









---

The Institute for Advanced Study

---

Annual Report 1979/80









---

# The Institute for Advanced Study

111

Annual Report for the Fiscal Year

July 1, 1979 - June 30, 1980

The Institute for Advanced Study  
Princeton, New Jersey 08540

Printed by Princeton University Press

Designed by Bruce Campbell

AS36  
I79  
1980

*It is fundamental to 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.*

Extract from the letter addressed by the Founders to the Institute's Trustees, dated June 6, 1930, Newark, New Jersey.



---

## Table of Contents

Trustees and Officers	9
Administration	10
The Institute for Advanced Study: Background and Purpose	11
Report of the Chairman	13
Report of the Director	15
Reports of the Schools	21
Publications of the Faculty, Professors Emeriti and Members with Long-term Appointments: A Selection	69
Record of Events, 1979-80	73
Report of the Treasurer	107
Donors	116



## Founders

---

**Caroline Bamberger Fuld**

**Louis Bamberger**

## Board of Trustees

---

**Daniel Bell**

*Professor of Sociology  
Harvard University*

**Charles L. Brown**

*Chairman of the Board and Chief  
Executive Officer  
American Telephone  
and Telegraph Company*

**Fletcher L. Byrom**

*Chairman of the Board  
Koppers Company, Inc.*

**Gladys Kriebel Delmas**

*New York, New York*

**J. Richardson Dilworth**

*Princeton, New Jersey*

**Joseph L. Doob**

*Professor Emeritus of Mathematics  
University of Illinois*

**Sidney D. Drell**

*Professor of Physics  
Stanford Linear Accelerator Center*

**Michael V. Forrestal**

*Lawyer  
New York, New York*

**Ralph E. Hansmann**

*New York, New York*

**James R. Houghton**

*Vice-Chairman and Director  
Corning Glass Works*

**Howard C. Kauffmann**

*President  
Exxon Corporation*

**John R. Opel**

*President and Director  
IBM Corporation*

**Howard C. Petersen**

*Philadelphia, Pennsylvania*

**Martin E. Segal**

*Partner, Wertheim & Co.;  
Chairman, Martin E. Segal Company*

**Zeph Stewart**

*Professor of Greek and Latin  
Harvard University*

**Donald B. Straus**

*President  
Research Institute of the American  
Arbitration Association*

**Frank E. Taplin**

*President  
Metropolitan Opera Association*

**Elizabeth A. Whitehead**

*Greenwich, Connecticut*

**James D. Wolfensohn**

*General Partner  
Salomon Brothers*

**Harry Woolf**

*Director  
The Institute for Advanced Study*

## Trustees Emeriti

---

Lloyd K. Garrison

Harold K. Hochschild

Amory Houghton, Sr.

Harold F. Linder

Ira A. Schur

Norton Simon

## Corporate Officers

---

Howard C. Petersen

*Chairman*

J. Richardson Dilworth

*President and Vice Chairman*

Ralph E. Hansmann

*Treasurer*

Donald C. Jenkins

*Assistant Treasurer*

John Hunt

*Secretary*

## Administration

---

Harry Woolf, *Director*

Aida L. La Brutte, *Secretary*

John Hunt, *Associate Director and Secretary of the Corporation*

Judith G. Grisham, *Secretary*

Allen I. Rowe, *Associate Director for Administration and Finance*

Alison Scheffler, *Secretary*

Mary S. Wisnovsky, *Assistant to the Director*

Grace Rapp, *Secretary*

James Barbour, *Assistant Manager of Administration*

Sabina Modzelewski, *Comptroller*

### Libraries

Lily B. Agar, *Historical Studies*

Virginia C. Radway, *Mathematics and Natural Sciences*

Pat Sherr, *Social Science*

### School of Historical Studies

Elizabeth I. Horton, *School Administrative Officer*

### School of Mathematics

Caroline D. Underwood, *School Administrative Officer*

### School of Natural Sciences

Valerie Nowak, *School Administrative Officer*

### School of Social Science

Peggy A. Clarke, *School Administrative Officer*



---

## The Institute for Advanced Study: Background and Purpose

*The Institute takes the following premises on the nature of learning as fundamental: most important work is the product of the disciplined and creative individual mind; accordingly, the individual scholar must be responsible for how he uses the precious resources of his own time and energy; the community of peers in his area of intellectual work is the ultimate judge of the results. (From PROCEDURES FOR ACADEMIC GOVERNANCE OF THE INSTITUTE.)*

The Institute for Advanced Study, 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 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." During the past half-century, these goals have been implemented by a Faculty of exceptional merit; by an annually renewed group of carefully selected visiting members; and by the

development of facilities and a mode of operation designed specifically to support and assist the Institute's intellectual purposes in every way possible.

Although the Institute is small when measured in terms of the size of its immediate academic community or of its operating budget, its intellectual weight is great and its influence on science and scholarship extraordinary. From its earliest years, it has been internationally recognized as one of the world's leading centers of research. Indeed, its successful example has created numerous imitators both in the United States and abroad.

From the beginning the Institute has been an international organization, although American in location and organizational form. It has operated throughout its existence on the premise that science and learning transcend national boundaries and that scholars and scientists are members of one commonwealth of the mind. Of the present Faculty, many have begun their scientific and scholarly careers outside the United States. One-third of the visiting members come from abroad, mostly from the great centers of learning of western Europe and, to a lesser extent, from other regions of the world.

With its devotion to the continuing examination of new and centrally important questions as they arise at the frontiers of knowledge, the Institute partakes of the character of both a university and a research institute, while differing in significant ways from both. It is unlike a university, for instance, in its small size—its academic membership annually numbers somewhat under 200—and in the fact that it has no formal curriculum, no scheduled courses of instruction, no commitment that all branches of learning be rep-

resented in its Faculty and members. It is unlike the usual research institute in that it supports many separate fields of study, maintains no laboratories and determines its programs in terms of individual intellectual imperatives rather than the collective aims of research teams or the particular interests of potential donors.

For close to five decades the Institute for Advanced Study has made a substantial contribution to the world of higher learning by providing support—intellectual and material—to visiting members whose development and growth constitute one of its principal purposes. More than half of these visiting members are young men and women 35 years of age or less whose work at the Institute involves the Faculty in a substantial amount of postdoctoral training. Though none of the visiting members is a student in the narrow sense of being a degree candidate, educational growth lies ahead.

The Institute devotes special attention to young people of accomplishment and promise, and offers them membership at a stage in their careers when independent work is of the highest importance to their intellectual development. These younger members then return to or join the faculties of universities all over the world and share what they have learned as a result of their stay at the Institute. This might be termed the invisible work of the Institute; its visible work is contained in the publications of the Faculty and visiting members. Both serve to reinforce in highly significant ways the quality of scholarship and research throughout the world.

The varied work of the Institute is, of course, specialized; no advanced study or deep scholarship can be otherwise. Formal attempts to organize scholarly work at the Institute are minimized, although lectures and seminars are a regular feature of its internal

life. The choice and conduct of research and study are matters which are decided entirely by each individual member of the Institute.

The Institute is nonetheless an intellectual community and not a mere collection of scholars. Community is possible because Faculty and members have some substantial knowledge outside their own fields of specialization. The fact that the visiting members live together in Institute housing, eat in the same dining hall, share the same common room and libraries, and carry out their work in an institutional setting where human scale has been carefully maintained is conducive to common interest, mutual understanding and friendship.

The Faculty and members of the Institute are also a part of the larger community of Princeton, with its University and its many institutions of research and learning. Many Institute seminars are open to interested members of the University's faculty and graduate school, and University seminars and conferences are frequently attended by Institute Faculty and members. Without the University, Princeton itself would be both physically and intellectually inadequate as the site of the Institute; and the Institute has brought a degree of international excellence to the general academic community of Princeton, contributing to the development of what has become one of the world's great educational centers.

The Institute today occupies a square mile of land in Princeton, New Jersey. Most of this is farm and woodland. Its buildings house libraries, offices for Faculty and members, seminar and lecture rooms, and common rooms. Although the Institute has no administrative or organic connection with Princeton University, there has always been close collaboration between the two institutions on matters of common interest.

---

## Report of the Chairman

The 1979-80 Annual Report commemorates the fiftieth anniversary of the founding of the Institute for Advanced Study. The Institute's certificate of incorporation was signed on the twentieth day of May 1930. On October 1, 1933, the Institute was formally opened. In the interval, Albert Einstein and Oswald Veblen were named as the first two members of the Faculty. This formative period in the Institute's life will be celebrated in various ways over the next three years.

The meaning for science and learning in America of Einstein's arrival at the Institute was best summed up in the comment of a scientific colleague: "It's as important an event as would be the transfer of the Vatican from Rome to the New World. The pope of physics has moved and the United States will now become the center of the natural sciences." Among his other achievements, Oswald Veblen was chiefly responsible for the selection of the brilliant group of professors (James W. Alexander, Marston Morse, John von Neumann and Hermann Weyl) who, with Einstein, were the original Faculty of the Institute's School of Mathematics.

As part of its current fiftieth year anniversary commemoration of the founding years, the Institute is now seeking contributions to a Fiftieth Anniversary Fund, the income from which will be used to provide permanent annual stipend support for 50 visiting members from each year's total group of some 160.

Once established, the Fiftieth Anniversary Fund will substantially strengthen the Institute's ability during the fifty years ahead to continue its support to visiting members whose intellectual development—particularly that of the younger postdoctoral members—was a central purpose of the Founders in establishing the Institute for Advanced Study.

A detailed presentation of the Institute's financial position is shown as part of the Report of the Treasurer. The performance of the endowment portfolio continues substantially to exceed national averages. Though other Institute revenues are derived from special purpose government grants and contracts, foundation grants and contributions from corporations and individuals, the Institute is and will remain dependent to a considerable extent on income from its endowment. This is particularly true given the fact that the Institute charges no tuition or other fees, neither seeks nor accepts commissioned service contracts, and receives little general purpose income of the kind provided by the large-scale alumni giving characteristic of most leading private educational institutions.

Thus it is the endowment fund which provides the Institute with the financial independence necessary to enable it to maintain its leadership role in scholarship and research, whatever the changing priorities of governmental and other outside funding sources. Such independence does not mean irresponsibility with regard to the ongoing interests of society. In fact, throughout its history, the Institute has carefully but steadily expanded its role in improving the quality of research and higher education worldwide by increasing the number of members it invites each year. Over the past fifty years, more than three thousand scientists and scholars have lived and worked at the Institute.

Contributions to the endowment should therefore be viewed as a vital reinforcement of the Institute's efforts to maintain a freedom of action which has proved itself over the past half-century. The alternative is an ever-increasing dependence on governmental funding and periodic fund-raising drives which in

## 14 Report of the Chairman

the case of the Institute for Advanced Study should not be relied on as a substitute for a substantial and indeed necessary self-sufficiency.

At the April 1980 meeting of the Corporation, the corporate officers were reelected for an additional term. Reelected to the Board for a term expiring in 1982 was Michael V. Forrestal.

Two new Trustees were elected to the Board during the year under review: Daniel Bell and Charles L. Brown.

Daniel Bell, Henry Ford II Professor of the Social Sciences at Harvard University, was born in New York City on May 10, 1919. He received his B.S.S. from the City College of New York in 1939 and his Ph.D. from Columbia University in 1960. Professor of sociology at Columbia University from 1962 to 1969, Dr. Bell has been a member of the Harvard faculty since 1969. In 1966 he received the Gold Medal of the American Council of Education for *The Reforming of General Education*. Other recent publications include *The Coming of Post-Industrial Society* and *The Cultural Contradictions of Capitalism*.

Charles L. Brown, chairman of the board of American Telephone and Telegraph Company, received his B.S.E.E. from the University of Virginia in 1943. Mr. Brown has been affiliated with AT&T since 1946, occupying numerous positions including vice chairman of the board and chief financial officer from April 1976 through March 1977, and president from April 1977 through January 1979, before being named chairman on February 1, 1979. He is a director of E. E. du Pont de Nemours & Co., the Chemical Bank and Chemical New

York Corporation, and Hart Schaffner and Marx.

In other Board action, Norton Simon was named Trustee Emeritus.

The Board also noted the retirement of Professor Deane Montgomery of the Institute's School of Mathematics and passed the following resolution in his honor:

*To Deane Montgomery, our affection and appreciation for his numerous contributions during his long and illustrious association with the Institute for Advanced Study as Member (1934-35, 1941-42 and 1945-46), Permanent Member (1948-51) and Professor (1951-1980). In addition to his widely known and greatly respected achievements in his field of topology and his services to his profession—serving as President of the American Mathematical Society in 1960-62 and President of the International Mathematical Union in 1974-78—he will long be remembered for his concern for the well-being of the annual visiting members in the School of Mathematics and for his availability to them for counsel and help. He has played an important role in establishing and maintaining the highest levels of quality at the Institute. We express to him our sincere best wishes for the fruitful continuation of his work as Professor Emeritus.*

Following the annual meeting of the Corporation and the Board of Trustees in April 1980, new Faculty appointments were announced in the Schools of Historical Studies, Mathematics and Social Science. Further information about these appointments will be found in the Report of the Director which follows.

Howard C. Petersen  
Chairman

---

## Report of the Director

A half-century of any institution's life is a fitting moment to pause for reflection, assessment and general summing up, even as we look forward to the half-century which lies before us. The following reflections concern a story whose conclusions are only processes in a continuing intellectual adventure and whose ends are simply directions pointing to the decades ahead.

In the summer and early fall of 1929, the two philanthropists who were soon to found the Institute for Advanced Study, Louis Bamberger and his sister, Mrs. Felix Fuld, decided to sell their business to R. H. Macy & Co. and to devote their time and their fortunes to the welfare of others. The timing could not have been more propitious. Within weeks of the consummation of the sale, the crash of 1929 followed, releasing forces of destruction and of evil which, along with other events of similar gravity elsewhere, made the decade of the thirties a time of tragedy for so many. Into these troubled waters the newly launched Institute elected to cast a lifeline of learning, to rescue some of those who could escape the collapse of European culture and to bring them to the haven of a deeply troubled but still safe America. Thus the accidental confluence of two streams of Western history brought the Institute for Advanced Study into being and shaped its early character: the American philanthropic tradition exemplified by the Bambergers, and the rise of Nazism and fascism, which sent to America's shores a flood of refugee scholars (some sixteen hundred of them), for most of whom the Institute was a beacon in the descending darkness, for some of whom it was a gateway to a new life, and for a very few a final place within which to continue to work and to transmit to others

the style and the techniques of great learning from the other shore.

The interplay of economic events, the personalities of the founding philanthropists, their friends and advisers, and the state of higher education in America during the twenties, all combining to bring the Institute to life, constitute a fascinating tale too long and too tangled to tell here. Nonetheless, one name rises above all the rest. More than any other individual, it was Abraham Flexner who designed and developed the very idea of an institute for advanced study. Deriving his notions from a careful study of All Souls College at Oxford, the Collège de France and the late nineteenth-century German universities, particularly the University of Göttingen, Flexner argued for the need of a postdoctoral research and teaching institution.

He did so at a time when his own career as a critic and a reformer of higher education appeared to have passed its zenith, for he was sixty-four when the Bambergers sought him out and much was behind him. He had taught Greek and Latin until he was thirty-nine, followed by graduate study at Harvard and Berlin. Employment by the Carnegie Foundation for the Advancement of Teaching in 1908 led to a study of American medical education and research that revolutionized the entire field in the United States and eventually the world. Published in 1910 as *Bulletin No. 4* of the Carnegie Endowment, the Flexner Report, as it came to be known, exposed American medicine for the shallow teaching enterprise it then was. It also made a national, indeed an international, figure of Flexner almost overnight.

Abraham Flexner firmly believed that men could shape their own affairs and direct their



lives toward a desirable future, and that research and education were major instruments of that endeavor. In his medical experience and its consequences, he discovered a larger purpose and the energy to sustain the drive for a new institution of higher learning. One result was an analysis of higher education published as *Universities: American, English, German*. A second result was the general outline for an institute for advanced study.

In that volume on universities, Flexner wrote of the need for "creative activity, productive and critical inquiry [and] minds which can both specialize and generalize," for what he was after was not only the advancement of knowledge but the nourishment of those values which make life worthwhile. Thus, when the Bambergers invited Flexner to guide and direct their effort, their thought was of a new university, but as discussions among them developed and external counsel came to bear on the question, the burdens of the conventional educational marketplace and the multiple purposes and limitations of university life appeared to be increasingly restrictive. In the confidential memorandum that Flexner then prepared for the Bambergers, he called for the creation of an Institute for Advanced Study designed so that it

*should be small, that its staff and students or scholars should be few, that administration should be inconspicuous, inexpensive, subordinate, that members of the teaching staff, while freed from the waste of time involved in administrative work, should freely participate in decisions involving the character, quality, and direction of its activities, that living conditions should represent a marked improvement over contemporary academic conditions in America, that its subjects should be fundamental in character, and that it should develop gradually.*

It was thus basic to Flexner's design that the permanent faculty would be "contributors to the progress of knowledge and the solution of problems," as if they were members of a research institute or center, but they would also be teachers, "choosing a few competent

and earnest disciples engaged in mastery of a subject"—a mastery which of course included the research process itself. Furthermore, Flexner wrote:

*The Institute will be neither a current university, struggling with diverse tasks and many students, nor a research institute, devoted solely to the solution of problems. It may be pictured as a wedge inserted between the two—a small university, in which a limited amount of teaching and a liberal amount of research are both to be found. . . . The level of the teaching and its form mark it off sharply from college teaching, from most university teaching, from technological or professional teaching.*

As for academic organization, given the boundary conditions to which I have referred, Flexner saw the Institute as a kind of expanding circle, within which, he wrote:

*I should, one by one, as men and funds are available—and only then—create a series of schools or groups—a school of mathematics, a school of economics, a school of history, etc. The "schools" may change from time to time; in any event, the designations are so broad that they may readily cover one group of activities today, quite another group as time goes on. Thus, from the outset the school of mathematics might well contain the history or philosophy of science; the school of economics a chair of law or political theory. Each school should conduct its affairs in its own way; for neither the subjects nor the scholars will all fit into one mold.*

And in recognition of the varied working habits of the distinguished scholars who would come to inhabit the Institute, Flexner also said:

*These men know their own minds; they have their own ways; the men who have, throughout human history, meant most to themselves and to human progress have usually followed their own inner light; no organizer, no administrator, no institution, can do more than furnish conditions favorable to the restless prowling of an enlightened and informed human spirit. . . .*

The first academic appointments, naming Albert Einstein and Oswald Veblen as pro-

fessors at the Institute, were approved in the autumn of 1932, in initiation of academic work. The impact of these first appointments exemplifies much of what I have said above about the eventual influence of the Institute on both American and European ideals of education.

Veblen was brought to Princeton University in 1905 by the then president of the university, Woodrow Wilson, and by Dean Henry Burchard Fine. Following his appointment to the Institute in 1932, Veblen remained a member of the Institute's faculty until he was named emeritus in 1950. As Deane Montgomery has pointed out elsewhere, Veblen was largely responsible for the selection of the Institute's early mathematics faculty, which, in addition to himself, included James W. Alexander, Albert Einstein, Marston Morse, John von Neumann and Hermann Weyl. Moreover, he shared responsibility with Flexner for determining the Institute's policy of concentrating on postdoctoral work. He was a Trustee of the Institute from its early days until his death (for his last few years he was an Honorary Trustee). He also played a large part in arranging the purchase by the Institute of the tract of land it now occupies. To the end of his life he was convinced that a great part of the mathematical lifeblood of the Institute was in the flow of young mathematicians through it. He felt too that the main justification for the institution was in whatever impact it might have upon the world academic scene, but particularly America.

One of Abraham Flexner's first acts as Director was to recruit a faculty for the new Institute. Invited in January 1932 to visit the California Institute of Technology by Robert Millikan and George Ellery Hale, under whose leadership another transformation in higher education and research was under way, Flexner gladly accepted, primarily to meet Albert Einstein, who was spending the second of three projected winter visits there. Apparently it was Flexner's intention only to consult with Einstein about the nature and future form of the Institute. In turn, he received an

invitation from Einstein to continue the conversation in Oxford later in the year. There in the following spring Flexner offered him a professorship with the words, "You would be welcome on your own terms." Einstein expressed serious interest in the possibility and asked Flexner to join him at his summer home in Caputh outside Berlin. In June, at the conclusion of a day's discussion about how the Institute would develop, Einstein said, "Ich bin Feuer und Flamme dafür."

The powerful gravitational effect created by Einstein's presence attracted others, even outside his field. The School of Mathematics, which was formally founded in 1933, was followed by the School of Humanistic Studies and the School of Economics and Politics in 1935. Subsequent developments resulted in the formal designation of the School of Historical Studies in 1948 and the School of Natural Sciences in 1966, and the creation of the School of Social Science in 1973.

The ways in which the Institute of today has fulfilled the dreams of its founders are perhaps best revealed in the following pages which contain detailed reports on the intellectual life of an institution which in fifty years has assumed historic importance by virtue of its contributions to the advancement of research and scholarship throughout the world.

### Honors and Distinctions

The most meaningful measure of the contribution of the Institute to international research and scholarship is the work done by its faculty, professors emeriti and members. Continuing recognition of the achievements of Institute Faculty and members with long-term appointments is demonstrated by the following list of this year's honors and distinctions.

Stephen L. Adler has been named New Jersey Albert Einstein Professor at the Institute. John N. Bahcall has been elected chairman of the Astronomy Section, National Academy of Science.

Enrico Bombieri has been named a Fellow of the American Academy of Arts and Sciences.

Roger Dashen has been named a Fellow of the American Academy of Arts and Sciences.

Freeman S. Dyson was a speaker at the twenty-fifth anniversary symposia of the Australian Academy of Science.

Clifford Geertz has been awarded the honorary degree of Doctor of Humane Letters by the University of Chicago and by Bates College. He has also been named a Fellow of the American Association for the Advancement of Science.

Felix Gilbert has been awarded the honorary degree of Doctor of Philosophy by the Free University of Berlin.

James F. Gilliam served as chairman of the Organizing Committee of the XVI International Congress of Papyrology.

S. D. Goitein was awarded the Harvey Prize of the Technion-Israel Institute of Technology. Previous Institute winners of the Harvey Prize were Freeman S. Dyson in 1978 and Bernard Lewis in 1979.

Herman H. Goldstine has received the Harry Goode Award presented by the American Federation of Information Processing Societies.

Albert O. Hirschman was lecturer in the Jane-way Lecture Series in Economics and History held at Princeton University.

Irving Lavin has been named to the Advisory Board of the Center for Advanced Study in the Visual Arts at the National Gallery of Art, Washington, DC.

John W. Milnor has been named Oswald Veblen Professor at the Institute.

Deane Montgomery is serving as president emeritus of the International Mathematical Union.

Otto Neugebauer has received the Distinguished Service Award presented by the Mathematical Association of America.

Kenneth M. Setton has been awarded the honorary degree of Doctor of Philosophy by the University of Kiel, the John Gilmary

Shea Prize of the American Catholic Historical Association, and the Haskins Medal of the Mediaeval Academy of America.

Homer A. Thompson has been elected to membership in the Academy of Athens.

André Weil has been awarded the 1979 Wolf Prize in Mathematics.

Hassler Whitney is serving as president of the International Commission on Mathematical Instruction.

### New Appointments

Following the annual April meeting of the Corporation, the Institute's Board of Trustees announced new Faculty appointments in the Schools of Historical Studies, Mathematics, and Social Science.

Named to a professorship in the School of Historical Studies was Glen W. Bowersock, who comes to the Institute from Harvard University. Born in 1936 in Providence, Rhode Island, Professor Bowersock took his A.B. summa cum laude in classics at Harvard in 1957 and then went as a Rhodes Scholar to Oxford, from which he received a B.A. with first class honors, *Literae Humaniores*, in 1959 and an M.A. and D.Phil. in 1962. During 1960-62 he was a lecturer in ancient history at Balliol and New College, Oxford. Returning to Harvard as an instructor in classics, he became professor of Greek and Latin in 1969 and served as chairman of the classics department from 1972 to 1977. From 1977 until his appointment to the Institute, he was associate dean of the faculty of arts and sciences at Harvard.

Professor Bowersock's active scholarly interests are wide, extending from the fifth century B.C. to the ninth century A.D. and to modern historiography. Thus far two large fields stand out in his scholarly work. The first is the cultural and social history of the eastern half of the Mediterranean world during the long centuries of Roman domination, and the complicated and changing relations between the Greek and Latin parts of the empire. The second is the history of the Near



East, Arabia and Syria in particular, from the second century B.C. to Byzantine times, and the interaction between Greco-Roman and Eastern elements. His first two books, *Augustus and the Greek World* and *Greek Sophists in the Roman Empire*, are original and illuminating contributions to the understanding of relationships within the early empire. *Julian the Apostate*, his most recent book, reflects his interest in the later Roman Empire. He has also been working for a number of years on a major study—to be entitled *Rome and the Arabs*—of relations between the empire and pre-Moslem North Arabia.

Shing-Tung Yau, professor of mathematics at Stanford University since 1976, has been appointed to a professorship in the Institute's School of Mathematics. Born in Swatow, China, in 1949, Dr. Yau holds a Ph.D. from the University of California, Berkeley, and was a member of the Institute for Advanced Study in 1971-72 and in 1979-80.

A major development in mathematics during the past decade has been the progress of analytical methods in differential geometry, which has led not only to considerable advances in analysis and differential geometry proper but also to far-reaching applications in algebraic geometry, algebraic topology and mathematical physics. In this broad and expanding area of mathematics, the undisputed leader and main contributor has been Professor Yau. His work combines geometric imagination and technical power in a unique manner and has made him a foremost expert in differential geometry and nonlinear partial differential equations. His important contributions are too numerous to list here. However, in view of their applications to other areas of mathematics, particular mention should be made of the proof of conjectures made by E. Calabi over twenty-five years ago about the existence of Einstein-Kähler metrics on compact complex manifolds, as well as of joint work with W. Meeks on compact three-dimensional manifolds and of the proof, jointly with R. Schoen, of the so-called positive mass and positive action conjectures in

general relativity theory. Professor Yau's area of expertise is still growing and has increasing importance in the whole of mathematics. It is also one in which close and welcome contacts with mathematical physics have been reestablished and will no doubt develop further.

The third appointment is that of Michael Walzer to the Faculty of the School of Social Science. Born in 1935 in New York City, Dr. Walzer has been professor of government at Harvard University since 1966. From 1962 to 1966 he was a member of the faculty at Princeton University. He holds a B.A. from Brandeis University and a Ph.D. from Harvard.

Professor Walzer's scholarly interests have been essentially in two related areas: the history of political thought and political and moral philosophy. His first book, *The Revolution of the Saints* (1965), was a reinterpretation of the English, or Puritan, Revolution; it has been widely influential. Another book with a primarily historical orientation was *Regicide and Revolution* (1974), a study of the debate over the fate of Louis XVI. His interests in moral philosophy and its relation to public affairs and human conduct in the public realm came to the fore in *Obligations: Essays on Disobedience, War and Citizenship* (1970) and again in his recent, much discussed and acclaimed work, *Just and Unjust Wars* (1977).

The addition of Professor Walzer, as a political scientist concentrating on the United States and on Western Europe, will broaden the range of disciplinary and area concerns of the Institute's School of Social Science, whose two Faculty members have until now been Clifford Geertz, anthropologist, and Albert O. Hirschman, political economist. At the same time, the appointment is fully consonant with the broad, humanistic approach to social science with which the School has been identified since its beginnings.

### Members' Program

During 1979-80 there were 168 members and 23 visitors at the Institute. Forty percent of

the members were under the age of 35. Ten percent of them were women. Taken together, they came from 104 universities in twenty-one countries. The names, academic backgrounds and fields of interest of this year's members and visitors are described in the pages which follow.

Among the many scholars of note who have been part of our community this year, special mention should be made of Sir Isaiah Berlin of All Souls College at Oxford.

Harry Woolf  
*Director*

---

## Reports of the Schools

## The School of Historical Studies

### Faculty

---

Marshall Clagett  
John H. Elliott  
James F. Gilliam

Morton White

Christian Habicht  
Irving Lavin  
Kenneth M. Setton

### Professors Emeriti

---

Andrew Alföldi  
Harold F. Cherniss  
Felix Gilbert

George F. Kennan  
Benjamin D. Meritt  
Homer A. Thompson

### Members with Long-term Appointments

---

Herman H. Goldstine

Otto E. Neugebauer

Bernard Lewis

---

## The School of Historical Studies

There is no work in the School of Historical Studies as extensive—and at the same time as concentrated and coherent—as that in pure mathematics or in theoretical physics, nor is any attempt made to cover all fields of historical scholarship. Rather, work has been encouraged in areas of research—political, intellectual and artistic, and largely focused on the Western world—which are manifestly fruitful and in which a very high level of scholarly excellence, intellectual interest and fundamental historical discovery are assured. The development of the School of Historical Studies has been defined by a measured movement into new fields which reveal such characteristics and by a continued exploration of those disciplines which by design and by tradition have been associated with historical research at the Institute from its beginnings.

Over the years the School of Historical Studies has mirrored the varied interests of its individual Faculty and visiting members, but certain developments have been more or less continuous for close to half a century. These have stressed Greek and Roman antiquity, medieval history and the history of art. In more recent times such main currents of inquiry have been augmented by interests in the history of mathematics and of the sciences, modern European and American history, the history of modern philosophy and the history of modern diplomacy.

The traditional aspects of the historian's craft are the work of narration and interpretation, of establishing legitimate connections among the varied experiences of human beings and their organizations, and of bringing the proven documents and the tested witnesses to bear on events to be described at least as asymptotically true. This continues

to characterize the historian at work at the Institute as elsewhere. In doing so it stresses the role of the individual scholar as master of the entire endeavor, so that whether one is concerned with the transmission of Archimedes' thought in the Middle Ages, the complex relationship between the papacy and the Levant over several centuries, the philosophy of the American Revolution, or the relationship between Spain and its American empire, the historian at the Institute does not generally engage in group projects.

Cooperation does occur of course as well as occasional collaboration; master-disciple relationships, the peer level exchanges, the seminars and lectures common to academic interchange everywhere also characterize the life of historians at the Institute. Additionally, the Institute's considerable impact on the course of historical scholarship has been obtained and multiplied through the influence acquired and spread by visiting members who have come and gone over the years and who now number close to a thousand.

### Academic Activities, 1979-80

The School was host to forty-five long-term, term and annual members in 1979-80. During the summer of 1979 it also provided facilities for ten summer visitors. Nineteen members came from foreign countries including Canada, the Federal Republic of Germany, Great Britain, Ireland, Israel, Italy, Japan, Poland and Switzerland. Members' fields of interest ranged over wide areas of the past, from ancient Greece and Rome to various aspects of modern European history, including the Mid-

dle Ages, the Renaissance and the Reformation. Present among this year's members were specialists in archaeology, art history, literature and the philosophy of history as well as in medieval science and the history of American medicine.

Brief examples of the work of the members and visitors must suffice.

Izabela Biežuńska-Małowist of the University of Warsaw is completing a study of slavery in Byzantine Egypt.

Timothy H. Breen of Northwestern University completed his research for a book on the culture and society of pre-revolutionary Virginia.

Peter F. Dembowski of the University of Chicago prepared a monograph on the poetry of Jean Froissart.

Ann E. Farkas of Brooklyn College completed a book on the history of Bulgarian art.

Alastair D. S. Fowler is completing a book on literary genres.

Roland M. Frye of the University of Pennsylvania has completed preliminary work for his forthcoming study of *Hamlet*.

