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

Newark, New Jersey.

It is fundamental 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.

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"In the study of history, our perspectives on the past are constantly changing. There are masses of new evidence to sift and to interpret, and the upheavals in the world around us compel us to look again at what brought us where we are today. If the present shapes our view of the past, our understanding of the past shapes, for good or ill, the future. The mission and sometimes the triumph of history lies in the inescapable fact that we have no other guide to the future than the past. History is the collective conscience of mankind."

GLEN BOWERSOCK

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“Mathematics is the study of relationships among objects. The universality of mathematics lies in the fact that the object itself is irrelevant — what really matters is the structure of the relationship. In this world of ideas, a mathematician is an explorer, an architect, an artist moving freely around in his never-ending quest for knowledge and vision with others, and seeing his discoveries put to good use.”

ENRICO BOMBIERI

INSTITUTE FOR ADVANCED STUDY: BACKGROUND AND PURPOSE

The Institute for Advanced Study is an independent, non-profit institution devoted to the encouragement of learning and scholarship. From its founding in 1930 it has been a community of scholars where intellectual inquiry can be pursued across a broad range of disciplines under the most favorable conditions. In the words of its original statement of mission, "The primary purpose is the pursuit of advanced learning and exploration in the fields of pure science and high scholarship to the utmost degree that the facilities of the institution and the ability of the faculty and students will permit." For more than sixty years this founding principle has been sustained and has yielded an unsurpassed record of definitive scholarship.

Although small in scale, the Institute embraces in some form many of the major academic disciplines. But unlike universities it has no scheduled courses of instruction or curriculum, awards no degrees, and does not aspire to represent all branches of learning. It is organized in four Schools: Historical Studies, Mathematics, Natural Sciences, and Social Science. Within each is found a spectrum of scholarly interests which transcend the usual divisions of academic subjects. This breadth of coverage and the opportunity it affords for independent, self-directed scholarship distinguish the Institute from most other centers for research and scholarship. So too does its permanent faculty, twenty-one distinguished scholars who guide the work of the Schools and each year award fellowships to about 160 visiting Members from universities and research institutions throughout the world.

From its beginnings, the Institute has been international in composition and a community in character. More than half of today's faculty began their scholarly careers outside the United States, and each year about a third to a half of the Institute's Members come from abroad. This mix of cultures as well as disciplines and of senior and younger scholars greatly enriches the Institute experience, as do the Institute's residential housing, outstanding dining, numerous lectures, concerts, and other cultural events. Contacts made at the Institute often become life-long intellectual ties spanning national boundaries.

The Institute was established with a major founding gift from New Jersey businessman and philanthropist Louis Bamberger and his sister, Mrs. Felix Fuld. They wished to use their fortunes to make a significant and lasting contribution to society. Abraham Flexner originated the concept from which the Institute took form, encouraged the Bambergers to provide resources for its realization, and served as the Institute's first Director. Through careful management and generous additional support, the Institute's endowment today produces about

two-thirds of the annual operating budget. Another third is provided through support from foundations, corporations, private gifts and federal agency grants. Important additional support comes from corporate and foundation sources outside the United States. The Institute is governed by an elected Board of Trustees which appoints a Director to oversee its operations and guide its development.

Set on about 800 acres of fields and woodlands in Princeton, New Jersey, the Institute campus includes a housing complex for Members and two libraries. Though independent from Princeton University, the Institute and the University have enjoyed a close relationship since the 1930s. Each has significantly contributed to Princeton's world-wide reputation as a center for scholarship and science.

REPORT OF THE CHAIRMAN

Among the highlights of the past year were the openings of two new buildings, the first new construction at the Institute since 1969. Both buildings were designed by Cesar Pelli with the landscaping provided by Balmori Associates, and were the fruit of careful planning and many discussions with the Faculty and Board of Trustees. The first and larger building houses the School of Mathematics and next to it is a lecture hall which serves the entire Institute community. The mathematics building brings together the Members and Faculty of the School in one proximate location for the first time in several decades and will greatly facilitate free communication and the lively exchange of ideas which are requisite for progress in today's world of mathematics and mathematical physics. With seminar rooms, a common room, and new computing equipment, the building will make an important contribution to the Institute's oldest and largest school.

The lecture hall, which seats 220 and has full audiovisual equipment, provides for the first time a place where all the Institute community can gather for lectures, symposia, and cultural events. The acoustics and academic ambience have already proved excellent, and we look forward to the many events it will house in the future.

This construction would have been impossible without the generous support of members of our Board of Trustees, and in particular Leon Levy, Ladislaus von Hoffmann, Hamish Maxwell, Charles L. Brown, Theodore L. Cross, Ralph and Doris Hansmann, Helene and Mark Kaplan, The Fuji Bank, Marella Agnelli, Frank E. Taplin, Jr., the Friends of the Institute and the members of AMIAS. The mathematics building has important new computers made possible through the deeply appreciated Science Initiative challenge grant from The Kresge Foundation for computer purchase, maintenance, and replacement. In addition, this building and the entire campus will be greatly enhanced through the generous contribution of a new telephone system from Northern Telecom Ltd.

With the end of this academic year, T. D. Lee, elected to the Board in 1986, completed his term. The Trustees expressed their appreciation in a Resolution which included the following description of Professor Lee's relationship with the Institute over many decades: "A visiting Member in the School of Natural Sciences from 1951–53, his work with C.N. Yang, also a Member here at that time, brought them the Nobel Prize in Physics in 1957. T.D. returned to the Institute as a Faculty member from 1960 to 1963 and was a frequent visitor in the years thereafter. University Professor at Columbia University since 1984, member, honoree, and fellow of so many great learned institutions in the United States, China, and Europe, T.D. has brought to the work of the Board a global view of theoretical physics and a profound insight into its present state and future possibilities. His sensitive interpretations for his colleagues on the Board have

enriched our understanding of this aspect of the Institute's life, and we are deeply grateful for the time and devotion he has given to our needs and deliberations."

In June 1993 Norton Simon died. Mr. Simon served as a Trustee from 1970 to 1980 and Trustee Emeritus since then. His long association with the Institute was one of many ways in which he served higher education and numerous public causes.

At the May 1993 meeting, two new Trustees were elected to serve. They are The Honorable A. Leon Higginbotham, Jr. and Mr. Robert B. Menschel.

Judge Higginbotham has degrees from Antioch College and Yale University. From 1977 until February of 1993, he served as judge, chief judge, and senior judge on the U.S. Court of Appeals for the Third Circuit in Philadelphia. Appointed by President John F. Kennedy to the Federal Trade Commission in 1962, he was the first black commissioner of a Federal regulatory agency. In 1964, he became a judge in the United States District Court. He is now Of Counsel to the law firm Paul, Weiss, Rifkind, Wharton & Garrison in its New York and Washington offices.

Robert B. Menschel is a graduate of Syracuse University and New York University. He has been with Goldman, Sachs & Co. since 1954 and has been a limited partner of the firm since 1979. He is a trustee of the New York Public Library, the Museum of Modern Art, Syracuse University, and Montefiore Hospital. He also is a managing director of the Horace W. Goldsmith Foundation and a member of the Executive Board of the American Jewish Committee.

We welcome our new colleagues and look forward to working with them in the years ahead.

The pages that follow in this Report for the Academic Year bear witness to the overall intellectual and financial vitality of the Institute and reflect its continuing commitment to the advancement of scholarship and research throughout the world. Scholars and scientists come to the Institute to investigate questions about which little is known and for which answers are elusive. Their work requires great risks and commitments but can lead to knowledge which can transform our understanding of ourselves and our world.

As Trustees, we are dedicated to furthering that mission by insuring that the Institute continues to provide conditions as near ideal for that purpose as we can make them. We extend our profound thanks to all of you — Faculty, Members, former Faculty and former Members, staff, foundations, Friends of the Institute, and corporations who share in this dedication and contribute your talents, time, and resources to the success of this vital enterprise.

James D. Wolfensohn
Chairman of the Board of Trustees

REPORT OF THE DIRECTOR

I begin my third year as Director of the Institute for Advanced Study looking back upon this past year's wide range of activities, summarized in the pages that follow, and also looking to the year ahead, confident that the work of the Institute will continue to hold a central place in scholarship and postdoctoral education. As opportunities for younger university faculty to move beyond their doctoral level achievements are increasingly limited by shrinking budgets, the Institute today provides an important service to higher education as a resource for the development of these scholars who will lead their disciplines and institutions in years to come.

In the year past, the Institute recognized the highly significant scholarship of deceased Professors Deane Montgomery and Felix Gilbert in separate services of tribute. I also express the deep appreciation of the Institute community to Armand Borel, who joined the Faculty of the School of Mathematics in 1957 and became Professor Emeritus in 1993. Although Borel was only thirty-four years old at the time of his appointment, Robert Oppenheimer wrote: "We value him for the power and depth of his own mathematical work, for the inspiration and assistance that he will give to our members — young Americans as well as students from abroad — and for the weight of his judgment in promoting mathematical science here, in the United States, and throughout the world." It was a prophecy amply fulfilled.

During the winter, the Institute resumed a process of Visiting Committees recommended in the 1976 Segal Committee Report and initiated in the mid-1980s. Visiting Committees to the School of Natural Sciences and the School of Historical Studies, both chaired by Henry Rosovsky, the former Dean of Harvard University, came to the Institute, each for a weekend of talk with Faculty, Members, Visitors, the Director and the Executive Officers of all four Schools. The resulting reports with their evaluations and recommendations were presented to the Board of Trustees at its spring meeting, and the Committees' suggestions are being discussed and in some cases have already been implemented by the Schools. The School of Mathematics will be visited in February of 1994 and the School of Social Science in 1994–95.

Along with the directors of five other research centers in the United States and Western Europe, I have been involved in a project to assist the establishment of indigenous centers for scholarship in the countries of Eastern Europe and the former Soviet Union. With generous funding from the John D. and Catherine T. MacArthur Foundation, the Fritz Thyssen Foundation, the Swedish Council for Studies of Higher Education and the Ministry of Education and Science of the Netherlands, we have established the New Europe Prize, an annual monetary prize to be awarded to individual scholars who have been members at one of the

Western institutes and who have returned to build comparable institutions in their home countries. The prizes are to be used at the awardees' institutions to advance scholarship through specific means such as building libraries, support for travel, and grants to young scholars. Two candidates, including Alexander Gavrilov, a former Member in the School of Historical Studies, were chosen this year to receive the \$60,000 prizes. The awards will be presented at a November 11–12, 1993, ceremony in Berlin.

Director's Visitors to the Institute in 1992–93 included Sir Michael Howard of Yale University, who with other invited scholars participated in a March 1993 symposium on Military History organized by Professor Peter Paret. In spite of the great March blizzard, the symposium was attended by over 150 participants and was the first academic event held in the new auditorium which proved an excellent venue for such meetings.

Later in the spring Director's Visitor Ilya Prigogine of the University of Brussels contributed to a symposium, "Chaos, Order, and Creativity: An Interdisciplinary Colloquium," and was joined by participants from all four Schools including Irving Lavin of the School of Historical Studies who organized and chaired the symposium, Dennis Hejhal of the School of Mathematics, Stephen Brush of the School of Social Science, and Frank Wilczek of the School of Natural Sciences.

Other Director's Visitors this past year were mathematicians Er Jian Xiao of Fudan University and Zhi-Jie Chen of the Mathematical Sciences Research Institute and East China Normal University, and physicist Gisbert Frhr. zu Putlitz of the University of Texas at Austin and the University of Heidelberg. Maxine Singer of the Carnegie Institution of Washington and Paul Berg of Stanford University returned to the Institute in June 1993, and Dr. Singer lectured on "Dealing with Genes II," continuing the theme of a lecture presented by Dr. Berg in 1992.

The Institute hosted an interdisciplinary seminar series on Science and Society in which the Schools of Social Science, Natural Sciences and Mathematics participated. Freeman Dyson, Professor in the School of Natural Sciences, presented a paper on "Science and Ethics," Karin Knorr Cetina, a Member in the School of Social Science, spoke on "What Scientists Do," and I discussed "Science and the Public Interest." Other participants in the series as chairpersons or discussants were Professors Clifford Geertz, Piet Hut, Robert Langlands and Michael Walzer, and Stephen Brush, a Member in the School of Social Science. The series was supported by a grant from The Andrew W. Mellon Foundation.

It was my privilege to represent the Institute for Advanced Study in Japan, Korea, and China, meeting former Institute Members and renewing both academic dialogue and long-time personal rapport with colleagues from the world

of mathematics in those countries. I deeply appreciate the kindness of Toru Hashimoto, T.D. Lee, Peter Kann, and Jim Wolfensohn in making this a memorable journey of new friendships and meaningful exchange.

A Trustee/Guest Weekend held at the Institute in January 1993 featured presentations from Professor Peter Paret of the School of Historical Studies, Professor Frank Wilczek of the School of Natural Sciences, and Members David Morrison of the School of Mathematics and Diana Barkan of the School of Social Science. The purpose of these gatherings is to inform the Trustees and their friends about some of the many interesting topics of research being pursued here.

In the Financial Statement, grants and gifts to the Institute are summarized by category, but I want to mention several specific grants awarded to the Institute this past year which will make possible important new program initiatives over the next several years. A large grant from The Andrew W. Mellon Foundation will support three year-long programs in the Schools of Historical Studies and Social Science which, in different ways, will enable those Schools to introduce new perspectives to broaden each School's reach. In the School of Historical Studies, funds will be used to invite to the Institute scholars in fields which, although part of historical study, have not been represented at the School, especially in recent years. The School of Social Science will use its portion of the grant to bring to the School those who are exploring cross-disciplinary areas of the social sciences, emphasizing areas of new and promising scholarship.

A major grant from the Alfred P. Sloan Foundation will be used by the School of Mathematics to explore emerging areas at the intersection of mathematics and the sciences where there is the prospect of significant discovery or insight flowing from mathematical applications. The grant will be for three years, beginning in 1993-94, and will allow the School to invite as senior Members and Distinguished Visitors some of the most active and accomplished people in new areas of mathematics.

A challenge grant was received this past spring from The Kresge Foundation which will make possible the purchase of new, state-of-the-art computer equipment for the Schools of Mathematics and Natural Sciences and the establishment of a fund for its maintenance and future replacement. In connection with this project, the Institute has begun a program to modernize and expand its communications facilities with a campus-wide fiber-optic system.

The provision of child care was a subject of considerable discussion among Faculty, Members and staff throughout this past year. It is an issue of great concern to me because it directly affects the benefit many younger scholars with children can derive from the Institute. A temporary "nanny center" was opened in the fall of 1992 to accommodate children under nursery school age. We hope

to renovate the ECP building during 1993–94 in order to open a full-time child care center in the fall of 1994 to serve primarily Institute families and also some families from the community. In addition, the long-established Crossroads Nursery School program will be integrated into the center. The renovated ECP building will also house an exercise facility for the Institute community.

