358
Amounts appropriated for current operations		(16,714,771)
Annuity trust income payment		(72,311)
Investments, end of year		$265,383,383

The participation in the pool and ownership of the other investments at June 30, 1996 is shown in the table below:

Permanently restricted net assets	$ 63,431,943
Temporarily restricted net assets	20,880,418
Unrestricted net assets	181,071,022
	$ 265,383,383

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, 1996 follows:

Land and improvements	$ 2,471,276
Buildings and improvements	33,165,741
Equipment	11,391,660
Rare book collection	214,109
Joint ownership property	921,717
Real estate deposit	305,711
Total	48,470,214
Less accumulated depreciation	(24,281,860)
Net book value	$ 24,188,354

D. LONG-TERM DEBT

A summary of long-term debt at June 30, 1996 follows:

6.275%, 1991 - NJEFA	$ 16,310,000
Less unamortized bond discount	223,688
Total long-term debt	$ 16,086,312

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 $455,000 (1997), $480,000 (1998) and $510,000 (1999), $535,000 (2000), $570,000 (2001) will mature in each of the designated years. The remaining balance of $13,760,000 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, 1996, the estimated fair value of the Institute's long-term debt was $17,370,150.

Interest expense on long-term debt for the year ended June 30, 1996 was $1,067,052.

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 non-discriminatory basis. Contributions for the year ended June 30, 1996 totaled approximately $795,001.

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 expense for postretirement benefits for 1996 is higher than the cash paid of $148,897, the result of having adopted the accrual method of accounting. The cost to the Institute of health benefit costs for retired employees, recognized as expense on the cash basis, was $159,759 in 1995. The component of the periodic expense for these postretirement benefits for 1996 are 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
Immediate Recognition of the Transition Obligation	3,363,520
Total	$3,722,391

The actuarial and recorded liabilities for these benefits, none of which have been funded, are as follows at June 30, 1996:

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

For measurement purposes, a 13.0% Pre-62 trend rate was used for 1996 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 1996, 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, 1996 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, 1995	$2,700,836
Additions:	
Contributions, grants, etc.	5,200,107
Restricted endowment income	1,760,742
Quasi-endowment funds utilized	1,897,378
Total additions	8,858,227
Deductions:	
Funds expended from contributions, grants, etc.	5,971,452
Funds expended from restricted endowment	3,658,120
Total deductions	9,629,572
Balance at June 30, 1996	$1,929,491

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 $2,403,951 as of June 30, 1996 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 support and revenue, expenses, capital additions and changes in fund balances. 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 ($516,515 net of $379,623 in revenues) and members' housing ($446,161, net of $945,861 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 $1,833,294 for the year ended June 30, 1996.

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 $1,067,052 and allocated interest income totaled $6,441 for the year ended June 30, 1996.

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 sup-
port. 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:

	1996
Academic Services:	
Educational Programs	$20,880,418

Permanently restricted net assets are restricted to:
Investments to be held in perpetuity, the income
from which is expendable to support academic

services	$64,980,943

Net assets were released from donor restrictions by incurring expenses satisfy-
ing the restricted purposes or by occurrence of other events specified by donors.

Purpose restrictions accomplished:

Program expenses:	
School of Mathematics	$2,989,577
School of Natural Sciences	2,170,575
School of Historical Studies	876,090
School of Social Science	1,654,668
Academic support costs:	
Libraries and other academic	1,353,328
Computing	42,800
Administration and general:	
Fund raising	8,924
Tenants' housing	86,825
Equipment acquired and placed in service	108,270
Trust fund disbursements	72,311
Total restrictions released	$9,363,368

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:

	1996
Expenses incurred were for:	
Salaries, wages, and benefits	$10,908,286
Stipends	4,227,375
Honoraria	152,498
Grants to other organizations	363,829
Supplies and travel	1,873,180
Services and professional fees	570,966
Depreciation	1,951,247
Interest	1,139,363
Implementation of post retirement benefit expense	3,722,391
Total expenses	$24,909,135

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, 1996	CARRYING AMOUNT	ESTIMATED FAIR VALUE
Assets:		
Cash	$ 603,940	$ 603,940
Investments	265,383,383	292,384,265
Grant/Contributions Receivable	3,139,193	3,139,193
Mortgage Receivable from		
Faculty and Staff	2,412,652	2,943,506
Liabilities:		
Long-term debt	16,086,312	17,370,150

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 discounted future cash flows and prepayments using the current rates at which similar loans would be made to borrowers and for the same remaining term.

The fair value estimates presented are based on information available to the Institute as of June 30, 1996, 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.

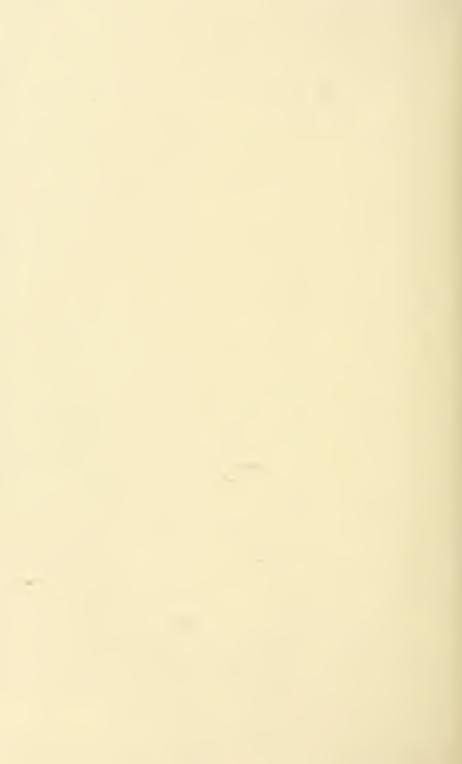M. DISCLOSURES OF PROMISES TO GIVE

June 30, 1996

Unconditional promises to give:	
Less than one year	$1,015,000
One to five years	714,000

The Institute has not recorded an allowance for uncollectible promises receivable as all promises are expected to be collected.

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