Thomas W. Gaehtgens of the University of Göttingen is completing a book on Versailles as a national monument.

Ian G. Kidd of the University of St. Andrews worked on the *Commentary* which will eventually form the companion volumes to *Posidonius*, volume 1, *The Fragments*.

Reinhard C. Kuhn of Brown University completed a book on the child in Western literature.

Wataru Kuroda of the University of Tokyo continued his work on the relations between Husserl and Wittgenstein.

Edmund Leites of Queens College of the City University of New York completed much of the work for his study of the resolution of conflicting claims of individual autonomy and

social hierarchy in seventeenth- and eighteenth-century England.

Steven Z. Levine of Bryn Mawr College continued work on his study of Claude Monet.

J. Russell Major of Emory University continued his study of the French nobility in the sixteenth century.

Fordyce W. Mitchel of the University of Missouri made use of the Institute's prosopography files for his study of early Hellenistic Athens.

Charles E. Rosenberg of the University of Pennsylvania is writing a book on the origins and development of the hospital in America between 1800 and 1920.

Lewis W. Spitz of Stanford University continued his work on Luther and German humanism.

Randolph Starn of the University of California at Berkeley completed a book on the history of exile in medieval and Renaissance Italy.

John Wilton-Ely of the University of Hull completed a study of the achievements of Piranesi as an architect and designer.

All members and visitors at the Institute are independent scholars and concentrate on their own subjects. But the contacts and exchanges with one another are often fruitful and stimulating, whether in the same field or one at a distance. In addition to occasional collaborative projects, there are formal colloquia—lectures followed by discussions—in art history on a monthly basis in which Princeton University's department takes part, and in classical studies roughly eight to ten times each term which scholars from the area attend. Some of the members regularly give papers at the meetings of the Institute's School of Social Science; others occasionally attend. Virtually all visiting members keep in regular touch with at least one member of the Faculty.

**Publications of Members Related to  
Residence at the Institute: A Selection**

- Beldiceanu, Nicoara. *Le timar dans l'État ottoman*. Weisbaden: Otto Harrassowitz Verlag, 1980.
- Brown, Jonathan (with John H. Elliott). *A Palace for a King: The Buen Retiro and the Court of Philip IV*. New Haven: Yale University Press, 1980.
- Cranz, F. Edward, ed. *Catalogus Translationum et Commentariorum*. Vol. 4. Washington, DC: Catholic University of America Press, 1980.
- Frommel, Christoph Luitpold. *Michelangelo und Tommaso dei Cavalieri*. Amsterdam: Castrum Peregrini Presse, 1979.
- Kennedy, Paul. *The Rise of the Anglo-German Antagonism, 1860-1914*. London and Boston: Allen & Unwin, 1980.
- Nagy, Gregory. *The Best of the Achaeans*. Baltimore: Johns Hopkins University Press, 1979.
- Rose, Paul Lawrence. *Bodin and the Great God of Nature: The Moral and Religious Universe of a Judaiser*. Geneva: Droz, 1980.
- Schorske, Carl E. *Fin de Siècle Vienna: Politics and Culture*. New York: Knopf, 1979.
- Talmon, J. L. *The Myth of the Nation and the Vision of Revolution: Origins of Ideological Polarization in the 20th Century*. London: Secker & Warburg, 1979.
- Wallace, William Augustine. *From a Realist Point of View: Essays on the Philosophy of Science*. Washington, DC: Catholic University of America Press, 1979.
- Zosimus. *Histoire nouvelle*. Texte établi et traduit par François Paschoud. Vol. 2, Livre III et IV. Paris: Belles Lettres, 1979.





---

## The School of Historical Studies

### Members with Long-term Appointments, Members, Visitors and Assistants, 1979-80

In the section which follows, the information was obtained from material provided by the members, visitors and assistants.

#### Members with Long-term Appointments

**Herman H. Goldstine.** *History of computers and computation; theory of computing machines.*

Born 13 September 1913, Chicago, Illinois. University of Chicago, BS 1933, MS 1934, PhD 1936; honorary doctorate University of Lund 1974, Amherst College 1978, Adelphi University 1978.

University of Chicago, Research Associate and Instructor 1936-39; University of Michigan, Instructor and Associate Professor 1939-42; US Army, in charge of development of ENIAC and of EDVAC 1942-46; IBM Corporation, Research Planning Staff 1958, Director of Mathematical Sciences 1958-65, Consultant to Director of Research 1967-69, IBM Fellow 1969-; Institute for Advanced Study, Electronic Computer Project, Associate Director 1946-57, School of Mathematics, Permanent Member 1951-58, School of Natural Sciences, Member with Long-term Appointment 1972-, School of Historical Studies, Member with Long-term Appointment 1977-.

**Bernard Lewis.** *Islamic history.*

Born 31 May 1916, London, England. University of London, BA 1936; University of Paris, Diplôme des Études Sémitiques 1937; University of London, PhD 1939; honorary doctorate Hebrew University 1974, Tel Aviv University 1979.

University of London, School of Oriental and African Studies, Assistant Lecturer in Islamic History 1938, Lecturer 1940, Senior Lecturer 1946, Reader 1947, Professor of the History of the Near and Middle East 1949-74; University of California at Los Angeles, Visiting Professor 1955-56; Columbia University, Visiting Professor

1960; Indiana University, Visiting Professor 1963; Princeton University, Visiting Professor 1964, Cleveland E. Dodge Professor of Near Eastern Studies 1974-; Institute for Advanced Study, Member 1969, Member with Long-term Appointment 1974-.

**Otto E. Neugebauer.** *History of exact sciences in antiquity.*

Born 26 May 1899, Innsbruck, Austria. University of Göttingen, PhD 1926; University of St. Andrews, LL.D. 1938; honorary doctorate Brown University, Princeton University.

University of Göttingen, Assistant Professor 1927-33; founder and joint editor of *Quellen und Studien zur Geschichte der Mathematik, Astronomie, und Physik* 1930-38; University of Copenhagen, Research Professor 1933-39; University of Cambridge, W. Rouse Ball Lecturer 1939; Cornell University, Messenger Lecturer 1949; Brown University, Professor of the History of Mathematics and Professor Emeritus 1939-69; Institute for Advanced Study, School of Historical Studies, Member 1950-55, 1959-60, Member with Long-term Appointment 1960-, School of Natural Sciences, Member 1950, 1952, 1954, 1956, 1958, Member with Long-term Appointment 1960-.

#### Members

**Marino Berengo.** *European urban history of the thirteenth through the seventeenth centuries.*

Born 8 November 1928, Venice, Italy. University of Padua, PhD 1953. University of Venice, Professor.

**David S. Berkowitz.** *Modern English history.*

Born 20 August 1913, USA. Harvard University, AB 1938, PhD 1946. Brandeis University, Associate Professor 1948-49, Professor 1949-; Harvard University, Visiting Professor 1957-58; Folger Shakespeare

## 28 Reports of the Schools

Library, Senior Fellow 1971-72; American Bar Foundation Legal History Research Fellow 1972-73; Yale University, Center for Parliamentary History, Advisory Board 1974-.

**Izabela Biezuńska-Małowist.** *Social history of the Hellenistic period.*

Born 1 January 1917, Warsaw, Poland. University of Warsaw, MA 1938, PhD 1947, habilitatio 1952.

University of Warsaw, Assistant Professor 1945-47, Associate Professor 1947-52, Professor extraordinarius 1952-72, Professor ordinarius 1972-.

**Larissa Bonfante.** *Ancient Greek and Roman costume.*

Born 27 March 1932, Naples, Italy. Barnard College, BA 1954; University of Cincinnati, MA 1957; Columbia University, PhD 1966.

Rutgers University, Instructor 1963; New York University, Assistant Professor 1963-70, Associate Professor 1970-78, Professor 1978-.

**Timothy H. Breen.** *Early American history.*

Born 5 September 1942, Cincinnati, Ohio. Yale University, BA 1964, MA 1966, PhD 1968.

Yale University, Assistant Professor 1968-70; Northwestern University, Associate Professor 1970-75, Professor 1975-.

**Hans-Günter Buchholz.** *Cypriote archaeology.*

Born 24 December 1919, Fürstenwalde, Germany. University of Kiel, Dr. phil. 1949; University of West Berlin, Dr. habil. 1967.

German Archaeological Institute, head of the publishing board 1961-69; University of Berlin, Privatdozent 1968-69; University of Saarbrücken, Professor of Ancient History 1969; University of Giessen, Professor of Classics 1969-.

**Nicholas P. Canny.** *English settlement in Ireland, 1580-1650.*

Born 4 January 1944, Ireland. National University of Ireland, BA 1964, MA 1967; University of Pennsylvania, PhD 1971.

University College, Galway, Assistant in history 1972, Statutory Lecturer 1973-.

**Jürgen Deininger.** *Greek political opposition to Rome in southern Italy and Sicily, c. 327-203 B.C.*

Born 10 June 1937, Schwaebisch Gmuend,

Germany. University of Tübingen, Dr. phil. 1961.

University of Saarbrücken, Wiss. Assistent 1963-67; University of Freiburg, Wiss. Assistent, Privatdozent 1967-69; University of Berlin, ord. Prof. f. Alte Geschichte 1969-76; University of Hamburg, ord. Prof. f. Alte Geschichte 1976-.

**Peter F. Dembowski.** *Reevaluation of fourteenth-century French poetry with special consideration of Jean Froissart.*

Born 23 December 1925, Warsaw, Poland. University of British Columbia, BA 1952; University of Paris, Doctorat de l'Université 1954; University of California at Berkeley, PhD 1960.

University of Toronto, Assistant Professor, Associate Professor 1960-66; University of Chicago, Associate Professor 1966-70, Professor 1970-, Dean of Students, Division of Humanities 1968-70, Chairman, Department of Romance Languages and Literature 1976-.

**Bruce S. Eastwood.** *History of science and the history of ideas.*

Born 8 February 1938, Worcester, Massachusetts. Emory University, BA 1959, MA 1960; University of Wisconsin, PhD 1964.

Russell Sage College, Instructor 1963-64; Ithaca College, Assistant Professor 1964-67; Clarkson College of Technology, Assistant Professor 1967-70; Kansas State University, Associate Professor 1970-73; University of Kentucky, Associate Professor 1973-; University of Virginia, Visiting Associate Professor 1977-78.

**Ann E. Farkas.** *History of Bulgarian art and architecture.*

Born 7 March 1931, New Brighton, Pennsylvania. University of Chicago, AB 1950; Columbia University, MA 1963, PhD 1967.

Columbia University, Associate 1964-67, Instructor 1967-68, Assistant Professor 1968-73; Brooklyn College, Associate Professor.

**Giovanni A. Forni.** *Roman history.*

Born 28 May 1922, Belgioioso, Italy. University of Pavia, Docteur-ès-Lettres 1945; Yale University, MA 1948.

University of Urbino, University professor in charge 1956-58, University professor ord. 1958-65; University of Genoa, University professor ord. 1965-76; editor of *Fasti Archaeologici* 1957-77; University of Perugia, Professor 1976-.

**Alastair D. S. Fowler.** *Iconographical studies in Renaissance literature.*

Born 17 August 1930, Glasgow, Scotland. University of Edinburgh, MA 1952; University of Oxford, MA 1955, DPhil 1957, DLitt 1972.

Brasenose College, University of Oxford, Fellow and Tutor in English Literature 1962-71; Columbia University, Visiting Professor 1964; Institute for Advanced Study, Member 1966-67; University of Virginia, Visiting Professor 1969; University of Edinburgh, Regius Professor of Rhetoric and English Literature.

**Roland M. Frye.** *Shakespeare's use of iconographic tradition in Hamlet.*

Born 3 July 1921, Birmingham, Alabama. Princeton University, BA 1943, MA 1950, PhD 1952.

Emory University, Assistant Professor, Professor 1952-61; Folger Shakespeare Library, Research Professor 1961-65; University of Pennsylvania, Felix E. Schelling Professor of English 1965-; Institute for Advanced Study, Member 1973-74.

**A. L. Gabriel.** *The world of Henry of Langenstein (1325-1397).*

Born 10 December 1907, Austria-Hungary. University of Budapest, PhD 1936.

University of Budapest, Privatdozent 1943-47; French International College, Hungary, Director 1943-47; Institute for Advanced Study, Member 1950-51; University of Notre Dame, Director of Medieval Institute 1953-75, Director of Ambrosiana Microfilm and Photographic Collection 1975-76; Harvard University, Guest Professor, Stillman Chair 1963-64.

**Thomas W. Gaetgens.** *Nineteenth-century French art.*

Born 24 June 1940, Leipzig, Germany. University of Bonn, PhD 1966; University of Göttingen, Habilitation 1972.

University of Bonn, Assistent 1966-70; University of Göttingen, Assistent 1970-72, Universitätsdozent 1972-74, Apl. Prof. 1974-.

**Woldemar E. H. Görler.** *Syntactical innovations of Virgil.*

Born 4 October 1933, Berlin, Germany. Freie Universität Berlin, PhD 1963; University of Heidelberg, Habilitation 1970.

Freie Universität Berlin, Assistent 1959-63;

University of Heidelberg, Assistent 1963-64, Akademischer Rat 1965-69, ausserplanmässiger Professor 1970, Professor 1970-.

**Michael Heyd.** *Seventeenth-century intellectual history.*

Born 1944, Israel. Hebrew University, BA 1969; Princeton University, MA 1971, PhD 1974. Hebrew University, Assistant Professor 1974-.

**Ian G. Kidd.** *History of philosophy and science.*

Born 6 March 1922, Chandernagore, French India. University of St. Andrews, MA 1947; University of Oxford, BA 1949.

University of St. Andrews, Senior Lecturer in Greek 1965-73, Personal Professor of Ancient Philosophy 1973-76, Professor of Greek 1976-, Provost of St. Leonard's College 1978-; University of Texas at Austin, Visiting Professor 1965-66; Institute for Advanced Study, Member 1971-72.

**Reinhard C. Kuhn.** *Comparative literature and the history of ideas.*

Born 6 September 1930, Berlin, Germany. Princeton University, AB 1952, PhD 1957.

University of Kansas, Assistant Professor, Associate Professor 1958-62; State University of New York at Buffalo, Professor 1962-63; Brown University, Professor 1964-.

**Wataru Kuroda.** *History of modern philosophical empiricism in Europe and in the United States.*

Born 21 October 1928, Tokyo, Japan. University of Tokyo, BA 1951.

University of Tokyo, Assistent 1951-55, Associate Professor 1972-74, Professor 1974-; University of Kumamoto, Instructor 1955-58, Associate Professor 1958-61; University of Kyushu, Associate Professor 1961-72.

**Jacob Lassner.** *Islamic history.*

Born 15 March 1935, Brooklyn, New York. University of Michigan, BA 1955; Brandeis University, MA 1957; Yale University, PhD 1963.

Wayne State University, Assistant Professor 1963-67, Associate Professor 1967-71, Professor 1971-, Department Chairman 1965, 1967-.

**Edmund Leites.** *History of philosophy.*

Born 24 November 1939, Chicago, Illinois.

## 30 Reports of the Schools

Yale University, BA 1959; Harvard University, MA 1965, PhD 1972.

Vassar College, Lecturer 1966-69; Queens College, City University of New York, Lecturer 1969-72, Assistant Professor 1972-76, 1977-; Mellon Scholar 1976.

**Steven Z. Levine.** *Claude Monet: the serial and decorative structures of his art.*

Born 6 March 1947, Boston, Massachusetts. Harvard University, AB 1967, MA 1969, PhD 1974.

Harvard University, Junior Fellow 1972-75, Visiting Lecturer 1973; Bryn Mawr College, Assistant Professor 1975-; Yale University, Visiting Assistant Professor 1976.

**J. Russell Major.** *French social history, 1400-1700.*

Born 7 January 1921, Riverton, Virginia. Virginia Military Institute, AB 1942; Princeton University, MA 1948, PhD 1949.

Emory University, Instructor 1949-50, Assistant Professor 1950-55, Associate Professor 1955-61, Professor 1961-; Harvard University, Visiting Professor 1965-66; Institute for Advanced Study, Member 1967-68.

**Hans Eberhard Mayer.** *Edition of the charters of the crusader kings of Jerusalem.*

Born 2 February 1932, Nürnberg, Germany. University of Innsbruck, PhD 1955.

*Monumenta Germaniae Historica*, Munich, Research Staff Member 1956-67; University of Innsbruck, Lecturer 1964-67; Dumbarton Oaks, Visiting Fellow 1965-66, Visiting Scholar 1970-71; University of Kiel, Full Professor 1967-; Yale University, Visiting Professor 1971; Institute for Advanced Study, Member 1972-73.

**Alexander G. McKay.** *Roman literature.*

Born 24 December 1924, Toronto, Canada. University of Toronto, BA 1946; Yale University, MA 1947; Princeton University, AM 1948, PhD 1950.

McMaster University, Assistant Professor 1957-59, Associate Professor 1959-62, Professor 1962-, Chairman, Department of Classics 1962-68, 1976-79, Dean, Faculty of Humanities 1968-73; Vergilian Society in Italy, Classical Summer School, Director 1954-78.

**Fordyce W. Mitchel.** *Early Hellenistic Athens.*

Born 3 July 1922, Memphis, Tennessee. Yale

University, AB 1943, MA 1944, PhD 1954.

Yale University, Instructor 1945-47; Vanderbilt University, Assistant Professor 1948-53; Randolph-Macon Woman's College, Associate Professor, Professor 1954-64; University of Missouri, Professor 1965-; University of Cincinnati, Visiting Professor and Simple Lecturer 1967-68; American School of Classical Studies at Athens, Associate Fellow 1964-65, 1972-73, Visiting Professor 1974, 1976, Director of Summer School 1975.

**Elzbieta Olechowska.** *Roman history: 54 B.C.*

Born 21 November 1944, Cracow, Poland. University of Warsaw, MA 1968, PhD 1972.

University of Geneva, Assistant 1970-72, Maitre-Assistant 1973-78.

**Anthony R. D. Pagden.** *Spanish-Indian relations in the Yucatán during the sixteenth century.*

Born 27 May 1945, Sussex, England. University of Oxford, AB 1972, MA 1975.

Merton College, University of Oxford, Research Fellow 1973-76; Warburg Institute, University of London, Senior Research Fellow 1976-.

**Donald E. Queller.** *Venetian medieval and Renaissance history.*

Born 14 January 1925, Saint Louis, Missouri. University of Michigan, BA 1949, MA 1951; University of Wisconsin, PhD 1954.

Beloit College, 1955-56; University of Southern California, 1956-68; University of Illinois, 1968-.

**Charles E. Rosenberg.** *The origins of the American hospital, 1800-1920.*

Born 11 November 1936, New York, New York. University of Wisconsin, BA 1956; Columbia University, MA 1957, PhD 1961.

University of Wisconsin, Lecturer 1961-62, Research Assistant Professor 1962-63; University of Pennsylvania, Assistant Professor 1963-65, Associate Professor 1965-68, Professor 1968-, Chairman, Department of History 1974-75.

**Christoph Schäublin.** *Greek philology.*

Born 4 March 1941, Basel, Switzerland. University of Basel, PhD 1967.

University of Basel, Assistent 1967-70, Privatdozent 1973-; Corpus Christi College,

University of Oxford, temporary member of the Sen. Common Room 1971-73.

**A. Mark Smith.** *Jean Buridan and the de anima tradition at fourteenth-century Paris.*  
 Born 29 December 1942, West Point, New York. St. John's College, BA 1967; University of Wisconsin, MA 1972, PhD 1976.  
 Brandeis University, Andrew Mellon Assistant Professor 1976-.

**Robert E. Somerville.** *Medieval ecclesiastical history.*  
 Born 16 July 1940, Pennsylvania. Case Western Reserve University, AB 1964; Yale University, MA 1965, PhD 1968.  
 Columbia University, Assistant Professor 1969-74, Professor 1976-; University of Pennsylvania, Associate Professor 1975-76.

**Lewis W. Spitz.** *Reformation history.*  
 Born 14 December 1922, Bertrand, Nebraska. Concordia College, AB 1944; University of Missouri, MA 1948; Harvard University, PhD 1954.  
 Stanford University, Dean 1967-76, William R. Kenan Professor of History.

**Alan B. Spitzer.** *Social and intellectual history of the French Revolution.*  
 Born 27 March 1925, Philadelphia, Pennsylvania. Swarthmore College, AB 1948; Columbia University, MA 1949, PhD 1955.  
 Boston University, Instructor, Assistant Professor, 1953-57; University of Iowa, Assistant Professor, Associate Professor, Professor, 1957-.

**Randolph Starn.** *The end of the Renaissance in Italy.*  
 Born 3 April 1939, Modesto, California. Stanford University, BA 1960; University of California at Berkeley, MA 1961; Harvard University, PhD 1967.  
 University of California at Berkeley, Department of History 1966-, Associate Dean, College of Letters and Science 1974-78, Professor.

**Arnold Thackray.** *History of science.*  
 Born 30 June 1939, England. University of Bristol, BS 1960; University of Cambridge, MA 1965, PhD 1966.  
 Churchill College, University of Cambridge, Fellow 1965-68; Harvard University, Visiting

Lecturer 1967-68; University of Pennsylvania, Assistant Professor, Associate Professor, Professor, 1968-, Chairman, Department of History and Sociology of Science 1970-77; Center for Advanced Study in the Behavioral Sciences, Fellow 1974.

**Gabriel P. Weisberg.** *History of art.*  
 Born 4 May 1942, New York, New York. New York University, BA 1963; Johns Hopkins University, MA 1967, PhD 1967.  
 University of New Mexico, Assistant Professor 1967-69; University of Cincinnati, Associate Professor, Acting Head of the Department 1969-73; Cleveland Museum of Art, Curator of Art History and Education 1973-; Case Western Reserve University, Adjunct Professor 1973-.

**John Wilton-Ely.** *The works of Robert and James Adam as architects and designers.*  
 Born 2 February 1937, London, England. Jesus College, University of Cambridge, BA 1961, MA 1966; Courtauld Institute, academic diploma 1963.  
 University of Nottingham, Lecturer 1963-79; University of Hull, Professor and Head of the Department of the History of Art 1979-.

**Franz Winzinger.** *History of art.*  
 Born 22 July 1910, Rottenburg, Bavaria. University of Munich, Dr. Rer. Nat. 1940; University of Erlangen, Dr. Phil. 1956.  
 University of Regensburg, Ordentlicher Prof. (Emeritus).

## Visitors

**Isaiah Berlin.** *Philosophy of history.*  
 Born 6 June 1909. Educated at St. Paul's School and at Corpus Christi College, University of Oxford; honorary degrees; O.M., Kt., C.B.E., M.A., F.B.A.  
 New College, University of Oxford, Lecturer in philosophy 1932; All Souls College, University of Oxford, Fellow 1932-38; New College, Fellow and Tutor 1938-50; attached to British Information Service, New York 1941; First Secretary, British Embassy, Washington 1942-46, Moscow 1945; University of Oxford, Lecturer 1947; New College, Sub-Warden 1949-50; All Souls College, Research Fellow 1950-57;



## 32 Reports of the Schools

University of Oxford, Chichele Professor of Social and Political Theory 1957-67; Harvard University, Visiting Lecturer 1949, 1951, 1953, Ford Research Professor 1962, Mellon Lecturer 1965; Princeton University, Visiting Professor 1966; Bryn Mawr College, Mary Flexner Lecturer 1952-53; London School of Economics, Auguste Comte Memorial Lecturer 1953; University of Chicago, Alexander White Professor 1955; University of Oxford, Romanes Lecturer 1971; City University of New York, Professor of Humanities 1966-72; Wolfson College, University of Oxford, President 1966-75; All Souls College, Fellow 1975; British Academy, President 1974-; Institute for Advanced Study, Director's Visitor, January-February 1980.

**Robert Darnton.** *Eighteenth-century history: the rise of the intelligentsia.*

Born 10 May 1939, New York, New York. Harvard University, AB 1960; University of Oxford, BPhil 1962, PhD 1964.

Harvard University, Junior Fellow 1965-68; Princeton University, Assistant Professor, Professor, 1968-; École Pratique des Hautes Études, VI Section, Directeur d'Études 1970-71; Center for Advanced Study in the Behavioral Sciences, Fellow 1973-74; Center for Advanced Study (Netherlands), Fellow 1976-77; Institute for Advanced Study, School of Historical Studies, Visitor, School of Social Science, Member first term.

**Margaret Patricia Gilbert.** *Philosophy of social science.*

Born 29 March 1942, Mursley, England. University of Cambridge, AB 1965; University of Oxford, BPhil 1967; Universities of Cambridge and Oxford, MA 1967.

Manchester University, Lecturer 1967-71; University of California at Davis, Lecturer 1970-71; St. Anne's College, University of Oxford, Fulford Research Fellow 1971-72; University of Reading, Lecturer 1971-73; St. Hilda's College, University of Oxford, McClrath Research Fellow 1972-76; Princeton University, Visiting Fellow 1974, Visiting Assistant Professor 1975; University of California at Los Angeles, Visiting Assistant Professor 1975; Institute for Advanced Study, Member 1978-79.

**S. D. Goitein.** *Medieval Islamic and Jewish history.*

Born 3 April 1900, Burgkunstadt, Bavaria. University of Frankfurt, PhD 1923.

Hebrew University, Lecturer, Professor, 1928-57; University of Pennsylvania, Professor 1957-70, Affiliated Professor 1970-71; Institute for Advanced Study, Visitor 1971-.

**Ephraim Isaac.** *History of the Ethiopian church.*

Born 29 May 1936. Concordia College, AB 1958; Harvard University, MA 1965, PhD 1969.

Harvard University, Teaching Fellow 1968-69, Lecturer 1969-72, Associate Professor 1972-77; Hebrew University, Visiting Professor 1973-74, 1977-78.

**Lilly L. Kahil.** *Iconographical studies in Greek art.*

Born 2 July 1926, Zurich, Switzerland. Sorbonne, University of Paris, Licence ès Lettres 1947; University of Dijon, Diplôme d'Études Supérieures classiques 1948; Sorbonne, University of Paris, Doctorat ès Lettres 1954.

Universities of Fribourg and Paris X, Professor of Classical Archaeology 1957-; LIMC Foundation (Switzerland), Secretary General of the *Lexicon Iconographicum Mythologiae Classicae* 1973-; Institute for Advanced Study, Member first term of academic years 1954-55, 1967-68, 1974-75, 1977-78, 1978-79, Visitor first term of academic years 1976-77, 1979-80.

**Marian Małowist.** *History of the Middle Ages.*

Born 19 December 1909, Łódź, Poland. University of Warsaw, MA 1931, PhD 1934.

University of Warsaw, Docent 1946-49, Professor extraordinarius 1949-54, Professor ordinarius 1954-; École Pratique des Hautes Études, Visiting Professor 1958-59; Clare Hall, University of Cambridge, Visiting Fellow 1971-72; Institute for Advanced Study, Member 1974-75.

### Assistants

**Susan M. Babbitt.** *Medieval history.*

Born 6 February 1949, Dayton, Ohio. University of California at Berkeley, BA 1970; Cornell University, MA 1972, PhD 1977.

Institute for Advanced Study, Assistant to Professor Kenneth M. Setton 1975-.

**Alfred S. Bradford, Jr.** *Ancient history.*

Born 5 July 1942, Appleton, Wisconsin. University of Wisconsin, BA 1964; University of Chicago, MA 1966, PhD 1973.

University of Wisconsin, Lecturer 1973-74;

University of Illinois at Chicago Circle, Visiting Assistant Professor 1977; Institute for Advanced Study, Assistant to Professor Christian Habicht 1977-.

**Klaus W. Fleissner.** *Roman history.*

Born 6 December 1952, Haan, Germany.

Institute for Advanced Study, Assistant to Professor Emeritus Andrew Alföldi.

**Edith W. Kirsch.** *Medieval and Renaissance art.*

Born 20 September 1932, New York, New York.

Cornell University, AB 1953; Princeton University, MFA 1971.

Institute for Advanced Study, Assistant to Professor Millard Meiss 1964-68, Assistant to Professor Irving Lavin 1975-; University of California Extension Program in Italy, Guest Lecturer July 1974; Princeton University, Index of Christian Art, Research Assistant 1974-75; Rutgers University, Visiting Lecturer 1976-77.

**Peter Marshall.** *Medieval intellectual history.*

Stanford University, BA 1970; Cornell University, MA 1974, PhD 1980.

Institute for Advanced Study, Assistant to Professor Marshall Clagett 1977-.

## The School of Mathematics

### Faculty

---

Enrico Bombieri

Armand Borel

Harish-Chandra

*(IBM von Neumann Professor)*

Atle Selberg

Robert P. Langlands

John W. Milnor

*(Oswald Veblen Professor)*

Deane Montgomery

### Professors Emeriti

---

Arne Beurling

Hassler Whitney

André Weil



---

## The School of Mathematics

Perhaps more than any other subject, pure mathematics is a cumulative science, for theories once proven remain part of its living body. They may change in the light of new insights and give rise to unexpected patterns of reasoning, but they do not vanish. Obviously, the historical context of the mathematics tradition, reaching back into ancient epochs and multiple cultures as well as developing through time into an ever wider set of specialized forms and designs, has produced the same specializations and difficulties of communication common to the history of other great disciplines. However, from time to time, their fragmentation finds its counterforce in unifying theories that bring hitherto unrelated divisions together and, under such unexpected and usually parsimonious insights, render accessible to a wider community enormous fields of knowledge with intellectual efficiency and aesthetic rewards.

For this rhythm of extension and accretion to succeed, communication and exchange that maximize matching, and resonance, and even confrontation are absolutely essential. Over time, various centers have created the locus for such possibilities. The international focus of mathematical discussion in the first part of this century took place at the University of Göttingen. When it was extinguished, the Institute for Advanced Study rekindled the flame, bringing within its fold Europeans such as Kurt Gödel, Carl Ludwig Siegel, John von Neumann and Hermann Weyl, and adding to their presence such American luminaries as James Alexander, Marston Morse and Oswald Veblen. The proximity of a strong mathematics group at Princeton University also played a part in relocating and centering

the new School in a benign and sympathetic environment.

As in the other Schools, formal organization is minimal. Although problems are not selected for team research, seminars, discussion groups, formal lectures and informal gatherings abound in a *mélange* that reflects thematic concentration and individual predilections. In response to the interests of the Faculty over time, the School has been primarily concerned with five areas broadly understood: topology; analysis and global analysis; Lie groups, algebraic groups, automorphic functions and number theory; algebraic geometry; and logic.

One feature of the School of Mathematics which differentiates it from the other Schools within the Institute is its commitment to a publishing endeavor. The School participates formally in the editing of the *Annals of Mathematics*, the leading mathematical journal in the United States. Among other contributions, the aperiodic Hermann Weyl Lectures given at the Institute are published in the *Annals of Mathematics Studies*. Essentially educational and informative, the series consists of a broad survey of recent work by experts in a given area for the benefit of those in other fields or specialties. In fact, this serves as a device whereby the Faculty itself encourages communication among the various subdivisions of mathematics and, equally, seeks to stimulate research in areas beyond the Faculty's own range.

### Academic Activities, 1979-80

The period under review was a particularly active one for the School of Mathematics and

featured a year-long program in differential geometry and nonlinear differential equations. The research activities associated with this program consisted mainly of weekly seminars about recent and current research, centered on the following topics: differential geometry, minimal submanifolds, relativity and mathematical physics. Coordinators of the seminars were Shing-Tung Yau and Leon Simon.