I wish to close my report by commenting on the most noticeable and important physical and academic change in the landscape of the Institute: its two new buildings. The opening of the new building to house the School of Mathematics was a major milestone for the Institute, brought about through the dedicated efforts of Trustees, Faculty, staff, and many others. It was celebrated in April 1993 with a two-day series of lectures by Institute Faculty and Members and a special talk by Dr. Frank Press, President of the National Academy of Sciences. For the dedication, the Institute reprinted “The School of Mathematics at the Institute for Advanced Study,” by Armand Borel, A Reprint from *A Century of Mathematics in America, Part III*, pp. 119–147, American Mathematical Society, Providence, R.I. Faculty, Members, and staff have already moved into the new building and are delighted with the facilities it provides.

The new lecture hall adjacent to the Mathematics Building has been named Wolfensohn Hall in honor of Elaine and James D. Wolfensohn. In naming its new lecture hall for them, the Institute for Advanced Study recognizes with deep appreciation the Wolfensohns’ generous and dedicated spirit and their commitment to the highest standards of quality and integrity. For all they have done and for their continuing leadership, the Faculty and Board of Trustees expressed their esteem, gratitude and affection through a concert of dedication on May 7 at which Isaac Stern, Sara Wolfensohn, and the St. Lawrence String Quartet performed. The facility is already in frequent and much appreciated use.

The best measure of the Institute’s vitality is in the reports of the Schools in the pages that follow. I want to thank all those who have worked to help the Institute achieve the high purpose and vision it embodies today.

Phillip A. Griffiths
Director

ACKNOWLEDGMENTS

The Institute for Advanced Study expresses its deepest appreciation for all gifts and grants to its endowment and capital funds, for annual operating support and for in-kind contributions of equipment. Special gratitude is extended to the following individuals and organizations who were major donors to the Institute during the academic year 1992–93.

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BEQUEST

The Institute acknowledges with special gratitude the generous bequest of Gladys Kriebel Delmas, former Trustee and Honorary Vice-Chair of the Board. In light of her firm belief in the mission of the Institute, Mrs. Delmas bequeathed to the Institute for Advanced Study the largest single gift since its founding.

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GEORGE F. KENNAN
KENNETH M. SETTON
HOMER A. THOMPSON
MORTON WHITE

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

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

Three additional appointments strengthened the field of classical and Near Eastern studies: Elias Avery Lowe, a Latin paleographer who worked on the handwriting of pre-ninth century manuscripts; Ernst Herzfeld, a Near Eastern archaeologist and historian, whose scholarly work comprised nearly 200 titles; and Hetty Goldman, one of the pioneering American women archaeologists,

whose discoveries at Tarsus in Turkey were published in six volumes. Modern history was represented at the Institute from the outset with the appointment of the military and political historian Edward M. Earle. Earle was an original Member of the School of Economics and Politics, which merged in 1949 with the School of Humanistic Studies to become the School of Historical Studies.

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

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

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

ACADEMIC ACTIVITIES

FACULTY

During the academic year 1992–93 GLEN BOWERSOCK published six scholarly papers, on topics ranging from Tacitus to Petra. His *Hellenism in Late Antiquity* appeared in an Italian translation, published by Laterza. He delivered a Faculty Lecture at the Institute in the autumn. In the spring, as Ena H. Thompson Lecturer at Pomona College, he gave three public lectures and two seminars,

CORRECTION

The following material was inadvertently omitted from Professor Oleg Grabar's report of academic activities on page 25.

1992 PUBLICATIONS

"The Early Islamic Period in al-Andalus," *Al-Andalus, The Art of Islamic Spain, The First Four Centuries, An Introduction*, ed. J.D. Dodds (New York, 1992), pp. 3–9.

The Mediation of Ornament (Princeton University Press: Princeton, 1992), 284 pp., 23 pls., 196 figs.

"Enlightenment or Decadence? Islam in the 18th Century and Europe," Council of Europe, *The Contribution of the Islamic Civilization to European Culture* (Strasbourg, 1992), pp. 120–135 and *passim*.

"Two Paradoxes in the Islamic Art of the Spanish Peninsula," in *The Legacy of Muslim Spain*, ed. S.K. Jayyusi (Leiden, 1992), pp. 583–591.

"L'Art Omeyyade en Syrie, Source de l'Art Islamique," in *Actes du Colloque international Lyon — Maison de l'Orient Méditerranéen*, ed. P. Canivet and J.-P. Rey-Coquais (Paris, 1992), pp. 187–193.

and he subsequently contributed to a symposium on Alexandria and Alexandrianism at the Getty Museum. In May Professor Bowersock delivered the Wiles Lectures on "Martyrdom and Rome" for the School of Modern History at the Queen's University of Belfast.

At the December meetings of the American Historical Association in Washington, D.C., Professor Bowersock was awarded the James H. Breasted Prize for his book on Hellenism. He is now completing the revisions of his Sather Lectures on "Fiction as History" for the University of California Press, and he expects to have the final text of his Wiles Lectures on martyrdom ready soon for the Cambridge University Press. He has, in addition, worked on two other books in collaboration with colleagues elsewhere. The late Louis Robert's extensive commentary, *Le martyre de Pionios*, prepared for publication jointly with Professor C.P. Jones (Harvard University), is now in proof and should appear in spring 1994 under the imprint of Dumbarton Oaks. Together with Dr. T.J. Cornell (University College London) Professor Bowersock has also prepared a selection of papers on modern scholarship by Arnaldo Momigliano for publication by the University of California Press in late 1994. He continues as General Editor of the series *Revealing Antiquity* at the Harvard University Press.

During the academic year 1992-93 GILES CONSTABLE edited (with Elizabeth H. Beatson and Luca Dainelli) *The Letters between Bernard Berenson and Charles Henry Coster* (Florence, 1993); published articles in *Homo Byzantinus: Papers in Honor of Alexander Kazhdan*, (Washington, D.C., 1992); *From Athens to Chartres: Neoplatonism and Medieval Thought. Studies in Honour of Edouard Jauneau*, (Leiden, New York, Köln, 1992); *Speculum*, Vol. 67, (1992) (with Robert Somerville); and *Mélanges offerts à Georges Duby*, Vol. III (Aix-en-Provence, 1992); and wrote a memorial minute in *Proceedings of the American Philosophical Society*, Vol. 136, (1992).

Professor Constable gave lectures in Moscow, Tübingen, Oberlin, Spoleto, and Zürich; attended conferences in Munich, Philadelphia, and Trenton; and participated in doctoral examinations at the Pontifical Institute in Toronto and at Princeton University. He also organized two conferences at the Institute for Advanced Study.

OLEG GRABAR participated in a colloquium on Muslim Spain at the Spanish Society in New York and contributed to a seminar of the ACLS and Getty Foundation on computers and scholarship in the Humanities. He gave lectures on Muslim Spain at the Metropolitan Museum, on theories of Islamic art at the University of Uppsala, and on Jerusalem at Harvard University. He also gave the key note lecture at the meeting in Paris of the International Association for the Study of Traditional Environments. He directed one more Ph.D. Thesis at Harvard University and was appointed to the Membership and Publications Committees of the American Philosophical Society.

In the summer of 1992, CHRISTIAN HABICHT visited excavation sites and museums in Greece (Thessaloniki, Dion in Macedonia, Olympia, Athens and Delphi). He participated in an international conference celebrating the 100th anniversary of French excavations at Delphi, held at the French School at Athens and at Delphi. At the invitation of the French and Greek sponsors, he contributed a paper on "Delphi and the Athenian Epigraphy." In October, he attended the tenth International Congress for Greek and Roman Epigraphy at Nîmes and gave one of the keynote talks, on the role of Hellenistic kings as benefactors of Greek cities. In June 1993, he took part in a colloquium at Munich that brought together historians and archaeologists for an interdisciplinary discussion of cities and citizens during the Hellenistic period. He spoke about the changes that transpired in the functions and public perceptions of both the citizen body and outstanding individual citizens.

He devoted most of his time to advance a major book on Athens from Alexander to Antony (338 to 31 B.C.). Four papers, including two of substantial length, were published during the year, six others written and accepted for publication in five different countries. He continued to serve on boards and committees.

IRVING LAVIN lectured at New York University and the University of Notre Dame and participated in a colloquium on the relations between art and science at Vinci, Italy. He was an organizer, together with Giles Constable, of the third Mellon Colloquium, "The Religious Orders and Culture in the Middle Ages and the Renaissance." Professor Lavin organized and hosted an interdisciplinary colloquium at the Institute entitled "Chaos, Order and Creativity," as well as the series of colloquia in the history of art sponsored by the School of Historical Studies. He was elected to the Board of Directors of the College Art Association, and continued his services to several other organizations and institutions, as a Trustee of the Canadian Centre for Architecture, as chairman of the U. S. National Committee for the History of Art and as a member of the executive committee of the Comité International d'Histoire de l'Art. Professor Lavin also continued to serve on the advisory boards of scholarly journals, including *Art e Dossier*, *The Journal of Medieval and Renaissance Studies*, *Palladio*, *rivista di storia dell'architettura e restauro*, and *Quaderni d'italianistica*.

Professor Lavin's publications during this period included the book *Past-Present. Essays on Historicism in Art from Donatello to Picasso*, University of California Press, 1993, and a number of articles dealing with the theory and history of art, including an essay on the relation between memory theory and art.

PETER PARET published a study of posters as historical and aesthetic documents, *Persuasive Images* (Princeton University Press, 1992) with Beth Irwin Lewis and his son, Paul Paret. With Ekkehard Mai he edited the proceedings of the conference on "German History from the Perspective of Art Collectors,"

Donors, Museums,” which he had chaired at the Institute in October 1991. The volume, *Sammler und Mäzene* (Boehlau Verlag, 1993), includes expanded versions of two papers he gave at the conference: an analysis of 19th-century museums as political and cultural phenomena; and a study of philo-Semitic and anti-Semitic interpretations of Jews as agents of modernism in the arts. His talk “Jefferson and the Birth of European Liberalism,” which he gave at the 250th anniversary meeting of the American Philosophical Society in April 1993, was published together with a talk by Bernard Bailyn in a pamphlet, *Two Lectures on Jefferson* (Institute for Advanced Study, 1993), and will also appear in the *Proceedings* of the Society. He contributed a chapter on Prussia in the Napoleonic Era, based on an earlier lecture at Yale, to the volume *Recovery after Defeat*, edited by Paul Kennedy (Yale University Press, 1993). Among his book reviews and shorter pieces is an introduction to a monograph by a former student, Carl Boyd, *Hitler's Japanese Confidant* (University Press of Kansas, 1993).

During the summer of 1992 Professor Paret was again in residence at Stanford as a Senior Fellow of the Hoover Institution, where he organized an exhibition of historical posters from the Hoover archives, which ran from September to December, and will also be shown at Rutgers. In March 1993 he chaired a conference on “The History of War as Part of General History” at the Institute, during which he gave a paper on unideological resistance to military service. He continued his participation in the work of various committees and editorial boards, among them the Council of the American Philosophical Society and its committees on research and on publications. He was appointed chairman of the Society's new committee on the Jacques Barzun Prize in Cultural History, Senior Fellow of the Rutgers University Center for Historical Analysis, and member of the joint commission of the Berlin Senate and the State of Brandenburg on the reorganization of historical research in Berlin. During the academic year he received the degree of D. Lit. from his alma mater, the University of London, the Thomas Jefferson Medal for distinguished achievement in the humanities from the American Philosophical Society, and the Samuel Eliot Morison Medal from the Society for Military History.

PROFESSORS EMERITI

MARSHALL CLAGETT completed Volume II of his *Ancient Egyptian Science*. It will go to press shortly with the subtitle *Calendars, Clocks, and Astronomical Monuments*.

Much of GEORGE KENNAN's time in 1992 was taken up with the completion, editing, and publication of his most recent book, *Around the Cragged Hill*. He was also extensively involved with the adjustment to the post-Cold-War period of the Kennan Institute for Advanced Russian Studies in Washington. Published articles included a major review, for the *New York Review of Books*, of Vaclav

Havel's *Summer Meditations*; an article, and subsequent published comments, on the principles governing the State Department's Policy Planning Staff in General Marshall's time; and another, on the subject of "Who Won the Cold War?"

KENNETH M. SETTON is writing a book entitled *Venice Adrift in the Eighteenth Century*. He began this volume early last summer and returned to Venice to research the archival chronicles pertaining to this period. Publication will be assumed by the American Philosophical Society, going to press late this year.

HOMER THOMPSON continued to devote much of his time to the publication program of the Excavation of the Athenian Agora. He has also been doing research on several architectural problems related to the Agora. On November 20, 1992, he received from the Alexander S. Onassis Foundation of New York University the Onassis Center Award for Excellence in Hellenic Studies. The award was the occasion for a conference, *The Cradle of Democracy: Athens Then and Now*, at which Professor Thompson presented a paper, "Some Highlights in the Exploration of the Athenian Agora." The proceedings of the conference are to be published.

MORTON WHITE's main academic activity during 1992-93 was to revise a manuscript on free will, now entitled *The Question of Free Will: A Holistic View*. This is now in page proof and will be published by Princeton University Press in the fall. AMIAS, through a misunderstanding, announced incorrectly that the book had been published last year.

THE SCHOOL OF HISTORICAL STUDIES
MEMBERS, VISITORS AND RESEARCH STAFF

NICHOLAS ADAMS
History of Architecture
Vassar College

MOHAMMAD AL-ASAD
History of Islamic Architecture
Institute for Advanced Study · *a*

SARA B. ALESHIRE
Greek Epigraphy and Religion
University of California, Berkeley

MOHAMMED ARKOUN
History of Islamic Thought
University of Paris-III, France

ABEER AUDEH
Contemporary Architecture, especially in the
Arab World
Institute for Advanced Study · *a*

DAVID AYALON
Islamic Medieval History
The Hebrew University of Jerusalem, Israel · *v*

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

ARNULF BARING
Modern European History
Free University, Berlin, Germany

INGRID BAUMGÄRTNER
Medieval History
Augsburg University, Germany

ROBERT L. BENSON
Medieval History
University of California, Los Angeles

NICOLE BÉRIOU
Medieval History
University of Paris-IV, France · *s*

GRIGORY BONGARD-LEVIN
Ancient India and Greece
Moscow State University, Russia

MONIQUE CANTO-SPERBER
Ancient Philosophy
C.N.R.S., University of Paris-IV, France · *s*

PAOLO DESIDERI
Greek and Roman History
University of Florence, Italy · *f*

CARLOS M. N. EIRE
Early Modern European History
University of Virginia · *v*

GARY FORSYTHE
Roman Republican History and Historiography
The University of Chicago

BRUCE W. FRIER
Roman History and Roman Law
The University of Michigan

BERNARD R. GOLDSTEIN
History of Science
University of Pittsburgh · *s*

ARYEH GRABOIS
Medieval Social and Intellectual History
University of Haifa, Israel · *s*