In view of the special interest expressed by many researchers in the New York and Philadelphia area about these lectures, particular attention was given to timing the schedule for them in order to insure full participation not only by Institute members but also by researchers from nearby institutions. As a result, many mathematicians from the New York and Philadelphia area as well as from Rutgers University and Princeton University attended the lectures regularly.

In addition to Yau and Simon, these Institute members and visitors participated actively in this program: Thierry Aubin, Jean Pierre Bourguignon, Paul E. Ehrlich, Basilis Gidas, Enrico Giusti, Robert Gulliver, Stefan Hildebrandt, Wei-Ming Ni, Chia-Kuei Peng, Roger Penrose, Richard Schoen, Nancy K. Stanton, Chuu-Lian Terng and Karen Uhlenbeck.

Forty lectures dealt with problems of differential geometry, twenty-one with topics connected with minimal submanifolds and eighteen were devoted to general relativity. A complete description of all the topics treated in these seminars would be beyond the range of this report; however, one can mention the following. Each of the three seminars began with a series of lecture surveys given by Shing-Tung Yau (differential geometry), Leon Simon (minimal submanifolds) and A. Lapedes and M. Perry (general relativity).

The other major activities in differential geometry may be grouped as follows. One group of lectures centered on Sobolev inequalities on manifolds, bounds for the eigenvalues of the Laplacian and of elliptic operators on manifolds, a priori estimates for nonlinear elliptic equations, with applications

to central problems such as the Yamabe problem on scalar curvature, the Calabi conjecture, and Monge-Ampère equations on Riemannian manifolds.

A second group of lectures explored the new techniques, introduced by Yau, Uhlenbeck and J. Sacks, which use minimal representatives of homology classes of submanifolds or of homotopy classes of maps in order to obtain new global results in problems in differential geometry.

Finally, a third major group of lectures dealt with the problems both of differential geometry proper and of nonlinear differential equations arising from gauge field theory and, more specifically, Yang-Mills fields. The lectures in this group were also followed closely by physicists in the Princeton area.

The other lectures in the area of minimal submanifolds dealt with both the classical theory of 2-dimensional surfaces with prescribed mean curvature, including the study of associated nonlinear differential equations, and with the variational point of view of geometric measure theory. Several associated problems, including free boundary problems for liquids and capillary surfaces, were discussed.

The general relativity seminar was characterized by the extraordinary cooperation of physicists from the Princeton area, which insured a mutual and unusual exchange of ideas between physicists and mathematicians. Quantum gravity and quantization problems, the mathematics of black holes and cosmology were some of the topics treated. Of particular interest to physicists and mathematicians was the solution, obtained by Yau and Schoen, of the so-called positive mass conjecture. The methods used there, ranging from minimal submanifolds to techniques in global differential geometry, are a good example of the unifying aspects of all activities of this special program.

Several original papers were produced as a direct consequence of this work; many more will be produced in the future as a consequence of the enormous exchange of ideas which went along with it. Many of the seminars presented original results and texts of

these talks were produced. They are now being collected and edited for publication in the *Annals of Mathematics Studies* series; it is expected to have two volumes for differential geometry and general relativity and one volume for minimal submanifolds.

Other activities during the year included a weekly seminar on the Cohomology of Arithmetic Groups organized by Armand Borel, a weekly seminar on Partial Differential Equations and Several Complex Variables which was held alternately at the Institute and at Princeton University, regular lectures by Harish-Chandra, weekly seminars in Topology and on Hopf Algebras, and two series of Hermann Weyl Lectures, the first by J. Coates on number theoretic conjectures by Birch and Swinnerton-Dyer, and the second by L. Nirenberg on topological and variational methods in nonlinear problems.

#### Publications of Members Related to Residence at the Institute: A Selection

Adolphson, Alan (with S. Sperber). "Exponential sums on the complement of a hypersurface." *Amer. J. Math.* 102 (1980).

Andersen, Henning H. "Vanishing theorems and induced representations." *J. Alg.* 62 (1980).

—. "The strong linkage principle." *J. Reine Ang. Math.* 315 (1980), 53-59.

—. "On the structure of Weyl modules." *Math. Z.* 170 (1980), 1-14.

—. "The Frobenius morphism on the cohomology of vector bundles on  $G/B$ ." *Annals of Math.* 112 (1980).

Eberlein, Patrick B. "Lattices in spaces of nonpositive curvature." *Annals of Math.* 111 (1980), 435-476.

Geoghegan, Ross. "Open problems in infinite dimensional topology." *Topology Proceedings* 4 (1979), 287-338.

Goto, Midori S. "On the cone topology of a manifold without focal points." *J. Differential Geom.* 14 (1979).

—. "On the fundamental groups of negatively curved manifolds with finite volume." *Proc. Amer. Math. Soc.* 75 (1979), 99-103.

—. "Isometry groups of negatively curved 3-manifolds." *Hiroshima Math. J.* 9 (1979), 313-319.

Hambleton, Ian (with D. R. Anderson).

"Balanced splittings of semi-free actions of finite groups on homotopy spheres." *Comment. Math. Helv.* 55 (1980), 130-158.

— (with R. J. Milgram). "The surgery obstruction groups for finite 2-groups." *Invent. Math.* 61 (1980), 33-52.

Jaco, William H. "On ends of groups and Johansson's deformation theorem." Springer-Verlag *Lecture Notes in Math.* 788 (1980), 62-88.

—. *Lectures on three-manifold topology*. CBMS Lecture Series 43. Providence, RI: American Mathematical Society, 1980.

Kawauchi, Akio (with R. Hartley). "Polynomials of amphicheiral knots." *Math. Ann.* 243 (1979), 63-70.

—. "The invertibility problem on amphicheiral excellent knots." *Proc. Japan Acad.* 55 (1979), 399-402.

—. "Vanishing of the Rochlin invariants of some  $Z_2$ -homology 3-spheres." *Proc. Amer. Math. Soc.* 79 (1980), 303-307.

Rosenberg, Jonathan M. "Realization of square-integrable representations of unimodular Lie groups on  $L^2$ -cohomology spaces." *Trans. Amer. Math. Soc.* (1980).

Taft, Earl J. (with R. Wilson). "There exist finite-dimensional Hopf algebras with antipodes of arbitrary even order." *J. Algebra* 62 (1980), 283-291.

— (with B. Peterson). "The Hopf algebra of linearly recursive sequences." *Aequationes Math.* 20 (1980), 1-17.

— (with J. A. Green and W. D. Nichols). "Left Hopf algebras." *J. Algebra* 65 (1980), 399-411.



---

# The School of Mathematics

## Members, Visitors and Assistants, 1979-80

In the section which follows, the information was obtained from material provided by the members, visitors and assistants.

### Members

**Luis Astej.** *Algebraic topology.*

Born 2 January 1951, Monterrey, Mexico. Centro de Investigación del IPN, MA 1973, PhD 1978.

Universidad Autónoma Metropolitana at Iztapalapa, Associate Professor 1976-78, Professor 1978-.

**Thierry E. F. Aubin.** *Analysis on Riemannian manifolds.*

Born 5 June 1942, Beziers, France. PhD 1969. Université de Lille, Maître de conférences 1968-73; Université de Paris VI, Professeur 1973-.

**Frits Beukers.** *Number theory.*

Born 1953, Ankara, Turkey. University of Leiden, PhD 1980.

University of Leiden, Assistant 1974-76, Research Assistant 1976-79.

**Jean Pierre Bourguignon.** *Differential geometry; analysis.*

Born 21 July 1947, Lyon, France. Université de Paris, MA 1968, PhD 1974.

CNRS, Attaché de Recherche 1969-74, Chargé de Recherche 1974-79; State University of New York at Stony Brook, Visiting Professor 1972-73; University of Bonn, SFB 40, Gast Professor 1976-77; Centre de Mathématiques, École Polytechnique at Palaiseau.

**David M. Bressoud.** *Number theory; combinatorics; special functions.*

Born 27 March 1950, Pennsylvania. Swarthmore College, BS 1971; Temple University, MA 1975, PhD 1977.

Temple University, University Fellow 1973-74, 1976-77; Pennsylvania State University, Assistant Professor 1977-.

**Robert L. Bryant.** *Differential geometry.*

Born 30 August 1953, Kipling, North Carolina. North Carolina State University, BS 1974; University of North Carolina, PhD 1979.

University of North Carolina at Chapel Hill, Teaching Assistant 1974-75, 1978-79, Research Assistant 1976-78.

**Eugenio Calabi.** *Differential geometry.*

Born 11 May 1923, Milan, Italy. Massachusetts Institute of Technology, BS 1946; University of Illinois, MA 1947; Princeton University, PhD 1950.

Louisiana State University, Assistant Professor 1951-54; California Institute of Technology, Assistant Professor 1954-55; University of Minnesota, Assistant Professor, Associate Professor, Professor, 1955-64; Institute for Advanced Study, Member 1958-59; University of Pennsylvania, Professor 1964-.

**Philippe Cassou-Noguès.** *Algebraic number theory; Galois module structure.*

Born 19 January 1944, Paris, France. University of Paris, Licence et Agregation de Mathématiques pures 1969; University of Bordeaux, Doctorat de troisième cycle Mathématiques pures 1972, Doctorat ès Sciences Mathématiques pures 1977.

University of Bordeaux, Assistant 1967-71, Maître Assistant 1973-; University of Tunis, Assistant 1971-73.

**Pierrette Cassou-Noguès.** *Number theory (zeta functions).*

Born 11 November 1945, Rabat, Morocco. University of Paris, Agregation Mathématiques pures 1968; University of Bordeaux, Doctorat de troisième cycle 1971, Doctorat ès Sciences 1978.

University of Bordeaux, Assistant 1967-71, Maître Assistant 1973-; University of Tunis, Assistant 1971-73.

**Joseph E. Z. Chein.** *Number theory.*

Born 1 April 1945, Taipai, Taiwan. Northeast

Missouri State University, BS 1972; St. John's University, MA 1975; Pennsylvania State University, PhD 1979.

Pennsylvania State University, Teaching Assistant 1975-.

**Po-chu Chiang.** *Algebraic topology.*

Born 4 September 1937, Tietsin, China.

Peking University, Assistant 1957-58, Associate Professor 1978-.

**Robert F. Coleman.** *Number theory.*

Born 22 November 1954, Glen Cove, New York. Harvard University, BS 1976; Princeton University, PhD 1979.

Princeton University, NSF Graduate Fellow 1976-79.

**Leon Ehrenpreis.** *Analysis; group representations.*

Born 22 May 1930, Brooklyn, New York. City College of New York, BS 1950; Columbia University, MA 1951, PhD 1953.

Johns Hopkins University, Instructor 1953-54; Institute for Advanced Study, Member 1954-57, 1961-62; Brandeis University, Associate Professor 1957-59; Yeshiva University, Professor 1959-61, 1968-; Courant Institute, New York University, Professor 1962-68.

**Paul E. Ehrlich.** *Differential geometry.*

Born 8 August 1948, Schenectady, New York. Harvard College, AB 1970; State University of New York at Stony Brook, MA 1971, PhD 1974.

Centre de Mathématiques, École Polytechnique, Invité 1973; University of Bonn, Visitor 1974-76, 1978; University of Missouri at Columbia, Assistant Professor 1976-.

**Jean-Marc Fontaine.** *Algebraic number theory.*

Born 13 March 1944, Boulogne-Billancourt, France. Université de Paris-Sud, Doctorat d'Etat 1972.

CNRS, Attaché de recherches 1971; Université de Paris VI, Chargé d'enseignement 1971-72; Université de Grenoble I, Maître de Conférences 1972-77, Professeur titulaire 1977-.

**Paul Gérardin.** *Harmonic analysis on reductive groups on locally compact fields and adèles.*

Born 16 January 1943, Roanne, France. Université de Paris, Baccalauréat 1959, Licence de mathématiques 1963, Diplôme

de mathématiques 1964, Agrégation de mathématiques 1965, Doctorat d'État de mathématiques 1974.

École Normale Supérieure, Élève fonctionnaire stagiaire 1962-66; Faculté des Sciences de Paris, Assistant; Université de Paris VI et Université de Paris VII, Maître-assistant 1966-74; Institute for Advanced Study, Member 1974-75; Université de Paris VII, Maître de Conférences, Professeur, 1975-.

**Claus Gerhardt.** *Partial differential equations.*

Born 4 November 1946, Mainz, Germany. University of Mainz, PhD 1973.

University of Mainz, Assistant 1970-73; University of Paris, Fellow of the DFG 1974; University of Bonn, SFB 40, Member 1975; University of Heidelberg, Professor 1975-.

**Basilis Gidas.** *Mathematical physics.*

Born 17 November 1941, Exarchos-Lochridos, Greece. National Technical University of Greece, BS 1965; University of Michigan, MA 1967, PhD 1970.

University of Michigan, Research Associate 1970-72; University of Washington, Assistant Professor 1972-75; University of Bielefeld, Visiting Assistant Professor 1975-76; Rockefeller University, Guest Investigator 1976-79.

**Jane P. Gilman.** *Riemann surfaces and Teichmüller theory.*

Born 17 April 1945, Washington, DC. University of Chicago, BS 1965; Columbia University, PhD 1971.

State University of New York at Stony Brook, Instructor 1971-72; Rutgers University at Newark, Assistant Professor 1972-76, Associate Professor 1977-.

**Enrico Giusti.** *Partial differential equations.*

Born 28 October 1940, Privorno, Italy. University of Rome, BS 1963, PhD 1968.

University of Pisa, Assistant Professor 1965-71, Professor 1978-; University of California at Berkeley and Stanford University, Visiting Associate Professor 1971-72; University of L'Aquila, Professor 1972-75; University of Trento, Professor 1975-78.

**Robert E. Greene.** *Differential geometry.*

Born 9 May 1943, Knoxville, Tennessee. Michigan State University, BS 1964; University of



California at Berkeley, MA 1966, PhD 1969.  
 Courant Institute, New York University, Instructor 1969-71; University of California at Los Angeles, Assistant Professor 1971-73, Associate Professor 1973-76, Professor 1976-; Institute for Advanced Study, Member second term 1975-76.

**Robert L. Griess, Jr.** *Group theory.*

Born 10 October 1945, Savannah, Georgia. University of Chicago, BS 1967, MA 1968, PhD 1971.

University of Michigan, Hildebrandt Research Instructor 1971-73, Assistant Professor 1973-74, 1975-76, Associate Professor 1976-; Rutgers University, Visiting Assistant Professor 1974-75.

**Robert D. Gulliver II.** *Analysis.*

Born 24 July 1945, Torrance, California. Stanford University, BS 1967, MA 1969, PhD 1971.

University of California at Berkeley, Lecturer 1971-73; University of Minnesota, Assistant Professor 1973-76, Associate Professor 1976-; University of Bonn, Guest Professor 1976.

**Allen E. Hatcher.** *Topology.*

Born 23 October 1944, Indianapolis, Indiana. Oberlin College, BS 1966; Stanford University, MA 1967, PhD 1971.

Princeton University, NSF Postdoctoral Fellow 1971-72, Lecturer 1972-73, Assistant Professor 1973-77; Institute for Advanced Study, Member 1975-76; University of California at Los Angeles, Assistant Professor 1977-.

**Haruzo Hida.** *Number theory; arithmetic theory of automorphic functions.*

Born 6 August 1952, Osaka, Japan. Kyoto University, BS 1974, MA 1976.  
 Hokkaido University, Assistant 1976-.

**Stefan O. W. Hildebrandt.** *Differential geometry; analysis.*

Born 13 July 1936, Leipzig. Universität Mainz, Diplom. Math. 1960, Dr. Rer. Nat. 1961. Universität Mainz, Wiss. Asst. 1961-65, Privatdozent 1965-67, Full Prof. 1967-70; Univ. Bonn, Prof. 1970-; Courant Institute, New York University, Visitor 1963-64, 1965, 1968-69, 1971; California Institute of Technology, Visitor 1971-72, 1976; Stanford University, Visitor 1972, 1975-76.

**Wu-chung Hsiang.** *Topology.*

Born 12 June 1935, Chekiang, China. National Taiwan University, BS 1957; Princeton University, PhD 1962.

Yale University, Lecturer 1962-63, Assistant Professor 1963-64, Associate Professor 1964-66, Professor 1966-72; Princeton University, Professor 1972-; Institute for Advanced Study, Member 1965-66, 1971-72.

**Richard M. Kane.** *Algebraic topology.*

Born 27 June 1944, Danbury, Connecticut. University of Toronto, BS 1967; University of Waterloo, MA 1969, PhD 1973.

University of Oxford, NRC Postdoctoral Fellow 1973-74; Massachusetts Institute of Technology, NRC Postdoctoral Fellow 1974-75; University of Alberta, Lecturer 1975-77, Assistant Professor 1977-.

**Leon Karp.** *Differential geometry and differential equations.*

Born 16 February 1950, New York, New York. Yeshiva University, BS 1971; Courant Institute, New York University, MA 1973, PhD 1976.

New York University, Lecturer 1975-77; Princeton University, Instructor 1977-.

**Akio Kawauchi.** *Topology (duality in manifolds and low dimensional manifolds).*

Born 16 October 1948, Japan. Sophia University, BS 1972; Kobe University, MS 1974; Osaka City University, DSc 1977.

Osaka City University, Instructor 1977-78; Institute for Advanced Study, Member 1978-79.

**David Kinderlehrer.** *Differential geometry; analysis.*

Massachusetts Institute of Technology, BS; University of California at Berkeley, PhD 1968.

Scuola Normale Superiore, Pisa, Visiting Scholar 1971-72, Visiting Professor 1976; Northwestern University, Visiting Associate Professor 1974; Mittag-Leffler Institut, Stockholm, Visiting Professor 1975; University of Minnesota, Professor 1976-.

**Moshe Koppel.** *Mathematical logic and number theory.*

Born 26 February 1956, New York, New York. Yeshiva University, BS 1977, MA 1977; New York University, PhD 1979.

## 42 Reports of the Schools

Bar-Ilan University, Research Assistant 1978;  
New York University, Instructor 1979.

**Daniel S. Kubert.** *Algebraic number theory and modular functions.*

Born 18 October 1947, Philadelphia, Pennsylvania. Brown University, BS 1969, MA 1969; Harvard University, PhD 1973.

Yale University, Gibbs Instructor 1973-75;  
Cornell University, Assistant Professor 1975-.

**Philip C. Kutzko.** *Representation theory of  $p$ -adic groups.*

Born 24 November 1946, New York, New York. City College, City University of New York, BS; University of Wisconsin, MA, PhD.

Princeton University, Instructor 1972-74;  
University of Iowa, Assistant Professor 1974-76,  
Associate Professor 1976-.

**Jean E. Lannes.** *Topology.*

Born 21 September 1947, Pauligne, France.  
Université de Paris XI, PhD 1975.

Université de Paris XI, Assistant 1970-74;  
Université de Tunis, Maître de conférences 1974-76;  
Université de Nancy I, Maître de conférences:

**Robert H. Latter.** *Fourier analysis.*

Born 24 September 1946, California.  
University of California at Los Angeles, BS 1970,  
MA 1973, PhD 1977.

University of Chicago, L. E. Dickson  
Instructor in Mathematics 1977-79.

**Peter Wai-Kwong Li.** *Differential geometry and geometric partial differential equations.*

Born 18 April 1952, Hong Kong. California State University, Fresno, BS 1974; University of California at Berkeley, MA 1977, PhD 1979.

University of California at Berkeley,  
Teaching Assistant 1975-76, Associate 1977-.

**Noël Lohoué.** *Harmonic analysis.*

Born 25 December 1939, Bayangam,  
Cameroun.

Université de Grenoble, Assistant 1967-69;  
Université de Paris-Sud, Assistant 1969-70;  
CNRS, Attaché de Recherche 1970-73, Chargé de  
Recherche 1973-76, Maître de Recherche 1976-.

**Perti E. J. Mattila.** *Geometric measure theory.*

Born 28 March 1948, Kuusankoski, Finland.

University of Helsinki, BS 1971, MA 1971, PhD  
1973.

University of Helsinki, Assistant 1973-.

**James E. Meister.** *Automorphic forms and group representations.*

Born 1 October 1952, Norwalk, Connecticut.  
University of Connecticut, BS 1974; Cornell  
University, MA 1977, PhD 1979.

Cornell University, Teaching Assistant 1974-79,  
Summer Fellowship 1978.

**Charles F. Miller III.** *Group theory; mathematical logic.*

Born 12 February 1941, Springfield, Illinois.  
Lehigh University, BS 1962; New York  
University, MA 1964; University of Illinois, PhD  
1969.

University of Illinois, Instructor 1968-69;  
Institute for Advanced Study, Member 1969-70;  
University of Oxford, NSF Postdoctoral Fellow  
1970-71; Princeton University, Assistant  
Professor 1971-76; University of Melbourne,  
Professor 1976-.

**Henri Moscovici.** *Theory of group representations.*

Born 5 May 1944, Tecuci, Rumania.  
University of Bucharest, MA 1966, PhD 1971.  
Polytechnic Institute of Bucharest, Assistant  
1966-71; Institute of Mathematics, Research  
Fellow 1971-75; Institute for Atomic Physics,  
Research Fellow 1975-77; INCREST, Research  
Fellow 1977-; Institute for Advanced Study,  
Member 1978-79.

**Joseph A. Neisendorfer.** *Algebraic topology.*

Born 22 April 1945, Chicago, Illinois.  
University of Chicago, BS 1967; Princeton  
University, MA 1968, PhD 1972.

University of Notre Dame, Assistant  
Professor 1972-76; Syracuse University, Assistant  
Professor 1976-78; Fordham University, Assistant  
Professor 1978-.

**Edward Nelson.** *Probability; mathematical physics.*

Born 4 May 1932, Decatur, Georgia.  
University of Chicago, MA 1953, PhD 1955.  
Institute for Advanced Study, Member 1956-59,  
1963-64, 1973-74; Princeton University,  
Assistant Professor 1959-62, Associate Professor  
1962-63, Professor 1964-.



**Wei-Ming Ni.** *Nonlinear functional analysis; partial differential equations.*

Born 23 December 1950, Taiwan. National Taiwan University, BS 1972; Courant Institute, New York University, MA 1977, PhD 1979.

Courant Institute, New York University, Research Assistant 1975-.

**Toshio Oshima.** *Linear partial differential equations.*

Born 18 December 1948, Japan. University of Tokyo, BA 1971, MA 1973, PhD 1977.

University of Tokyo, Assistant 1973-77, Associate Professor 1977-; Institute for Advanced Study, Member 1978-79.

**Chia-Kuei Peng.** *Differential geometry and equations.*

Born 13 September 1943, Kiangsu, China.

Graduated from University of Science and Technology of China, Peking, 1965.

University of Science and Technology of China, Hefei, Instructor 1965-; University of California at Berkeley, Visiting Scholar 1978-79.

**Frank Raymond.** *Topology.*

Born 19 March 1932, Syracuse, New York. Syracuse University, BS 1953; Harvard University, MA 1954; University of Michigan, PhD 1958.

Institute for Advanced Study, Member 1958-60, 1966-67, 1970-71; University of Wisconsin, Research Assistant Professor 1960-62; University of California at Berkeley, Visiting Associate Professor 1962-63; University of Michigan, Professor 1963-; University of Texas, Visiting Professor 1976-77.

**Seppo U. Rickman.** *Theory of quasiregular mappings.*

Born 28 November 1935, Helsinki, Finland. University of Technology, Helsinki, MS 1961; University of Helsinki, MA 1964, PhD 1966.

University of Helsinki, Assistant 1964-68, Docent 1969-71, Associate Professor 1971-; Harvard University, Research Fellow 1967-68; Academy of Finland, Research Associate 1968-71; University of Michigan, ASLA Fellow 1972-73.

**Robert F. Riley.** *Kleinian groups; 3-dimensional manifolds.*

Born 22 December 1935, New York, New York. Cornell University, BS 1957.

Avco Corporation, Associate Scientist 1963-66; University of Southampton, Research Assistant, Lecturer, 1968-72, 1976-79; Université de Strasbourg, Maître de Recherche 1973.

**Gilles Robert.** *Number theory.*

Born 23 May 1949, Paris, France. Université de Paris-Sud, PhD 1977.

ENS, Élève professeur 1968-72; Université de Paris VII, Assistant 1972-73; Université de Paris-Sud, Assistant 1973-.

**David E. Rohrlich.** *L-functions of number fields.*

Born 4 February 1951, Washington, DC. Haverford College, AB 1972; Yale University, PhD 1976.

Harvard University, Assistant Professor 1976-.

**Oscar S. Rothaus.** *Logarithmic Sobolev inequalities.*

Born 21 October 1927, Baltimore, Maryland. Princeton University, AB 1948, MA 1951, PhD 1958.

NSA (Washington, DC), Analyst 1953-60; Institute for Defense Analyses (Princeton, NJ), Mathematician and Deputy Director 1960-65; Yale University, Visiting Professor 1965-69; Hebrew University, Visiting Professor 1972-73; Cornell University, Professor 1966-.

**Richard M. Schoen.** *Geometry; general relativity.*

Born 23 October 1950, Celina, Ohio.

University of Dayton, BS 1972; Stanford University, MA 1974, PhD 1976.

University of California at Berkeley, Lecturer 1976-78; Courant Institute, New York University, Assistant Professor 1978-.

**Irving E. Segal.** *Quantum field theory.*

Born 13 September 1918, Bronx, New York. Princeton University, AB 1937; Yale University, PhD 1940.

Institute for Advanced Study, Member 1945-47, 1948-49 first term, 1951-52, 1954-55; University of Chicago, Assistant Professor, Associate Professor, Professor, 1948-60; Massachusetts Institute of Technology, Professor 1960-.

**Constantin Sevici.** *Number theory.*

Born August 1950, Ohaba, Rumania.

University of Bucharest, BS 1974; University of Michigan, PhD 1979.

#### 44 Reports of the Schools

University of Michigan, Rackham  
Predoctoral Fellow 1975-76; Graduate Student  
Assistant 1974-79.

**Leon Simon.** *Differential geometry.*

Born 6 July 1945, Australia. University of  
Adelaide, AB 1967, PhD 1971.

Stanford University, Assistant Professor  
1972-76; University of Adelaide, Visiting  
Professor 1976-77; University of Minnesota,  
Associate Professor 1977-78; University of  
Melbourne, Professor 1978-.

**Shashi Mohan Srivastava.** *Descriptive set theory;  
functional analysis.*

Born 2 March 1953, Darbhanga, India.  
University of Calcutta, BSc 1971; Indian  
Statistical Institute, MStat 1973, PhD 1979.

Indian Statistical Institute, Junior Research  
Fellow 1973-.

**Nancy K. Stanton.** *Several complex variables; partial  
differential equations; complex differential  
geometry.*

Born 23 March 1948, San Francisco,  
California. Stanford University, BS 1969;  
Massachusetts Institute of Technology, PhD  
1973.

Massachusetts Institute of Technology,  
Instructor 1973-74; University of California at  
Berkeley, Lecturer 1974-76; Columbia University,  
Ritt Assistant Professor 1976-.

**John B. Sullivan.** *Algebraic groups.*

Born 6 August 1944, Lynn, Massachusetts.  
Harvard University, BS 1966; Cornell University,  
PhD 1971.

University of California at Berkeley, Lecturer  
1971-73; University of Washington, Assistant  
Professor 1973-78, Associate Professor 1978-.

**Geraldine A. Taiani.** *Several complex variables;  
partial differential equations.*

Born 13 February 1948, New York, New  
York. State University of New York at Stony  
Brook, BS 1968; City University of New York,  
PhD 1974.

City College of New York, Instructor 1969;  
Dartmouth College, Lecturer 1972-74, Visiting  
Assistant Professor 1974-76; State University of  
New York at Stony Brook, Visiting Assistant  
Professor 1976-77; Institute for Advanced Study,

Member 1977-78; Inst. Mat. Univ., Firenze,  
Visiting Assistant Professor 1978-79.

**Mitsuhiro Takeuchi.** *Algebra.*

Born 30 March 1947, Ueda, Nagano, Japan.  
University of Tokyo, BS 1969, MA 1971, PhD  
1975.

Tokyo Metropolitan University, Assistant  
Professor 1971-74; University of Tsukuba,  
Lecturing Professor 1974-.

**Chuu-Lian Terng.** *Differential geometry.*

Born 1 February 1949, Taiwan. National  
Taiwan University, BS 1971; Brandeis University,  
PhD 1976.

National Taiwan University, Teaching  
Assistant 1971-72; University of California at  
Berkeley, Lecturer 1976-78; Princeton University,  
Assistant Professor 1978-.

**Robert Treger.** *Algebraic geometry.*

Born 30 November 1945, Daugpils, Latvia,  
USSR. Moscow University, MA 1967; University  
of Chicago, PhD 1976.

Latvia State University, Riga, Fellow 1967-69;  
Technion, Instructor 1973; Harvard University,  
Research Fellow 1977; Brandeis University,  
Visiting Member 1977; Hebrew University, Ledy  
Davis Fellow 1977-78; Inst. Mittag-Leffler,  
Sweden, Guest 1978-79.

**Karen Uhlenbeck.** *Differential geometry; analysis.*

Born 24 August 1942, USA. University of  
Michigan, BS 1964; Brandeis University, MA  
1966, PhD 1968.

Massachusetts Institute of Technology,  
Instructor 1968-69; University of California at  
Berkeley, Lecturer 1969-71; University of Illinois,  
Assistant Professor, Associate Professor, 1971-76,  
Professor 1976-.

**Robert Varley, Jr.** *Algebraic geometry.*

Born 21 February 1951, Durham, North  
Carolina. University of North Carolina, BS 1972,  
PhD 1977.

Academia Cotopaxi (Quito, Ecuador),  
Teacher 1972-73; University of Utah, Instructor  
1977-.

**John S.-P. Wan<sup>3</sup>.** *Lie groups.*

Born 27 May 1939, Kwangsi, China.  
National Taiwan University, BS 1962; Cornell  
University, PhD 1966.

Institute for Advanced Study, Member 1967-68; Purdue University, Assistant Professor 1968-69, Associate Professor 1970-75, Professor 1975-; Yale University, Visiting Assistant Professor 1969-70.

**Raymond O. Wells, Jr.** *Several complex variables.*

Born 12 June 1940, Dallas, Texas. Rice University, BS 1962, PhD 1965.

Rice University, Assistant Professor 1965-69, Associate Professor 1969-74, Professor 1974-; Brandeis University, Visiting Assistant Professor 1967-68; Institute for Advanced Study, Member 1970-71; University of Göttingen, Visiting Professor 1974-75.

**Clarence W. Wilkerson, Jr.** *Algebraic topology.*

Born 12 August 1944, Laredo, Texas. Rice University, BS 1966, PhD 1970.

University of Hawaii, Assistant Professor 1970-72; ETH, Zurich, Research Associate 1972-73; Carleton University, Research Associate 1973-74; University of Pennsylvania, Instructor 1974-75, Assistant Professor 1975-77; Wayne State University, Associate Professor 1977-.

**Kazuhiro Yamamoto.** *Partial differential equations.*

Born 13 November 1948, Ibara, Okayama, Japan. Hokkaido University, BS 1971, MA 1973, PhD 1977.

Hokkaido University, Assistant 1976; Kyoto University, Research Institute for Mathematical Science, Temporary Member 1978-79.

**Shing-Tung Yau.** *Differential geometry.*

Born 12 April 1952, Hong Kong. State University of New York at Stony Brook, MA 1974, PhD 1976.

Institute for Advanced Study, Member 1976-77, 1977-78.

**Misha Zafran.** *Harmonic and functional analysis.*

Born 10 August 1949, Berlin, Germany. University of California at Riverside, BS 1968, PhD 1972.

Institute for Advanced Study, Member 1972-73; Stanford University, Assistant Professor 1973-.

**Louis Nirenberg.** *Partial differential equations.*

Born 28 February 1925, Hamilton, Ontario,

Canada. McGill University, BS 1945; New York University, MS 1947, PhD 1949.

New York University, Assistant Professor 1952-54, Associate Professor 1954-57, Professor 1957-, Courant Institute, Director 1970-72; Institute for Advanced Study, Member 1957-58 second term.

**Roger Penrose.** *Mathematical physics.*

University of Oxford, Rouse Ball Professor of Mathematics.

**Joel Spruck.** *Differential geometry; partial differential equations.*

Born 30 October 1946, Brooklyn, New York. Columbia University, BS 1967; Stanford University, PhD 1971.

Courant Institute, New York University, Instructor 1972-74, Visiting Member 1977-78; University of Minnesota, Associate Professor 1974-; Brooklyn College, City University of New York, Visiting Associate Professor 1978-.

**Robert F. Williams.** *Dynamical systems.*

Born 27 July 1928, Bessemer, Alabama. University of Texas, BS 1948; University of Virginia, PhD 1954.

Purdue University, Assistant Professor 1956-59; Institute for Advanced Study, Member 1959-61; University of Chicago, Assistant Professor 1961-63; Northwestern University, Associate Professor 1963-67, Professor 1967-.

**Edythe P. Woodruff.** *Cellular decompositions of Euclidean spaces.*

Born 15 January 1928, Bellwood, Illinois.

University of Rochester, BA 1948, MS 1952; Rutgers University, MS 1967; State University of New York at Binghamton, PhD 1971.

Rutgers University, Instructor 1970-71; Trenton State College, Assistant Professor 1971-.

## Assistants

**Paolo de Bartolomeis.** *Complex analysis; complex differential geometry.*

Born 16 January 1952, Firenze, Italy. Scuola Normale Superiore, Pisa, PhD 1974.

Università della Calabria, Assistant Professor 1976; Università di Firenze, Professore Incaricato

## 46 Reports of the Schools

1978; Institute for Advanced Study, Assistant to Professor Enrico Bombieri.

**Ronald A. Fintushel.** *Geometric topology; transformation groups.*

Born 14 August 1945, Rochester, New York. Columbia College, BA 1967; University of Illinois, MA 1969; State University of New York at Binghamton, PhD 1975.

Nazareth College of Rochester, Instructor 1969-72; Tulane University, Assistant Professor

1975-; University of Georgia, Postdoctoral Fellow 1977; Institute for Advanced Study, Assistant to Professor Deane Montgomery 1978-.

**Ziv Ran.** *Algebraic geometry.*

Born 26 May 1957, Israel. Tel Aviv University, BA 1975; University of California at Berkeley, MA 1977, PhD 1978.

Institute for Advanced Study, Member 1978-79, Visitor summer 1979, spring 1980, Assistant to Professor Robert P. Langlands.



## The School of Natural Sciences

### Faculty

---

Stephen L. Adler  
*(New Jersey Albert Einstein Professor)*  
John N. Bahcall

Roger Dashen  
Freeman J. Dyson  
Marshall N. Rosenbluth

### Visiting Professor

---

Tullio Regge

### Permanent Member

---

Julian H. Bigelow

### Members with Long-term Appointments

---

Charles R. Alcock  
Herman H. Goldstine

Otto E. Neugebauer  
Claudio Teitelboim  
Scott D. Tremaine

---

## The School of Natural Sciences

In the early years of the Institute there was no formal division between mathematics and physics. Einstein himself and the other great physicists such as Pauli, Dirac and Bohr who came as members belonged to the School of Mathematics. The School of Mathematics had Hermann Weyl, equally great as mathematician and physicist, to hold the two disciplines together. Unfortunately Weyl had no successor. He was the last in the great line of mathematician-physicist-philosophers which began with Descartes and Newton. After Weyl's death, his dream of unifying mathematics and physics within the School of Mathematics was gradually abandoned.

When J. Robert Oppenheimer became Director of the Institute in 1947, he began immediately to collect a group of young physicists working in the new areas of particle physics that had come into flower in the early postwar years. C. N. Yang and T. D. Lee were appointed professors, and they gave vigorous leadership to the work in particle physics. Yang was a member of the Institute's Faculty when he and Lee did the work for which they received the Nobel Prize in physics. A number of visiting members and professors of the Institute have received Nobel Prizes and other major awards.

The twenty years from 1960 to 1980 were a period of transition for the work in the natural sciences at the Institute. The particle physics group was enlarged first by the addition of astronomers led by Bengt G. Strömberg. After years of de facto independence, the School of Natural Sciences was formally established in 1966. The Faculty of the School which Oppenheimer had assembled began to disperse in the 1960s, with only two professors—Freeman J. Dyson and Tullio

Regge—remaining from that period. Between 1967 and 1971, four new professors were appointed—Marshall N. Rosenbluth in plasma physics, Stephen L. Adler and Roger Dashen in high energy physics, and John N. Bahcall in astrophysics. The present Faculty gives the School both a wider range and a more intimate engagement with experimental work than was the case in earlier years.

Despite the dramatic change in the composition of the Faculty, the School continues to function very much in the manner and style which Oppenheimer had established. Members and visitors are brought to the Institute each year, chosen by the School's Faculty and reflecting either their interests or their sense of interesting intellectual areas, even if they are not directly involved in a given field itself. Members and Faculty alike are free to devote their time to their own research, with mutual criticism and frequent collaboration the normal pattern, but there are no formal rules or requirements. Seminars are established as needed, often jointly with the faculty of nearby universities, and there are scheduled and unscheduled luncheons for extensive discussion. Since physics is basically an experimental science, the Faculty maintains substantial connections to scientific institutions elsewhere, whether the major national laboratories (such as the Stanford Linear Accelerator Center, Brookhaven or Fermilab) or optical and radio telescope facilities (such as those at Kitt Peak, Green Bank or Socorro) or equivalent institutionalized centers in other subdisciplines of the physical sciences. Additionally, Faculty members frequently lecture at various universities or, as consultants to government or industry, participate in the process that sets the direction and develops



the instrumentation for the advancing frontiers of science. This balances the theoretical orientation of the Institute for Advanced Study and offsets the absence here of laboratories and experimental facilities vital to the whole of science.

Bounded by design and tradition as well as by budgetary realities, the School has come to concentrate on three fundamental areas: the physics of the very small (meaning elementary particle physics, high energy physics and field theory), the physics of the very large (astrophysics and general relativity) and the physics of very complex finite systems (statistical mechanics and the many-body problem as well as plasma physics).

Within the category embraced by the physics of the very small is a family of fascinating problems and processes. The problem of resolving the increasingly finer properties of the structure of matter has called for smaller and smaller probing fingers or wavelengths. In turn, this has demanded larger and larger probing energies so that high energy physics, the physics of the big machines, has become synonymous with the physics of elementary particles. From a theoretical point of view this requires the simultaneous reconciliation of quantum mechanics with Einstein's special relativity, that is, of defining a reality in which the transformation of matter into energy holds, according to the famous formula  $E = mc^2$ , even though according to quantum mechanics there is an uncertainty in determining the energy of a system because an arbitrarily large number of particles is involved, which leads to systems with infinite degrees of freedom. Quantum electrodynamics, which is the system describing the interaction between electrons and photons (or in field language, the interaction of the electron with the electromagnetic field), is one response to this situation. Unfortunately, it has not proved adequate to the task of dealing with the four basic types of particle interactions: the electromagnetic, the strong forces which hold the nucleus together, the weak forces responsible for  $\beta$ -decay in radioactivity, and gravitation. At present, the work in par-

ticle physics and field theory is concentrated on a theory which is a generalization of quantum electrodynamics, called quantum chromodynamics, which in turn is believed to be one of the best candidates for an acceptable theory of the strong interaction force. The history and discussion of modern particle theory at the Institute are thus attempts to find ways of developing a satisfactory theoretical understanding of particles and their interactions.

In dealing with the physics of the very large, which is the second major area of interest within the School of Natural Sciences, the astronomer faces problems whose conditions are separate and distinct from the general practice of science. Unlike the physicist who deals with the very small, the astronomer has no access to controlled laboratory experiments. His knowledge is derived from the careful study of signals from distant objects, which up to the Second World War were exclusively optical in character. The new technologies which were spawned during the war bloomed rapidly in the years that followed, broadening the spectrum of observable phenomena to include the radio spectrum, the infrared, the ultraviolet, x-ray and gamma-ray astronomy, and even the possibility of neutrino and gravitational radiation.

Changing observational methods have also led to the discovery or prediction of new astronomical objects such as neutron stars (which Oppenheimer predicted), black holes, pulsars (later identified as neutron stars), quasi-stellar objects such as quasars as well as the continuing study of old familiars such as novae, supernovae and white dwarfs. Of equal interest has been the study of the interstellar medium, important because of its influence on the transmission of radiation signals, and the cosmic black body radiation, which is believed to be the remains of radiation which once filled the universe in an earlier, hotter stage of its expansion. For astrophysicists, general relativity theory thus assumes great importance as they come to grips with the gravitational effects of very large masses. Small well-known deviations from Newton-



ian predictions within the solar system have been delineated by general relativity theory, but its greatest importance lies in the physics of neutron stars, black holes and theories of cosmic evolution. These revolutionary developments in astronomy have rekindled the interest in general relativity, so that Einstein's work remains at the edge of contemporary science as a vigorous research frontier.

Under these rather sweeping rubrics, the work of the School of Natural Sciences concentrates on particular areas: neutrino astronomy, galactic evolution, Cepheid variables, supernovae, compact x-ray sources, neutron stars and black holes. Additionally, quasars as the most distant objects, and the recently discovered rings of Uranus as some of the nearest, have occupied the research attention of the astrophysics group. The group also specializes in predicting what the Space Telescope (to be launched about 1984) will see at the very faint levels of light and in the new parts of the spectrum that will be accessible from this first permanent international observatory in space.

The third major subject, the physics of very complex finite systems, divides into two areas. These are statistical mechanics and the many-body problem, which is concerned with various physical properties of matter in bulk, such as stability, thermodynamic properties and the like; and plasma physics, which examines the special properties of matter present at very high temperatures when the atoms have been stripped of their electrons by concentrated thermal collisions. The study of such plasmas has a double relevance for they are both astrophysically interesting and terrestrially important, relating in the first instance to the structure of stars and in the second to the possible exploitation of nuclear fusion as a useful energy source. Two patterns of research have developed on this subject at the Institute, reflecting the manner in which plasmas of appropriate density and confinement are created. One set of interests deals with magnetically confined plasmas, where the containment is brought about by different geometric arrangements of magnetic fields; a

second set deals with inertially confined plasmas, where the plasma confinement occurs as the result of an implosion induced by laser irradiation.

### Academic Activities, 1979-80

Work in high energy physics and field theory in 1979-80 has centered on studies of quantum chromodynamics (QCD), currently the best candidate for a theory of the strong interaction force, and studies of quantum gravitation. In the work on QCD, Roger Dashen has continued his instanton gas calculations (with C. Callan and D. Gross at Princeton University), which provide strong evidence that gauge theories contain a smooth transition from asymptotically free behavior at short distances to confining behavior at long distances. Junko Shigumitsu has also continued her strong coupling lattice gauge theory calculations (begun last year with J. Kogut and R. Pearson) which lead to the same conclusion; the work of both is in good agreement with recent computer studies of lattice gauge theories done by M. Creutz at Brookhaven. The agreement of these three independent methods of approximation to the QCD confinement problem is an important theoretical milestone. A number of other members made contributions to the study of lattice gauge theories, QCD and weak and strong interaction phenomenology.

In a QCD-related development, Stephen L. Adler showed the  $U(n)$  gauge theories are covariant under general operator-valued gauge transformations (that is, no factor reorderings are required to verify gauge invariance of the theory) and made a promising preliminary study of the  $U(2)$  or quaternionic theory as a dynamics for quark-lepton constituents.

The 1979-80 academic year was a very fruitful one for studies of quantum gravitation. Lee Smolin continued his work on the relation between gravitation and spontaneous scale-breaking during a one-term visit. Building on this idea (and related work of A. Zee), Adler showed that in matter theories with dynam-

ical scale-breaking, the induced gravitational action is calculable (as opposed to being merely normalizable). This permits a concrete realization of the old Sakharov idea of "gravitation as the metric elasticity of the vacuum." Calculations by Brosl Hasslacher and Emil Mottola have shown that the induced inverse gravitational constant  $G_{\text{ind}}^{-1}$  is in general nonvanishing and can have the correct sign to give an attractive gravitational force. Adler subsequently obtained a compact formal expression for  $G_{\text{ind}}$ , while work by Lowell Brown (with J. Collins at Princeton University) elucidated the general structure of Lagrangian counter-terms in curved spacetime and showed how induced gravitation is to be understood from a renormalization group point of view.

Pursuing a different approach to the quantization of gravitation, Claudio Teitelboim has shown how to construct the superspace propagator for Einstein gravitation (and for supergravity) by proper time methods. His approach emphasizes the analogies between gravitation, the string model and relativistic particle dynamics, all viewed as constrained Hamiltonian systems. Work on gravitational instantons was done by Alan Lapedes and on supergravity by Warren Siegel.

Two members made contributions in the overlap area between astrophysical gravitation and particle theory. James Bardeen made an important contribution to the discussion of monopole production in the early universe, which showed that mechanisms proposed to evade monopole production in current grand unified models lead to even worse problems. Tsvi Piran, working with Adler, began the application to gauge field problems of numerical analysis methods previously widely used in numerical relativity.

Work in astrophysics has covered a wide range of topics, including planetary astronomy, solar physics, stellar accretion disks, theory of the interstellar medium, galactic structure, quasar phenomena and general relativity.

Scott Tremaine has continued to collaborate

with P. Goldreich (of the California Institute of Technology) on the dynamics of planetary rings, finding that the interaction of rings with moons can explain the eccentricities observed in several of the Uranian rings. Agris J. Kalnajs has studied the origin of nearly-commensurable satellite orbital periods and found that rings could play a role.

John N. Bahcall and Stephen Lubow, working with a number of collaborators, have refined and updated solar model predictions, finding that the large discrepancy between the model predictions and the low neutrino flux detected by the Davis neutrino detector cannot be attributed to uncertainties in the "standard" solar model. This work is especially interesting because of speculations that the neutrino problem may be due to neutrino oscillations which have been reported in some reactor experiments.

Charles Alcock has obtained important results on the surface properties of stars and on diffusive transport in stellar interiors.

A number of dynamical problems have been worked on. Lubow has studied the response of the accretion disk around a star to tidal disturbances by a companion star, and discovered a set of important resonances. Tremaine and D.N.C. Lin (University of California at Santa Cruz) have examined the effects of a massive black hole at the center of a dense system of stars. Kalnajs has obtained results on the formation of spiral structure in disk-shaped stellar systems, and William Newman has studied the effects of the disk thickness on the galactic rotation curve.

The structure of our galaxy has been clarified as a result of detailed models, calculated by Bahcall and Raymond Soneira, which specify the distribution of stars and mass; this work predicts the distribution of stars at very faint magnitudes which will be accessible by Space Telescope in a few years.

Bruce Draine has investigated the effects of magnetic fields on interstellar shock waves and found that conventional analyses have overlooked an important effect—the formation of a magnetic precursor—which may

help resolve some hitherto unexplained phenomena. He has also calculated the infrared emission expected from dust in shocked gas.

John L. Giuliani, Jr., has obtained important results relating to star formation, finding that ionization fronts can delay or even inhibit star formation in dense clouds. Giuliani has also studied the role of ionization fronts in the function of planetary nebulae, finding that three different types of structure are possible.

Paul R. Shapiro has studied the propagation of shock waves driven by a time-dependent central source embedded in a stratified medium such as the gaseous disk of our galaxy; his result may be relevant to the formation of the recently-observed x-ray "superbubbles."

Shapiro and Bahcall have calculated the degree to which intergalactic medium will absorb x-rays emitted by quasars; careful observation of the x-ray spectrum of quasars may thereby be used to infer the properties of the intergalactic medium. Shapiro and Bahcall have also examined the astrophysical implications of the optical radiation which often results after an x-ray is absorbed.

Herbert J. Rood has continued his work on the distribution of galaxies and, together with John R. Dickel (University of Illinois at Urbana), used measured redshifts to derive masses of binary galaxies.

Bardeen has made important progress in the study of cosmological perturbation by developing a complete gauge-invariant description of perturbations in homogeneous, isotropic cosmological models in order to clarify the physical interpretation of the perturbations at early times, when the perturbation wavelength is larger than the particle horizon.

A number of significant results were obtained in mathematical physics. C. Taubes, during a short visit, had useful conversations with mathematicians at the Institute and completed a beautiful proof of the existence of N-monopole solutions to the Euclidean Yang-Mills equations in the Prasad-Sommerfield limit. Volker Enss solved an important prob-

lem in the quantum theory of scattering of composite systems, by proving that, under precisely specified conditions which are fulfilled in a wide variety of circumstances in atomic and molecular physics, all scattering cross-sections are finite. His proof, which is based on simple geometrical pictures of the underlying physical process, points the way to a better mathematical treatment of the behavior of interacting composite systems in general.

One of the most challenging problems in plasma physics today is the development of a strong turbulence theory to explain observed anomalous transport. Patrick H. Diamond and Marshall N. Rosenbluth have now worked out a self-consistent treatment of nonlinear electron motions including stochastic orbit effects. The principal result is to show a strong nonlinear stabilizing effect on modes driven by density and temperature gradients. The stabilization occurs at levels consistent with observed turbulence.

By contrast, Benjamin A. Carreras and Rosenbluth have shown that for modes driven by magnetic free energy the introduction of stochastic magnetic fields results in faster mode growth as it is observed in disruptions.

James Van Dam, Yee-Chun Lee and Rosenbluth have been looking at the stability properties of relativistic electron rings as employed in "bumpy torus" configurations. This has produced the first explanation of the remarkable observed stability of such rings.

Lee, Yu ping Huo and Rosenbluth have calculated the effects of diffraction on free-electron lasers, while Ho has also pursued work on optical pattern recognition, proving an important theorem demonstrating the completeness of holographic lens simulation.

John Bahcall was a member of the Scientific Organizing Committee for a colloquium on "Scientific Research with the Space Telescope." Held at the Institute in August 1979, the colloquium investigated the research possibilities of the Space Telescope, scheduled for launch about 1984. Discussion focused on the designation of those observations to be

made with the Space Telescope which promised to be of most crucial importance. More than 100 participants attended the colloquium, many of them from abroad.

In addition to those School activities shown in the Record of Events which follows, a series of talks on relativity was held roughly every week. Speakers included Marek Abramowicz of the University of Texas, and Mitch Begelman; G. H. Bath of the University of Oxford; Roger Davies of the University of California at Santa Cruz and the University of Cambridge; Kim Innanen of York University, Toronto; Phil Marcus of Cornell University; Mark Morris of Columbia University; Jeremiah P. Ostriker of Princeton University; Bill Press of Harvard University; Doug Richstone of the University of Pittsburgh; M. P. Schwarz of Yale University; and Alar Toomre of the Massachusetts Institute of Technology; as well as speakers from the Institute. Furthermore, the School's astrophysicists held an informal luncheon discussion each Tuesday during the year.

#### Publications of Members Related to Residence at the Institute: A Selection

Baluni, Varouzhan. The Bose form of two-dimensional quantum chromodynamics, revised version, *Phys. Lett.* B90, 407 (1980).

Bronzan, J. B. Embedding lattice field theory in continuum field theory, *Phys. Rev.* D21, 2270 (1980).

— (with R. Sugar). Thinning degrees of freedom in lattice field theories, *Phys. Rev.* D21, 1564 (1980).

Enss, Volker. Asymptotic completeness for quantum-mechanical potential scattering. II. Singular and long-range potentials, *Ann. Phys.* 119, 117 (1979).

— (with B. Simon). Bounds on total cross sections in atom-atom and atom-ion

collisions by geometric methods, *Phys. Rev. Lett.* 44, 319 (1980).

Frishman, Yitzhak. Non-Abelian gauge theory in two dimensions, *Nucl. Phys.* B148, 74 (1979).

— (with S. Yankielowicz). Large order behavior of perturbation theory and mass terms, *Phys. Rev.* D19, 540 (1979).

Green, Frederic L. (with I. Bars). Complete integration of U(N) lattice QCD in a large N limit, *Phys. Rev.* D20, 3311 (1979).

Ore, F. Robert, Jr. (with G. Sterman). An operator approach to weighted cross sections, *Nuclear Phys.* B165, 93 (1980).

Piran, Tsvi. Numerical codes for cylindrical general relativistic systems, *J. Comp. Phys.* 35, 254 (1980).

— (with P. A. Connors and R. F. Stark). Polarization features of X-ray radiation emitted near black holes, *Astrophys. J.* 235, 224 (1980).

Shapiro, Paul R. Hydrodynamical acceleration of particles in supernovae and extragalactic radio sources, in *Particle Acceleration Mechanisms in Astrophysics* (La Jolla Institute, 1979), J. Arons, C. McKee and C. Max, eds. (New York, AIP, 1979), pp. 295-315.

— Relativistic blast waves in two dimensions. I. The adiabatic case, *Ap. J.* 233, 831 (1979).

— Relativistic blast waves that accelerate, *Ap. J.* 236, 958 (1980).

— (with A. K. Dupree and R. T. Moore). Nonequilibrium ionization in solar and stellar winds, *Ap. J. Letters* 229, L101 (1979).

— (with R. Ramaty, et al.). Energetic particles in solar flares, in *Solar Flares*, P. Sturrock, ed., Boulder, Colorado Associated University Press, 1979.

Siegel, Warren D. Constraints on superspace, in *Supergravity*, Proceedings of the Supergravity Workshop at Stony Brook, 27-29 September 1979, P. van Nieuwenhuizen and D. Z. Freeman, eds. (Amsterdam, North-Holland Publishing Company, 1979), pp. 71-75.

Soneira, Raymond M. A cosmological redshift-distance square law? *Ap. J. Letters* 230, L63 (1979).



---

## The School of Natural Sciences

### Permanent Member, Members with Long-term Appointments, Members and Visitors, 1979-80

In the section which follows, the information was obtained from material provided by the members and visitors.

#### Permanent Member

**Julian H. Bigelow.** *Applied mathematics; electronic computers; experimental physics.*

Born 19 March 1913, Nutley, New Jersey. Massachusetts Institute of Technology, BS 1934, MS 1935.

Sperry Rand Corporation, Research Engineer 1936-39; IBM Corporation, Research Engineer 1939-41; Massachusetts Institute of Technology, Research Associate 1941-42, Instructor 1942-43; Columbia University, OSRD, Statistical Research Group, Associate Director 1943-46; Institute for Advanced Study, Electronic Computer Project, Head of Experimental Group 1946-51, School of Mathematics, Permanent Member 1951-70, School of Natural Sciences, Permanent Member 1970-; University of California at Los Angeles, Visiting Professor 1966-67; Massachusetts Institute of Technology, Neurosciences Research Program, Visiting Scientist 1969-70.

#### Members with Long-term Appointments

**Charles R. Alcock.** *Astrophysics.*

Born 15 June 1951, Windsor, England. University of Auckland, BS 1973; California Institute of Technology, PhD 1978.

California Institute of Technology, Graduate Research Fellow 1973-78; Institute for Advanced Study, Member with Long-term Appointment 1977-.

**Herman H. Goldstine.** See page 27 for biographical entry.

**Otto E. Neugebauer.** See page 27 for biographical entry.

**Claudio Teitelboim.** *Relativity.*

Born 15 April 1947, Santiago, Chile. Universidad de Chile, Santiago, BA 1969; Princeton University, MA 1971, PhD 1973.

Universidad de Chile, Teaching Assistant 1966-68, Memorista 1968-69, Ayudante de Investigacion (on leave) 1969-70, Investigador Asociado (on leave) 1970-73; Princeton University, Research Assistant 1969-70, Research Associate 1973-74, Assistant Professor 1974-; Institute for Advanced Study, Member 1975-78, Member with Long-term Appointment 1978-.

**Scott D. Tremaine.** *Astrophysics.*

Born 25 May 1950, Toronto, Canada. McMaster University, BS 1971; Princeton University, MA 1973, PhD 1975.

California Institute of Technology, Research Fellow 1975-77; Institute for Advanced Study, Member with Long-term Appointment 1977-.

#### Members

**Varouzhan Baluni.** *Particle physics, field theories.*

Born 9 July 1943, Cairo, Egypt. Moscow University, MA 1965; Joint Institute for Nuclear Research, Dubna, USSR, PhD 1969.

Yereren and Moscow Universities 1969-72; Massachusetts Institute of Technology 1974-.

**James M. Bardeen.** *Astrophysics.*

Born 9 May 1939, Minneapolis, Minnesota. Harvard College, AB 1960; California Institute of Technology, PhD 1965.

California Institute of Technology, Research Associate 1965; University of California at Berkeley, Postgraduate Research Physicist 1966; University of Washington, Assistant Professor 1966-70, Associate Professor 1970-72, Professor 1976-; Yale University, Associate Professor 1972-74, Professor 1974-76.

**Lowell S. Brown.** *Particle physics.*

Born 15 February 1934, Visalia, California. University of California at Berkeley, BS 1956; Harvard University, PhD 1961.

Yale University, Assistant Professor 1964-66, Associate Professor 1966-68; University of Washington, Associate Professor 1968-71, Professor 1971-.

**Benjamin A. Carreras.** *Plasma physics.*

Born 5 July 1943, Mahon, Spain. University of Barcelona, AB 1965; University of Valencia, PhD 1968.

University of Madrid, Assistant Professor 1967-68; University of Glasgow, Research Fellow 1969; Davesbury Laboratory (England), Research Associate 1970-72; Junta de Energía Nuclear (Spain), Staff Member 1972-; Oak Ridge National Laboratory, Visitor 1976-78.

**Frank J. De Luccia.** *Theoretical particle physics.*

Born 18 October 1953, Paterson, New Jersey. Massachusetts Institute of Technology, BS 1974; Harvard University, MA 1976, PhD 1979.

Harvard University, NSF Graduate Fellow 1974-77, Teaching Fellow 1974-79.

**Patrick H. Diamond.** *Theoretical plasma physics.*

Born 15 September 1955, New York, New York. Massachusetts Institute of Technology, BS 1976, PhD 1979.

Massachusetts Institute of Technology, Karl Taylor Compton Fellow 1976-79.

**Jonathan D. Dimock.** *Mathematical physics.*

Born 15 February 1945, USA. Dartmouth College, BS 1966; Harvard University, PhD 1971.

Courant Institute, New York University, Visiting Member 1971-73; State University of New York at Buffalo, Assistant Professor 1973-77, Associate Professor 1977-.

**Bruce T. Draine.** *Theoretical astrophysics.*

Born 19 November 1947, Calcutta, India. Swarthmore College, AB 1969; Cornell University, MA 1975, PhD 1978.

Harvard University, Center for Astrophysics, Research Fellow 1977-.

**Volker Enss.** *Mathematical physics.*

Born 27 October 1942, Kassel, Germany. University of Freiburg, Vordiplom 1964; University of Hamburg, Diplom 1967, PhD 1974. Heeresoffizierschule II, Hamburg, Lecturer

1970-71; University of Hamburg, Wissenschaftl. Hilfskraft 1971-74; University of Bielefeld, Wiss. Asst. 1974-; Indiana University, Visiting Assistant Professor 1977-78; Institute for Advanced Study, Visitor summer 1978.

**Yitzhak Frishman.** *Particle physics.*

Born 13 September 1938, Zamosc, Poland. Hebrew University, BSc 1962, MSc 1964; Weizmann Institute, PhD 1967.

Stanford Linear Accelerator Center, Research Associate 1966-68, Visiting Associate Professor 1972; Institute for Advanced Study, Member 1968-69, second term 1972-73, 1974-75, second term 1979-80, Visitor 1977; Weizmann Institute, Assistant Professor 1969-72, Associate Professor, Professor, 1972-.

**John L. Giuliani, Jr.** *Astrophysics, interstellar matter, hydrodynamics.*

Born 17 January 1950, Baltimore, Maryland. Georgetown University, AB 1972, MA 1974; Yale University, MS 1977, PhD 1979.

Yale University, Teaching Assistant.

**Frederic L. Green.** *Elementary particle theory.*

Born 3 April 1951, New York, New York. Rensselaer Polytechnic Institute, BS 1973; Yale University, PhD 1979.

**Brosi Hasslacher.** *Theoretical high energy physics.*

Born 13 May 1941, New York, New York. Harvard University, AB 1962; State University of New York at Stony Brook, PhD 1971.

University of Illinois, Postdoctoral Fellow 1971-73; Institute for Advanced Study, Member 1973-75; California Institute of Technology, Senior Research Fellow 1975-78; École Normale Supérieure, Research Associate of CNRS at ENS 1978-79.

**Yu ping Huo.** *Non-equilibrium statistical mechanics and plasma physics.*

Born 20 August 1937, Hu Bei, China. Peking University, PhD.

Hefei Laboratory, Institute of Plasma Physics, Academia Sinica, Professor and head of theory division.

**Agris J. Kalnajs.** *Astrophysics.*

Born 8 May 1937, Riga, Latvia. Massachusetts Institute of Technology, BS 1959; Harvard University, PhD 1965.

Harvard University, Lecturer, Research

Fellow, Research Associate, 1965-69; Tel Aviv University, Visiting Lecturer 1970-71; Royal Greenwich Observatory, Senior Research Fellow 1971-72; Australian National University, Mount Stromlo Observatory, Senior Research Fellow, Senior Fellow, 1972-.

**Miguel Lagos.** *Relativity.*

Born 5 March 1946, Santiago, Chile.

Universidad de Chile, Licenciado en Ciencias 1971, Doctor en Ciencias 1975.

Comisión Chilena de Energía Nuclear, Associate Researcher 1973-76; Universidad Católica de Chile, Associate Professor 1976-; Institute for Advanced Study, Member second term 1978-79.

**Alan S. Lapedes.** *Quantum effects in general relativity.*

Born 18 February 1951, USA. University of Virginia, AB 1973; University of Cambridge, PhD 1978.

DAMTP, University of Cambridge, NATO Postdoctoral Fellow 1978-79.

**John H. Lowenstein.** *Quantum field theory.*

Born 15 March 1941, Newark, New Jersey.

Harvard University, AB 1962; University of Illinois, MS 1963, PhD 1966.

University of Minnesota, Research Associate 1966-68; Universidad de São Paulo, Visiting Associate Professor 1968-70; University of Pittsburgh, Research Associate 1970-72; New York University, Research Assistant Professor 1972-74, Associate Professor 1974-.

**Stephen H. Lubow.** *Theoretical astrophysics.*

Born 1 May 1949, Salem, Massachusetts.

Cornell University, BS 1971; University of California at Berkeley, MA 1972, PhD 1977.

University of California at Berkeley, Teaching Assistant 1973-74, Research Assistant 1974-76; University of California at Los Angeles, Postdoctoral Scholar 1976-.

**Emil Mottola.** *Particle physics.*

Born 13 October 1953, Bronx, New York.

Columbia University, BA 1974, MA 1976, PhD 1979.

Columbia University, Graduate Teaching Fellowship 1974-76, Pfister Fellow 1976-79.

**William I. Newman.** *Theoretical astrophysics.*

Born 28 August 1949, Edmonton, Canada.

University of Alberta, BS 1971, MA 1972; Cornell University, MA 1975, PhD 1978.

Cornell University, Graduate Research Assistantship 1972-73, 1976-78; Institute for Advanced Study, Member 1978-79.