NORBERTO GRAMACCINI
Italian and French Art
Bern University, Switzerland · *f*

JACK M. GREENSTEIN
History of Art
University of California, San Diego

TOMAS HÄGG
Ancient Greek Literature
University of Bergen, Norway

THOMAS HEAD
Medieval History
Yale University · *f vs*

CARLA HESSE
French Revolution
University of California, Berkeley

- THOMAS C. HOLT
19th Century Southern and Caribbean History
University of Chicago · *vs*
- NIGEL M. KENNELL
Roman Greece
Memorial University of Newfoundland,
Canada · *a*
- ERNST KITZINGER
History of Art
Oxford, England · *vf*
- MARJORIE LAMBERTI
Modern German History
Middlebury College
- HAROLD MAH
Modern European Intellectual and Cultural
History
Queen's University, Canada
- FRANZ GEORG MAIER
Ancient History, Archaeology
University of Zürich, Switzerland
- PATRICIA MAINARDI
Art History
City University of New York · *s*
- CHRISTIAN MAREK
Ancient History
University of Marburg, Germany · *r*
- SHAUN E. MARMON
Islamic History
Princeton University
- BORIS MARSHAK
Archaeology, Art History
State Hermitage Museum, Russia · *f*
- OKSANA MINAEVA
History of Medieval Bulgarian Art
Institute of Art Studies, Bulgarian Academy of
Sciences, Bulgaria
- KENNETH J. MOURÉ
European Economic History, Modern France
University of California, Santa Barbara
- ALESSANDRO NOVA
Italian Renaissance Art and Literature
Stanford University
- ALLISON LEE PALMER
Italian Baroque Architecture
Rutgers University · *a*
- ROBERT R. PALMER
18th Century European History
Princeton, New Jersey · *v*
- ALEXANDER PATSCHOVSKY
Medieval History
Konstanz University, Germany
- MYRIAM ROSEN-AYALON
Islamic Art and Archaeology
The Hebrew University of Jerusalem, Israel
- PETER SCHÄFER
Judaism in Late Antiquity
Free University, Berlin, Germany · *s*
- INGRID SEVERIN
Modern Art and Cultural History
Wissenschaftszentrum Berlin, Germany · *a*
- MAYA SHATZMILLER
Medieval Islamic History
University of Western Ontario,
Canada · *f*
- PHILIP SOHM
Italian Renaissance and Baroque Art History
University of Toronto, Canada
- GARY D. STARK
German Cultural History
The University of Texas,
Arlington · *f*
- CLAUDE VIAL
Ancient History
Paul Valéry University, France · *s*
- LOREN WEBER
Medieval History
Institute for Advanced Study · *a*

THE SCHOOL OF MATHEMATICS

Faculty

ENRICO BOMBIERI [*IBM von Neumann Professor*]

ARMAND BOREL [*Hermann Weyl Professor*]

LUIS A. CAFFARELLI

PIERRE DELIGNE

ROBERT P. LANGLANDS

THOMAS SPENCER

Professors Emeriti

ATLE SELBERG

ANDRÉ WEIL

ACADEMIC ACTIVITIES

The School of Mathematics featured a broad spectrum of activity ranging from applied mathematics to abstract, pure mathematics. This year there was a special emphasis on differential geometry and on algebraic geometry. Richard Schoen from Stanford University was this year's Distinguished Visiting Professor. He and Armand Borel organized a year-long program in differential geometry focusing primarily on geometrical aspects related to partial differential equations. In algebraic geometry, Members and Faculty from the Schools of Mathematics and Natural Sciences explored some mathematical conjectures motivated by ideas from physics.

This year's program in differential geometry was quite large, involving about 20 of our Members. There were numerous lectures which not only attracted the participants of the program but also many who came to learn other areas of mathematics. There were three to five seminars per week specializing in various aspects of geometry. R. Schoen and A. Borel organized a seminar on super-rigidity and R. Schoen ran a general seminar on differential geometry. During term I, Richard Hamilton (UC San Diego) gave two series of lectures entitled "Geometric Heat Flows" and "Ricci Flow Seminar." In addition, R. Schoen organized the "Scalar and Mean Curvature Seminar." All of these lecture series were basically self-contained and were very well received by our Members.

The second major area of activity was in algebraic geometry. Gerd Faltings (Princeton University) spent the year here and delivered a series of lectures on

his recent work on the Verlinde conjecture entitled "Factorization in Conformal Field Theory." In a different but related area, Brian Greene, David Morrison, and Edward Witten gave a sequence of lectures on "Quantum Algebraic Geometry." This seminar brought together both mathematicians and physicists to get a better understanding of mirror symmetry. The main problem is nearly a classical one in algebraic geometry — counting rational curves in a special class of Calabi-Yau manifolds. Surprisingly, there are apparently deep and fascinating connections with $N=2$ supersymmetric conformal field theory studied in the School of Natural Sciences.

Another prominent series of lectures was given in term I by Enrico Bombieri on "New Effective Methods for the Thue equation." E. Bombieri presented his new approach for getting bounds on heights of solutions to the Thue equation. During term II, E. Bombieri gave a series of lectures on "Baker's Method and Diophantine Approximation," and E. Bombieri and P. Sarnak conducted a popular seminar "Harmonic Analysis and Number Theory." It met on alternate weeks at the Institute for Advanced Study and Princeton University. Other seminars this year included the PDE seminar run by Luis Caffarelli, and the Applied Mathematics — Mathematical Physics seminar run by Weinan E and Thomas Spencer. Of particular interest were lectures by Claude Bardos (Université de Paris VII) entitled "From Particles to Fluids Through PDE and Boltzman's Equation," by Boris Schraiman (Bell Labs) on "Fluctuations and Mixing in Random Flow" and by Shi Jin (Courant Institute) on "Numerical Schemes for Hyperbolic Conservation Laws with Stiff Source Terms and their Applications."

The School has encouraged interaction between Mathematics and Natural Sciences and continues to maintain activity in applied mathematics. This year there were three Members who had joint appointments with the School of Natural Sciences, Brian Greene (Cornell), Maxim Kontsevich (Bonn) and Ping Sheng (Exxon).

The Marston Morse Memorial Lectures were delivered by Nigel J. Hitchin of the University of Warwick, March 8, 10 and 11. The title of his talks was "The Geometry of the Painlevé Equation."

The new Mathematics Building was completed this spring and was dedicated on April 2 and 3, 1993. The building was made possible by the vision and generosity of James Wolfensohn, the Board of Trustees, Marvin Goldberger, and G. Daniel Mostow. The new building will have an important impact on life at our School. It will integrate our membership and enhance the exchange of ideas. We believe that this building will foster a real sense of community by bringing those Members who would have been in the ECP building to the center of the campus. All our Members will now either be in Fuld Hall or in the new building. Those

Members who have moved into the new building are very enthusiastic about their offices.

ENRICO BOMBIERI was nominated “Chevalier de l’ordre des Palmes Académiques,” after ending a three-year period in an international advising committee for the Minister of Education of France. He was also awarded the International Prize “Gerolamo Cardano” from the University of Pavia. ROBERT LANGLANDS was elected to the National Academy of Sciences and was granted an honorary Doctor of Science degree at the University of Toronto. In January, LUIS CAFFARELLI delivered the Colloquium Lectures at the annual meeting of the American Mathematical Society in San Antonio on “Nonlinear Differential Equations and Lagrangian Coordinates.” In the Fall of 1992 ARMAND BOREL received the International E. Balzan Prize for his “fundamental contributions to the theory of Lie groups, algebraic groups and arithmetic groups.” The Balzan prize is offered in the physical, mathematical and natural sciences as well as for literature and humanity. Borel retires at the end of this year. Over the past 36 years he has made great contributions to the intellectual life of our School and to that of the Institute as a whole.

THE SCHOOL OF MATHEMATICS
MEMBERS AND VISITORS

STEVEN ALTSCHULER
Symplectic geometry, geometric evolution
equations
Australian National University, Canberra

FRANCESCO AMOROSO
Theory of numbers
University of Padova, Italy

HANS-JOACHIM BAUES
Algebraic topology
Max-Planck-Institut für Mathematik, Germany

CARL-FRIEDRICH BÖDIGHEIMER
Algebraic topology
University of Göttingen, Germany

ALBERTO CANDEL
Geometry and topology
Washington University

HUAI-DONG CAO
Differential geometry and nonlinear partial
differential equations
Columbia University

SUN-YUNG ALICE CHANG
Geometric partial differential equations
University of California, Los Angeles · *s*

RUTH CHARNEY
Geometric group theory
Ohio State University

PAULO CORDARO
Partial differential equations; Overdetermined
systems
Universidade de Sao Paulo, Brazil

KEVIN CORLETTE
Differential geometry; harmonic maps
University of Chicago · *f*

PANAGIOTA DASKALOPOULOS
Partial differential equations
University of Chicago

MICHAEL DAVIS
Topology, geometric group theory
Ohio State University

EDSON DE FARIA
Dynamical systems
City University of New York · *f*

MANUEL DEL PINO
Nonlinear partial differential equations
University of Minnesota

VINAY DEODHAR
Algebraic groups and Kac-Moody Lie algebras
Indiana University

VICTOR DONNAY
Dynamical systems
Bryn Mawr College · *v*

RICARDO GUILLERMO DURÁN
Numerical analysis
University of La Plata, Argentina · *s*

WEINAN E
Fluid dynamics; incompressible flows
Courant Institute

GERD FALTINGS
Arithmetic algebraic geometry
Princeton University

DEVRA GARFINKLE
Representation theory of Lie Groups
Rutgers University

CHRISTIAN GÉRARD
Mathematical physics; scattering theory
École Polytechnique,
France · *f*

BRIAN GREENE
Mathematical physics
Cornell University · *fj*

IAN GROJNOWSKI
Algebraic groups; representation theory
Massachusetts Institute of Technology

WALTER GUBLER
Arithmetic algebraic geometry
Eidgenössische Technische Hochschule,
Switzerland

-
- MATTHEW GURSKY
Partial differential equations; differential geometry
University of Chicago · *f*
- RICHARD HAMILTON
Differential geometry; nonlinear partial differential equations
University of California, San Diego · *f*
- ZHENG-CHAO HAN
Nonlinear partial differential equations; global analysis; differential geometry
Stanford University
- DENNIS HEJHAL
Analytic number theory, modular forms
University of Minnesota · *s*
- ALEXANDROU HIMONAS
Partial differential equations
University of Notre Dame
- LUCAS HSU
Differential geometry and calculus of variations
Mathematical Sciences Research Institute, Berkeley
- ALESSANDRA IOZZI
Discrete subgroups of Lie groups; ergodic theory
Mathematical Sciences Research Institute, Berkeley
- PUI TAK KAN
Nonlinear partial differential equations
University of Wisconsin, Madison
- NICOLAOS KAPOULEAS
Differential geometry and partial differential equations
Brown University
- GEORG KELLER
Mathematical Physics
Max-Planck-Institut für Physik, Germany · *s*
- BRUCE KLEINER
Differential geometry
University of Pennsylvania
- MAXIM KONTSEVICH
Algebraic geometry and mathematical physics
Max-Planck-Institut für Mathematik, Germany · *j*
- NICHOLAS KOREVAAR
Geometric analysis
University of Utah
- ROBERT KUSNER
Differential geometry and variational problems
University of Massachusetts, Amherst
- JOSEPH LANDSBERG
Geometry
University of Pennsylvania
- YNG-ING LEE
Differential and symplectic geometry
Stanford University
- JAMES LEPOWSKY
Conformal field theory, Kac-Moody Lie algebras
Rutgers University · *f*
- TONG LI
Nonlinear parabolic and hyperbolic partial differential equations
Courant Institute · *v*
- KEQIN LIU
Quantum groups
University of Alberta, Canada
- HARTMUT MAENNEL
Number theory
Max-Planck-Institut für Mathematik, Germany
- GEORGE MAJDA
Numerical solution of partial differential equations
Ohio State University
- ANTONIOS MELAS
Geometric analysis
University of California, Los Angeles
- MARIO MILMAN
Real and harmonic analysis
Florida Atlantic University
- DAVID MORRISON
Algebraic geometry
Duke University
- JULIA MUELLER
Number theory, Diophantine approximations
Fordham University · *f*
-

DIANA NUNZIANTE
 Partial differential equations
 Istituto Universitario Navale, Italy · *vf*

KIERAN O'GRADY
 Algebraic geometry, gauge theory
 Harvard University

VIJAY PARMAR
 Differential geometry
 University of Leeds, England · *v*

JAMES POMMERSHEIM
 Algebraic geometry
 University of Chicago

JONATHAN PORITZ
 Gauge theory, moduli spaces, harmonic metrics
 for stable bundles
 Mathematical Sciences Research Institute,
 Berkeley

DIPENDRA PRASAD
 Representation theory, automorphic forms
 Tata Institute of Fundamental Research, India

ZHENBO QIN
 Algebraic geometry, gauge theory, low-
 dimensional topology
 McMaster University, Canada

OLIVER RAMARÉ
 Analytic number theory
 Université Bordeaux I, France

YVAN SAINT-AUBIN
 Mathematical physics
 Université de Montréal, Canada

LESLIE SAPER
 Intersection cohomology
 Duke University

RICHARD SCHOEN
 Differential geometry and nonlinear partial
 differential equations
 Stanford University

DISTINGUISHED VISITING PROFESSOR

PING SHENG
 Wave propagation and localization in
 inhomogeneous media
 Exxon Research and Engineering Company · *j*

ISRAEL SIGAL
 Mathematical physics
 University of Toronto, Canada

TATIANA TORO
 Geometric measure theory, partial differential
 equations, differential geometry
 Stanford University

VLADIMIR VOEVODSKY
 Algebraic geometry; category theory
 Harvard University

C. EUGENE WAYNE
 Mathematical physics and dynamical systems
 Pennsylvania State University · *f*

GILBERT WEINSTEIN
 General relativity, differential equations,
 differential geometry
 University of Alabama, Birmingham · *vf*

NOEMI IRENE WOLANSKI
 Partial differential equations
 Universidad de Buenos Aires, Argentina · *s*

SIJUE WU
 Harmonic analysis; partial differential equations
 Courant Institute · *f*

PAUL YANG
 Geometric analysis
 University of Southern California

ERNST-WILHELM ZINK
 Representation theory of p -Adic groups
 Max-Planck-Gesellschaft, Germany · *f*

THE SCHOOL OF NATURAL SCIENCES

Faculty

STEPHEN L. ADLER [*New Jersey Albert Einstein Professor*]

JOHN N. BAHCALL
FREEMAN J. DYSON
PIET HUT
FRANK WILCZEK
EDWARD WITTEN

ACADEMIC ACTIVITIES

STEPHEN ADLER's main activity this year has been work on the final stages of his book on Quaternionic Quantum Mechanics, to be published by Oxford University Press. During the summer of 1992 he began work on a chapter on field theory, leading to some ideas for putting a Hamiltonian dynamics on a manifold with non-commuting (i.e., operator valued) coordinates. This work was put aside during August–October to permit further work on revisions. Larry Horwitz, during his visit to the Institute during September and October of 1992, reread the entire manuscript in its revised form and made a whole series of useful suggestions for changes, which were incorporated. Starting in November, Professor Adler resumed work on the field theory issue, and now a chapter on this is virtually complete. It gives an extension of standard quantum mechanics to systems with an invariance under general operator-valued gauge transformations, using a new type of Lagrangian and Hamiltonian based on a total trace as the primary tool. A condensed account of these results has been put out as a paper, since it will be a year and a half at least until the book is in print. Work in progress includes a short final chapter on outlook and open issues, and a review of the final three chapters with Larry Horwitz, who will again visit the Institute during the fall of 1993. Professor Adler now expects the manuscript to go to the publisher by November 1993.

As an outgrowth of his discussions with Professor Adler on quaternionic quantum mechanics, Horwitz wrote a paper showing that a time operator, which does not exist in complex quantum mechanics, exists in the quaternionic case under rather general conditions. Horwitz is exploring further implications of this, and has other investigations in progress on problems related to Professor Adler's program.

Professor Adler has also been discussing aspects of computational physics with Gyan Bhanot and with a Princeton graduate student, John Weckel, for whom he

and Bhanot are serving as thesis advisors. Currently, Weckel is working on a model which in various limits becomes the two dimensional XY model and the $q = \infty$ Potts model. This study aims to resolve the issue of whether the XY model has a continuum limit which is not of the Kosterlitz-Thouless type.

In other related work, Bhanot and Ben-Av (Princeton University) invented a procedure to study the relaxation of specific Fourier modes in numerical simulations. In a collaboration involving Bhanot, Lacki (IAS) and Weckel, and other researchers from Brookhaven National Lab and the University of Wuppertal, the method of exact partition functions was used to generate very high order series expansions (low and high temperature) in the Ising and Potts models in dimension $D = 2, 3, 4$ and 5 . Bhanot and Lacki used exact partition functions to study the critical properties of the $D = 3$ spin glass. They also invented a new method to use these exact partition functions to compute the low temperature expansion for spin glasses.

JOHN BAHCALL's work in 1992–1993 was focused on the solar neutrino problem and on the identification of the absorption lines in the spectra of quasars observed with the Hubble Space Telescope. Professor Bahcall developed a precise new test of the stellar evolution that can be performed in the future by measuring the average energy of a neutrino line that is produced in the solar interior. This line is calculated to be 1.29 KeV more energetic than the corresponding neutrino line that is produced in the laboratory. The difference reflects the central temperature distribution in the center of the sun and is ultimately due to thermal energy of the solar particles.

Professor Bahcall spent much of his time developing software that algorithmically identifies resonant absorption lines from abundant ions in the gaseous environments between us and distant quasars. The software makes statistically valid identifications in crowded spectra in spite of the fact that many accidental coincidences are possible between redshifted standard lines and the many observed lines. The first application of an earlier version of this software led to a determination of the density of hydrogen-rich (perhaps primordial) gas clouds in the nearby part of the universe. The current work is directed toward determining the density of hydrogen-rich clouds at intermediate cosmological distances, when the universe was perhaps one-half to one-quarter its present age. When this work is completed, astronomers will be able to trace the evolution of hydrogen-rich clouds from the nearest cosmological distances to the environments of the most distant quasars known.

FREEMAN DYSON worked mainly on mathematical problems in collaboration with Pavel Bleher, a visiting Member in the School of Natural Sciences. One of their studies resulted in a joint preprint, "Distribution of the Error Term for the Number of Lattice Points inside a Shifted Circle," which will be published

in “Communications in Mathematical Physics.” Others have resulted in preprints and papers by Bleher alone. The general aim of this work is to understand the effects of the transition from order to chaos in a classical dynamical system upon the statistical behavior of eigenstates in the corresponding quantum system. They are looking in detail at the eigenvalue statistics of classical systems that are completely integrable and so have maximal order. Numerical evidence suggests that classical order goes with quantum disorder and vice versa. But no rigorous statement of the inverse relationship between classical and quantum order has been formulated, let alone proved. Dyson and Bleher hope that their work will be a small step in this direction. They have had a lot of help from Peter Sarnak in the Princeton University mathematics department.

Professor Dyson spent part of the year preparing lectures for delivery at a variety of formal occasions. One was a Compton Memorial Lecture given at Washington University in St. Louis in conjunction with a meeting of astronomers to discuss the scientific output of the Compton Gamma-Ray Observatory now in orbit. This lecture, with the title “Revolutions in Astronomy,” was also given as a Faculty Lecture to the Institute community. Another lecture, with the title “Science and Ethics,” was given at the Mellon Seminar on Science and Society at the Institute. A third lecture, with the title “Homage to George Green,” was given in England in July 1993 at the celebration of George Green’s 200th birthday. He also gave convocation addresses at a couple of liberal arts colleges under the title “The Scientist as Rebel.”

PIET HUT’s research has focused on the study of dense stellar systems, with applications to globular star clusters and galactic nuclei. He has taken part in the design of large-scale simulations in collisional stellar dynamics, to be performed on the 1 Tflops special-purpose computer under development in the astronomy department at Tokyo University. As part of this effort, new tree-based algorithms for the treatment of close encounters and physical collisions were developed in collaboration with Jun Makino from Tokyo University and Steve McMillan from Drexel University.

Other studies of globular clusters included a series of Fokker-Planck simulations of post-collapse evolution, in which a detailed investigation was made of the properties of gravothermal oscillations, in collaboration with Joseph Breiden and Haldan Cohn of Indiana University. A theoretical study of the formation and dynamical evolution of stellar-mass black hole remnants in globular clusters was carried out in collaboration with Shri Kulkarni from the California Institute of Technology and Steve McMillan. This work resulted in potentially interesting observational consequences, by predicting a significant formation rate of black hole containing X-ray binaries.

In response to the recent discovery of a significant population of primordial binaries in globular clusters, Prof. Hut has made a study of binary-binary scattering experiments, partly numerically and partly through analytical calculations, in collaboration with Douglas Heggie from the University of Edinburgh. In addition, together with Steve McMillan, he continued a series of N-body simulations of tidally limited star clusters in which the influence of various populations of primordial binaries was investigated. With Jun Makino and Lars Hernquist, from the University of California at Santa Cruz, he completed a comparative study of the error propagation of various hardware and software limitations on collisional stellar dynamics calculations.

Professor Hut also took part in a seminar on Science Studies, organized by Professor Geertz in the School of Social Science.

FRANK WILCZEK's scientific activity over the past year, as in the previous year or two, falls into a few main categories:

QCD Phase Transition: Professor Wilczek's student, Krishna Rajagopal, and he worked out the consequences of the renormalization group applied to the QCD phase transition. This phase transition can be studied theoretically and numerically for various numbers of quark flavors and masses. The analysis indicates that the phase transition associated with chiral symmetry breaking is likely to be second order for two massless flavors but first order for three or more. In the case of the second order transition one can exploit universality to make many quantitative predictions, some of them quite striking. In laboratory experiments there is less flexibility, and one must live with a particular spectrum of quarks. It appears that for purposes of the transition the real world is close to the case of two massless quarks (u and d) while the strange quark plays a less important role, although it is not impossible that one actually lies close to the tricritical point which marks the boundary between 2 light flavor (second order) and 3 light flavor (first order) dynamics. In any case the actual u and d quarks are not precisely massless and the behavior of thermodynamic quantities near the transition therefore will be rapid but not truly singular. It is possible that something close to quark-gluon plasma in thermal equilibrium at a temperature above the QCD phase transition temperature can be produced in the course of heavy ion collisions. Indeed, recent calculations indicate this rather strongly for RHIC and LHC energies. Of course the plasma once produced will cool rapidly, and the question arises whether the dramatic events that have taken place leave dramatic signatures. Wilczek and Rajagopal explored the possibility that large correlated regions of misaligned chiral vacuum, similar to domains in a magnet, could develop. They found that such regions were likely to develop under conditions of a *quench*, that is when the hot plasma is suddenly put in contact with a much colder heat bath. While a quench is at best a very crude idealization of what actually happens in a heavy ion collision, it may serve to indicate qualitative

possibilities. Large misaligned regions once formed decay coherently toward the normal vacuum, radiating clusters of pions which are highly correlated in momentum and charge. The Centauro, anti-Centauro, and mini-Centauro phenomena observed in cosmic rays could be an indication of such behavior; if so, it would become much clearer in a controlled laboratory setting.

In the course of analyzing the quench Wilczek and Rajagopal discovered a mechanism for producing large coherent structures that appears to be rather general, and may have interesting consequences in other settings. They are considering similar phenomena that arise in the reheating phase of some inflationary universe models, with an eye toward the problem of primordial magnetic fields. Professor Wilczek believes that one can also apply their logic to suitable condensed matter systems, specifically to phases developing spin order at low temperatures. (It seems that in the existing condensed matter literature diffusive dynamics in zero field is considered almost exclusively, so they may have something to add.)

Condensed Matter: Professor Wilczek probably spent the bulk of his time during the indicated period struggling with the problem of high-temperature superconductivity, or more precisely with the problem of understanding the anomalous normal state properties of the copper oxides which appears to exhibit the microscopic dynamics more clearly. However his ideas on this problem are still unsettled, and it would be inappropriate to discuss them here.

Professor Wilczek has continued to be interested in the quantum Hall effect, especially in the parts of the theory which use the ideas of anyons and statistical transmutation. He has developed a modification of the conventional effective field theory of the fractional quantized effect, that he believes has significant conceptual advantages. It is based on representing electrons as composites of fractionally charged, fractional statistics "quarks." In this picture, which can be made mathematically precise, the quantized Hall effect occurs as a Higgs-like phase when the quark fields condense. Traditionally experimentalists have explored the quantum Hall states by transport measurements. Recently they have begun to do spectroscopy (numerical "experimentalists" have been doing this implicitly for years, since a main source of information on these states is exact diagonalization studies). This will afford the possibility of much more direct quantitative manifestations of fractional statistics, which Professor Wilczek has begun to explore.

Black Holes: Because of the foregoing projects Professor Wilczek's planned activity in this area has been somewhat on the back burner. Christoph Holzhey and he did some work which he believes clarifies the difference between true thermodynamic (coarse-grained) entropy and the formal entropy associated with the radiation fields of moving mirrors or (presumably) black holes. Holzhey wrote this work up in his thesis, and Professor Wilczek is now preparing a

lengthy account of it. An aspect of this work he finds particularly intriguing is that it raises the whole question of defining a local notion of entropy in quantum field theory. Problems analogous to the ultraviolet catastrophe in defining localized energy in quantum field theory occur, and apparently one must regularize and renormalize in the context of entropy too. So far only free field theory has been analyzed, but Professor Wilczek is tackling interacting theories with another student.

Tooling Up: Professor Wilczek has spent a substantial amount of time trying to strengthen his grasp of superstring theory. One concrete issue he would like to understand is the status of various “non-renormalization” theorems. Roughly speaking these theorems state that certain quantities do not receive corrections in any finite order of perturbation theory. These theorems are among the most important foundations for attempts to derive predictions from superstring theory, but at the same time lead to central difficulties including the difficulty of breaking supersymmetry and of giving the dilaton a mass. In any case, the relevant perturbation series do not converge. There are techniques from field theory that allow one to push the analysis further in such situations. These techniques have not been fully exploited even within field theory, and Professor Wilczek is attacking a cluster of problems in that domain (precise quantitative use of instantons in high temperature QCD and vortices in the XY model, estimate of monopole-antimonopole production at high energies in model field theories, corrections to the non-renormalization theorems of supersymmetric field theory) on the way to addressing string theory.

There have been two major new directions in EDWARD WITTEN’s work during 1992–93:

(1) One involves a new approach to string field theory, that is, to formulating a Lagrangian whose perturbative expansion would give string theory as we know it. This Lagrangian should be background independent and gauge invariant.

It has long been felt that background independence might be achieved in the sigma model approach to string theory, by working in the space of all two dimensional field theories. There have been two basic problems: (a) because of ultraviolet divergences, one does not have much insight about a wished-for space of two dimensional field theories parametrized by the space of all Lagrangians (b) even granted such a space, one has had no idea how to construct a gauge invariant Lagrangian in that space.

In his paper “On Background Independent Open-String Field Theory,” Professor Witten obtained some insight about the second question. Formally, at least in the open-string case, he showed how to construct a gauge invariant Lagrangian on the space of all world-sheet theories; the Lagrangian has world-sheet BRST

invariance for the classical equations of motion, as expected. Professor Witten showed that an antibracket (in the sense of Batalin and Vilkovisky) on the space of two dimensional field theories is the main structure needed to carry this out.

Professor Witten has pursued this matter in two subsequent papers. In “Some Computations In Background Independent Off-Shell String Theory,” he made the definition of the string field action concrete in some cases in which ultraviolet divergences are not a problem. In a forthcoming paper, five-year Member Keke Li and Professor Witten investigate the role of the ultraviolet divergences (and thus the crucial, unsolved problem (a) mentioned above) in a special situation.

(2) Professor Witten once again has been working on properties of the $N=2$ superconformal models that are used in making models of particle physics from string theory. He made several contributions.

(a) In “Phases Of $N=2$ Theories In Two Dimensions,” he gave a much better explanation of the relation of Calabi-Yau and Landau-Ginzburg models than had existed previously. It turned out, unexpectedly, that this gave rise to insights about some apparently different questions, such as the occurrence of topology-changing processes in physics, that is processes in which the topology of space-time changes. (Along with parallel work by Paul Aspinwall, Brian Green, and David Morrison here at the Institute, which will be mentioned shortly, this development was featured in the February 27 issue of *Science News* magazine.) Professor Witten thinks this work makes the whole theory of string theory on Calabi-Yau manifolds much more beautiful. Some aspects of this work may also prove to have applications relatively close to phenomenology.

(b) In “Landau-Ginzburg Models and $N=2$ Minimal Models,” Professor Witten has obtained a much better understanding of the Landau-Ginzburg description of $N=2$ minimal models in two dimensions than had existed previously.

(c) In a forthcoming paper, “On Quantum Background Independence In String Theory,” he analyzes the “holomorphic anomaly” recently found by Bershadsky, Cecotti, Ooguri, and Vafa as an obstruction to ordinary background independence in certain topological field theories. He also proposes a more exotic sense in which background independence does hold in this situation. Professor Witten hopes that this phenomenon may be relevant to ordinary background independence in string theory, the question addressed in (1) above.

Professor Witten notes that we have had a mini-workshop on mirror symmetry (a remarkable non-classical relation between different space-times that is possible in string theory) here at the Institute this year, with the participation of Aspinwall, Morrison, and Greene. They made a fundamental discovery using mirror symmetry to predict the possibility of change in the topology of space-time; this

work interrelated with Professor Witten's work mentioned above in a fashion that is too complex to summarize here. Professor Witten's choice of problems in (a) and (b) above was motivated partly by the fact that these particular points are important in relation to mirror symmetry. One of his aspirations for the future, so far unrequited, is to get a better explanation of mirror symmetry. He also has been working intensively, but so far inconclusively, on the problem of the cosmological constant in string theory.

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THE SCHOOL OF SOCIAL SCIENCE

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JOAN WALLACH SCOTT

MICHAEL WALZER [*UPS Foundation Professor*]

Professor Emeritus

ALBERT O. HIRSCHMAN

INTERPRETIVE SOCIAL SCIENCE

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

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

ACADEMIC ACTIVITIES

Nineteen scholars, from an applicant pool of 266, were invited to join the permanent faculty in the School of Social Science scholarly community as Members and Visitors for 1992–93; three research assistants also participated in the year's activities. The Mellon Foundation provided partial support for seven of the fellows, the National Endowment for the Humanities also provided support for seven, and the Volkswagen Stiftung, one. The UPS Foundation provided general support for the group of ten women and twelve men.

Individuals in this group came from England, France, Germany, Israel, Italy, and the Netherlands, as well as the United States. Their fields of inquiry were anthropology, three; folklore, one; history, seven; philosophy, one; political economy, one; political science, four; and sociology, five.