**F. Robert Ore, Jr.** *Theoretical particle physics and quantum field theory.*

Born 6 August 1952, Fort Monmouth, New Jersey.

Massachusetts Institute of Technology, BS 1974, PhD 1978.

Massachusetts Institute of Technology, Teaching Assistant 1974-76, Research Assistant 1976-78, Research Associate 1978; Institute for Advanced Study, Member 1978-79.

**Paul A. Pearce.** *Statistical mechanics.*

Born 10 June 1951, London, England.

University of Melbourne, BS 1974, PhD 1977.

Carnegie-Mellon University, Research Physicist 1977-79.

**Tsvi Piran.** *General relativity and relativistic astrophysics.*

Born 6 May 1949, Tel Aviv, Israel.

Tel Aviv University, BS 1970, MA 1972; Hebrew University, PhD 1976.

Hebrew University, Teaching Assistant 1975-76; University of Oxford, Postdoctoral Research Assistant 1976-77; University of Texas, Research Associate 1977-.

**Stuart A. Samuel.** *Particle physics.*

Born 8 August 1953, Buffalo, New York.

Princeton University, BA 1975; University of California at Berkeley, PhD 1979.

University of California at Berkeley, Teaching Assistant 1975-76, Research Assistant 1977; Lawrence Berkeley Laboratory, Research Assistant 1977-.

**Paul R. Shapiro.** *Astrophysics.*

Born 2 August 1953, New Haven, Connecticut.

Harvard College, AB 1974; Harvard University, PhD 1978.

Harvard University, NSF Predoctoral Fellowship in Astronomy 1974-77; Harvard-Radcliffe College, South House, Resident Tutorship in Astronomy and Physics 1975-78, Parker Fellowship 1977-78; Institute for Advanced Study, Member 1978-79.

**Junko Shigemitsu.** *Theoretical high-energy physics.*

Born 19 March 1949, Japan. Sophia

University, BS 1973; Cornell University, PhD 1978.

Institute for Advanced Study, Member 1978-79.

**Warren D. Siegel.** *Particle physics.*

Born 16 November 1952, Flint, Michigan. University of California at Berkeley, BS 1972, MA 1976, PhD 1977.

Harvard University, Honorary Postdoctoral Research Fellow 1977-79.

**Lee Smolin.** *Quantum theory of gravity; elementary particle theory.*

Born 6 June 1955, New York, New York. Hampshire College, AB 1975; Harvard University, MA 1978, PhD 1979.

Harvard University, Teaching Fellow 1976-79.

**Raymond M. Soneira.** *Astrophysics.*

Born 10 July 1949, New York, New York. Columbia College, BS 1972; Princeton University, MA 1974, PhD 1978.

CBS Television Network, Engineering and Development Department, Consultant 1967-70; Princeton University, Cyclotron Laboratory, Assistant in Research 1972-73, Introductory Physics Laboratory, Assistant in Instruction 1973-74, Gravitation Research Group, Assistant in Research 1974-77; Institute for Advanced Study, Member 1978-79.

**Toshio Tange.** *Plasma physics.*

Born 6 January 1947, Japan. University of Tokyo, BS 1969, MA 1971, PhD 1974.

University of Tokyo, Postdoctoral Fellow 1974-75; Hiroshima University, Research Associate 1975-.

**James W. Van Dam.** *Tokamak stability theory.*

Born 25 March 1948, Kalamazoo, Michigan. Calvin College, BS 1970; University of California at Los Angeles, MA 1974, PhD 1978.

University of California at Berkeley, Teaching Assistant 1971; University of California at Los Angeles, Teaching Assistant 1973, Research Assistant 1973-77, Staff Research Associate 1978-; Lawrence Livermore Laboratory, "M" Division, physicist 1977.

**Eduard J. Zehnder.** *Mathematical physics.*

Born 10 November 1940, Leuggern. ETH, Zurich, PhD 1971.

Courant Institute, New York University, Visiting Member 1971-72; Institute for Advanced Study, Member 1972-74; University of Erlangen, Dozent 1974-76; University of Bochum, Professor 1976-.

## Visitors

**John B. Bronzan.** *Particle physics.*

Born 5 April 1937, Los Angeles, California. Stanford University, BS 1959; Princeton University, PhD 1963.

Massachusetts Institute of Technology, Instructor 1963-65, Assistant Professor 1965-68, Associate Professor 1968-71; Rutgers University, Associate Professor 1971-75, Professor 1975-; Fermilab, Visiting Scientist 1973-74; University of California at Santa Barbara, Visiting Professor 1977.

**Kenneth M. Case.** *Mathematical physics.*

Born 23 September 1923, New York, New York. Harvard University, BA 1945, MA 1946, PhD 1948.

Los Alamos Scientific Laboratory, physics staff 1944-45, Consultant 1948-; University of Michigan, Assistant Professor of Physics 1950-52, Professor of Chemistry 1953-67; Rockefeller University, Professor of Physics 1967-; Institute for Advanced Study, Member 1948-49, 1949-50, 1956-57, Visitor 1969-70, 1975-76, 1976-77, 1978-79.

**Glennys R. Farrar.** *Particle physics.*

Born 19 September 1946, Washington, DC. University of California at Berkeley, BS 1967; Princeton University, MA 1969, PhD 1970.

University of California at Berkeley, NSF Graduate Fellow; Princeton University, NSF Graduate Fellow; Institute for Advanced Study, Member 1971-72, 1972-73.

**Paul G. Langacker.** *Particle physics.*

Born 14 July 1946, USA. Massachusetts Institute of Technology, BS 1968; University of California at Berkeley, MA 1969, PhD 1972.

Rockefeller University, Research Associate 1972-74; University of Pennsylvania, Research Associate 1974-75, Assistant Professor 1975-.

**Bohdan Paczyński.** *Astrophysics.*

Born 8 February 1940, Wilno, Poland.



University of Warsaw, MA 1962, PhD 1964.

University of California, Lick Observatory, Assistant 1962-63; University of Colorado, JILA, Visiting Fellow 1968-69; California Institute of Technology, Visiting Professor 1973, Sherman Fairchild Distinguished Scholar 1975-76; Copernicus Astronomical Center (Poland), Associate Professor 1974-; Institute for Advanced Study, Visitor fall 1974, spring 1976, spring 1977, spring 1978; University of California at Berkeley, Visiting Professor 1979.

**Herbert J. Rood.** *Astrophysics.*

Born 22 April 1937, New Brunswick, New Jersey. Massachusetts Institute of Technology, BS 1959; University of Michigan, MS 1961, PhD 1965.

University of Michigan, Teaching Assistant 1962-64; Mount Wilson and Palomar Observatories, Research Fellow 1965; Wesleyan

University, Assistant Professor; Institute for Advanced Study, Member 1972-73.

**Martin Schwarzschild.** *Astrophysics.*

Born 31 May 1912, Potsdam, Germany. University of Göttingen, PhD 1935.

Harvard College Observatory, Littauer Fellow 1937-40; Columbia University, Lecturer in Astronomy 1940-44, Assistant Professor 1944-47; Princeton University, Professor 1947-51, Higgins Professor of Astronomy 1951-79, Senior Research Associate 1979-.

**Alberto Sirlin.** *Particle physics.*

Born 25 November 1930, Buenos Aires, Argentina. Cornell University, PhD 1958.

Columbia University, Research Associate 1957-59; New York University, Assistant Professor 1959-61, Associate Professor 1961-68, Professor 1968-.

The School of Social Science

Faculty

---

Clifford Geertz

Albert O. Hirschman  
*(1907 Foundation Professor)*

Member with Long-term Appointment

---

Bernard Lewis

---

## The School of Social Science

In terms of its formal existence, the School of Social Science is the youngest of the Institute's four divisions. Although its roots go back to 1935 to what was then the School of Economics and Politics at the Institute, its creation as an enduring program came with a permanent academic appointment in 1970-71 and its formulation as a School in 1973. This process of moving from program to School, from experimental venture to institutionalization, is an essential characteristic of growth at the Institute.

The School of Social Science pursues an operational pattern parallel to that of other Institute Schools, combining a rather small number of permanent Faculty with a larger group of visiting annual members. These are drawn from an ever wider pool of possibilities created by individuals who initiate their own applications as well as by those who respond to invitations issued by the School.

The School of Social Science does not normally attempt to take on large-scale statistical or quantitative studies. Such work has been done at the Institute but it is not central to its purposes. Furthermore, the School does not select certain social problems and, seeking their solutions, come up with prescriptions for this or that social malaise. This does not mean that such uses may not be made of work accomplished at the Institute. Indeed, an interest in policy questions has characterized the work of some members of the School and will surely occur again in the future. However, the main focus of the School is interpretive in nature, investigating the meanings of social behavior and delineating the determinants of social change. As such it is resolutely multi-disciplinary, cross-cultural and internationally comparative, drawing its data from

historical as well as contemporary problems, exploiting ethnographic as well as quantitative sources.

In a sense, the empirical findings of the social sciences are employed to criticize and to refine both methodology and theory in the contemporary human sciences. Thus the School, while giving credit to the long-dominant quantitative approach in American social science, nevertheless shares in the growing numbers of reservations expressed about it; that is, that its methods are narrow and overspecialized, that its procedures lead to a warping present-mindedness and that both combine to create an unjustified scientism, incapable of producing a legitimate, durable set of solutions to the pressing social and economic problems of our time.

This intellectual posture demonstrates one of the roles of the Institute for Advanced Study as part of the seamless fabric of higher education and research—to use, when warranted, its private security and intellectual freedom for an independent position in, and critical assessment of, the academic accomplishment embraced by its areas of expertise.

### Academic Activities, 1979-80

In April 1980 the School achieved a long-time objective by naming a third professor, Michael Walzer, who was professor of government at Harvard University at the time of his appointment. The year under review was the last year of a five-year appointment for William H. Sewell, Jr., who will join the department of history at the University of Arizona. Both he and Quentin R. D. Skinner, whose three-year appointment came to an end in

1979, rendered important services to the School by their active participation in both academic and administrative affairs.

During 1979-80 the School was host to sixteen members and two visitors. As is now traditional, the principal intellectual communication not only among the members of the School but also between these members and a group of members of the School of Historical Studies took place during the weekly luncheon seminars. These seminars covered a wide spectrum of topics as can be seen from the Record of Events presented in a later section of the Annual Report. Six of the twenty-seven seminars were given by members of the School of Historical Studies and one by a member of Princeton Theological Seminary. The seminars were remarkably well attended, each topic attracting a somewhat different audience; discussions were lively and spilled over into subsequent informal conversations and exchanges.

The focus of the year was the sociology of art and literature. Seven members and one visitor were involved in this program together with members of the Institute Faculty as well as that of Princeton University. In the course of a series of specialized seminars, participants presented their own work in progress to the extent that it was related to the sociology of art and literature. In addition, they discussed theoretical and methodological problems which have become prominent in the field in recent years. The various academic and scholarly backgrounds of the participants (history, sociology, anthropology, economics, art history, theory of literature, literary criticism) made the discussion of a broad range of topics possible. Among the more important of these were:

- the existence in various countries of theoretical traditions in the sociology of art and literature;
- the question of theoretical and methodological differences between the sociology of art and the sociology of literature;

- the precarious disciplinary relationship of the sociology of art and literature with history, art history, sociology and literary criticism;
- a criss-cross orientation between anthropology and art history in recent years by which anthropology concentrates on individual aspects of the artistic process and the art object whereas art history (or the sociology of art) deals more and more with culture-related aspects of art phenomena;
- a comparison of recent paradigm changes in the sociology of science and the sociology of art and literature; and,
- an evaluation of Marxist approaches in the field from the viewpoint of different disciplinary backgrounds and national theory traditions.

Three members of the group—Robert Darn-ton, Alexander J. Field and Michael Gil-senan—were also members of the project Self-Perception, Mutual Perception and Historical Development, organized jointly by the School of Historical Studies and the School of Social Science under a three-year grant from the Andrew W. Mellon Foundation. An evening seminar was organized by this group which met regularly to discuss various aspects of Self-Perception and Decline, the topic that had been selected as the focus for the program's first year.

Three other informal seminars were organized as a result of converging interests of various members. During the fall term a small seminar composed of anthropologists, historians, art historians and literary critics met every other week to explore the possibilities of the text as an analogy for social action. The seminar grew out of informal discussions of a talk given by Professor Geertz at the end of the year's first luncheon seminar. Participants read and discussed several articles that either developed a theoretical approach to social action as text or analyzed specific social actions from a textual point of view. By the end of the term there was general agreement that a textual analogy for the analysis of social action was valuable because it encouraged a close

and critical "reading" of the meaning of social action in its context, but there were also some worries that the "fixed" and "closed" character of texts limited their utility as an analogy for *action* which is, by definition, processual and open.

A seminar on Issues in Language, Culture and Ideology began in November 1979 and continued until June 1980. The basic focus of readings and discussion was to understand how language (both as structure and discourse) relates to culture (as a set of rules and patterns as well as norms and behavior). Language was interpreted both as a creative feature which fosters and channels thought and behavior as well as a constraint on certain forms of thought and behavior. The issues relating to language creativity and constrictiveness were recognized to be culturally specific as well as historically produced.

Another informal seminar met regularly during the spring term to discuss papers on problems in social philosophy. Among the topics were moral relativism, moral responsibility, obligations to future generations, moral luck, and social explanation. Participants in the seminar included visitors and permanent members from the School of Social Science and the School of Historical Studies as well as faculty from Princeton University.

Professors Geertz and Hirschman and Dr. Sewell met regularly to make membership application decisions for the next year. The focus for 1980-81 will be the comparative impact of the colonial experience on the insti-

tutions, values and development patterns of the now independent countries of Asia, Africa and Latin America. This broad area of research was first suggested by a well-known Indian economist and economic historian, Dharma Kumar of the Delhi School of Economics. In addition to Dr. Kumar, six scholars have been appointed as members of the core program next year. Four members have been named as participants in next year's Mellon program.

#### Publications of Members Related to Residence at the Institute: A Selection

- Blu, Karen J. *The Lumbee Problem: The Making of an American Indian People*. Cambridge: Cambridge University Press, 1980.
- Huff, Toby E., ed. *On the Roads to Modernity: Conscience, Science and Civilizations*. Selected writings by Benjamin Nelson. Totowa, NJ: Rowman and Littlefield, 1980.
- Manuel, Frank E. (with Fritzie P. Manuel). *Utopian Thought in the Western World*. Cambridge: Harvard University Press, 1979.
- Richter, Melvin, ed. *Political Theory and Political Education*. Princeton: Princeton University Press, 1980.
- Rosaldo, Michelle Z. *Knowledge and Passion: Ilongot Notions of Self and Social Life*. Cambridge: Cambridge University Press, 1980.
- Sulloway, Frank J. *Freud, Biologist of the Mind: Beyond the Psychoanalytic Legend*. New York: Basic Books, 1979.
- Twitchett, Denis C., ed. and contrib. *Cambridge History of China*, Vol. III. Cambridge: Cambridge University Press, 1979.



---

## The School of Social Science

### Member with Long-term Appointment, Members and Visitors, 1979-80

In the section which follows, the information was obtained from material provided by the members and visitors.

### Member with Long-term Appointment

**Bernard Lewis.** See page 27 for biographical entry.

### Members

**Svetlana Alpers.** *Seventeenth-century northern European art; art and society.*

Born 10 February 1936, Cambridge, Massachusetts. Radcliffe College, AB 1957; Harvard University, PhD 1965.

University of California at Berkeley, Instructor, Assistant Professor 1962-69, Associate Professor 1969-75, Professor 1975-; Center for Advanced Study in the Behavioral Sciences, Fellow 1975-76.

**Barbara A. Babcock.** *Reading culture: anthropology and the uses of literary theory.*

Born 7 August 1943, Danville, Pennsylvania. Northwestern University, AB 1965; University of Chicago, MA 1967, PhD 1975.

University of Texas, Instructor 1972-75, Assistant Professor 1975-77, Associate Professor 1978-.

**Keith M. Baker.** *Ideological origins of the French Revolution.*

Born 7 August 1938, Swindon, England. University of Cambridge, AB 1960, MA 1963; University of London, PhD 1964.

Reed College, Instructor 1964-65; University of Chicago, Assistant Professor, Associate Professor 1965-77, Professor 1977-; Yale University, Visiting Associate Professor fall 1974.

**Timothy J. Clark.** *Relations between art and society in nineteenth-century France.*

Born 12 April 1943, Bristol, England. University of Cambridge, BA 1964; University of London, PhD 1973.

CNRS, Research Fellow 1966-67; University of Essex, Lecturer in Art History 1967-69; University of Oxford, Senior Research Fellow 1969-70, 1973-74; Camberwall School of Art, London, Senior Lecturer 1970-73; University of California at Los Angeles, Associate Professor 1974-76; University of Leeds, Professor 1976-.

**Robert Darnton.** See page 32 for biographical entry.

**Alexander J. Field.** *European economic history and thought in the nineteenth century.*

Born 17 April 1949, Boston, Massachusetts. Harvard University, BS 1970; London School of Economics, MA 1971; University of California at Berkeley, PhD 1974.

University of California at Berkeley, Teaching Assistant 1974; Stanford University, Assistant Professor.

**David J. Garrow.** *The civil rights movement under Martin Luther King, Jr.*

Born 11 May 1953, New Bedford, Massachusetts. Wesleyan University, BA 1975; Duke University, MA 1978.

Duke University, Teaching Assistant 1976-78, Instructor 1979; Institute for Advanced Study, Member and Assistant to Professor Clifford Geertz.

**Michael Gilsenan.** *Changes in ideology and culture in Middle Eastern societies since the eighteenth century.*

Born 6 February 1940, London, England. University of Oxford, AB 1963, PhD 1967.

Harvard University, Center for Middle Eastern Studies, Research Fellow 1967-68; University of California at Los Angeles, Assistant Professor 1968-70; University of Manchester, Research Lecturer 1970-73; St. Antony's College,



## 66 Reports of the Schools

University of Oxford, Associate Fellow 1970-73; University College, London, Lecturer 1973-78, Reader 1978-.

**Geoffrey P. Hawthorn.** *Counterfactuals and possible social worlds: the example of rural India.* Born 28 February 1941, Slough, United Kingdom. University of Oxford, AB 1962.

University of Essex, Lecturer in sociology 1964-70; University of Cambridge, Lecturer in sociology 1970-; Harvard University, Visiting Professor 1973-74.

**George Armstrong Kelly.** *Citizenship in contemporary Western democracies.* Born 26 May 1932, Pittsburgh, Pennsylvania. Harvard University, AB 1953, PhD 1967; Stanford University, MA 1954.

Harvard University, Assistant Professor 1967-68; Brandeis University, Associate Professor 1968-72, Professor 1973-77; Massachusetts Institute of Technology, Visiting Scholar in the humanities 1973-74.

**Jacques Leenhardt.** *Sociology of the literary avant-garde in nineteenth-century France.*

Born 17 April 1942, Geneva, Switzerland. University of Paris X, PhD 1972.

Faculté des Sciences Economiques et Sociales, Geneva, 1964-66; École des Hautes Études en Sciences Sociales 1966-; University of California at San Diego, Visiting Associate Professor 1975.

**Wolf Lepenies.** *Changing relationships between the sciences since the eighteenth century.*

Born 11 January 1941, Deuthen/Allenstein. University of Münster, Dr. phil. 1967; Free University of Berlin, Habilitation 1970.

Wesleyan University, Center for the Humanities, Fellow 1973; University of Texas, Visiting Professor 1975; Vienna Institute for Advanced Studies and Scientific Research, Visiting Professor 1976; École des Hautes Études, Directeur d'études associé 1977, 1978; Free University of Berlin, Professor.

**Carlo Poni.** *Origin of the factory system in early modern Europe.*

Born 15 March 1927, Italy. University of Bologna, Laurea 1951; University of Rome, Libera Docenza 1964, Concorso Cattedra 1968. University of Trieste, Incariato 1964-68;

University of Bologna, Ordinario 1968-; University of Reading, Fellow 1972; St. Antony's College, University of Oxford, Visiting Scholar 1974; École des Hautes Études, Directeur d'études associé 1978.

**Robert Schwarz.** *Literature and ideology in nineteenth-century Brazil.*

Born 20 August 1938, Vienna, Austria. Universidade de São Paulo, AB 1960; Yale University, MA 1963; Sorbonne, PhD 1976. Universidade de São Paulo, Instructor 1964-68; Paris, Invité du serv. relations culturelles 1969; Vincennes-Paris, Chargé de cours 1970-73; Universidade de Campinas, Assistant Professor 1978-.

**William H. Sewell, Jr.** *Social history of modern Europe.*

Born 15 May 1940, Stillwater, Oklahoma. University of Wisconsin, BA 1962; University of California at Berkeley, MA 1963, PhD 1971.

University of Chicago, Instructor in History 1968-71, Assistant Professor 1971-75; Institute for Advanced Study, Member 1971-72, Long-term Member 1975-80.

**John O. Stewart.** *The impact of social and economic structures on folk religion and secular expressive forms in Trinidad.*

Born 24 January 1933, Trinidad, West Indies. California State University, Los Angeles, BA 1960; Stanford University, MA 1965; University of Iowa, MFA 1966; University of California at Los Angeles, PhD 1973.

University of Iowa, Instructor 1964-66; Fresno State College, Assistant Professor 1966-69, Associate Professor 1969; University of California at Los Angeles, Acting Assistant Professor 1969; University of Illinois, Assistant Professor 1972-76, Associate Professor 1976-; Director of Afro-American Studies 1974-78.

**Aram A. Yengoyan.** *Language and culture in aboriginal Australian society.*

Born 14 September 1935, Fresno, California. Fresno State College, AB 1956; University of California at Los Angeles, MA 1958; University of Chicago, PhD 1964.

University of California at Berkeley, Visiting Professor 1977, 1978; University of Michigan, Professor.



## Visitors

**John Orr.** *Fiction and mass culture in post-war American society.*

Born 26 July 1943, Rochester, England.  
University of Birmingham, BSS.  
Simon Fraser University, Teaching Assistant 1966-67; University of Edinburgh, Assistant Lecturer 1967-69, Lecturer 1969-.

**Richard Sennett.** *The urban family.*

Born 1 January 1943, Chicago, Illinois.  
University of Chicago, BA 1964; Harvard University, PhD 1969.  
New York University, Director of Research, Department of Sociology 1971-; Institute for

Advanced Study, Member 1973-74; New York Institute for the Humanities, Director.

**Dennis F. Thompson.** *Political theory: political ethics and public policy.*

Born 12 May 1940, Hamilton, Ohio. William and Mary College, AB 1962; Balliol College, University of Oxford, AB 1964, MA 1968; Harvard University, PhD 1968.

Harvard University, Teaching Fellow 1965-67, Instructor 1967-68, Research Associate 1973-74; Princeton University, Assistant Professor 1968-72, Associate Professor 1972-75, Professor 1975-; Stanford University, Institute for Political Studies, Visiting Scholar 1971.



---

# Publications of the Faculty, Professors Emeriti and Members with Long-term Appointments: A Selection

## Faculty

### Stephen L. Adler

Integration of source-charge constraints in quantum chromodynamics with fixed quark and anti-quark sources, *Phys. Rev. D* 20, 3273 (1979).

Scalar field algebraic chromodynamics, *Phys. Rev. D* 21, 550 (1980).

Order-R vacuum action functional in scalar-free unified theories with spontaneous scale breaking, *Phys. Rev. Letters* 44, 1567 (1980).

Quaternionic chromodynamics as a theory of composite quarks and leptons, *Phys. Rev. D* 21, 2903 (1980).

### John N. Bahcall

Solar neutrinos: theory versus observation, *Space Science Rev.* 24, 227 (1979).

(with Y. Avni) On the simultaneous analysis of several complete samples: the  $V/V_{\max}$  and  $V_e/V_a$  variables, *Ap. J.* 235, 694 (1980).

(with M. Milgrom) A magnetic dipole model for superluminal radio sources, *Ap. J.* 236, 24 (1980).

Absorption lines in the spectra of distant objects, in *Proceedings of IAU Colloquium No. 54*, p. 215, NASA CP-2111, eds. M. S. Longair and J. W. Warner (1979).

(with R. Soneira) Star counts as an indicator of galactic structure and quasar evolution, *Ap. J. Lett.* 238, L17 (1980).

### Enrico Bombieri

Thompson's problem ( $\sigma^2 = 3$ ), *Inventiones mathematicae* 58 (1980), 77-100.

### Marshall Clagett

*Studies in Medieval Physics and Mathematics*. London: Variorum Reprints, 1979.

*Archimedes in the Middle Ages*. Vol. 4. *Supplement on the Medieval Latin Traditions of Conic Sections (1150-1566)*. Philadelphia: American Philosophical Society, 1980.

### Roger F. Dashen

*Sound Transmission through a Fluctuating Ocean*, Cambridge Monographs on Mechanics and Applied Mathematics, Stanley M. Flatté (with co-authors W. H. Munk, K. M. Watson and F. Zachariasen), Cambridge University Press, New York, 1979.

Path integrals for waves in random media, *J. Math. Phys.* 20, 894 (1979).

(with C. Callan and D. Gross) Instantons as a bridge between weak and strong coupling in QCD, *Phys. Rev. D* 20, 3279 (1979).

(with C. Callan and D. Gross) Are instantons found? *Phys. Rev. Lett.* 44, 435 (1980).

### Freeman J. Dyson

*Disturbing the Universe*, commissioned by the Science Book Program of the Alfred P. Sloan Foundation and published by Harper & Row, New York and London, 1979. Parts of the book were also published in the *New Yorker*, August 6, 13, 20, 1979; in the *Observer*, October 28, 1979; and in French translation in *La Recherche*, January 1980.

### John H. Elliott

(with Jonathan Brown) *A Palace for a King: The Buen Retiro and the Court of Philip IV*. London and New Haven: Yale University Press, 1980.

### Clifford Geertz

"Blurred Genres: The Refiguration of Social Thought," *The American Scholar*, 49 (2): 165-179.

**James F. Gilliam**

"Introduction: Epigraphie et armées," *Actes du VII<sup>e</sup> Congrès International d'Epigraphie Grecque et Latine*, Constantza, 1977 (1979), pp. 187-189.

**Christian Habicht**

"Bemerkungen zum Papyrus Hauniensis 6," *Zeitschrift für Papyrologie und Epigraphik* 39 (1980), pp. 1-5.

**Harish-Chandra**

A submersion principle and its applications, in *Geometry and Analysis*, pp. 95-102, Indian Academy of Sciences, Bangalore, and Tata Institute of Fundamental Research, Bombay, 1979.

**Albert O. Hirschman**

"The Turn to Authoritarianism in Latin America and the Search for Its Economic Determinants," in David Collier, ed., *The New Authoritarianism in Latin America*, Princeton University Press, 1979, pp. 61-98.

"The Welfare State in Trouble: Systemic Crisis or Growing Pains?" *American Economic Review, Papers and Proceedings*, Vol. 70, No. 2, May 1980, pp. 113-116.

**Robert P. Langlands**

Sur la mauvaise réduction d'une variété de Shimura, *Astérisque*, t.65 (1979).

Automorphic representations, Shimura varieties, and motives, *Proceedings of Symposia in Pure Mathematics*, vol. 33 (1979).

On the notion of an automorphic representation, *Proceedings of Symposia in Pure Mathematics*, vol. 33 (1979).

Stable conjugacy: Definitions and Lemmas, *Can. Jour. Math.*, vol. 31 (1979).

L-indistinguishability for  $SL(2)$ , *Can. Jour. Math.*, vol. 31 (1979).

On the zeta-functions of some simple Shimura varieties, *Can. Jour. Math.*, vol. 31 (1979).

Base change for  $GL(2)$ , *Annals of Math. Study* 96 (1980).

**Irving Lavin**

*Bernini and the Unity of the Visual Arts*, Oxford University Press, The Pierpont Morgan Library,

New York and London, 1980; Italian translation, *Bernini e l'unità delle arti visive*, Rome, 1980.

"A Further Note on the Ancestry of Caravaggio's First 'Saint Matthew,'" *The Art Bulletin*, LXII, March 1980, No. 1, 113-114.

**Marshall N. Rosenbluth**

(with P. J. Catto, et al.) Axis encircling ion gyroinstability, *Phys. Fluids* 23, 764 (1980).

(with F. L. Hinton) Convective amplification of universal drift modes, Report #FRCR, University of Texas at Austin, Fusion Research Center (1979).

(with P. J. Catto and K. T. Tsang) Resistive drift-Alfvén waves in sheared magnetic fields, *Physics of Fluids* 22, 1284 (1979).

(with B. Richter and W. Thompson) Ion propagation in reactors, JASON Report, SRI, Arlington, Virginia, 1980.

(with N. M. Kroll and P. H. Morton) JASON Telluride lectures on free electron lasers, SRI Technical Report, JSR-79-15 (1980).

(with P. J. Catto and K. T. Tsang) Reply to the comments by K. Itoh and S. Inoue, *Phys. Fluids* 23, 848 (1980).

**Morton White**

"Oughts and Cans" in Alan Ryan, ed., *The Idea of Freedom: Essays in Honor of Isaiah Berlin*, Oxford University Press, 1979, pp. 211-219.

**Professors Emeriti****Andrew Alföldi**

*Der frühromische Reiteradel und seine Ehrenabzeichen*, reprint, with new introduction, L'Erma di Bretschneider, Rome, 1979.

"Die stadtrömischen Münzporträts des Jahres 43 v. Chr.," *Eikones. Festschrift Hans Jucker* (12. Beiheft "Antike Kunst," 1980), pp. 17-28, pls. 1-6.

**Felix Gilbert**

"Myron P. Gilmore and the Villa I Tatti," *The Journal of Italian History*, Vol. 2, No. 1, Spring 1979, pp. 5-10.

"Humanism in Venice," *Florence and Venice:*

*Comparisons and Relations*, Vol. I: *Quattrocento*, Florence, 1979, pp. 13-26.

*The Pope, His Banker and Venice*. Cambridge: Harvard University Press, 1980.

### George F. Kennan

*The Decline of Bismarck's European Order: Franco-Russian Relations, 1875-1890*. Princeton: Princeton University Press, 1979.

### Benjamin D. Meritt

"The Choiseul Marble Again," *Archaiologikē Ephēmeris*, 1980, pp. 95-108.

### Homer A. Thompson

"Stone Tile and Timber: Commerce in Building Materials in Classical Athens," *Expedition* 22 (1980), pp. 12-26.

## Members with Long-term Appointments

### Charles R. Alcock

Diffusion of heavy ions in convective envelopes, with implications for the masses of white dwarfs, in *IAU Colloquium No. 53*, eds. H. M. Van Horn and V. Weidemann, University of Rochester, 1979.

The effect of the heavy element abundance on the evolution of stars, II. The structure of the models, *Acta Astronomica* 30, 1 (1980).

(with B. Paczyński) An evolution free test for non-zero cosmological constant, *Nature* 281, 358 (1979).

(with A. Illarionov) The surface chemistry of stars, I. Diffusion of heavy ions in white dwarf envelopes, *Ap. J.* 235, 534 (1980).

(with A. Illarionov) The surface chemistry of stars, II. Fractional accretion of interstellar matter, *Ap. J.* 235, 541 (1980).

(with B. Paczyński and A. Schwarzenberg-Czerny) A diagnostic for models of U Geminorum, in *IAU Colloquium No. 53*, eds. H. M. Van Horn and V. Weidemann, University of Rochester, 1979.

### Herman H. Goldstine

"The Role of John von Neumann in the

Computer Field." *John von Neumann Society for Computing Sciences*, Budapest, Hungary, 1979.