In 1992–93 the School concluded a three-year program on new perspectives on the history, sociology, and philosophy of the sciences and the social sciences, with the focus for this year on "The Philosophy and Sociology of Science": how conceptual systems arise and change, the intersection between science and government, and discussion about how knowledge is produced.

PROFESSOR CLIFFORD GEERTZ was awarded the Fukuoka Asian Cultural Prize (Academic, International) for 1992. He gave the keynote address to the conference on "New Directions in Ethnography" at the University of Colorado in Boulder, spoke at the Instituto Suor Orsola in Naples and the Fondazione San Carlo in Modena, served as commentator to Professor Amartya Sen's Trilling Lecture at Columbia University, participated in the conference on "The Cultural Significance of Place" at the School of American Research in Santa Fe, served on the Selection Committee of the Cornell Society for the Humanities, and presented a Faculty Lecture at the Institute. Professor Geertz's recent published works include "Achter de Feiten: Twee Landen, Vier Decennia, Één Antropoloog" in C. Bouw and B. Kruithof, eds., *De Kern van het Verschil: Culturen en Identiteiten*, Amsterdam: Amsterdam University Press, 1993, pp. 41–58; "The Strange Estrangement: Charles Taylor and the Natural Sciences," *The Philosophy of Charles Taylor: Critical Perspectives*, James Tully, ed., Cambridge: Cambridge University Press; "Preface," to K. Newland and K. Soedjatmoko, *Common Humanity: An Indonesian Voice for Global Solidarity. Selected Writings of Soedjatmoko*, Kumarian Press; "'Ethnic Conflict': Three Alternative Terms," *Common Knowledge*, all in press.

PROFESSOR EMERITUS ALBERT O. HIRSCHMAN published "Exit, Voice, and the Fate of the German Democratic Republic: An Essay in Conceptual History," *World Politics*, January 1993; "Industrialization and its Manifold Discontents: West, East, and South," *World Development*, September 1992; and "Does the

Market Keep Us out of Mischief or out of Happiness?" (review article on Robert E. Lane, *The Market Experience*, 1991), *Contemporary Sociology*, 21/6, November 1992. His 1986 collection, *Rival Views of Market Society and Other Recent Essays*, was published in a paperback edition, with a new preface by the author, by Harvard University Press, 1992, and his *Journeys toward Progress: Studies of Economic Policy-Making in Latin America*, which was first published in 1963, was reprinted by the Westview Press. *The Rhetoric of Reaction* (1991), which had already been translated into French, Italian, and Spanish, appeared in German and Portuguese editions.

Professor Hirschman participated in a conference on "Social Justice and Inequalities" organized by the Commissariat Général du Plan, Paris, in November 1992 and presented a paper, "La rhétorique progressiste et le réformateur" (Progressive rhetoric and the reformer). This paper was published in the magazine *Commentaire*, Summer 1993; subsequently, Professor Hirschman expanded it to a general retrospective article on *The Rhetoric of Reaction*.

Professor Hirschman gave the Il Mulino Lecture (a lecture sponsored annually by the publishing house Il Mulino) in Bologna and a Political Economy Lecture at Harvard University. He also lectured at the universities of Coimbra (Portugal) and Zurich (Switzerland).

In the fall semester of 1992, a group of social scientists at M.I.T. held a seminar on the work of Professor Hirschman, with particular attention to his writings in the field of economic development. The papers and transcripts of the discussions were sent to Professor Hirschman, who presented some reflections, under the title "A Propensity to Self-Subversion," at the last session of the seminar in December. A volume of essays based on the seminar presentations may be forthcoming.

During May and June, Professor Hirschman returned to the Wissenschaftskolleg in Berlin as a permanent visiting fellow. In the course of the academic year he received three honorary degrees: from the Universidad Internacional Meléndez Pelayo in Santander (Spain) in July 1992, from the University of Coimbra (Portugal) in April 1993, and from the University of Paris-X (Nanterre) in May 1993.

During 1992–93 PROFESSOR JOAN SCOTT delivered papers at the University of Utrecht (Netherlands), the University of Sussex (England), and the Universities of Buffalo and Illinois, Champaign-Urbana. She also gave papers at the meetings of the American Historical Association and at the Berkshire Conference of Women Historians. In October, Professor Scott was the keynote speaker at the Food and Drug Law Institute Seminar in Washington, D.C. on "Women in Clinical Trials of FDA Regulated Products: Who Participates and Who Decides?" She conducted a seminar at the New York Psychoanalytic Association meetings.

Professor Scott participated in a meeting at the Ford Foundation to assess the future direction of women's studies programs and served on the selection committee for the French-American Foundation's Bicentennial Fellowships.

During the academic year 1992-93, PROFESSOR MICHAEL WALZER gave the Edward Block Lecture at Indiana University and the Frank M. Covey Lectures in Political Analysis at Loyola University in Chicago. He delivered papers at conferences in Paris (on justice, sponsored by the French government's Comissariat du Plan), in Turin (on the future of the Left, sponsored by the Rosselli Foundation), and in Jerusalem (on war and peace in different religious traditions, sponsored by the Ethikon Foundation). He talked about "the culture of community" at several meetings organized by the New Jersey Committee for the Humanities. Professor Walzer's book *What It Means to be an American* was published in English (it had appeared earlier in Italian). A collection of his essays came out in Germany under the title *Zivile Gesellschaft und amerikanische Demokratie*. *Spheres of Justice* was published in German translation and *Exodus and Revolution* in Hebrew. One of his essays on nationalism appeared in the course of the year in Czech, Dutch, French, German, Italian, Polish and Spanish translations. Here in Princeton, he continued to work on nationalist and ethnic politics, on a book on "biblical politics," and on a collaborative project on Jewish political thought.

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“The road to the general, to the revelatory simplicities of science, lies through a concern with the particular, the circumstantial, the concrete, but a concern organized and directed in terms of the sort of theoretical analyses that I have touched upon — analyses of physical evolution, of the functioning of the nervous system, of social organization, of psychological process, of cultural patterning, and so on — and most especially, in terms of the interplay among them. That is to say, the road lies, like any genuine Quest, through a terrifying complexity.”

CLIFFORD GEERTZ

THE LIBRARIES

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

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

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

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

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

The *Mathematics-Natural Sciences Library* [Momota Ganguli, Librarian] is located on the second floor of Fuld Hall and contains some 30,000 volumes (including bound periodicals and monographs) plus subscriptions to nearly 200 journals. Its collection of older periodicals (prior to 1940) is housed in compact shelving on the lower level of the Historical Studies-Social Science Library. The areas covered by this collection are pure and applied mathematics, astrophysics and theoretical, particle and mathematical physics.

Both of the Institute's libraries participate in the shared cataloguing system of the Research Libraries Group, which gives Institute scholars computerized access to a database that contains more than fourteen million records. Searches of this database retrieve bibliographic information and identify the location of materials in all participating libraries. Scholars who use the Historical Studies-Social Science Library can also conduct computerized searches in the Avery Art Index, the Eighteenth Century Short Title Catalogue and such indexes as the Art Index, the Humanities Index and the Social Science Index.

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

The librarians, the faculties and the visiting scholars of all four Schools at the Institute warmly appreciate gifts, too numerous to mention here, of books and articles from former and current Members of the Institute.

RECORD OF EVENTS

What follows is a calendar of events sponsored by the Schools of
Historical Studies, Mathematics, Natural Sciences and Social Science
and by the Office of the Director

Academic Year 1992–1993

September 22

School of Mathematics

Algebraic Geometry Seminar: “Factorization in
CFT” (Verlinde-formula)

GERD FALTINGS, *IAS*

PDE Seminar: “Blow-up Surfaces for Nonlinear
Wave Equations”

SATYANAD KICHENASSAMY, *University of
Minnesota*

September 25

School of Historical Studies

Art History Colloquium: “The Architectural
Drawings of Antonio da Sangallo the Younger:
Problems and Preliminary Results”

NICHOLAS ADAMS, *IAS*

School of Natural Sciences

Lunchtime Seminar: “On Background
Independent Open-String Field Theory”

EDWARD WITTEN, *IAS*

September 28

School of Natural Sciences

Theoretical Physics Seminar: “Gravitational
Waves in the Cosmic Microwave Background”

RICK DAVIS, *University of Pennsylvania*

September 29

School of Mathematics

Algebraic Geometry Seminar: “Factorization in
CFT” (Verlinde-formula)

GERD FALTINGS, *IAS*

PDE Seminar: “Asymptotic Behavior for a
Parabolic Problem of the Emden-Fowler Type”

IRENEO PERAL, *Universidad de Autónoma de Madrid*

Scalar and Mean Curvature Seminar: “A Survey
of Prescribed Curvature Problems”

PAUL YANG, *IAS*

School of Natural Sciences

Condensed Matter Seminar: “Electrodynamics of
a Quantum Hall Liquid”

CHARLES HANNA, *IBM Watson Research Center*

September 30

School of Mathematics

Superrigidity Seminar: “Introductory Survey”
ARMAND BOREL, *IAS*

Diophantine Approximation Seminar: “New
Effective Methods for the Thue Equation”

ENRICO BOMBIERI, *IAS*

Geometry Seminar: “Manifolds Without
Conjugate Points”

BRUCE KLEINER, *IAS*

October 1

School of Mathematics

Quantum Algebraic Geometry Seminar:
“Introduction to Mirror Manifolds”

BRIAN GREENE, *IAS*

Geometric Heat Flows Seminar: “A Survey of
Geometric Flows”

RICHARD HAMILTON, *IAS*

Ricci Flow Seminar: “Results and Conjectures in
the Ricci Flow”

RICHARD HAMILTON, *IAS*

October 2

School of Social Science

Science Studies Seminar: Organizational Meeting
CLIFFORD GEERTZ, *IAS*

October 5

School of Mathematics

Members Seminar: “A Survey of L_2 -
cohomology”

LESLIE SAPER, *IAS*

October 6

School of Mathematics

Algebraic Geometry Seminar: “Factorization in
CFT” (Verlinde-formula)

GERD FALTINGS, *IAS*

PDE Seminar: “Green’s Function Estimates and
the Moser-Trudinger Inequality”

WILLIAM BECKNER, *University of Texas, Austin*

Scalar and Mean Curvature Seminar: "A Survey of Constructions of Constant Mean Curvature Surfaces"

NICOLAOS KAPOULEAS, *IAS*

October 7

School of Mathematics

Superrigidity Seminar: "Archimedean Superrigidity in Hyperbolic Geometry"

KEVIN CORLETTE, *IAS*

Diophantine Approximation Seminar: "New Effective Methods for the Thue Equation"

(continued)

ENRICO BOMBIERI, *IAS*

Geometry Seminar: "The Ricci Flow in Three and Four Dimensions"

RICHARD HAMILTON, *IAS*

October 8

School of Mathematics

Quantum Algebraic Geometry Seminar: "Introduction to Mirror Manifolds, Part II"

BRIAN GREENE, *IAS*

Geometric Heat Flows Seminar: "A Survey of Geometric Flows" (continued)

RICHARD HAMILTON, *IAS*

Ricci Flow Seminar: "Results and Conjectures in the Ricci Flow" (continued)

RICHARD HAMILTON, *IAS*

Applied Mathematics-Math Physics Seminar: "Spectra of Liapunov Exponents for Systems with Many Degrees of Freedom"

EUGENE WAYNE, *IAS*

School of Social Science

Luncheon Seminar: "The Strange Estrangement: Charles Taylor and the Natural Sciences"

CLIFFORD GEERTZ, *IAS*

October 9

School of Mathematics

Special PDE Seminar: "Superquadratic Elliptic Systems"

DJAIRO DE FIGUEIREDO, *Universidade Estadual de Campinas, Brazil*

School of Natural Sciences

Lunchtime Seminar: "Unitary Matrix Models and Open Strings"

CLIFFORD JOHNSON, *IAS*

School of Social Science

Science Studies Seminar: "Scientific Change, Discussion of "Naturalistic Theories of Scientific Change"

LARRY LAUDAN, STEPHEN BRUSH, YUVAL YONAY, *IAS*

October 12

School of Mathematics

Members Seminar: "Branching Laws for Representations of Real and p-adic Groups"

DIPENDRA PRASAD, *IAS*

School of Natural Sciences

Theoretical Physics Seminar: "Navigating Around the Algebraic Jungle of QCD"

C.S. LAM, *McGill University*

October 13

School of Mathematics

Algebraic Geometry Seminar: "Factorization in CFT" (Verlinde-formula)

GERD FALTINGS, *IAS*

PDE Seminar: "A Priori Estimates and Existence for a Semilinear Elliptic System"

MANUEL DEL PINO, *IAS*

Scalar and Mean Curvature Seminar: "Analogues Between Constant Scalar and Mean Curvature"

NICHOLAS KOREVAAR, *IAS*

School of Natural Sciences

Theoretical Physics Seminar: "Navigating Around the Algebraic Jungle of QCD"

C.S. LAM, *McGill University*

October 14

School of Mathematics

Superrigidity Seminar: "Archimedean Superrigidity in Hyperbolic Geometry" (continued)

KEVIN CORLETTE, *IAS*

School of Mathematics

Diophantine Approximation Seminar: "New Effective Methods for the Thue Equation"

(continued)

ENRICO BOMBIERI, *IAS*

Geometry Seminar: "The Ricci Flow on Kähler Manifolds"

HUAI-DONG CAO, *IAS*

School of Natural Sciences

Condensed Matter Seminar: "How to Create Topological Defects and a New Phase of Matter in Nematic Liquid Crystals Using Little Balls"

JOHN TONER, *IBM Watson Research Center*

October 15

School of Historical Studies

Medieval Seminar: "Godfrey of Viterbo (c. 1125-1202?)"