### Bernard Lewis

"The State of Middle Eastern Studies," *The American Scholar*, vol. 48, no. 3, Summer 1979, pp. 365-381.

"Palestine: On the History and Geography of a Name," *The International History Review*, vol. 11, no. 1, January 1980, pp. 1-12.

"Translation from Arabic," *The American Philosophical Society*, vol. 124, no. 1, February 1980, pp. 41-47.

"Ottoman Land Tenure and Taxation in Syria," *Studia Islamica*, Fasc. 50, 1979, pp. 109-124.

"The Ottoman Empire and Its Aftermath," *Journal of Contemporary History*, vol. 15, 1980, pp. 27-56.

"Slade on Turkey," *Türkiye'nin Sosyal Ve Ekonomik Tarihi (1071-1920)* [Social and economic history of Turkey (1071-1920)], Ankara, 1980, pp. 215-226.

"Some Statistical Surveys of 16th Century Palestine," in B. C. Bloomfield, ed., *Studies and Libraries: A Felicitations Volume for Professor F. D. Pearson*, London, 1980, pp. 115-122.

"The Bases of Political Power and Perceptions in the Middle East," *The Political Economy of the Middle East, 1973-78: A Compendium of Papers Submitted to the Joint Economic Committee, Congress of the United States*, Washington, DC, April 21, 1980, pp. 503-520.

"The United States, Turkey and Iran," in Haim Shaked and Itamar Rabinovitch, eds., *The Middle East and the United States: Perceptions and Policies*, (Transaction Books) New Brunswick, NJ, 1980, pp. 165-180.

### Otto E. Neugebauer

*Ethiopic Astronomy and Computus*. Oesterr. Akad. d. Wissenschaften, Wien, Sitzungsberichte, Vol. 347 (1979).

"Ethiopic Easter Computus," *Oriens Christianus* 63 (1979), pp. 87-102.

"Rev. of Tihon, *Le Petit Commentaire de Théon*," *Centaurus* 23 (1980), p. 312f.

(with P. J. Sijpestein) "A New Version of Greek Planetary Tables," *Zeitschr. f. Papyrologie u. Epigraphie* 37 (1980), pp. 285-293.

## 72 Publications

"On the Orientation of Pyramids," *Centaurus* 24 (1980), pp. 54-56.

(with J. Sachs and G. J. Toomer)

"O. Neugebauer, Bibliography 1925-1979," *Centaurus* 22 (1979), pp. 258-280.

### Claudio Teitelboim

The Hamiltonian structure of spacetime, in *General Relativity and Gravitation*, Vol. 1, ed. A. Held, Plenum Publishing Corporation, New York, 1980, pp. 195-225.

### Scott D. Tremaine

(with P. Goldreich) Precession of the  $\epsilon$  ring of Uranus, *Astronomical Journal* 84, 1638 (1979).

(with P. Goldreich) Towards a theory for the Uranian rings, *Nature* 277, 97 (1979).

(with P. Goldreich) The excitation of density waves at the Lindblad and corotation resonances by an external potential, *Ap. J.* 233, 857 (1979).

(with G. Lake) An estimate of the galaxy covariance function at small scales and low luminosities, *Ap. J. Lett.* 238, May 15, 1980.

---

## Record of Events, 1979-80

*September 14*

School of Mathematics

Special Lecture: "Oscillatory Integrals on Flag Manifolds"  
Guest Lecturer: V. S. Varadarajan, University of California at  
Los Angeles

*September 20*

School of Mathematics

Special Lecture: "New Families of Manifolds Which Do Not  
Have Group Actions"  
Guest Lecturer: Reinhard Schultz, Purdue University

*September 21*

School of Mathematics

Special Lecture: "Algebraic Groups Associated to Hodge-Tate  
Modules"  
Guest Lecturer: J.-P. Serre, Collège de France

*September 26*

School of Natural Sciences

Theoretical Physics Seminar: "A New Approach to the Large N  
Limit"  
Guest Lecturer: Antal Jevicki, Brown University

*September 27*

School of Mathematics

Topology Seminar: "Incompressible Surfaces in 3-Manifolds"  
Allen E. Hatcher, University of California at Los Angeles;  
Visiting Member, School of Mathematics, IAS

*September 28*

School of Mathematics

Differential Geometry Seminar: "A Non-Trivial Extremal Kähler  
Metric"  
Eugenio Calabi, University of Pennsylvania; Visiting Member,  
School of Mathematics, IAS

School of Natural Sciences

Theoretical Physics Seminar: "Integration of Source-Charge  
Constraints in QCD with Fixed Quark and Antiquark  
Sources" and "Algebraic Chromodynamics"  
Stephen L. Adler, Professor, School of Natural Sciences, IAS

*October 1*

School of Natural Sciences

Seminar: "Topics in Supergravity"  
Guest Lecturer: Julius Wess, University of Karlsruhe

*October 2*

School of Mathematics

Harish-Chandra Seminar: "Supertempered Distributions on  
Real Reductive Groups"  
Harish-Chandra, Professor, School of Mathematics, IAS

Cohomology of Arithmetic Groups Seminar: "Introductory Survey"  
Armand Borel, Professor, School of Mathematics, IAS

Members Seminar: "The Minkowski Problem and the Radon Transform"  
Eugenio Calabi, University of Pennsylvania; Visiting Member, School of Mathematics, IAS

*October 3*  
School of Mathematics

Minimal Submanifolds Seminar: "Survey Lecture"  
Leon Simon, University of Minnesota; Visiting Member, School of Mathematics, IAS

*October 4*  
School of Historical Studies

Art History Colloquium: "The Beginnings and First Development of the European Woodcut, 1350-1450"  
Franz Winzinger, University of Regensburg; Visiting Member, School of Historical Studies, IAS

School of Mathematics

Hopf Algebra Seminar: "Hopf Algebras of Differential Operators on Split Semisimple Groups"  
Guest Lecturer: W. Haboush, Rutgers University

Topology Seminar: "Cohomology of Finite H-spaces"  
Richard M. Kane, University of Alberta; Visiting Member, School of Mathematics, IAS

School of Social Science

Seminar: "A Wary Reasoning: Humanities, Analogies and Social Theory"  
Clifford Geertz, Professor, School of Social Science, IAS

*October 5*  
School of Mathematics

Differential Geometry Seminar: "Survey Lecture"  
Shing-Tung Yau, Stanford University; Visiting Member, School of Mathematics, IAS

General Relativity Seminar: "Introduction to Hawking's Approach to Quantum Gravity"  
Alan S. Lapides, University of Cambridge; Visiting Member, School of Natural Sciences, IAS

Differential Geometry Seminar: "The Poincaré and Sobolev Inequalities for Manifolds"  
Peter Wai-Kwong Li, University of California at Berkeley; Visiting Member, School of Mathematics, IAS

*October 8*  
School of Mathematics

Members Seminar: "A Walking Tour of the Sporadic Simple Groups of Mathieu, Conway, Fischer and the So-called 'Monster'"  
Robert L. Griess, Jr., University of Michigan; Visiting Member, School of Mathematics, IAS



- School of Natural Sciences  
Seminar: "Vacuum Polarization in a Uniform Non-Abelian Field"  
Lowell S. Brown, University of Washington; Visiting Member, School of Natural Sciences, IAS
- October 9*  
School of Mathematics  
Harish-Chandra Seminar: "Supertempered Distributions on Real Reductive Groups" (continued)  
Harish-Chandra, Professor, School of Mathematics, IAS  
Cohomology of Arithmetic Groups Seminar: "Survey" (concluded)  
Armand Borel, Professor, School of Mathematics, IAS
- October 10*  
School of Mathematics  
Minimal Submanifolds Seminar: "Survey Lecture" (continued)  
Leon Simon, University of Minnesota; Visiting Member, School of Mathematics, IAS
- October 11*  
School of Mathematics  
Joint IAS-Rutgers University Seminar on Hopf Algebras: "Hopf Algebras of Differential Operators on Split Semisimple Groups" (continued)  
Guest Lecturer: W. Haboush, Rutgers University  
Topology Seminar: "Multiplicative Properties of Power Maps"  
Guest Lecturer: C. A. McGibbon, University of Pennsylvania  
Joint IAS-Princeton University Seminar on Partial Differential Equations and Several Complex Variables: "Removable Singularities"  
Leon Ehrenpreis, Yeshiva University; Visiting Member, School of Mathematics, IAS
- School of Social Science  
Seminar: "Policing Men of Letters in Paris ca. 1750"  
Robert Darnton, Princeton University; Visiting Member, School of Social Science, and Visitor, School of Historical Studies, IAS
- October 12*  
School of Mathematics  
Differential Geometry Seminar: "Survey Lecture" (continued)  
Shing-Tung Yau, Stanford University; Visiting Member, School of Mathematics, IAS  
General Relativity Seminar: "Introduction to Hawking's Approach to Quantum Gravity" (continued)  
Alan S. Lapedes, University of Cambridge; Visiting Member, School of Natural Sciences, IAS  
Differential Geometry Seminar: "Conformal Metrics with Zero Scalar Curvature and a Symmetrization Process via Maximum Principle"

Wei-Ming Ni, Courant Institute, New York University; Visiting Member, School of Mathematics, IAS

School of Natural Sciences

Theoretical Physics Seminar: "Arbitrary N-vortex Solutions to the First-Order Landau-Ginzburg Equations"  
Guest Lecturer: Clifford H. Taubes, Harvard University

*October 15*

School of Mathematics

Affine Differential Geometry Seminar: "Introduction to Affine Geometry"  
Eugenio Calabi, University of Pennsylvania; Visiting Member, School of Mathematics, IAS

Marston Morse Memorial Lecture: "Three-dimensional Geometry and Topology"  
Guest Lecturer: William Thurston, Princeton University

School of Natural Sciences

Seminar: "A Model of U(1) Chiral Symmetry Breaking"  
Emil Mottola, Columbia University; Visiting Member, School of Natural Sciences, IAS

*October 16*

School of Mathematics

Cohomology of Arithmetic Groups Seminar: "Stable Cohomology"  
Armand Borel, Professor, School of Mathematics, IAS

*October 17*

School of Mathematics

General Relativity Seminar: "Presentation of Some of the Basic Facts in Constructive Field Theory"  
Guest Lecturer: B. Simon, Princeton University

Minimal Submanifolds Seminar: "Survey Lecture" (continued)  
Leon Simon, University of Minnesota; Visiting Member, School of Mathematics, IAS

Lecture Series: "p-adic Representations of the Galois Group of a Local Field"  
Jean-Marc Fontaine, University of Grenoble; Visiting Member, School of Mathematics, IAS

School of Natural Sciences

Special Theoretical Physics Seminar: "Effects of Spacetime Topology on the Quantum Electromagnetic Field"  
Guest Lecturer: Rafael Sorkin, University of Chicago

*October 18*

School of Mathematics

Joint IAS-Rutgers University Seminar on Hopf Algebras: "Hopf Algebras of Differential Operators on Split Semisimple Groups" (continued)  
Guest Lecturer: W. Haboush, Rutgers University

Topology Seminar: "Vanishing Theorems for Nonintegrable Bundles"  
Robert L. Bryant, University of North Carolina; Visiting Member, School of Mathematics, IAS

- School of Social Science  
Seminar: "Microeconomics, Socialization and Norms"  
Alexander J. Field, Stanford University; Visiting Member,  
School of Social Science, IAS
- October 19  
School of Mathematics  
Differential Geometry Seminar: "Survey Lecture" (continued)  
Shing-Tung Yau, Stanford University; Visiting Member, School  
of Mathematics, IAS
- General Relativity Seminar: "Introduction to Hawking's  
Approach to Quantum Gravity" (continued)  
Guest Lecturer: Malcolm J. Perry, Princeton University
- Differential Geometry Seminar: "The Best Constant for the  
Sobolev Inequality in  $\mathbb{R}^n$ "  
Thierry E. F. Aubin, University of Paris; Visiting Member,  
School of Mathematics, IAS
- October 22  
School of Mathematics  
Members Seminar: "Regularity and Singularities on Nonlinear  
Elliptic Systems"  
Enrico Giusti, University of Pisa; Visiting Member, School of  
Mathematics, IAS
- School of Natural Sciences  
Seminar: "Diagonalization of the Chiral Gross-Neveu  
Hamiltonian"  
John H. Lowenstein, New York University; Visiting Member,  
School of Natural Sciences, IAS
- October 23  
School of Mathematics  
Harish-Chandra Seminar: "Supertempered Distributions on  
Real Reductive Groups" (continued)  
Harish-Chandra, Professor, School of Mathematics, IAS
- Cohomology of Arithmetic Groups Seminar: "Stable  
Cohomology" (continued)  
Armand Borel, Professor, School of Mathematics, IAS
- October 24  
School of Mathematics  
Affine Differential Geometry Seminar: "Introduction to Affine  
Geometry" (continued)  
Eugenio Calabi, University of Pennsylvania; Visiting Member,  
School of Mathematics, IAS
- Minimal Submanifolds Seminar: "Function Theoretic  
Representation of Minimal Surfaces in  $\mathbb{R}^3$ "  
Eugenio Calabi, University of Pennsylvania; Visiting Member,  
School of Mathematics, IAS
- Lecture Series: " $p$ -adic Representations of the Galois Group of  
a Local Field" (continued)  
Jean-Marc Fontaine, University of Grenoble; Visiting Member,  
School of Mathematics, IAS

## 78 Record of Events

October 25

School of Mathematics

Joint IAS-Rutgers University Seminar on Hopf Algebras: "Hopf Algebras of Differential Operators on Split Semisimple Groups" (continued)

Guest Lecturer: W. Haboush, Rutgers University

Topology Seminar: "Exponent Theory"

Joseph A. Neisendorfer, Fordham University; Visiting Member, School of Mathematics, IAS

Joint IAS-Princeton University Seminar on Partial Differential Equations and Several Complex Variables: "Extremal Plurisubharmonic Functions on  $\mathbb{C}^2$ "

Guest Lecturer: E. Bedford, Princeton University

School of Social Science

Seminar: "The Duty to Desire: Love, Friendship, and Sexuality in Some Puritan Theories of Marriage"

Edmund Leites, Queens College, City University of New York; Visiting Member, School of Historical Studies, IAS

October 26

School of Mathematics

Differential Geometry Seminar: "Survey Lecture" (continued)

Shing-Tung Yau, Stanford University; Visiting Member, School of Mathematics, IAS

General Relativity Seminar: "Introduction to Hawking's Approach to Quantum Gravity" (continued)

Guest Lecturer: Malcolm J. Perry, Princeton University

Differential Geometry Seminar: "Curvature of Two-dimensional Surfaces and Conformal Deformations"

Guest Lecturer: J. Kazdan, University of Pennsylvania

October 29

School of Mathematics

General Relativity Seminar: "Renormalization: An Introduction for Mathematicians"

Guest Lecturer: A. M. Jaffe, Harvard University

Members Seminar: "Partitions and Orthogonal Polynomials"

David M. Bressoud, Pennsylvania State University; Visiting Member, School of Mathematics, IAS

October 30

School of Mathematics

Harish-Chandra Seminar: "Supertempered Distributions on Real Reductive Groups" (continued)

Harish-Chandra, Professor, School of Mathematics, IAS

Cohomology of Arithmetic Groups Seminar: "Arithmetic Properties of Eisenstein Cohomology"

Guest Lecturer: G. Harder, University of Bonn and Yale University

Affine Differential Geometry Seminar: "Introduction to Affine

## Geometry" (continued)

Eugenio Calabi, University of Pennsylvania; Visiting Member,  
School of Mathematics, IAS

October 31

School of Historical Studies

Colloquium in Classical Studies: "Problems of Greek Epigraphy  
(Fifth and Fourth Centuries)"

Fordyce W. Mitchel, University of Missouri; Visiting Member,  
School of Historical Studies, IAS

School of Mathematics

General Relativity Seminar: "Presentation of Some of the Basic  
Facts in Constructive Field Theory" (continued)

Guest Lecturer: B. Simon, Princeton University

Minimal Submanifolds Seminar: "A Bernstein Theorem for  
Stable Surfaces with Applications to Riemannian Geometry"

Richard M. Schoen, Courant Institute, New York University;  
Visiting Member, School of Mathematics, IAS

November 1

School of Historical Studies

Art History Colloquium: "Looking at Words: The  
Representation of Texts in Seventeenth-Century Dutch Art"  
Svetlana Alpers, University of California at Berkeley; Visiting  
Member, School of Social Science, IAS

School of Mathematics

Topology Seminar: "Novikov Conjecture for Non-positively  
Curved Manifolds"

Wu-chung Hsiang, Princeton University; Visiting Member,  
School of Mathematics, IAS

Joint IAS-Rutgers University Seminar on Hopf Algebras: "Hopf  
Algebras of Differential Operators on Split Semisimple  
Groups" (continued)

Guest Lecturer: W. Haboush, Rutgers University

Special Lecture: "Cohomology of  $SL_n\mathbb{Z}$ "

Guest Lecturer: G. Harder, University of Bonn and Yale  
University

School of Social Science

Seminar: "The Civic and Civil Models of Public Behavior"

George Armstrong Kelly, New York City; Visiting Member,  
School of Social Science, IAS

November 2

School of Mathematics

Differential Geometry: "Survey Lecture" (continued)

Shing-Tung Yau, Stanford University; Visiting Member, School  
of Mathematics, IAS

General Relativity Seminar: "How Little Do We Know about 4-  
Manifolds?"

Wu-chung Hsiang, Princeton University; Visiting Member,  
School of Mathematics, IAS

Differential Geometry Seminar: "Laplacian on Singular Spaces"  
 Guest Lecturer: J. Cheeger, State University of New York at  
 Stony Brook

School of Natural Sciences

Theoretical Physics Seminar: "Proton Life-Time in SU(5) Grand  
 Unified Theories"  
 Guest Lecturer: Douglas Ross, California Institute of  
 Technology

*November 5*

School of Mathematics

Hermann Weyl Lecture: "The Conjecture of Birch and  
 Swinnerton-Dyer"  
 Guest Lecturer: J. Coates, Université de Paris-Sud

School of Natural Sciences

Seminar: "Confinement in SU(N) Lattice Gauge Theories"  
 Guest Lecturer: Laurence G. Yaffe, Princeton University

*November 6*

School of Mathematics

Harish-Chandra Seminar: "Supertempered Distributions on  
 Real Reductive Groups" (continued)  
 Harish-Chandra, Professor, School of Mathematics, IAS

Cohomology of Arithmetic Groups Seminar: "Higher  
 Regulators"  
 Armand Borel, Professor, School of Mathematics, IAS

*November 7*

School of Historical Studies

Colloquium in Classical Studies: "Sparta from Vespasian to  
 Caracalla"  
 A. S. Bradford, Jr., Assistant to Professor Christian Habicht,  
 School of Historical Studies, IAS

School of Mathematics

Minimal Submanifolds Seminar: "Maximal Domains for Mean  
 Curvature Equations"  
 Enrico Giusti, University of Pisa; Visiting Member, School of  
 Mathematics, IAS

Affine Differential Geometry: "Introduction to Affine  
 Geometry" (continued)  
 Eugenio Calabi, University of Pennsylvania; Visiting Member,  
 School of Mathematics, IAS

Hermann Weyl Lecture: "The Conjecture of Birch and  
 Swinnerton-Dyer" (continued)  
 Guest Lecturer: J. Coates, Université de Paris-Sud

*November 8*

School of Mathematics

Joint IAS-Rutgers University Seminar on Hopf Algebras: "There  
 Exist Finite-Dimensional Hopf Algebras over Arbitrary Fields  
 with Antipode of Arbitrary Even Order"  
 Guest Lecturer: E. J. Taft, Rutgers University

Topology Seminar: "Pseudo-Isotopy and Invariant Theory—The  
 Trace Map of Algebraic K-Theory"

Wu-chung Hsiang, Princeton University; Visiting Member,  
School of Mathematics, IAS

Joint IAS-Princeton University Seminar on Partial Differential  
Equations and Several Complex Variables: "The Heat  
Equation for the  $\bar{\delta}$ -Neumann Problem"

Nancy K. Stanton, Columbia University; Visiting Member,  
School of Mathematics, IAS

School of Social Science

Seminar: "Ontology, Structure and Event: Experience and  
Order in Aboriginal Australia and Beyond"

Aram A. Yengoyan, University of Michigan; Visiting Member,  
School of Social Science, IAS

*November 9*

School of Mathematics

Differential Geometry Seminar: "The Yamabe Problem"

Thierry E. F. Aubin, University of Paris; Visiting Member,  
School of Mathematics, IAS

General Relativity Seminar: "Introduction to Hawking's  
Approach to Quantum Gravity" (continued)

Guest Lecturer: Malcolm J. Perry, Princeton University

Hermann Weyl Lecture: "The Conjecture of Birch and  
Swinnerton-Dyer" (continued)

Guest Lecturer: J. Coates, Université de Paris-Sud

School of Natural Sciences

Theoretical Physics Seminar: "Asymptotic Behavior for  
Exclusive and Nearly Exclusive Processes"

Guest Lecturer: Al Mueller, Columbia University

*November 12*

School of Mathematics

Hermann Weyl Lecture: "The Conjecture of Birch and  
Swinnerton-Dyer" (continued)

Guest Lecturer: J. Coates, Université de Paris-Sud

School of Natural Sciences

Seminar: "Topological Symmetry Breakdown and Quark  
Confinement"

Stuart A. Samuel, University of California at Berkeley; Visiting  
Member, School of Natural Sciences, IAS

*November 13*

School of Mathematics

Harish-Chandra Seminar: "Supertempered Distributions on  
Real Reductive Groups" (continued)

Harish-Chandra, Professor, School of Mathematics, IAS

Cohomology of Arithmetic Groups Seminar: "Intersection  
Homology Theory"

Guest Lecturer: R. MacPherson, Brown University

*November 14*

School of Historical Studies

Colloquium in Classical Studies: "Roman Monuments at  
Cumae"

Alexander G. McKay, McMaster University; Visiting Member,  
School of Historical Studies, IAS

School of Mathematics

Affine Differential Geometry Seminar: "Introduction to Affine  
Geometry" (continued)

Eugenio Calabi, University of Pennsylvania; Visiting Member,  
School of Mathematics, IAS

Minimal Submanifolds Seminar: "Regular Minimal  
Hypersurfaces Exist on Manifolds in Dimensions up to Six"  
Guest Lecturer: J. Pitts, University of Rochester

Hermann Weyl Lecture: "The Conjecture of Birch and  
Swinnerton-Dyer" (continued)

Guest Lecturer: J. Coates, Université de Paris-Sud

November 15

School of Mathematics

Joint IAS-Rutgers University Seminar on Hopf Algebras:  
"Bismash Products of Hopf Algebras"

Mitsuhiro Takeuchi, University of Tsukuba; Visiting Member,  
School of Mathematics, IAS

Topology Seminar: "Deformation Theory and Moduli for  
Rational Homotopy Type (Joint Work with Schlessinger)"  
Guest Lecturer: J. D. Stasheff, University of North Carolina

Joint IAS-Princeton University Seminar on Partial Differential  
Equations and Several Complex Variables: "Necessary  $\bar{\partial}$ -  
Conditions for Subellipticity and Hypoellipticity for the  
Neumann Problem on Pseudoconvex Domains"

Guest Lecturer: D. Catlin, University of Chicago

School of Social Science

Seminar: "Stories Told in Clay"

Barbara A. Babcock, University of Arizona; Visiting Member,  
School of Social Science, IAS

November 16

School of Mathematics

Differential Geometry Seminar: "Curvature and Complex  
Analysis"

Robert E. Greene, University of California at Los Angeles;  
Visiting Member, School of Mathematics, IAS

General Relativity Seminar: "The Nonlinear Graviton"  
Raymond O. Wells, Jr., Rice University; Visiting Member,  
School of Mathematics, IAS

Hermann Weyl Lecture: "The Conjecture of Birch and  
Swinnerton-Dyer" (concluded)

Guest Lecturer: J. Coates, Université de Paris-Sud

November 19

School of Mathematics

Members Seminar: "Twistor Theory: Some Recent  
Developments"



Roger Penrose, University of Oxford; Visitor, School of Mathematics, IAS

School of Natural Sciences

Seminar: "Topological Symmetry Breakdown and Quark Confinement" (continued)

Stuart A. Samuel, University of California at Berkeley; Visiting Member, School of Natural Sciences, IAS

*November 20*

School of Mathematics

Harish-Chandra Seminar: "Supertempered Distributions on Real Reductive Groups" (continued)

Harish-Chandra, Professor, School of Mathematics, IAS

Cohomology of Arithmetic Groups Seminar: "Higher Regulators" (continued)

Armand Borel, Professor, School of Mathematics, IAS

Special Lecture: "Some Applications and Examples of Non-Hausdorff Complex Manifolds"

Roger Penrose, University of Oxford; Visitor, School of Mathematics, IAS

*November 21*

School of Mathematics

Affine Differential Geometry Seminar: "Introduction to Affine Geometry" (continued)

Eugenio Calabi, University of Pennsylvania; Visiting Member, School of Mathematics, IAS

Minimal Submanifolds Seminar: "Evolution Surfaces of Prescribed Mean Curvature"

Claus Gerhardt, University of Heidelberg; Visiting Member, School of Mathematics, IAS

Lecture Series: "The Local Langlands' Correspondence: I—Construction of Supercuspidals"

Philip C. Kutzko, University of Iowa; Visiting Member, School of Mathematics, IAS

*November 26*

School of Mathematics

Members Seminar: "Irrationality Measures of Classical Constants"

Frits Beukers, University of Leiden; Visiting Member, School of Mathematics, IAS

School of Natural Sciences

Seminar: "Black Hole Thermodynamics and the Spontaneous Collapse of Wave Functions"

Roger Penrose, University of Oxford; Visitor, School of Mathematics, IAS

*November 27*

School of Mathematics

Harish-Chandra Seminar: "Supertempered Distributions on Real Reductive Groups" (continued)

Harish-Chandra, Professor, School of Mathematics, IAS

Cohomology of Arithmetic Groups Seminar: "Higher Regulators" (concluded). "L<sup>2</sup>-cohomology"  
Armand Borel, Professor, School of Mathematics, IAS

*November 28*

School of Historical Studies

Colloquium in Classical Studies: "Josephus and the Greeks"  
Christoph Schäublin, University of Basel; Visiting Member,  
School of Historical Studies, IAS

School of Mathematics

Minimal Submanifolds Seminar: "The Wave Equation for  
Minimal Surface Operators"  
Guest Lecturer: A. Maejda, Courant Institute, New York  
University

Lecture Series: "The Local Langlands' Correspondence: II—  
Lifting; Local Factors"  
Philip C. Kutzko, University of Iowa; Visiting Member, School  
of Mathematics, IAS

*November 29*

School of Mathematics

Topology Seminar: "The Stable Geometric Dimension of Vector  
Bundles over Real Projective Spaces"  
Guest Lecturer: D. Davis, Lehigh University

Joint IAS-Princeton University Seminar on Partial Differential  
Equations and Several Complex Variables: "Value  
Distribution Theory of Entire and Meromorphic Functions"  
Guest Lecturer: Lo Yang, Academia Sinica, Peking, and Cornell  
University

School of Social Science

Seminar: "Metaphors and Symbols"  
Guest Lecturer: Gibson Winter, Princeton Theological Seminary

*November 30*

School of Mathematics

Differential Geometry Seminar: "Stability of the Yang-Mills  
Field"  
Guest Lecturer: H. B. Lawson, State University of New York at  
Stony Brook

General Relativity Seminar: "Introduction to Hawking's  
Approach to Quantum Gravity" (continued)  
Guest Lecturer: Malcolm J. Perry, Princeton University

Differential Geometry Seminar: "Clifford Cohomology"  
Guest Lecturer: M. L. Michaelson, State University of New  
York at Stony Brook

School of Natural Sciences

Theoretical Physics Seminar: "The Color Magnetic Stability of  
Quark Matter"  
John B. Bronzan, Rutgers University; Visitor, School of Natural  
Sciences, IAS

December 3

School of Mathematics

Harish-Chandra Seminar: "Supertempered Distributions on Real Reductive Groups" (continued)

Harish-Chandra, Professor, School of Mathematics, IAS

Cohomology of Arithmetic Groups Seminar: " $L^2$ -harmonic Forms on  $X/\Gamma$ "

Armand Borel, Professor, School of Mathematics, IAS

Affine Differential Geometry Seminar: "Introduction to Affine Geometry" (continued)

Eugenio Calabi, University of Pennsylvania; Visiting Member, School of Mathematics, IAS

School of Natural Sciences

Seminar: "Experimental Tests and Consequences of Supersymmetry"

Glennys R. Farrar, Rutgers University; Visitor, School of Natural Sciences, IAS

December 5

School of Historical Studies

Colloquium in Classical Studies: "Some Problems regarding Roman Tribes"

Giovanni A. Forni, University of Perugia; Visiting Member, School of Historical Studies, IAS

School of Mathematics

General Relativity Seminar: "Presentation of Some of the Basic Facts in Constructive Field Theory" (continued)

Guest Lecturer: B. Simon, Princeton University

Minimal Submanifolds Seminar: "Minimal Spheres and Conformal Variational Problems"

Karen Uhlenbeck, University of Illinois at Chicago Circle; Visiting Member, School of Mathematics, IAS

Lecture Series: "The Local Langlands' Correspondence: III—Exceptional Representations"

Philip C. Kutzko, University of Iowa; Visiting Member, School of Mathematics, IAS

December 6

School of Historical Studies

Art History Colloquium: "Social Themes from the History of Realism: Their Implications and Development"

Gabriel P. Weisberg, Cleveland Museum of Art and Case Western Reserve University; Visiting Member, School of Historical Studies, IAS

School of Mathematics

Joint IAS-Rutgers University Seminar on Hopf Algebras: "Andersen's Proof of Kempf's Vanishing Theorem"

John B. Sullivan, University of Washington; Visiting Member, School of Mathematics, IAS

Topology Seminar: "Knotted Periodic Orbits and Algebraic Knots"

Robert F. Williams, Northwestern University; Visitor, School of Mathematics, IAS

Joint IAS-Princeton University Seminar on Partial Differential Equations and Several Complex Variables: "Applications of the Stability of the Bergman Kernel"

Robert F. Greene, University of California at Los Angeles; Visiting Member, School of Mathematics, IAS

School of Social Science

Seminar: "The Category *Courtisane* in 1865"

Timothy J. Clark, University of Leeds; Visiting Member, School of Social Science, IAS

December 7

School of Historical Studies

Lecture: "New Evidence from the Public Archives of Paphos"  
Guest Lecturer: Ino Nikolaou, Cyprus Museum, Nicosia

School of Mathematics

Differential Geometry: "Survey Lecture" (continued)  
Shing-Tung Yau, Stanford University; Visiting Member, School of Mathematics, IAS

General Relativity Seminar: "How Little Do We Know about 4-Manifolds?" (continued)

Wu-chung Hsiang, Princeton University; Visiting Member, School of Mathematics, IAS

Differential Geometry Seminar: "Laplacian on Singular Spaces" (continued)

Guest Lecturer: J. Cheeger, State University of New York at Stony Brook

December 10

School of Mathematics

Members Seminar: "Einstein Metrics on Kähler Manifolds"  
Thierry E. F. Aubin, University of Paris; Visiting Member, School of Mathematics, IAS

School of Natural Sciences

Seminar: "Quark Lepton Spectrum and CP Non-conservation"  
Varouzhan Baluni, Massachusetts Institute of Technology; Visiting Member, School of Natural Sciences, IAS

December 11

School of Mathematics

Harish-Chandra Seminar: "Supertempered Distributions on Real Reductive Groups" (continued)

Harish-Chandra, Professor, School of Mathematics, IAS

Cohomology of Arithmetic Groups Seminar: " $L^2$ -harmonic Forms on  $X/\Gamma$ " (continued)

Armand Borel, Professor, School of Mathematics, IAS

Affine Differential Geometry Seminar: "Introduction to Affine Geometry" (continued)

Eugenio Calabi, University of Pennsylvania; Visiting Member, School of Mathematics, IAS

*December 12*

School of Historical Studies

Colloquium in Classical Studies: "The Explanation of the Change from Republic to Principate"  
 Juergen Deininger, University of Hamburg; Visiting Member, School of Historical Studies, IAS

School of Mathematics

General Relativity Seminar: "Presentation of Some of the Basic Facts in Constructive Field Theory" (continued)  
 Guest Lecturer: B. Simon, Princeton University

Minimal Submanifolds Seminar: "The Analyticity of the Liquid Edge and Related Free Boundary Problems"  
 David Kinderlehrer, University of Minnesota; Visiting Member, School of Mathematics, IAS

Lecture Series: "The Local Langlands' Correspondence: IV—Conclusion"  
 Philip C. Kutzko, University of Iowa; Visiting Member, School of Mathematics, IAS

*December 13*

School of Mathematics

Joint IAS-Rutgers University Seminar on Hopf Algebras: "Yoneda Extensions for Hopf Algebra Orders"  
 Guest Lecturer: R. G. Larsen, University of Illinois at Chicago Circle

Topology Seminar: "Lin's Theorem, the Segal Conjecture for  $\mathbb{Z}/2\mathbb{Z}$ , and a Stable Version of a Conjecture of Sullivan"  
 Guest Lecturer: M. Mahowald, Northwestern and Princeton Universities

Joint IAS-Princeton University Seminar on Partial Differential Equations and Several Complex Variables: "An Invariant Metric on the Jet Bundle of an Algebraic Manifold"  
 Guest Lecturer: M. Green, University of California at Los Angeles and Harvard University

School of Social Science

Seminar: "Are Counterfactual Questions Unavoidable and Unanswerable?"  
 Geoffrey P. Hawthorn, University of Cambridge; Visiting Member, School of Social Science, IAS

*December 14*

School of Mathematics

Differential Geometry Seminar: "The Variational Problem for Yang-Mills Fields"  
 Karen Uhlenbeck, University of Illinois at Chicago Circle; Visiting Member, School of Mathematics, IAS

General Relativity Seminar: "What Is the Main Problem of Quantum Gravity?"  
 Lee Smolin, Harvard University; Visiting Member, School of Natural Sciences, IAS

Differential Geometry Seminar: "Subharmonic Functions on Complete Riemannian Manifolds"  
 Leon Karp, Princeton University; Visiting Member, School of Mathematics, IAS

School of Natural Sciences

Theoretical Physics Seminar: "Bäcklund Transformations and Continuity Equations for Classical Self-dual Yang-Mills Fields and Chiral Fields"  
 Guest Lecturer: Ling Lie Wang, Brookhaven National Laboratory

*December 17*

School of Historical Studies

Lecture: "Eretria in the Geometric Period"  
 Lilly Kahil, Universities of Fribourg and Paris X; Visitor, School of Historical Studies, IAS

School of Mathematics

Members Seminar: "New Methods in Free Boundary Problems: An Expository Account"  
 David Kinderlehrer, University of Minnesota; Visiting Member, School of Mathematics, IAS

*December 18*

School of Mathematics

Harish-Chandra Seminar: "Supertempered Distributions on Real Reductive Groups" (continued)  
 Harish-Chandra, Professor, School of Mathematics, IAS

Cohomology of Arithmetic Groups Seminar: " $L^2$ -cohomology of  $X/T$ "  
 Armand Borel, Professor, School of Mathematics, IAS

Affine Differential Geometry Seminar: "Introduction to Affine Geometry" (continued)  
 Eugenio Calabi, University of Pennsylvania; Visiting Member, School of Mathematics, IAS

School of Natural Sciences

Seminar: "Partons at Low Transverse Momentum"  
 Guest Lecturer: John Collins, Princeton University

*December 19*

School of Historical Studies

Colloquium in Classical Studies: "The Sovereignty of the Roman People in the Republic"  
 Andrew Alföldi, Professor Emeritus, School of Historical Studies, IAS

School of Mathematics

General Relativity Seminar: "What Is the Main Problem of Quantum Gravity?" (continued)  
 Lee Smolin, Harvard University; Visiting Member, School of Natural Sciences, IAS

Minimal Submanifolds Seminar: "A Review of Isoperimetric Inequalities with Some Applications"  
 Enrico Bombieri, Professor, School of Mathematics, IAS

*December 20*

School of Mathematics

Joint IAS-Rutgers University Seminar on Hopf Algebras:  
 "Andersen's Proof of the Kempf Vanishing Theorem"  
 (continued)

John B. Sullivan, University of Washington; Visiting Member,  
 School of Mathematics, IAS

*December 21*

School of Mathematics

Differential Geometry Seminar: "Extension Theorems for  
 General Gauge Field Theory"

Guest Lecturer: T. Parker, Stanford University

General Relativity Seminar: "What Is the Main Problem of  
 Quantum Gravity?" (continued)

Lee Smolin, Harvard University; Visiting Member, School of  
 Natural Sciences, IAS

Differential Geometry Seminar: "L<sup>2</sup>-cohomology for Complete  
 Riemannian Manifolds"

Guest Lecturer: J. Dodziuk, University of Pennsylvania

*January 8*

School of Mathematics

Cohomology of Arithmetic Groups Seminar: "L<sup>2</sup>-cohomology"  
 (continued)

Armand Borel, Professor, School of Mathematics, IAS

*January 9*

School of Mathematics

Minimal Submanifolds Seminar: "Affine Minimal Surfaces"

Guest Lecturer: C. L. Terng, Princeton University

*January 10*

School of Historical Studies

Art History Colloquium: "Changing Attitudes towards  
 Herculaneum and Pompeii in Neoclassicism"

John Wilton-Ely, University of Hull; Visiting Member, School of  
 Historical Studies, IAS

School of Mathematics

Lecture Series: "Compactification of Symmetric Spaces and  
 Bruhat-Tits Buildings"

Paul Gérardin, University of Paris; Visiting Member, School of  
 Mathematics, IAS

School of Social Science

Seminar: "Transformation and Storage of Scientific Traditions  
 in Literature"

Wolf Lepenies, Free University, Berlin; Visiting Member,  
 School of Social Science, IAS

*January 11*

School of Mathematics

Differential Geometry Seminar: "Hyperbolic Affine Spheres and  
 the Equation

$$\det \left( \frac{\delta^2 u}{\delta x_i \delta x_j} \right) = \left( \frac{-1}{u} \right)^{n+2},,$$

Guest Lecturer: S. Y. Cheng, Princeton University



General Relativity Seminar: "The Positive Mass Conjecture in General Relativity"

Richard M. Schoen, Courant Institute, New York University; Visiting Member, School of Mathematics, IAS

Differential Geometry Seminar: "The Classical Isoperimetric Inequality and Its Relation to Algebraic Geometry"

Guest Lecturer: F. Teissier, École Polytechnique, Paris, and Harvard University

January 14

School of Mathematics

Members Seminar: "The  $\bar{\delta}$ -Neumann Problem: An Expository Talk"

Nancy K. Stanton, Columbia University; Visiting Member, School of Mathematics, IAS

January 15

School of Mathematics

Harish-Chandra Seminar: "Supertempered Distributions on Real Reductive Groups" (continued)

Harish-Chandra, Professor, School of Mathematics, IAS

Cohomology of Arithmetic Groups Seminar: " $L^2$ -cohomology" (continued)

Armand Borel, Professor, School of Mathematics, IAS

Joint IAS-Princeton University Seminar on Partial Differential Equations and Several Complex Variables: "Boundary Values of Pluriharmonic Functions"

Paolo de Bartolomeis, University of Florence; Visiting Member, School of Mathematics, IAS

January 16

School of Mathematics

Minimal Submanifolds Seminar: "Stable Minimal Hypersurfaces in Riemannian Manifolds"

Leon Simon, University of Minnesota; Visiting Member, School of Mathematics, IAS

January 17

School of Mathematics

Joint IAS-Rutgers University Seminar on Hopf Algebras:

"Coverings and Hyperalgebras of Affine Algebraic Groups"

Mitsuhiro Takeuchi, University of Tsukuba; Visiting Member, School of Mathematics, IAS

Topology Seminar: "Compact Complex Symmetric Spaces"

Armand Borel, Professor, School of Mathematics, IAS

Lecture Series: "Compactification of Symmetric Spaces and Bruhat-Tits Buildings" (continued)

Paul Gérardin, University of Paris; Visiting Member, School of Mathematics, IAS

School of Social Science

Seminar: "Blaming Public Officials: The Problem of Many Hands"

Dennis F. Thompson, Princeton University; Visitor, School of Social Science, IAS

*January 18*  
School of Mathematics

Differential Geometry Seminar: "Minimal Surfaces in Hyperbolic 3-Manifolds"

Karen Uhlenbeck, University of Illinois at Chicago Circle; Visiting Member, School of Mathematics, IAS

General Relativity Seminar: "The Positive Mass Conjecture in General Relativity" (continued)

Richard M. Schoen, Courant Institute, New York University; Visiting Member, School of Mathematics, IAS

Differential Geometry Seminar: "A Note on Exterior Differential Systems"

Guest Lecturer: S. S. Chern, University of California at Berkeley

School of Natural Sciences

Theoretical Physics Seminar: "Quaternionic Chromodynamics as a Theory of Composite Quarks and Leptons"

Stephen L. Adler, Professor, School of Natural Sciences, IAS

*January 22*  
School of Mathematics

Harish-Chandra Seminar: "Supertempered Distributions on Real Reductive Groups" (continued)

Harish-Chandra, Professor, School of Mathematics, IAS

Cohomology of Arithmetic Groups Seminar: "Spectral Sequences: Growth Conditions"

Armand Borel, Professor, School of Mathematics, IAS

*January 23*  
School of Mathematics

Minimal Submanifolds Seminar: "Computing F-Minimal Surfaces"

Guest Lecturer: J. Taylor, Rutgers University

*January 24*  
School of Mathematics

Joint IAS-Rutgers University Seminar on Hopf Algebras: "Coverings and Hyperalgebras of Affine Algebraic Groups" (continued)

Mitsuhiro Takeuchi, University of Tsukuba; Visiting Member, School of Mathematics, IAS

Topology Seminar: "Browder's Result on the Kervaire Invariant"

Jean E. Lannes, University of Nancy; Visiting Member, School of Mathematics, IAS

Lecture Series: "Compactification of Symmetric Spaces and Bruhat-Tits Buildings" (continued)

Paul Gérardin, University of Paris; Visiting Member, School of Mathematics, IAS

School of Social Science

Seminar: "The Ambiguous Heritage of the French Restoration: The Distant Consequences of the Revolution and the Daily Realities of the Empire"  
 Alan B. Spitzer, University of Iowa; Visiting Member, School of Historical Studies, IAS

*January 25*

School of Mathematics

Differential Geometry Seminar: "On Equivalence Problems for Exterior Differential Systems"  
 Robert L. Bryant, University of North Carolina; Visiting Member, School of Mathematics, IAS

General Relativity Seminar: "Proof of the Positive Action Conjecture"  
 Richard M. Schoen, Courant Institute, New York University; Visiting Member, School of Mathematics, IAS

Differential Geometry Seminar: "Stability and Self-duality of Yang-Mills Fields"  
 Jean Pierre Bourguignon, University of Paris; Visiting Member, School of Mathematics, IAS

School of Natural Sciences

Theoretical Physics Seminar: "Instantons, Critical Phenomena and the Renormalized Strong Coupling Expansion"  
 Guest Lecturer: Fred Cooper, Los Alamos Scientific Laboratory

*January 28*

School of Mathematics

Special Lecture: "Stable Minimal Submanifolds"  
 Guest Lecturer: Do Carmo, University of California at Berkeley

Members Seminar: "Self-duality and Isolated Singularities of Solutions of the Euclidean Yang-Mills Equations"  
 Basilis Gidas, Rockefeller University; Visiting Member, School of Mathematics, IAS

School of Natural Sciences

Seminar: "The Phase Structure of QCD<sub>2</sub>"  
 Varouzhan Baluni, Massachusetts Institute of Technology; Visiting Member, School of Natural Sciences, IAS

*January 29*

School of Mathematics

Cohomology of Arithmetic Groups Seminar: "Cohomology and Growth Conditions"  
 Armand Borel, Professor, School of Mathematics, IAS

Joint IAS-Princeton University Seminar on Partial Differential Equations and Several Complex Variables: "Hans Lewy Extendability and the Singular Spectrum"  
 Geraldine A. Taiani, University of Florence; Visiting Member, School of Mathematics, IAS

*January 30*

School of Historical Studies

Colloquium in Classical Studies: "The Libraries of Ancient Athens"

Homer A. Thompson, Professor Emeritus, School of Historical Studies, IAS

School of Mathematics

Minimal Submanifolds Seminar: "Minimal Varieties Defined by Closed Forms"

Guest Lecturer: H. B. Lawson, State University of New York at Stony Brook

January 31

School of Mathematics

Joint IAS-Rutgers University Seminar on Hopf Algebras: "Coverings and Hyperalgebras of Affine Algebraic Groups" (continued)

Mitsuhiro Takeuchi, University of Tsukuba; Visiting Member, School of Mathematics, IAS

Topology Seminar: "Algebraic Classification of Linking Pairings on 3-Manifolds"

Akio Kawachi, Osaka City University; Visiting Member, School of Mathematics, IAS

Lecture Series: "Compactification of Symmetric Spaces and Bruhat-Tits Buildings" (concluded)

Paul Gérardin, University of Paris; Visiting Member, School of Mathematics, IAS

School of Social Science

Seminar: "Historical Ends and Endings"

Randolph Starn, University of California at Berkeley; Visiting Member, School of Historical Studies, IAS

February 1

School of Mathematics

Differential Geometry Seminar: "Symmetry and Isolated Singularities for Conformally Flat Metrics and Yang-Mills Connections"

Basilis Gidas, Rockefeller University; Visiting Member, School of Mathematics, IAS

General Relativity Seminar: "Mathematical Problems in Numerical Relativity"

Tsvi Piran, University of Texas; Visiting Member, School of Natural Sciences, IAS

Differential Geometry Seminar: "Metrics with Prescribed Ricci Curvature"

Guest Lecturer: D. DeTurck, University of Pennsylvania

February 4

School of Natural Sciences

Seminar: "Problems in Quantum Gravity"

Alan S. Lapedes, University of Cambridge; Visiting Member, School of Natural Sciences, IAS

February 5

School of Mathematics

Cohomology of Arithmetic Groups Seminar: "Laplacians on  $G/\Gamma$  and Discrete Spectrum"

Armand Borel, Professor, School of Mathematics, IAS

## 94 Record of Events

*February 6*

School of Historical Studies

Colloquium in Classical Studies: "Thracian Art of the Classical Period"  
Ann Farkas, Brooklyn College; Visiting Member, School of Historical Studies, IAS

School of Mathematics

Minimal Submanifolds Seminar: "Can the Free Boundary of an Area Minimizing Minimal Surface Possess a Singularity, Say, a Cusp?"  
Stefan O. W. Hildebrandt, University of Bonn; Visiting Member, School of Mathematics, IAS

*February 7*

School of Mathematics

Joint IAS-Rutgers University Seminar on Hopf Algebras: "Hopf Algebras with a Projection"  
Guest Lecturer: David Radford, Rutgers University

Topology Seminar: "An Exotic Free Involution on  $S^4$ "  
Ronald A. Fintushel, Tulane University; Visiting Member, School of Mathematics, IAS

School of Social Science

Seminar: "Peasant Tricks and Landlord Control in the Bolognese Countryside"  
Carlo Poni, University of Bologna; Visiting Member, School of Social Science, IAS

*February 8*

School of Mathematics

Differential Geometry Seminar: "Liouville Theorems for Non-linear Elliptic Systems, and an Approach to Bernstein- and Jörgens-Type Theorems"

Stefan O. W. Hildebrandt, University of Bonn; Visiting Member, School of Mathematics, IAS

General Relativity Seminar: "The Nonlinear Graviton Construction of Penrose, I"

Raymond O. Wells, Jr., Rice University; Visiting Member, School of Mathematics, IAS

Differential Geometry Seminar: "The Volume of a Blaschke Manifold"

Guest Lecturer: C. T. Yang, University of Pennsylvania

*February 11*

School of Mathematics

Members Seminar: "Logarithmic Sobolev Inequalities"  
Oscar S. Rothaus, Cornell University; Visiting Member, School of Mathematics, IAS

School of Natural Sciences

Seminar: "U(N) Integrals,  $1/N$  and the De Wit-'t Hooft Anomalies"

Stuart A. Samuel, University of California at Berkeley; Visiting Member, School of Natural Sciences, IAS

February 12

School of Mathematics

Cohomology of Arithmetic Groups Seminar: "Laplacians on G/T and Discrete Spectrum" (continued)  
Armand Borel, Professor, School of Mathematics, IAS

Joint IAS-Princeton University Seminar on Partial Differential Equations and Several Complex Variables: "Relative de Rham Complexes and a Holomorphic Generalization of the Radon Transform"  
Raymond O. Wells, Jr., Rice University; Visiting Member, School of Mathematics, IAS

February 13

School of Historical Studies

Colloquium in Classical Studies: "Posidonius and Seneca: A Problem of Evidence. Seneca, Ep. 87. 31-40 = Posidonius F170EK"  
Ian G. Kidd, University of St. Andrews; Visiting Member, School of Historical Studies, IAS

School of Mathematics

Minimal Submanifolds Seminar: "Mod p Surfaces in Variational Problems"  
Guest Lecturer: B. White, Princeton University

February 14

School of Historical Studies

Art History Colloquium: "Monet, Narcissus, and Self-reflection"  
Steven Z. Levine, Bryn Mawr College; Visiting Member, School of Historical Studies, IAS

School of Mathematics

Joint IAS-Rutgers University Seminar on Hopf Algebras: "The Cofree Irreducible Hopf Algebra of a Commutative Algebra of Characteristic p"  
Guest Lecturer: David Radford, Rutgers University

Topology Seminar: "Localized Stable Homotopy of Algebraic Integers"  
Guest Lecturer: V. Snaith, Princeton University and University of Western Ontario

School of Social Science

Seminar: "The Question of the 'Subject' in the Study of the Meaning of Cultural Production"  
Jacques Leenhardt, École des Hautes Études en Sciences Sociales; Visiting Member, School of Social Science, IAS

February 15

School of Mathematics

Differential Geometry Seminar: "Vortex Phenomena"  
Guest Lecturer: M. S. Berger, University of Massachusetts

General Relativity Seminar: "The Nonlinear Graviton Construction of Penrose, II"  
Raymond O. Wells, Jr., Rice University; Visiting Member, School of Mathematics, IAS

- Differential Geometry Seminar: "Constant Mean Curvature Hypersurfaces in Minkowski Space"  
Guest Lecturer: A. Treiberg, University of Pennsylvania
- School of Natural Sciences      Theoretical Physics Seminar: "Dynamical Breaking of Weak Interaction Symmetries"  
Guest Lecturer: Estia Eichten, Harvard University
- February 18*  
School of Mathematics      Members Seminar: "Invariant Elliptic Operators on Homogeneous Spaces"  
Henri Moscovici, INCREST, Bucharest; Visiting Member, School of Mathematics, IAS
- School of Natural Sciences      Seminar: "An Operator Approach to Weighted Cross Sections"  
F. Robert Ore, Jr., Massachusetts Institute of Technology; Visiting Member, School of Natural Sciences, IAS
- February 19*  
School of Mathematics      Cohomology of Arithmetic Groups Seminar: "Some Cycles Coming from the Boundary"  
Guest Lecturer: A. Ash, Columbia University
- February 20*  
School of Historical Studies      Colloquium in Classical Studies: "Recent Excavations in Tamassos, Cyprus"  
Hans-Günther Buchholz, University of Giessen; Visiting Member, School of Historical Studies, IAS
- School of Mathematics      Minimal Submanifolds Seminar: "Multiple-valued Functions, Minimizing Dirichlet's Integral and the Regularity of Mass Minimizing Integral Currents"  
Guest Lecturer: F. J. Almgren, Princeton University
- Special Lecture: "Complex Analyticity of Harmonic Maps"  
Guest Lecturer: Y. T. Siu, Stanford University
- February 21*  
School of Mathematics      Joint IAS-Rutgers University Seminar on Hopf Algebras: "The Cofree Irreducible Hopf Algebra of a Commutative Algebra of Characteristic  $p$ "  
Guest Lecturer: David Radford, Rutgers University
- Topology Seminar: "Highly Connected Embeddings in Codimension 2"  
Guest Lecturer: S. Szczepanski, Rutgers University
- Special Lecture: "Kuznetsov's Proof of the Ramanujan-Petersson Conjecture for Modular Forms of Weight Zero"  
Constantin Sevici, University of Michigan; Visiting Member, School of Mathematics, IAS
- School of Social Science      Seminar: "Historical Backwardness and Artistic Excellence"



Robert Schwarz, University of Campinas; Visiting Member,  
School of Social Science, IAS

February 22  
School of Mathematics

Differential Geometry Seminar: "Complex Analyticity of  
Harmonic Maps" (continued)  
Guest Lecturer: Y. T. Siu, Stanford University

General Relativity Seminar: "Causally Disconnecting Sets,  
Maximal Geodesics and Nonspacelike Geodesic  
Incompleteness of Strongly Causal Space-Times"  
Paul E. Ehrlich, University of Missouri; Visiting Member,  
School of Mathematics, IAS

Differential Geometry Seminar: "Isoperimetric Inequality  
Involving Injectivity Radius Application to Wiedersehen  
Manifolds"  
Guest Lecturer: J. Kazdan, University of Pennsylvania

February 25  
School of Mathematics

Members Seminar: "Non-vanishing of L-functions of Elliptic  
Curves"  
David E. Rohrlich, Harvard University; Visiting Member,  
School of Mathematics, IAS

February 26  
School of Mathematics

Cohomology of Arithmetic Groups Seminar: "Theta Series and  
 $L^2$ -harmonic Forms for  $SU(p, q)$  ( $Z[i]$ )"  
Guest Lecturer: N. Wallach, Rutgers University

Joint IAS-Princeton University Seminar on Partial Differential  
Equations and Several Complex Variables: "On Higher Order  
Schwarz Lemma"  
Guest Lecturer: Qui-Keng Lu, Academia Sinica, Peking

February 27  
School of Historical Studies

Colloquium in Classical Studies: "Some Remarks on Virgil's  
Syntax"  
Woldemar E. H. Görler, University of Heidelberg; Visiting  
Member, School of Historical Studies, IAS

School of Mathematics

Minimal Submanifolds Seminar: "Multiple-valued Functions,  
Minimizing Dirichlet's Integral and the Regularity of Mass  
Minimizing Integral Currents" (continued)  
Guest Lecturer: F. J. Almgren, Princeton University

February 28  
School of Mathematics

Joint IAS-Rutgers University Seminar on Hopf Algebras: "The  
Cofree Irreducible Hopf Algebra of a Commutative Algebra  
of Characteristic  $p$ " (continued)  
Guest Lecturer: David Radford, Rutgers University

Topology Seminar: "Topological Affine and Isometric Actions on Flat Riemannian Manifolds"

Frank Raymond, University of Michigan; Visiting Member, School of Mathematics, IAS

Lecture Series: "Kuznetsov's Proof of the Ramanujan-Petersson Conjecture for Modular Forms of Weight Zero" (continued)

Constantin Sevici, University of Michigan; Visiting Member, School of Mathematics, IAS

School of Social Science

Seminar: "The F.B.I. and Dr. King"

David J. Garrow, Duke University; Assistant to Professor Clifford Geertz, School of Social Science, IAS

*February 29*

School of Mathematics

Differential Geometry Seminar: "Monge-Ampère Equations Applied to Linear and Quasi-linear Equations"

Guest Lecturer: I. Bakelman, University of Minnesota

General Relativity Seminar: "What Is an Expanding Universe, and Why Isn't It?"

Irving E. Segal, Massachusetts Institute of Technology; Visiting Member, School of Mathematics, IAS

Differential Geometry Seminar: "Existence of Periodic Motions of Conservative Systems"

Guest Lecturer: H. Gluck, University of Pennsylvania

School of Natural Sciences

Theoretical Physics Seminar: "Quantum Mechanics of Heavy Bound States"

Guest Lecturer: Chris Quigg, Fermi National Accelerator Laboratory

*March 3*

School of Mathematics

Hermann Weyl Lecture Series: "Topological and Variational Methods in Nonlinear Problems"

Louis Nirenberg, Courant Institute, New York University; Visitor, School of Mathematics, IAS

School of Natural Sciences

Seminar: "Isospin Violation in the Strong Interactions"

Paul G. Langacker, University of Pennsylvania; Visitor, School of Natural Sciences, IAS

*March 4*

School of Mathematics

Cohomology of Arithmetic Groups Seminar: "Poincaré Dual of Some Arithmetic Cycles"

John S.-P. Wang, Purdue University; Visiting Member, School of Mathematics, IAS

*March 5*

School of Historical Studies

Colloquium in Classical Studies: "The Demosion Sema: Athens' State Cemetery in the Classical Period"

Guest Lecturer: Christoph Clairmont, Rutgers University

- School of Mathematics  
Minimal Submanifolds Seminar: "Are Harmonically Immersed Surfaces at All Like Minimally Immersed Surfaces?"  
Guest Lecturer: T. Milnor, Rutgers University
- March 6*  
School of Historical Studies  
Art History Colloquium: "The Disintegration of Styles"  
Timothy J. Clark, University of Leeds; Visiting Member, School of Social Science, IAS
- School of Mathematics  
Joint IAS-Rutgers University Seminar on Hopf Algebras: "On the Existence of Divided Powers"  
Guest Lecturer: K. Newman, University of Massachusetts
- Topology Seminar: "The Geometry of Representations of Finite Groups"  
Guest Lecturer: S. Cappell, Courant Institute, New York University
- Special Lecture: "The Existence of Initial Data for Asymptotically Flat Spacetime"  
Guest Lecturer: M. Cantor, University of Texas
- School of Social Science  
Seminar: "The Mechanics of Power in North Lebanon"  
Michael Gilson, University College, London; Visiting Member, School of Social Science, IAS
- March 7*  
School of Mathematics  
Differential Geometry Seminar: "Complete Positively Curved Manifolds with Large Diameter"  
Guest Lecturer: D. Gromoll, State University of New York at Stony Brook
- General Relativity Seminar: "Some Problems in Classical General Relativity"  
Roger Penrose, University of Oxford; Visitor, School of Mathematics, IAS
- Differential Geometry Seminar: "Parallel Yang-Mills Field"  
Guest Lecturer: C. H. Gu, State University of New York at Stony Brook
- March 10*  
School of Mathematics  
Special Topology Seminar: "Graph Links and Morse-Smale Flows"  
Guest Lecturer: W. Neumann, University of Maryland
- Hermann Weyl Lecture Series: "Topological and Variational Methods in Nonlinear Problems" (continued)  
Louis Nirenberg, Courant Institute, New York University; Visitor, School of Mathematics, IAS
- School of Natural Sciences  
Seminar: "QCD and Instantons at Finite Temperature"  
Guest Lecturer: Laurence G. Yaffe, Princeton University

## 100 Record of Events

*March 11*

School of Mathematics

Special General Relativity Seminar: "Quantization on a Differentiable Manifold"  
Guest Lecturer: M. Nouri-Moghadam, Princeton University

Cohomology of Arithmetic Groups Seminar: "Cohomology of the Boundary and Eisenstein Series"  
Armand Borel, Professor, School of Mathematics, IAS

Joint IAS-Princeton University Seminar on Partial Differential Equations and Several Complex Variables: "Value Distribution of Quasi-regular Mappings"  
Seppo U. Rickman, University of Helsinki; Visiting Member, School of Mathematics, IAS

*March 12*

School of Historical Studies

Colloquium in Classical Studies: "Cicero in 54 B.C."  
Elzbieta Olechowska, Vancouver, British Columbia; Visiting Member, School of Historical Studies, IAS

School of Mathematics

Minimal Submanifolds Seminar: "Necessary Conditions for Submanifolds with Prescribed Mean Curvature Vector"  
Robert D. Gulliver II, University of Minnesota; Visiting Member, School of Mathematics, IAS

*March 13*

School of Mathematics

Joint IAS-Rutgers University Seminar on Hopf Algebras: "Sufficient Conditions for a One-sided Hopf Algebra to Be a Hopf Algebra"  
Guest Lecturer: E. J. Taft, Rutgers University

Topology Seminar: "Quillen's Dimension Theorem for Finite Hopf Algebras"  
Clarence W. Wilkerson, Jr., Wayne State University; Visiting Member, School of Mathematics, IAS

School of Social Science

Seminar: "Fantasy and National Cultural Identity in West Indian Society"  
John O. Stewart, University of Illinois; Visiting Member, School of Social Science, IAS

*March 14*

School of Mathematics

Differential Geometry Seminar: "Local Isometric Embeddings and Deformations"  
Guest Lecturer: H. Jacobowitz, Rutgers University at Camden

General Relativity Seminar: "Gravitational Radiation and Complex Manifolds"  
Roger Penrose, University of Oxford; Visitor, School of Mathematics, IAS

Differential Geometry Seminar: "On the Existence of Short Closed Geodesics and Their Stability Properties"  
Guest Lecturer: W. Ziller, University of Pennsylvania

- School of Natural Sciences      Theoretical Physics Seminar: "Minkowski Space Approach to the Large  $N$  Limit"  
Guest Lecturer: Herbie Levine, Harvard University
- March 17*  
School of Mathematics      Members Seminar: "Groups of Möbius Transformations Generated by Two-parabolics"  
Robert F. Riley, University of Southampton; Visiting Member, School of Mathematics, IAS
- School of Natural Sciences      Seminar: "Vacuum Phase Transition in the Early Universe—Why Black Holes Are Worse Than Monopoles"  
James M. Bardeen, University of Washington; Visiting Member, School of Natural Sciences, IAS
- March 19*  
School of Historical Studies      Colloquium in Classical Studies: "The Influence of Slavery on the Attitudes and Mentality of the Free in Antiquity"  
Izabela Biezuńska-Małowist, University of Warsaw; Visiting Member, School of Historical Studies, IAS
- School of Mathematics      Minimal Submanifolds Seminar: "On the Structure of the Family of Minimal Submanifolds of a Sphere"  
Guest Lecturer: W. K. Allard, Duke University
- March 20*  
School of Mathematics      Joint IAS-Rutgers University Seminar on Hopf Algebras: "Construction of One-sided Hopf Algebras Which Are Not Hopf Algebras"  
Guest Lecturer: E. J. Taft, Rutgers University
- Topology Seminar: "On the Nielsen Type and the Classification for the Mapping Class Group"  
Jane P. Gilman, Rutgers University at Newark; Visiting Member, School of Mathematics, IAS
- School of Social Science      Seminar: "King Henry II of England and the Holy Land"  
Hans Eberhard Mayer, University of Kiel; Visiting Member, School of Historical Studies, IAS
- March 21*  
School of Mathematics      Differential Geometry Seminar: "Open Problems in Differential Geometry"  
Shing-Tung Yau, Stanford University; Visiting Member, School of Mathematics, IAS
- General Relativity Seminar: "Introduction to Supergravity"  
Warren D. Siegel, Harvard University; Visiting Member, School of Natural Sciences, IAS
- Differential Geometry Seminar: "Convexity Properties and A Priori Estimates for Solutions of Semi-linear Equations"  
Joel Spruck, University of Minnesota and Brooklyn College; Visitor, School of Mathematics, IAS