LOREN WEBER, *IAS*

School of Mathematics

Quantum Algebraic Geometry Seminar: "Hodge Theory and Mirror Symmetry"

DAVID MORRISON, *IAS*

Geometric Heat Flows Seminar: "A Survey of Geometric Flows" (continued)

RICHARD HAMILTON, *IAS*

Ricci Flow Seminar: "Results and Conjectures in the Ricci Flow" (continued)

RICHARD HAMILTON, *IAS*

Applied Mathematics-Math Physics Seminar: "Stability of Fronts and the Kuramoto-Sivashinsky Equations"

JONATHAN GOODMAN, *Courant Institute*

School of Social Science

Luncheon Seminar: "The Role of Journals in the Social Construction of Scientific Knowledge"

STEPHEN COLE, *IAS*

October 16

School of Mathematics

Special Math Physics Seminar: "Infinite Genus Riemann Surfaces"

EUGENE TRUBOWITZ, *E.T.H., Zurich*

School of Social Science

Science Studies Seminar: Scientific Change (continued) Discussion of I. Bernard Cohen, "Introduction" to *Revolution in Science*; Stephen Cole, "Shapin and Pickering"; Keith W. Kintigh, "Archaeoastronomy and Archaeology"; Dudley Shapere, "The Scope and Limits of Scientific Change"; and Steven Shapin, "History of Science and Its Sociological Reconstructions"

LARRY LAUDAN, STEPHEN BRUSH, YUVAL YONAY, *IAS*

October 19

School of Mathematics

Members Seminar: "Rigidity of Integral Curves and Gromov's h-principle"

LUCAS HSU, *IAS*

October 20

School of Mathematics

Algebraic Geometry Seminar: "Factorization in CFT" (Verlinde-formula)

GERD FALTINGS, *IAS*

PDE Seminar: "Maxwell's Equations with the Effects of a Temperature Field"

HONG-MING YIN, *Notre Dame*

Scalar and Mean Curvature Seminar: "Curvature Flows: Existence and Regularity"

LIHE WANG, *Princeton University*

October 21

School of Mathematics

Superrigidity Seminar: "Harmonic Maps and Non-archimedean Superrigidity"

RICHARD SCHOEN, *IAS*

Diophantine Approximation Seminar: "New Effective Methods for the Thue Equation" (continued)

ENRICO BOMBIERI, *IAS*

Geometry Seminar: "The Isosystolic Problem"

EUGENIO CALABI, *University of Pennsylvania*

School of Historical Studies

Islamic Seminar

MAYA SHATZMILLER, *IAS*

October 22

School of Historical Studies

Art History Colloquium: "Problems in the Art of Crusader Silver"

BORIS MARSHAK, *IAS*

School of Mathematics

Quantum Algebraic Geometry Seminar: "Sigma Models, I"

EDWARD WITTEN, *IAS*

Geometric Heat Flows Seminar: "A Survey of Geometric Flows" (continued)

RICHARD HAMILTON, *IAS*

Ricci Flow Seminar: "Results and Conjectures in the Ricci Flow" (continued)

RICHARD HAMILTON, *IAS*

Applied Mathematics–Math Physics Seminar:
“Scaling Theory for Localization and Density of
States”

THOMAS SPENCER, *IAS*

School of Social Science

Luncheon Seminar: “Folklore and Authenticity:
Excerpts of a History of Values in Scholarship
and Practice”

REGINA BENDIX, *IAS*

October 23

School of Natural Sciences

Lunchtime Seminar: “Dilaton Gravity and WZW-
Models”

CHIARA NAPPI, *IAS*

October 26

School of Mathematics

Members Seminar: “Renormalization of Circle
Mappings”

EDSON DE FARIA, *IAS*

School of Natural Sciences

Theoretical Physics Seminar: “Tunneling to
Monopoles in Quantum Hall Systems”

A. ZEE, *University of California, Santa Barbara*

October 27

School of Mathematics

Algebraic Geometry Seminar: “Factorization in
CFT” (Verlinde-formula)

GERD FALTINGS, *IAS*

PDE Seminar: “The Cauchy Problem for
Generalized Porous Medium Equations”

PANAGIOTA DASKALOPOULOS, *IAS*

Scalar and Mean Curvature Seminar: “The Ricci
Flow on \mathbf{R}^2 (the limiting case for the porous
medium equation)”

LANG-FANG WU, *Princeton University*

October 28

School of Mathematics

Superrigidity Seminar: “Harmonic Maps and
Non-archimedean Superrigidity” (continued)

RICHARD SCHOEN, *IAS*

Diophantine Approximation Seminar: “New
Effective Methods for the Thue Equation”

(continued)

ENRICO BOMBIERI, *IAS*

Geometry Seminar: “Kähler–Einstein Metrics and
Mumford Stability”

GANG TIAN, *Courant Institute*

School of Natural Sciences

Condensed Matter Seminar: “Generalized
Coherent Potential Approximation — Theory of
Quasi Modes in Dense Random Media”

PING SHENG, *IAS*

October 29

School of Historical Studies

Art History Colloquium: “The Early Islamic
Monuments of Jerusalem: Reflections on a Recent
Publication”

MYRIAM ROSEN-AYALON, *IAS*

School of Mathematics

Quantum Algebraic Geometry Seminar: “Sigma
Models, II”

EDWARD WITTEN, *IAS*

Geometric Heat Flows Seminar: “A Survey of
Geometric Flows” (continued)

RICHARD HAMILTON, *IAS*

Ricci Flow Seminar: “Results and Conjectures in
the Ricci Flow” (continued)

RICHARD HAMILTON, *IAS*

Applied Mathematics–Math Physics Seminar:
“Periodic Solutions of Non-linear Wave and
Schroedinger Equations”

I.M. SIGAL, *IAS*

School of Social Science

Science Studies Seminar: Constructionism and
Networks, Discussion of Bruno Latour, “Give
Me a Laboratory”; Steven Shapin, “Pump and
Circumstance”; and Sergio Sismondo, “Some
Social Constructions”

KARIN KNORR-CETINA, STEPHEN COLE, JAMES
RULE, MARIANNE DE LAET, *IAS*

Luncheon Seminar: “Arias of Ambiguity:
Intercession and Social Status in Islamic Cairo”

SHAUN MARMON, *IAS*

October 30

Faculty Lecture: “Revolutions in Astronomy”

FREEMAN DYSON, *IAS*

November 2

School of Mathematics

Members Seminar: "A Survey of Algorithms in Primitive Ideal Theory"

DEVRA GARFINKLE, *IAS*

November 3

School of Mathematics

Algebraic Geometry Seminar: "Factorizations in CFT" (Verlinde-formula)

GERD FALTINGS, *IAS*

PDE Seminar: "Stability of Some Eigenvalue Estimates"

ANTONIOS MELAS, *IAS*Scalar and Mean Curvature Seminar: "The Structure of Surfaces with L^2 Second Fundamental Form"TATIANA TORO, *IAS*

November 4

School of Mathematics

Superrigidity Seminar: "Harmonic Maps and Non-archimedean Superrigidity" (continued)

RICHARD SCHOEN, *IAS*

November 5

School of Historical Studies

Medieval Seminar: "The Tremessen Chalice"

ROBERT BENSON, *IAS*

School of Mathematics

Quantum Algebraic Geometry Seminar: "The Simplest Case of Mirror Symmetry"

PAUL ASPINWALL, *IAS*

Geometric Heat Flows Seminar: "A Survey of Geometric Flows" (continued)

RICHARD HAMILTON, *IAS*

Ricci Flow Seminar: "Results and Conjectures in the Ricci Flow" (continued)

RICHARD HAMILTON, *IAS*

Applied Mathematics-Math Physics Seminar: "Trapping, Percolation and Anomalous Diffusion of Particles in a 2D Random Field"

MARCOS AVELLENADA, *Courant Institute*

School of Social Science

Luncheon Seminar: "How (Scientific) Controversies End"

LARRY LAUDAN, *IAS*

November 6

School of Natural Sciences

Lunchtime Seminar: "How to Generate Very High Order Weak Coupling Expansions for Discrete Spin Models and What They are Good For"

GYAN BHANOT, *IAS*

November 9

School of Mathematics

Members Seminar: "Donaldson's Polynomials"

KIERAN O'GRADY, *IAS*

School of Natural Sciences

Theoretical Physics Seminar: "A Predictive Ansatz for Fermion Masses and Mixing Angles"

STUART RABY, *Ohio State University*

November 10

School of Mathematics

Scalar and Mean Curvature Seminar: "Prescribing Scalar Curvature on S^3 , S^4 and Related Topics"YANYAN LI, *Rutgers University*

November 11

School of Mathematics

Superrigidity Seminar: "Harmonic Maps and Non-Archimedean Superrigidity" (continued)

RICHARD SCHOEN, *IAS*

School of Natural Sciences

Condensed Matter Seminar: "Heavy Fermion Insulators and Superconductors: Persistent Questions and Possible Common Origins"

P. COLEMAN, *Rutgers University*

November 12

School of Historical Studies

Art History Colloquium: "An Unknown Statue of Virgil in the Middle Ages"

NORBERTO GRAMACCINI, *Bern University*

School of Mathematics

Quantum Algebraic Geometry Seminar: "Rational Curves and Mirror Symmetry"

DAVID MORRISON, *IAS*

Geometric Heat Flows Seminar: "A Survey of Geometric Flows" (continued)

RICHARD HAMILTON, *IAS*

Ricci Flow Seminar: "Results and Conjectures in the Ricci Flow" (continued)

RICHARD HAMILTON, *IAS*

Applied Mathematics-Math Physics Seminar:
 “Classical Global Existence for Supercritical
 Non-linearities and Large Data”

AVY SOFFER, *Princeton University*

School of Social Science

Luncheon Seminar: “Dynamics of Theory-
 Change in Science: The Role of Predictions”

STEPHEN BRUSH, *IAS*

November 13

School of Social Science

Science Studies Seminar: Non-Human Actors in
 Networks, Discussion of Michel Callon, “Some
 Elements of a Sociology of Translation”; H. M.
 Collins and Steven Yearley, “Epistemological
 Chicken”; Jim Johnson and Bruno Latour,
 “Mixing Humans and Nonhumans Together”;
 and Bruno Latour, “One More Turn after the
 Social Turn”

KARIN KNORR-CETINA, *IAS*

November 16

School of Mathematics

Members Seminar: “Toric Varieties, Lattice
 Points and Dedekind Sums”

JAMES POMMERSHEIM, *IAS*

November 17

School of Mathematics

PDE Seminar: “Nonlinear Wave Equations”

MICHAEL STRUWE, *ETH, Zurich*

Scalar and Mean Curvature Seminar: “Adding
 Handles to the Helicoid”

DAVID HOFFMAN, *University of Massachusetts*

November 18

School of Mathematics

Superrigidity Seminar: “Harmonic Maps and
 Non-archimedean Superrigidity” (continued)

RICHARD SCHOEN, *IAS*

Geometry Seminar: “Arithmetic Quantum
 Chaos”

PETER SARNAK, *Princeton University*

School of Natural Sciences

Condensed Matter Seminar: “Super-Lax Pairs
 and Infinite Symmetries in the $1/r^2$ System”

B. SRIRAM SHASTRY, *AT&T Bell Labs*

Faculty Lecture: “The Invention of Martyrdom”

GLEN W. BOWERSOCK, *IAS*

School of Historical Studies

Islamic Seminar

BORIS MARSHAK, *IAS*

November 19

School of Historical Studies

Mellon Seminar: “Culture and the Church”
 “The Church and the Cult of the Saints”

THOMAS HEAD, *IAS* and PATRICIA LABALME, *IAS*

School of Mathematics

Quantum Algebraic Geometry Seminar: “Sigma
 Models” (continued)

EDWARD WITTEN, *IAS*

Geometric Heat Flows Seminar: “A Survey of
 Geometric Flows” (continued)

RICHARD HAMILTON, *IAS*

Ricci Flow Seminar: “Results and Conjectures in
 the Ricci Flow” (continued)

RICHARD HAMILTON, *IAS*

School of Social Science

Luncheon Seminar: “What Shape Will the
 ‘Down-Curve’ Assume? Proof, Persuasion and
 the Nobel Prize”

DIANA BARKAN, *IAS*

November 20

School of Mathematics

Special Geometry Seminar: “Rigidity in Sub-
 Riemannian Geometry”

ROBERT BRYANT, *Duke University*

Applied Mathematics-Math Physics Seminar: “A
 New Type of Stochastic Process”

LAWRENCE GRAY, *University of Minnesota*

School of Natural Sciences

Lunchtime Seminar: “Geometry of the 2+1
 Black Hole”

CLAUDIO TEITELBOIM, *IAS*

November 23

School of Natural Sciences

Theoretical Physics Seminar: “Quantum Fluids
 and Plate Tectonics in Neutron Stars”

MAL RUDERMAN, *Columbia University*

November 24

School of Mathematics

PDE Seminar: “An A Priori Estimate for
 Solutions to the Scalar Curvature Equation”

MATTHEW GURSKY, *IAS*

Quantum Algebraic Geometry Seminar:
“Monodromy and Mirror Symmetry”
DAVID MORRISON, *IAS*

Scalar and Mean Curvature Seminar:
“Equilibrium Configurations of Coaxial Black
Holes”
GILBERT WEINSTEIN, *IAS*

November 25
School of Mathematics
Superrigidity Seminar: “Harmonic Maps and
Non-archimedean Superrigidity” (continued)
RICHARD SCHOEN, *IAS*

November 30
School of Mathematics
Members Seminar: “A Survey of Kazhdan-
Lusztig Theory and Related Topics”
VINAY DEODHAR, *IAS*

December 1
School of Mathematics
Scalar and Mean Curvature Seminar:
“Prescribing Scalar Curvature on S^2 , S^3 ”
MATTHEW GURSKY, *IAS*

December 2
School of Mathematics
Superrigidity Seminar: “Harmonic Maps and
Non-archimedean Superrigidity” (continued)
RICHARD SCHOEN, *IAS*

Diophantine Approximation Seminar: “New
Effective Methods for the Thue Equation”
(continued)
ENRICO BOMBIERI, *IAS*

Geometry Seminar: “Kähler Manifolds with
Constant Scalar Curvature”
CLAUDE LEBRUN, *SUNY, Stony Brook*

December 3
School of Mathematics
Quantum Algebraic Geometry Seminar: “Sigma
Models” (continued)
EDWARD WITTEN, *IAS*

Geometric Heat Flows Seminar: “A Survey of
Geometric Flows” (continued)
RICHARD HAMILTON, *IAS*

Ricci Flow Seminar: “Results and Conjectures in
the Ricci Flow” (continued)
RICHARD HAMILTON, *IAS*

Applied Mathematics–Math Physics Seminar:
“Asymptotic Completeness for Long Range
Three Body Problems”
CHRISTIAN GÉRARD, *IAS*

School of Social Science
Luncheon Seminar: “Liminal and Referent
Epistemologies in Contemporary Science: An
Ethnography of the Empirical”
KARIN KNORR-CETINA, *IAS*

December 4
School of Natural Sciences
Lunchtime Seminar: “R-1/R Duality, Mirror
Symmetry and $K3$ ”
PAUL ASPINWALL, *IAS*

December 7
School of Mathematics
Members Seminar: “The Representations of the
Q-deformed Virasoro Algebra”
KEQIN LIU, *IAS*

School of Natural Sciences
Theoretical Physics Seminar: “A Twistor
Approach to Superparticles and Superstrings”
A. GALPERIN, *Johns Hopkins University*

December 8
School of Mathematics
PDE Seminar: “On the Homogenization of Some
Parabolic Equations”
SIJUE WU, *IAS*

Scalar and Mean Curvature Seminar: “Ginsburg-
Landau Vortices”
HAIM BREZIS, *Rutgers University*

December 9
School of Mathematics
Superrigidity Seminar: “Harmonic Maps and
Non-archimedean Superrigidity” (continued)
RICHARD SCHOEN, *IAS*

Diophantine Approximation Seminar: “New
Effective Methods for the Thue Equation”
(continued)
ENRICO BOMBIERI, *IAS*

Geometry Seminar: “Knotted 2-spheres and
Symplectic Geometry”
YAKOV ELIASHBERG, *Stanford University*

School of Historical Studies

Islamic Seminar

ANDRAS HAMORI, *Princeton University*

School of Natural Sciences

Condensed Matter Seminar: "Statics and Dynamics of Polymer Brushes"

JOHN MARKO, *Cornell University*

December 10

School of Historical Studies

Medieval Seminar: "Muslim Women in Law and Society: Attitudes to Economic Activity"

MAYA SHATZMILLER, *IAS*

School of Mathematics

Quantum Algebraic Geometry Seminar: "Moduli Spaces and Mirror Symmetry"

DAVID MORRISON, *IAS*

Geometric Heat Flows Seminar: "A Survey of Geometric Flows" (continued)