## 102 Record of Events

March 24

School of Mathematics

Members Seminar: "Automorphic Functions: Fourier Analysis and Ergodic Approaches"  
Leon Ehrenpreis, Yeshiva University; Visiting Member, School of Mathematics, IAS

School of Natural Sciences

Theoretical Physics Seminar: "Classical and Quantum Mechanics of Generally Covariant Systems"  
Claudio Teitelboim, Princeton University; Long-term Member, School of Natural Sciences, IAS

March 26

School of Historical Studies

Colloquium in Classical Studies: "Clothing and Nudity in Ancient Art"  
Larissa Bonfante, New York University; Visiting Member, School of Historical Studies, IAS

School of Mathematics

Minimal Submanifolds Seminar: "Size and Shape Estimates for Capillary Surfaces"  
Guest Lecturer: R. Finn, Stanford University

General Relativity Seminar: "Mathematical Cosmology: Space-Time Geometries and Wave Equations"  
Irving E. Segal, Massachusetts Institute of Technology; Visiting Member, School of Mathematics, IAS

Differential Geometry Seminar: "The Nonlinear Evolution Equation and the Backlund Transformation in Physics"  
Yee-Chun Lee, University of California at Los Angeles; Visiting Member, School of Natural Sciences, IAS

March 27

School of Mathematics

Joint IAS-Rutgers University Seminar on Hopf Algebras: "Relative Brauer Groups and Descent Coalgebras"  
Mitsuhiro Takeuchi, University of Tsukuba; Visiting Member, School of Mathematics, IAS

Topology Seminar: "Computing  $H_2$  for the Mapping Class Group of a Closed Oriented Surface"  
Guest Lecturer: J. Harer, Columbia University

School of Social Science

Seminar: "Sensationalism and Faulkner's *Sanctuary*: Literary and Social Reading"  
John Orr, University of Edinburgh; Visitor, School of Social Science, IAS

March 28

School of Mathematics

Differential Geometry Seminar: "Harmonic Curvature and Einstein Metrics"  
Jean Pierre Bourguignon, University of Paris; Visiting Member, School of Mathematics, IAS

General Relativity Seminar: "Black Hole Uniqueness Theorems"

Alan S. Lapedes, University of Cambridge; Visiting Member,  
School of Natural Sciences, IAS

Differential Geometry Seminar: "Some Discrete Properties of  
the Minimal Hypersurfaces in the Sphere"

Chia-Kuei Peng, University of California at Berkeley; Visiting  
Member, School of Mathematics, IAS

School of Natural Sciences

Theoretical Physics Seminar: "Proper Time Approach to  
Quantum Gravity"

Claudio Teitelboim, Princeton University; Long-term Member,  
School of Natural Sciences, IAS

March 31

School of Mathematics

Members Seminar: "Double Covers of  $\mathbb{P}^3$  and Intermediate  
Jacobians"

Robert Varley, Jr., University of Utah; Visiting Member, School  
of Mathematics, IAS

School of Natural Sciences

Theoretical Physics Seminar: "Regge Calculus and  
Observations"

Guest Lecturer: Ruth Williams, University of Cambridge

Theoretical Physics Seminar: "Renormalization by Computer"

Guest Lecturer: Stephen Shenker, University of Chicago

April 2

School of Mathematics

General Relativity Seminar: "Statistical Cosmology:  
Observations vs. Predictions"

Irving E. Segal, Massachusetts Institute of Technology; Visiting  
Member, School of Mathematics, IAS

General Relativity Seminar: "Physical Cosmology: Quasi-  
statistical Phenomena and Theoretical Analysis"

Irving E. Segal, Massachusetts Institute of Technology; Visiting  
Member, School of Mathematics, IAS

April 3

School of Historical Studies

Art History Colloquium: "Versailles As a National Monument:  
The Political Implications of the Galeries Historiques de  
Versailles by Louis-Philippe"

Thomas W. Gaehtgens, University of Göttingen; Visiting  
Member, School of Historical Studies, IAS

School of Mathematics

Joint IAS-Rutgers University Seminar on Hopf Algebras:  
"Quasi-affine Homogeneous Spaces"

John B. Sullivan, University of Washington; Visiting Member,  
School of Mathematics, IAS

Topology Seminar: "Poincaré-Hopf Type Theorem for the  
de Rham Invariant"

Guest Lecturer: D. Chess, Princeton University



## 104 Record of Events

School of Social Science

Seminar: "Ut Pictura, Ita Visio: Some Cultural Contexts for Dutch Art"  
Svetlana Alpers, University of California at Berkeley; Visiting Member, School of Social Science, IAS

April 4

School of Natural Sciences

Theoretical Physics Seminar: "Proper Time Approach to Quantum Supergravity"  
Claudio Teitelboim, Princeton University; Long-term Member, School of Natural Sciences, IAS

April 7

School of Natural Sciences

Seminar: "Instabilities in Quantum Gravity"  
Guest Lecturer: Malcolm J. Perry, Princeton University

April 10

School of Mathematics

Topology Seminar: "Automorphisms and Mapping Class Groups of Seifert Manifolds"  
Frank Raymond, University of Michigan; Visiting Member, School of Mathematics, IAS

School of Social Science

Seminar: "On the Ideological Origins of the French Revolution"  
Keith M. Baker, University of Chicago; Visiting Member, School of Social Science, IAS

April 12

School of Natural Sciences

Theoretical Physics Seminar: "String States in QCD"  
Guest Lecturer: André Neveu, École Normale Supérieure, Paris

April 16

School of Mathematics

Topology Seminar: "Upper Semicontinuous Decomposition Spaces Having Arbitrarily Small Neighborhoods with 2-sphere Boundaries"  
Edythe P. Woodruff, Trenton State College; Visitor, School of Mathematics, IAS

April 17

School of Social Science

Seminar: "Enthusiasm and Melancholy: From a Medical Tradition to Religious Controversy"  
Michael Heyd, Hebrew University; Visiting Member, School of Historical Studies, IAS

April 21

School of Natural Sciences

Seminar: "Quantized Field Theory of Composite Particles"  
Guest Lecturer: He Zuo-hsiu, Academia Sinica, Peking

April 22

School of Natural Sciences

Theoretical Physics Seminar: "Gauge Theory of Gravity"  
Guest Lecturer: Gou Han-Ying, Academia Sinica, Peking

April 24

School of Mathematics

Joint IAS-Rutgers University Seminar on Hopf Algebras:  
"Divided Power Coalgebras, Witt Algebras and Embedding

## Theorems"

Guest Lecturer: R. L. Wilson, Rutgers University

## Topology Seminar: "Spherical Space Forms in the Period Dimension"

Guest Lecturer: I. Madsen, Princeton University and University of Aarhus

School of Social Science

## Seminar: "The Historicity of Fiction and the Fictionality of History"

Reinhard Kuhn, Brown University; Visiting Member, School of Historical Studies, IAS

April 25

School of Natural Sciences

Theoretical Physics Seminar: "Radiative Corrections in the  $SU(2)_L \times U(1)$  Theory"

Alberto Sirlin, New York University; Visitor, School of Natural Sciences, IAS

April 28

School of Natural Sciences

## Seminar: "Renormalization of Interacting Fields in Curved Spacetime"

Guest Lecturer: J. G. Taylor, King's College, University of London

School of Mathematics

## Joint IAS-Princeton University Seminar on Partial Differential Equations and Several Complex Variables: "Maximum Modulus Sets"

Guest Lecturer: E. L. Stout, University of Washington

May 1

School of Mathematics

## Joint IAS-Rutgers University Seminar on Hopf Algebras: "Divided Power Coalgebras, Witt Algebras and Embedding Theorems" (continued)

Guest Lecturer: R. L. Wilson, Rutgers University

School of Social Science

## Seminar: "Collective Loyalties and Collective Violence in France Since the Seventeenth Century"

William H. Sewell, Jr., Long-term Member, School of Social Science, IAS

May 2

School of Natural Sciences

## Theoretical Physics Seminar: "Dynamical Symmetry Breaking"

Guest Lecturer: Heinz Pagels, Rockefeller University

May 5

School of Mathematics

Special Lecture: "A Construction of a Simple Group of Order  $2^{46} \cdot 3^{20} \cdot 5^9 \cdot 7^6 \cdot 11^2 \cdot 13^3 \cdot 17 \cdot 19 \cdot 23 \cdot 29 \cdot 31 \cdot 41 \cdot 47 \cdot 59 \cdot 71$ "

Robert L. Griess, Jr., University of Michigan; Visiting Member, School of Mathematics, IAS

School of Natural Sciences

## Seminar: "Hadronic Bremsstrahlung"

Guest Lecturer: J. C. Collins, Princeton University

School of Natural Sciences

Seminar: "Gauge Field Model of Induced Classical Gravity"  
Emil Mottola, Columbia University; Visiting Member, School of  
Natural Sciences, IAS

In addition, the following events of interest to the Institute community were presented during the academic year:

*October 2*

Archaeological Institute of America Lecture: "Greek and Persian Sites in the Nile Delta"  
Guest Lecturer: Bernard V. Bothmer, Brooklyn Museum

*November 6*

Archaeological Institute of America Lecture: "The Beginnings of the Greek Theatre and What  
Happened after That"  
Guest Lecturer: Elizabeth Gebhard, University of Illinois at  
Chicago Circle

*December 4*

Archaeological Institute of America Lecture: "Ancient Glass before Glass Blowing"  
Guest Lecturer: Susan H. Auth, Newark Museum

*December 12*

Princeton Chapter of Sigma Xi Seminar: "The CO<sub>2</sub> in the Atmosphere"  
Freeman J. Dyson, Professor, School of Natural Sciences, IAS

*February 5*

Archaeological Institute of America Lecture: "Anemuriu, a Roman City on Turkey's Southern  
Shore"  
Guest Lecturer: E. Hector Williams, University of British  
Columbia

*March 4*

Archaeological Institute of America Lecture: "Ceremonialism at Batan Grande on the North Coast  
of Peru"  
Guest Lecturer: Isumi Shimada, Princeton University

*April 8*

Archaeological Institute of America Lecture: "Art in the Aegean Bronze Age"  
Guest Lecturer: Günter Kopke, Institute of Fine Arts, New  
York University

---

## Report of the Treasurer

The market value of the Institute's endowment totalled \$82,724,545 on June 30, 1980. This represents an increase of \$14,306,626 or 21 percent over the comparable total for June 30, 1979.

During the fiscal year, total operating expenditures were \$7,417,765. After applying \$2,031,276 in special purpose gifts and grants against these expenditures, the Institute was required to provide \$5,386,489 from endowment resources. This represents approximately 7.1 percent of the average of the endowment market values at June 30, 1980, and June 30, 1979, as compared to 7.9 percent of the comparable endowment totals for fiscal year 1979.

The performance of the Institute's portfolio

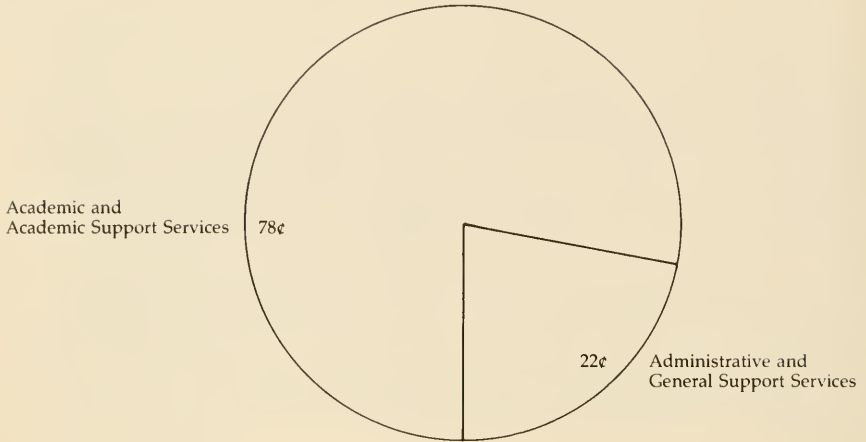
is measured annually by Hamilton, Johnston & Co., Inc. Over the six-year period ending June 30, 1980, dividend and interest income and net realized and unrealized gains combined for a total average annual rate of return on Institute investments of 17.6 percent. Over the past three years, the average annual rate of return was 19.7 percent. For fiscal 1980, the annual rate of return was 30.6 percent.

The financial statements of the Institute for Advanced Study are audited by Deloitte Has-kins + Sells. The auditors' opinion letter and statements for the fiscal year ended June 30, 1980, follow this report.

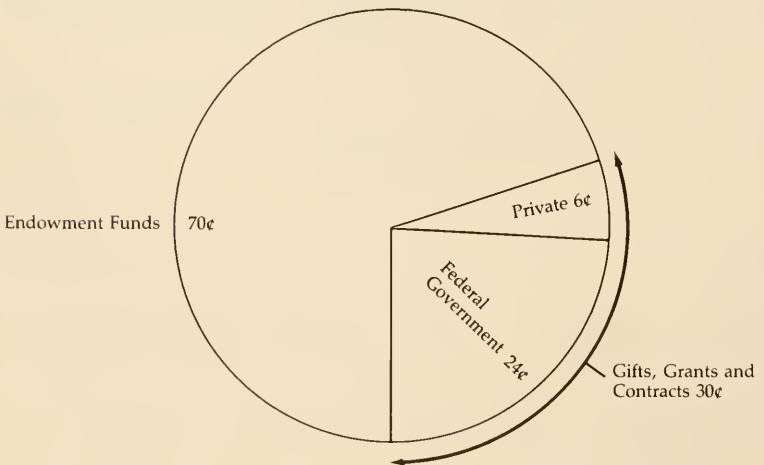
Ralph E. Hansmann  
*Treasurer*

### Operations

The Institute Expense Dollar  
Fiscal Year 1980



The Institute Income Dollar  
Fiscal Year 1980



**Deloitte  
Haskins + Sells**

111 Madison Avenue  
Morristown, New Jersey 07960  
(201) 540-0940  
Cable DEHANDS

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

September 18, 1980

Dear Sirs:

We have examined the financial statements of the Institute for Advanced Study - Louis Bamberger and Mrs. Felix Fuld Foundation as of June 30, 1980 and for the year then ended, listed in the foregoing table of contents. Our examination was made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, such financial statements present fairly the financial position of the Institute at June 30, 1980 and the results of its operations and the changes in its financial position for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Yours truly,

*Deloitte Haskins + Sells*

**Institute for Advanced Study**  
**Louis Bamberger and Mrs. Felix Fuld Foundation**

Exhibit A

Balance Sheet, June 30, 1980

**ASSETS****Operating Funds:**

Cash .....	\$ 14,600
Accounts and notes receivable .....	79,422
Government receivable .....	273,983
Specific purpose funds receivable .....	229,439
Accrued income on investments .....	672,138
Deferred charges .....	79,194
Total operating funds .....	<u>\$ 1,348,776</u>

**Plant Funds:**

Cash .....	\$ 15,500
Land, buildings and improvements, equipment and library books (including rare book collection) (Note C) .....	11,574,766
Total plant funds .....	<u>\$11,590,266</u>

**Endowment and Similar Funds (Note B):**

Cash .....	\$ 60,357
Marketable securities .....	73,008,008
Mortgages and notes receivable .....	1,098,180
Total endowment and similar funds .....	<u>\$74,166,545</u>

**LIABILITIES AND FUND BALANCES****Operating Funds:**

Accounts payable, accrued expenses, etc. ....	\$ 168,014
Deferred restricted revenue (Note G) .....	190,781
Fund balance (Exhibit B) - unrestricted .....	989,981
Total operating funds .....	<u>\$ 1,348,776</u>

**Plant funds:**

2-3/4% Apartment Bonds (Note D) .....	\$ 660,000
6-1/4% note payable, payable in instalments to 1984 (Note D) .....	59,116
Plant funds balance (Exhibit B) .....	10,871,150
Total plant funds .....	<u>\$11,590,266</u>

**Endowment and Similar Funds:**

Investment accounts payable .....	\$ 2,252,187
Fund balances (Exhibit B):	
Endowment funds - restricted .....	19,213,388
Quasi-endowment funds - unrestricted .....	52,700,970
Total endowment and similar funds .....	<u>\$74,166,545</u>

See Summary of Significant Accounting Policies and Notes to Financial Statements.



## Louis Bamberger and Mrs. Felix Fuld Foundation

Exhibit B

## Statement of Support and Revenue, Expenses, Capital Additions, and Changes in Fund Balances for the Year Ended June 30, 1980

	Operating Funds		Plant Funds	Endowment & Similar Funds	Total All Funds
	Unrestricted	Restricted			
<b>Support and Revenue:</b>					
Endowment income .....	\$3,626,486	\$1,122,883			\$ 4,749,369
Contributions .....	231,875	1,391,606			1,623,481
Government contracts .....	117,682	290,113			407,795
<b>Total support and revenue .....</b>	<b>3,976,043</b>	<b>2,804,602</b>			<b>6,780,645</b>
<b>Expenses:</b>					
School of Mathematics .....	813,912	595,872	\$ 82,796		1,492,580
School of Natural Sciences .....	702,809	585,254	59,790		1,347,853
School of Historical Studies .....	939,394	278,666	80,167		1,298,227
School of Social Science .....		622,446	57,431		679,877
Library .....	321,377		56,963		378,340
Director's Special Purpose Fund (including the Albert Einstein Centennial Celebration Fund totalling \$188,100) .....	1,833	273,204			275,037
Administration and General .....	1,678,963	30,288	40,862		1,750,113
Auxiliary Activity:					
Tenants' housing expenses net of \$27,028 of revenue .....	117,300	55,575	22,863		195,738
<b>Total expenses .....</b>	<b>4,575,588</b>	<b>2,441,305</b>	<b>400,872</b>		<b>7,417,765</b>
Excess (deficiency) of support and revenue over expenses before capital additions .....	(599,545)	363,297	(400,872)		(637,120)
<b>Capital Additions:</b>					
Gifts .....		158,685		\$ 711,494	870,179
Realized net gains on investments .....				14,282,828	14,282,828
<b>Total capital additions .....</b>		<b>158,685</b>		<b>14,994,322</b>	<b>15,153,007</b>
Excess (deficiency) of support and revenue over expenses after capital additions .....	(599,545)	521,982	(400,872)	14,994,322	14,515,887
<b>Fund Balances at Beginning of Year:</b>					
	360,319	- 0 -	9,777,865	59,121,418	69,259,602
<b>Transfers:</b>					
Proceeds from disposal of plant facilities ..	110,300		(110,300)		
Plant acquisitions and principal debt service payments .....	(1,598,957)		1,598,957		
Portion of quasi-endowment funds appropriated .....	2,719,364			(2,719,364)	
Transfers to endowment and similar funds ..		(516,982)		516,982	
Others - net .....	(1,500)	(5,000)	5,500	1,000	
<b>Fund Balances at End of Year .....</b>	<b>\$ 989,981</b>	<b>\$ - 0 -</b>	<b>\$10,871,150</b>	<b>\$71,914,358</b>	<b>\$83,775,489</b>

See Summary of Significant Accounting Policies and Notes to Financial Statements.

## Louis Bamberger and Mrs. Felix Fuld Foundation

Exhibit C

## Statement of Changes in Financial Position for the Year Ended June 30, 1980

	Operating Funds	Plant Funds	Endowment and Similar Funds	Total All Funds
<b>Resources Provided:</b>				
Excess (deficiency) of support and revenue over expenses before capital additions ..	\$ (236,248)	\$ (400,872)		\$ (637,120)
Capital additions:				
Gifts .....	158,685		\$ 711,494	870,179
Realized net gains on investments .....			14,282,828	14,282,828
Excess (deficiency) of support and revenue over expenses after capital additions .....	(77,563)	(400,872)	14,994,322	14,515,887
Items not using (providing) resources:				
Provision for depreciation .....		410,872		410,872
(Gain) on disposition of plant facilities ..		(26,520)		(26,520)
(Gain) on disposition of investments - net			(14,282,828)	(14,282,828)
Decrease in deferred charges .....	8,966			8,966
Proceeds from sale of investments .....			130,851,859	130,851,859
Proceeds from sale of plant facilities .....		110,300		110,300
Increase in accounts payable .....	116,949		2,252,187	2,369,136
Total resources provided .....	48,352	93,780	133,815,540	133,957,672
<b>Resources Used:</b>				
Increase in receivables .....	392,352			392,352
Increase in accrued income .....	304,291			304,291
Purchase of equipment .....		1,473,164		1,473,164
Reduction of long-term debt .....		114,273		114,273
Purchases of investments .....			131,661,346	131,661,346
Decrease in deferred restricted revenue ..	141,526			141,526
Total resources used .....	838,169	1,587,437	131,661,346	134,086,952
<b>Transfers:</b>				
Proceeds from disposal of plant facilities ..	110,300	(110,300)		
Plant acquisitions and principal debt service payments .....	(1,598,957)	1,598,957		
Portion of quasi-endowment funds appropriated .....	2,719,364		(2,719,364)	
Transfers to endowment and similar fund .....	(516,982)		516,982	
Others - net .....	(6,500)	5,500	1,000	
Total transfers .....	707,225	1,494,157	(2,201,382)	
Increase (decrease) in cash .....	\$ (82,592)	\$ 500	\$ (47,188)	\$ (129,280)

See Summary of Significant Accounting Policies and Notes to Financial Statements.

## Summary of Significant Accounting Policies June 30, 1980

### Accrual Basis

The financial statements of the Institute have been prepared on the accrual basis. The significant accounting policies followed are described below to enhance the usefulness of the financial statements to the reader.

### 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 fund balances, 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).

### 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 to specific purposes by action of the governing board. Externally restricted funds may only be utilized in accordance with the purpose established by the source of such funds and are in contrast with unrestricted funds over which the governing board retains full control to use in achieving any of its institutional purposes.

Endowment funds are subject to the restrictions of gift instruments requiring in perpetuity that the principal be invested and the income only 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.

All gains and losses arising from the sale, collection, or other disposition of investments and other noncash assets are accounted for in the fund which owned such assets. Ordinary income derived from investments, receivables, and the like, is accounted for in the fund owning such assets, except for income derived from investments of endowment and similar funds, which income, if unrestricted, is accounted for as revenue in unrestricted operating funds, or if restricted, as deferred restricted revenue until used in accordance with the terms of the restriction.

### Other Significant Accounting Policies

Other significant accounting policies are set forth in the financial statements and notes thereto.

## Notes to Financial Statements for the Year Ended June 30, 1980

### A.

The accompanying financial statements are presented in accordance with certain recommendations contained in Statement of Position No. 78-10 of the American Institute of Certified Public Accountants titled Accounting Principles and Reporting Practices for Certain Nonprofit Organizations.

### B.

Investments purchased by the Institute are recorded at cost; investments received by gift are carried at fair market value at the date of acquisition. Quoted market value of endowment and similar fund investments aggregated \$84,916,375 at June 30, 1980.

## 114 Report of the Treasurer

Assets of endowment and similar funds, except non-marketable investments restricted for the School of Social Science having a book value of approximately \$2,500,000, are pooled with each individual fund subscribing to or disposing of units on the basis of the market value per unit on a quarterly basis.

The following tabulation summarizes changes in relationships between cost and market values of the pooled endowment fund investments:

	Pooled Assets		Net Gains	Market Value Per Unit
	Market Value	Carrying Value		
June 30, 1980 ...	\$80,168,788	\$69,414,369	\$10,754,419	\$3,811
July 1, 1979 ...	65,917,919	56,621,418	9,296,501	3,071
Unrealized appreciation for the year ended June 30, 1980.			1,457,918	\$ 740
Realized net gains for the year ended June 30, 1980.			14,282,828	
Net gain for the year ended June 30, 1980.			\$15,740,746	

Earnings per unit, exclusive of net gains, amounted to \$215 for the year ended June 30, 1980.

### C.

Physical plant and equipment are stated at cost at date of acquisition, less accumulated depreciation. The cost of library books, other than rare books purchased subsequent to June 30, 1947, has not been capitalized. It is not practicable to determine the value of such books. A summary of plant assets follows:

Land .....	\$ 1,880,554
Building and improvements .....	14,406,816
Equipment .....	1,779,420
Library books .....	194,628
Total .....	18,261,418
Less accumulated depreciation .....	6,686,652
Net book value .....	\$11,574,766

### D.

The Institute for Advanced Study Apartment Bonds of 1956 are collateralized by (1) a first mortgage on the members' housing project with a book value of \$2,193,299, (2) a first lien and pledge of gross revenues from the project and (3) United States Treasury Notes, 7.875% due November 15, 1982, with an aggregate face amount of \$125,000.

The bonds, which mature serially on December 1 of each year, bear interest at the rate of 2-3/4% and are payable \$30,000 in 1980, increasing each December 1 with final

payment due December 1, 1996, and are subject to redemption at various prices.

The note is payable in monthly instalments of \$1,538, with final payment due January 1, 1984.

### E.

Separate voluntary contributory retirement plans are in effect for faculty members and eligible staff personnel, both of which provide for annuities which are funded with the Teachers Insurance and Annuity Association and/or the College Retirement Equities Fund. Payments for the year ended June 30, 1980, amounted to \$238,000.

In addition to the voluntary retirement plans, the Board of Trustees or the Director has at various times authorized the payment of pensions to certain members, employees and the widow of a deceased member. Total pension payments which aggregated \$24,200 for the year ended June 30, 1980, have been charged to expense, and no reserves have been provided for pensions payable in subsequent years.

### F.

The Institute is the residuary beneficiary of a trust under the Will of George Placzek, Deceased, and upon the death of the life tenant will be entitled to receive the corpus thereof. The approximate market value of the assets under the fourth and fifth paragraphs of the Will, as reported by the accountant for the Estate, aggregated \$989,186 as of June 30, 1980, and are not included in the accompanying financial statements.

### G.

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

	Specific Purpose Funds	Government Contracts	Total
Balances at beginning of year .....	\$ 332,307	\$ - 0 -	\$ 332,307
Additions:			
Contributions .....	1,179,326	16,130	1,195,456
Endowment income .....	1,122,883		1,122,883
Receivables .....	229,439	273,983	503,422
Total additions .....	2,531,648	290,113	2,821,761
Deductions:			
Funds expended during year .....	2,151,192	290,113	2,441,305
Transfers to endowment and similar funds .....	516,982		516,982
Other transfers - net .....	5,000		5,000
Total deductions .....	2,673,174	290,113	2,963,287
Balances at end of year .....	\$ 190,781	\$ - 0 -	\$ 190,781

## H.

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 costs incurred by the Institute in operating both the Dining Hall (\$119,179 net of \$126,566 in revenues) and Members' Housing (\$320,343 net of \$346,624 in revenues) have been allocated among the programs and supporting services benefited.

## I.

On July 10, 1980, the New Jersey Educational Facilities Authority sold \$8,775,000 in Revenue Bonds, 1980 Series A, The Institute for Advanced Study Issue. The obligation to pay the Authority, on a periodic basis, in amounts sufficient to pay principal and interest due on the Bonds is a general obligation of the Institute. The bonds are dated July 1, 1980, bear interest at the net average annual rate of 7.804%, and mature on July 1 of the years 1981 through 1995 with the final balance of \$6,630,000 maturing on July 1, 2011.

---

## Donors

The Institute for Advanced Study gratefully acknowledges contributions of gifts, grants and pledges in the amount of \$2,990,182.91 received between July 1, 1979, and June 30, 1980. Space limitations prohibit listing all of those who sup-

ported the Institute during this period. Following are the names of individuals and organizations who made contributions of \$1,000 or more. To all of the contributors, the Institute expresses its deepest appreciation.

### Individuals

Anonymous donor  
Association of Members of the Institute for Advanced Study (AMIAS)  
Mr. and Mrs. George W. Ball  
Paul Benacerraf  
Peter B. Benchley  
Dr. and Mrs. George Packer Berry  
Leonard Block  
Thomas Block  
Mr. and Mrs. Charles Lee Brown  
Mr. and Mrs. Nathaniel Burt  
Mr. and Mrs. Douglas F. Bushnell  
Mrs. W. Walton Butterworth  
Fletcher L. Byrom  
Mrs. Whitney Coletti  
Edward T. Cone  
Mr. and Mrs. Theodore Lamont Cross  
Mrs. Douglas Delanoy  
Gladys Kriebel Delmas  
Mr. and Mrs. Charles P. Dennison  
Mr. and Mrs. J. Richardson Dilworth  
Manuel Dupkin II  
Mrs. Brooks Emeny  
Mr. and Mrs. David L. Frothingham  
Mr. and Mrs. William T. Golden  
Mr. and Mrs. George J. W. Goodman  
Estate of William Axer Graham  
Ralph E. Hansmann  
Mr. and Mrs. Richard D. Hargrave  
Mrs. Alfred O. Hoyt  
Mr. and Mrs. J. Seward Johnson, Jr.  
Lydia P. S. and Nicholas deB. Katzenbach  
Howard C. Kauffmann  
Mrs. Kenneth B. Keating  
Philip M. Klutznick  
Mrs. Gerard Lambert

Mr. and Mrs. Peter Lawson-Johnston  
Mr. and Mrs. Rensselaer W. Lee  
Mr. and Mrs. David E. Lilienthal  
Harold F. Linder  
Miss Sarnia Marquand  
The Honorable Anne Martindell  
Joseph F. McCrindle  
Brunson S. McCutchen  
Margaret L. Meiss  
James I. Merrill  
Robert B. and Helen S. Meyner  
Albert Nerken  
Stavros S. Niarchos  
Howard C. Petersen  
George T. Piercy  
Mr. and Mrs. Daniel Rose  
Arthur Ross  
William M. Roth  
Mr. and Mrs. William H. Scheide  
Richard B. Scudder  
Martin E. Segal  
Margaret Setton  
Adele Simmons  
Mr. and Mrs. A. N. Spanel  
Donald B. Straus  
Frank E. Taplin  
Stanley A. Wainer  
F. Helmut and Caroline Weymar  
Elizabeth A. Whitehead  
James D. Wolfensohn  
Richard S. Zeisler

### Foundations

Amax Foundation, Inc.  
Julius Bär Stiftung

Corning Glass Works Foundation  
 The Gladys Kriebel Delmas Foundation  
 Exxon Education Foundation  
 The Ford Foundation  
 The German Marshall Fund of the United States  
 Joseph H. Hazen Foundation, Inc.  
 Samuel H. Kress Foundation  
 Alfried Krupp von Bohlen und Halbach Stiftung  
 The Lucius N. Littauer Foundation Inc.  
 The Andrew W. Mellon Foundation  
 Memorial Foundation for Jewish Culture  
 Alfred P. Sloan Foundation

#### Corporations

American Telephone and Telegraph Company

Bell Laboratories  
 IBM Corporation  
 Mathematica, Inc.  
 Union Carbide Corporation

#### Government agencies

Ministry of Education and Science, Federal  
 Republic of Germany  
 National Aeronautics and Space Administration  
 National Endowment for the Humanities  
 National Science Foundation  
 State of New Jersey  
 U.S. Department of Energy  
 U.S. Office of Naval Research













AS36 .I79 1978-1981  
Institute for Advanced Study  
(Princeton, N.J.)  
Annual report for the fiscal yr.

DATE	ISSUED TO

**Historical Studies-Social Science Library**  
**Institute for Advanced Study**  
Princeton, NJ 08540

DEMCO