RICHARD HAMILTON, *IAS*

Ricci Flow Seminar: "Results and Conjectures in the Ricci Flow" (continued)

RICHARD HAMILTON, *IAS*

Applied Mathematics-Math Physics Seminar:

"Spectral Gap and Logarithmic Sobolev Inequality for Glauber and Kawasaki Dynamics"

H.T. YAU, *Courant Institute*

School of Social Science

Luncheon Seminar: "From Marshall to Samuelson: The Great Watershed in Economic Science"

YUVAL YONAY, *IAS*

December 11

"Realism and Idealism in American Diplomacy The Origins: Homage to Felix Gilbert"

BERNARD BAILYN, *Harvard University*

School of Mathematics

Special Geometry Seminar: "Lagrangian Intersections, Fundamental Group, and Pseudo-isotopics"

YAKOV ELIASHBERG, *Stanford University*

School of Social Science

Science Studies Seminar: The Study of

Laboratories, Discussion of Karin Knorr-Cetina, "The Couch, the Cathedral, and the Laboratory";

Stefan Hirschauer, "The Manufacture of Bodies in Surgery"; and Thomas Kuhn, "The Trouble with the Historical Philosophy of Science"

KARIN KNORR-CETINA, *IAS*

December 12

School of Historical Studies

Medieval Seminar: "Was there a Medieval Middle Class? *Mediocrates* in the Middle Ages"

GILES CONSTABLE, *IAS*

"Between God and Men: Formal Construction of Woman's Voice in Medieval Christianity"

THOMAS HEAD, *IAS*

"The Political Impact of Heresy and Its Persecution in Late Medieval Bohemia"

ALEXANDER PATSCHOVSKY, *IAS*

December 14

School of Mathematics

Members Seminar: "Approaches to Algebraic Conformal Field Theory and Moonshine"

JAMES LEPOWSKY, *IAS*

December 15

School of Mathematics

Quantum Algebraic Geometry Seminar: "Sigma Models" (continued)

EDWARD WITTEN, *IAS*

December 16

School of Mathematics

Special Number Theory Seminar: "The Riemann Zeta Quantum Analogy"

M. BERRY, *Department of Physics, Bristol, England*

Superrigidity Seminar: "Classification of Rank 2 Flat Bundles Over Projective Varieties"

KEVIN CORLETTE, *IAS*

Diophantine Approximation Seminar: "New Effective Methods for the Thue Equation"

(continued)

ENRICO BOMBIERI, *IAS*

December 17

School of Historical Studies

Art History Colloquium: "Seductive Color,
Cosmetic Beauty and the Semantics of Gender in
Italian Baroque Art Criticism"

PHILIP SOHM, *IAS*

School of Social Science

Luncheon Seminar: "A Possible Virtue: Civic
Virtue and Patriotism"

MAURIZIO VIROLI, *Princeton University*

Mellon Seminars in Science and Society
"Science and the Public Interest"

CLIFFORD GEERTZ, *Chair, IAS*, PHILLIP A.

GRIFFITHS, *Speaker, IAS*, STEPHEN BRUSH,
Discussant, University of Maryland

December 18

School of Natural Sciences

Lunchtime Seminar: "Phases of $N = 2$ Models in
Two Dimensions"

EDWARD WITTEN, *IAS*

January 4

School of Natural Sciences

Theoretical Physics Seminar: "Challenges for
Superstring Cosmology"

RAM BRUSTEIN, *University of Pennsylvania*

January 5

School of Natural Sciences

Theoretical Particle Physics Seminar: "Baryon
Non-conservation in the Standard Model and
Yukawa Couplings"

A. ANSELM, *St. Petersburg*

January 7

School of Historical Studies

Art History Colloquium: "Likeness and the
Viewer: A Reconstruction of Renaissance
Portraiture"

JACK M. GREENSTEIN, *IAS*

January 8

School of Social Science

Science Studies Seminar: Comparative Analysis
of Scientific Productivity, Discussion of Stephen
Cole and Thomas Phelan, "The Scientific
Productivity of Nations"

STEPHEN COLE, *IAS*

January 13

School of Mathematics

Joint IAS-Princeton University Number Theory
Seminar: "Heights of Subvarieties"

WALTER GUBLER, *IAS*

School of Natural Sciences

Condensed Matter Seminar: "Melting, Pinning,
and Forced Flow of Two-Dimensional Magnetic
Bubble Arrays"

RAJ SESHADRI, *AT&T Bell Labs*

January 14

School of Historical Studies

Medieval Seminar: "Cane Sugar Production in
Cyprus: A Case Study in Medieval Technology"

MARIE-LOUISE VON WARTBURG MAIER,
University of Zürich

School of Mathematics

Special Seminar — News from Moscow:

"Elementary Proof of the Commutativity of
 $\pi_1(\mathbb{P}^2(\mathbb{C}) - \mathbb{C})$ for \mathbb{C} with Normal Crossings
(after S. Orevkov)

PIERRE DELIGNE, *IAS*

Special Seminar: "Arakelov Theory for Varieties
over Discrete Valuation Fields"

CHRISTOPHE SOULE, *CNRS-IHES*

School of Social Science

Luncheon Seminar: "'Relevance' and the
Ultimate Ends of Social Inquiry"

JAMES RULE, *IAS*

January 15

School of Social Science

Science Studies Seminar: The Anthropology of
Science, Discussion of Donna Haraway, "The
Biopolitics of Postmodern Bodies"; Emily
Martin, "The Egg and the Sperm"; and Sharon
Traweek, "Border Crossings: Narrative
Strategies in Science Studies and among
Physicists in Tsukuba Science City, Japan"

EMILY MARTIN, *IAS*

January 18

School of Mathematics

Special Seminar: "Linear Representations and
Analytic Groups"

OLEG TAV'GEN, *Minsk, Belarus*

Members Seminar: "Conformal Invariance in Two Dimensional Percolation"

YVAN SAINT-AUBIN, *IAS*

School of Natural Sciences

Theoretical Physics Seminar: "Embedded Defects, Electroweak Strings and the Sphaleron"

TANMAY VACHASPATTI, *Tufts University*

January 19

School of Mathematics

Mirror Symmetry Seminar: "Introduction to Toric Geometry"

DAVID MORRISON, *IAS*

PDE Seminar: "Harnack Estimates for the Sum of Squares of Vector Fields"

HUAI-DONG CAO, *IAS*

January 20

School of Mathematics

Special PDE Seminar: "From Particles to Fluids through PDE and Boltzman's Equation"

CLAUDE BARDOS, *Université de Paris VII*

Special PDE Seminar: "High Frequency Asymptotics for Control of PDE"

CLAUDE BARDOS, *Université de Paris VII*

Diophantine Approximation Seminar: "Baker's Method"

ENRICO BOMBIERI, *IAS*

School of Natural Sciences

Condensed Matter Seminar: "Scaling and Rare Fluctuations in Randomly Pinned Flux Lines"

TERRY HWA, *Harvard University*

January 21

School of Mathematics

Quantum Algebraic Geometry Seminar: "Sigma Models" (continued)

EDWARD WITTEN, *IAS*

Applied Mathematics-Math Physics Seminar: "Hysteresis and Hierarchies: Dynamics of Disorder-driven First-order Phase Transformations"

JAMES SETHNA, *Cornell*

School of Social Science

Luncheon Seminar: "Must Global Politics Constrain Democracy? or Why Democracy was an Anomaly in the American 'Science' of International Politics and Why It Is Now a Fashion"

ALAN GILBERT, *IAS*

January 22

School of Natural Sciences

Lunchtime Seminar: "Off-Shell String Physics"

VIPUL PERIWAL, *IAS*

January 25

School of Mathematics

Members Seminar: "Riemann Surface Laminations"

ALBERTO CANDEL, *IAS*

January 26

School of Mathematics

PDE Seminar: "High Frequency Asymptotics for Control of PDE"

CLAUDE BARDOS, *Université de Paris VII*

January 27

School of Mathematics

Superrigidity Seminar: "Harmonic Map Theory" (continued)

RICHARD SCHOEN, *IAS*

Geometry Seminar: "Upper Bounds on High Eigenvalues"

NICHOLAS KOREVAAR, *IAS*

Diophantine Approximation Seminar: "Baker's Method" (continued)

ENRICO BOMBIERI, *IAS*

School of Natural Sciences

Condensed Matter Seminar: "Electrodynamics of a Quantum Hall Liquid"

CHARLES HANNA, *IBM Watson Research Center*

School of Historical Studies

Islamic Seminar

MICHAEL COOK, *Princeton University*

January 28

School of Mathematics

Quantum Algebraic Geometry Seminar: "Sigma Models" (continued)

EDWARD WITTEN, *IAS*

News from Moscow Seminar: "Exceptional Objects in Derived Categories" (continued)

PIERRE DELIGNE, *IAS*

School of Social Science

Luncheon Seminar: "Is Liberal Socialism a Hircocervus?"

NADIA URBINATI, *IAS*

January 29

School of Social Science
 Science Studies Seminar: Testing Hypotheses about the History of Science, Discussion of Rachel Laudan, “Good History and the Good of History”; Rachel Laudan, Arthur Donovan and Larry Laudan, “A Repository for More than Anecdote or Chronology: The Study of Science as the Science of Science”; and Frank Sulloway, “The ‘Science’ of Science”
 RACHEL LAUDAN, *IAS*

February 1

School of Mathematics
 Members Seminar: “Complex Structures on $S^2 \times S^2$ ”
 ZHENBO QIN, *IAS*

School of Natural Sciences
 Theoretical Physics Seminar: “Quark Mass Matrix Models”
 NATHAN SEIBERG, *Rutgers University*

February 2

School of Mathematics
 Mirror Symmetry Seminar: “Calabi-Yau Hypersurfaces in Toric Varieties”
 DAVID MORRISON, *IAS*

PDE Seminar: “High Frequency Asymptotics for Control of PDE”
 CLAUDE BARDOS, *Université de Paris VII*

Geometry Seminar: “Minimal Lagrangian Surfaces in Kähler-Einstein Surfaces”
 YNG-ING LEE, *IAS*

February 3

School of Mathematics
 Superrigidity Seminar: “Harmonic Map Theory” (continued)
 RICHARD SCHOEN, *IAS*

Geometry Seminar: “Gauge Theory on Punctured Riemann Surfaces”
 JONATHAN PORITZ, *IAS*

Diophantine Approximation Seminar: “Baker’s Method” (continued)
 ENRICO BOMBIERI, *IAS*

School of Natural Sciences
 Condensed Matter Seminar: “Entropic Forces in Fluid Membranes”
 MARK GOULIAN, *University of California, Santa Barbara*

February 4

School of Mathematics
 Quantum Algebraic Geometry Seminar: “Sigma Models” (continued)
 EDWARD WITTEN, *IAS*

Applied Mathematics–Math Physics Seminar: “Singular Solutions of the Vlasov-Poisson Equations”
 GEORGE MAJDA, *IAS*

Special Seminar: “A Candidate for Conformal Field Theory in Higher Dimensions and On Periodicity of the Standard Map”
 MAXIM KONTSEVICH, *IAS*

IAS, Princeton University, Rutgers University
 Harmonic Analysis and Number Theory Seminar: “A Degenerate Principal Series for G_2 ”
 R. HOWE, *Yale University*

School of Social Science
 Luncheon Seminar: “Bourgeois Virtue”
 DONALD MCCLOSKEY, *University of Iowa*

February 5

School of Mathematics
 Several Complex Variables and PDE: “CR-embeddings and Deformations of Surface Singularities”
 CHARLES EPSTEIN, *University of Pennsylvania*

School of Natural Sciences
 Lunchtime Seminar: “Semilocal Strings and Cosmology”
 MARTIN BUCHER, *IAS*

February 8

School of Mathematics
 Members Seminar: “Vassiliev Invariants of Knots”
 MAXIM KONTSEVICH, *IAS*

February 9

School of Mathematics
 Mirror Symmetry Seminar: “Resolving Singularities of Calabi-Yau Hypersurfaces”
 DAVID MORRISON, *IAS*

PDE Seminar: "Asymptotic Regimes in Nonlinear Diffusion. The Case of Anomalous Exponents"
 JUAN VAZQUEZ, *Universidad de Autónoma de Madrid*

Geometry Seminar: "Minimal Submanifolds and Generalizations of the Cauchy-Riemann Equations"
 JOSEPH M. LANDSBERG, *IAS*

February 10
 School of Mathematics
 Superrigidity Seminar: "Harmonic Map Theory" (continued)
 RICHARD SCHOEN, *IAS*

Geometry Seminar: "Ricci Flat Manifolds with Euclidean Volume Growth"
 JEFF CHEEGER, *Courant Institute, New York University*

Diophantine Approximation Seminar: "Baker's Method" (continued)
 ENRICO BOMBIERI, *IAS*

Faculty Lecture: "Chaos and Randomness — A Mathematical Perspective"
 THOMAS SPENCER, *IAS*

February 11
 School of Historical Studies
 Art History Colloquium: "Husbands, Wives and Lovers. Marriage and its Discontents in Nineteenth Century France"
 PATRICIA MAINARDI, *IAS*

School of Mathematics
 Quantum Algebraic Geometry Seminar: "Sigma Models" (continued)
 EDWARD WITTEN, *IAS*

Applied Mathematics-Math Physics Seminar: "Global Weak Entropy Solutions to Systems of Nonstrictly Hyperbolic Conservation Laws"
 PUI TAK KAN, *IAS*

IAS, Princeton University, Rutgers University
 Harmonic Analysis and Number Theory Seminar: "Counting Lattice Points and Singularities of Analytic Functions"
 S. CAPPEL, *New York University*

School of Social Science
 Luncheon Seminar: "Understanding the Immune System Culturally"
 EMILY MARTIN, *IAS*

Mellon Seminars in Science and Society
 "Science and Ethics"
 PHILLIP A. GRIFFITHS, *Chair, IAS*, FREEMAN J. DYSON, *Speaker, IAS*, MICHAEL WALZER, *Discussant, IAS*

February 12
 School of Social Science
 Science Studies Seminar: The Science of Anthropology, Discussion of George Stocking, "Prologue" and Chapter 1 of *After Tylor: The Reformation of Anthropology in Post-Victorian Britain (1888–1938)*
 GEORGE STOCKING, *IAS*

February 15
 School of Natural Sciences
 Theoretical Physics Seminar: "Cosmic Variance, Inflation, and Microwave Anisotropies"
 LARRY KRAUSS, *Yale University*

February 16
 School of Mathematics
 Mirror Symmetry Seminar: "The Monomial-divisor Mirror Map"
 DAVID MORRISON, *IAS*

February 17
 School of Mathematics
 Superrigidity Seminar: "Harmonic Map Theory" (continued)
 RICHARD SCHOEN, *IAS*

Geometry Seminar: "The Euler Characteristic of Nonpositively Curved, Piecewise Euclidean Manifolds"
 MICHAEL DAVIS, *IAS*

Diophantine Approximation Seminar: "Baker's Method" (continued)
 ENRICO BOMBIERI, *IAS*

School of Natural Sciences
 Condensed Matter Seminar: "Elasticity and Phase Behavior in Membranes"
 DAVID MORSE, *Exxon Research and Engineering*

February 18
 School of Mathematics
 Quantum Algebraic Geometry Seminar: "Sigma Models" (continued)
 EDWARD WITTEN, *IAS*

Applied Mathematics–Math Physics Seminar:
“Directed Line Liquids”

R. KAMIEN, *IAS*

IAS, Princeton University, Rutgers University
Harmonic Analysis and Number Theory

Seminar: “Codes and Siegel Modular Forms”

WILLIAM DUKE, *Rutgers University*

School of Social Science

Luncheon Seminar: “The Politics of the
Everyday, or, Why the Trivial Matters”

LEORA AUSLANDER, *IAS*

School of Historical Studies

Public Lecture: “The Place of the Reader in the
Design of the Works of St. Augustine”

BRIAN STOCK, *University of Toronto*

February 19

School of Mathematics

Several Complex Variables and PDE Seminar:

“On Local Solutions of $\partial_{\bar{b}}$ ”

S. BERHANU, *Temple University*

School of Natural Sciences

Lunchtime Seminar: “Off-Shell Open String
Theory with Quadratic Boundary Interactions”

KEKE LI, *IAS*

February 22

School of Mathematics

Members Seminar: “Characters of Double Cosets
Algebras and Non-rational Varieties”

IAN GROJNOWSKI, *IAS*

February 23

School of Mathematics

PDE Seminar: “On a Fourth Order PDE in
Conformal Geometry”

ALICE CHANG, *IAS*

Geometry Seminar: “Regular Homotopy Classes
of Minimal Surfaces and the Spinor

Representation”

ROBERT KUSNER, *IAS*

February 24

School of Mathematics

Superrigidity Seminar: “Geometric Superrigidity
after Mok-Siu-Yeung”

ARMAND BOREL, *IAS*

Geometry Seminar: “Asymptotic Behavior of a
Mean Curvature Flow Singularity”

GERHARD HUISKEN, *IAS*

Diophantine Approximation Seminar: “Baker’s
Method” (continued)

ENRICO BOMBIERI, *IAS*

School of Historical Studies

Islamic Seminar

MOHAMMED ARKOUN, *IAS*

February 25

School of Historical Studies

Art History Colloquium: “Cyprus and
Byzantium”

FRANZ GEORG MAIER, *IAS*

School of Mathematics

Quantum Algebraic Geometry Seminar: “Sigma
Models” (continued)

EDWARD WITTEN, *IAS*

Applied Mathematics–Math Physics Seminar:

“Fluctuations and Mixing in Random Flow”

BORIS SCHRAIMAN, *Bell Labs*

IAS, Princeton University, Rutgers University
Harmonic Analysis and Number Theory

Seminar: “Estimates for the Number of Non-
diagonal Solutions of Certain Diagonal
Equations, and Applications to Quasi-diagonal
Solubility”

TREVOR WOOLEY, *University of Michigan*

School of Social Science

Luncheon Seminar: “Injury, Identity, Politics”

WENDY BROWN, *IAS*

February 26

School of Mathematics

Several Complex Variables and PDE Seminar:

“Estimates on the Bergman Kernel and Mapping
Properties of the Projector”

J.D. MC NEAL, *Princeton University*

School of Social Science

Science Studies Seminar: Science and Risk,
Discussion of Chapter 6, “Nuclear Nemesis” and
Chapter 7, “Radon’s Deadly Daughters” of
Robert Proctor, *The Great Cancer Debates*, and
Proctor, “Genomics and Eugenics: How Fair Is
the Comparison?”

ROBERT PROCTOR, *Pennsylvania State University*

March 1

School of Mathematics
 Special Seminar: "Algebraic K-theory of
 Operator Algebras: Higher Indices and
 Regulators"
 MARIUSZ WODZICKI, *University of California*

Members Seminar: "Singular Homology of
 Abstract Algebraic Varieties"
 VLADIMIR VOEVODSKY, *IAS*

School of Natural Sciences
 Theoretical Physics Seminar: "Multiple Mirror
 Manifolds and Topology Change in String
 Theory"
 BRIAN GREENE, *Cornell University*

March 2

School of Mathematics
 Mirror Symmetry Seminar: "More About Mirror
 Symmetry"
 DAVID MORRISON, *IAS*

PDE Seminar: "Inequalities for the Jacobians of
 Orientable Maps"
 MARIO MILMAN, *IAS*

Geometry Seminar: "Surfaces in R^3 whose
 Geodesic Flow is Ergodic"
 VICTOR DONNAY, *IAS*

March 3

School of Mathematics
 Superrigidity Seminar: "Geometric Superrigidity
 after Mok-Siu-Yeung" (continued)
 ARMAND BOREL, *IAS*

Geometry Seminar: "The Generic Spectrum for
 Hyperbolic Surfaces with Cusps"
 SCOTT WOLPERT, *University of Maryland*

Diophantine Approximation Seminar: "Baker's
 Method" (continued)
 ENRICO BOMBIERI, *IAS*

March 4

School of Historical Studies
 Art History Colloquium: "Teofilo Folengo,
 Girolamo Romanino and the 'Questione della
 Lingua' "
 ALESSANDRO NOVA, *IAS*

School of Mathematics
 Quantum Algebraic Geometry Seminar: "Sigma
 Models" (continued)
 EDWARD WITTEN, *IAS*

Applied Mathematics-Math Physics Seminar:
 "Dynamics of the Moving Contact Line"
 PING SHENG, *IAS*

School of Social Science
 Luncheon Seminar: "Is Anyone Obligated to
 Conduct Biomedical Research? Moral
 Quandaries about a 'Constant Emergency' "
 NOAM ZOHAR, *IAS*

March 4-5

School of Historical Studies
 Mellon Colloquium: The Religious Orders and
 Culture in the Middle Ages and the Renaissance
 "Monks and Clocks: Observations on a Medieval
 Time-Keeping Community" FRANZ GEORG
 MAIER, *IAS*

"Confession as a Sign of Conversion and a Means
 of Control: The Franciscans and Penance between
 the Middle Ages and Modernity" ADRIANO
 PROSPERI, *University of Pisa*

" 'Popular' Art in Renaissance Italy: Early
 Response to the Holy Mountain at Varallo"
 ALESSANDRO NOVA, *IAS*

"The Preaching of Friars and the Culture of
 Congregations in the 13th Century" NICOLE
 BÉRIOU, *IAS*

"Chess and the Preachers" JOHN VAN ENGEN,
University of Notre Dame

"The Cultures and Development of the Early
 Society of Jesus" JOHN O'MALLEY, *Boston College*

"The Corpse of Saint Teresa and the Waning of
 the Renaissance" CARLOS EIRE, *IAS*

"Tradition and Revival in Religious Musical
 Spectacle: The Florentine Confraternities in the
 16th and 17th Centuries" JOHN HILL, *University of
 Illinois, Urbana-Champaign*

"Bernini's Busts of No-Body and the Four Last
 Things" IRVING LAVIN, *IAS*

Chairs: GILES CONSTABLE, *IAS*, IRVING LAVIN,
IAS, JOHN O'MALLEY, *Boston College*

March 5

School of Mathematics
 Several Complex Variables and PDE Seminar:
 "The Topology of Transversally Elliptic
 Operators"
 GERARDO MENDOZA, *Temple University*

School of Natural Sciences
Lunchtime Seminar: “Chiral Perturbation Theory for Heavy Mesons”
MARK WISE, *California Institute of Technology*

March 8

School of Mathematics
Marston Morse Memorial Lecture: “The Geometry of the Painlevé Equation”
NIGEL J. HITCHIN, *University of Warwick, U.K.*

Special PDE Seminar: “Numerical Simulation of Waves in Fluid Saturated Porous Media”
J. SANTOS, *Purdue University*

March 9

School of Mathematics
Mirror Symmetry Seminar: “Kähler Cones and the Secondary Fan”
DAVID MORRISON, *IAS*

PDE Seminar: “Asymptotic Behavior of Solutions of Certain Elliptic Equations Involving Critical Nonlinear Growth”
ZHENG-CHAO HAN, *IAS*

Geometry Seminar: “On Singularities of the Heat Flow for Harmonic Maps from Surfaces into Spheres”
JIE QING, *IAS*

March 10

School of Mathematics
Superrigidity Seminar: “Geometric Superrigidity after Mok-Siu-Yeung” (continued)
ARMAND BOREL, *IAS*

Marston Morse Memorial Lecture: “The Geometry of the Painlevé Equation”
NIGEL J. HITCHIN, *University of Warwick, U.K.*

March 11

School of Historical Studies
Medieval Seminar: “Medieval World Maps and Experience: The Reception of the Travel Reports about Asia in Cartography from the 13th to the 15th Century”
INGRID BAUMGÄRTNER, *IAS*

School of Mathematics
Marston Morse Memorial Lecture: “The Geometry of the Painlevé Equation”
NIGEL J. HITCHIN, *University of Warwick, U.K.*

Applied Mathematics–Math Physics Seminar: “Filamentation and Undulation of Self-focused Laser Beams in Liquid Crystals”
DAVID MURAKI, *Princeton University*

IAS, Princeton University, Rutgers University
Harmonic Analysis and Number Theory Seminar: “The Arithmetic of Fermat Curves”
WILLIAM MCCALLUM, *University of Arizona*

Special Seminar: “The Method of Chabauty and Coleman”
WILLIAM MCCALLUM, *University of Arizona*

Mellon Seminars in Science and Society: “What Scientists Do”
PHILLIP A. GRIFFITHS, *Chair, IAS*, KARIN KNORR CETINA, *Speaker, IAS*, PIET HUT and ROBERT LANGLANDS, *Discussants, IAS*

School of Social Science
Luncheon Seminar: “Reading the Palimpsest of Inquiry: *Notes and Queries* and the History of British Social Anthropology”
GEORGE STOCKING, *IAS*

March 12

School of Social Science
Science Studies Seminar: Prediction and Theory Evaluation, Discussion of Stephen Brush, “Prediction and Theory Evaluation in the Social Sciences”; Brush, “The Role of Empirical Tests in the Evaluation of Theories in Physical Science”; and James Rule, “Relative Deprivation and Related Psychological Theories”
JAMES RULE and STEPHEN BRUSH, *IAS*

March 12–13

School of Historical Studies
The History of War as Part of General History Symposium: “The Cultural Approach to the History of War”
JOHN W. SHY, *University of Michigan*
“The American Military and the Principle of Civilian Control from McClellan to Powell”
RUSSELL F. WEIGLEY, *Temple University*
Chair: HENRY S. BAUSUM
Commentators: CHARLES ROYSTER, *Louisiana State University* and EMILY ROSENBERG, *Macalester College*

“The Japanese Army as a Bureaucracy, 1868–1945”

SHIN'ICHI KITAOKA, *Rikkyo University*

“War and the Rise of Nationalism in Twentieth-Century China”

ARTHUR WALDRON, *Naval War College and Brown University*

Chair: MARIUS JANSEN, *Princeton University*

Commentators: GEOFFREY PARKER, *University of Illinois* and JOANNA WALEY-COHEN, *New York University*

“The Study of War and its Limits: The *Militärtsche Gesellschaft* in Berlin, 1801–1805”

PETER PARET, *IAS*

“The First World War and the Crisis in European History”

SIR MICHAEL HOWARD, *Yale University and Director's Visitor, IAS*

Chair: DENNIS SHOWALTER, *Colorado College*

Commentators: CARLA HESSE, *IAS* and MICHAEL GEYER, *University of Chicago*

Concluding Remarks: JOHN W. SHY, *University of Michigan*

March 15

School of Mathematics

Special Seminar: “Character Values and Hyperelliptic Curves”

THOMAS HALES, *University of Chicago*

Special Geometry Seminar: “Kodaira Embedding for Singular Varieties”

CHARLES VUONO, *University of Utah*

Members Seminar: “Parabolic Free Boundary Problems”

LUIS A. CAFFARELLI, *IAS*

School of Natural Sciences

Theoretical Physics Seminar: “Heavy Quarkonium on the Lattice”

KENT HORNBOSTEL, *Southern Methodist University*

March 16

School of Mathematics

Quantum Algebraic Geometry Seminar: “Sigma Models” (continued)

EDWARD WITTEN, *IAS*

PDE Seminar: “Necessary Conditions for the Local Solvability of the Tangential CR Equations”

PAULO CORDARO, *IAS*

Geometry Seminar: “Compactness Results for the Singular Yamabe Problem”

DANIEL POLLACK, *University of Texas*

Special Seminar: “Character Values and Hyperelliptic Curves” (continued)

THOMAS HALES, *University of Chicago*

March 17

School of Mathematics

Superrigidity Seminar: “Geometric Superrigidity after Mok-Sui-Yeung” (continued)

ARMAND BOREL, *IAS*

Geometry Seminar: “Hyperbolization of Polyhedra”

RUTH CHARNEY, *IAS*

Diophantine Approximation Seminar: “Baker's Method Kummer Theory”

ENRICO BOMBIERI, *IAS*

School of Natural Sciences

Condensed Matter Seminar: “Tunneling and Transport in Luttinger and Quantum Hall States”

MATTHEW FISHER, *IBM Watson Research Center*

March 18

School of Historical Studies

Medieval Seminar: “Reportationes: A Source for the History of Preaching in the 13th Century”

NICOLE BÉRIOU, *IAS*

School of Mathematics

Special Seminar: “Unitarity and Functoriality”

ILYA PIATETSKI-SHAPIRO, *Yale University*

IAS, Princeton University, Rutgers University Harmonic Analysis and Number Theory Seminar: “The Arithmetic of Dynamical Systems”

JOE SILVERMAN, *Brown University*

School of Social Science

Luncheon Seminar: “Is Science (Still) a Public Good?”

MICHEL CALLON, *IAS*

Institute Lecture: “The Reorientation of Strategy”

SIR MICHAEL HOWARD, *Yale University and Director's Visitor, IAS*

March 19

School of Mathematics

Special Seminar: “Character Values and Hyperelliptic Curves” (conclusion)

THOMAS HALES, *University of Chicago*

School of Natural Sciences

Lunchtime Seminar: “Model for the Normal State of CuO Superconductors”

FRANK WILCZEK, *IAS*

March 23

School of Mathematics

Mirror Symmetry Seminar: “Mirror Symmetry for K3 Surfaces”

DAVID MORRISON, *IAS*

PDE Seminar: “The Diameter and Location of the First Nodal Line of a Convex Planar Domain”
DAVID JERISON, *Massachusetts Institute of Technology*

Geometry Seminar: “A Survey of Harmonic Morphisms”

VIJAY PARMAR, *IAS*

Special PDE Seminar: “Approximating Degenerate Quasilinear Parabolic Equations”

MICHAEL CRANDALL, *University of California, Santa Barbara*

March 24

School of Mathematics

Diophantine Approximation Seminar: “Baker’s Method — Zero Estimates on Group Varieties”

ENRICO BOMBIERI, *IAS*

School of Historical Studies

Islamic Seminar

OLEG GRABAR and MOHAMMAD AL-ASAD, *IAS*

March 25

School of Historical Studies

Medieval Seminar: “The Discovery of the Middle East by Thirteenth Century Pilgrims”

ARYEH GRABOIS, *IAS*

School of Mathematics

Quantum Algebraic Geometry Seminar: “Sigma Models” (continued)

EDWARD WITTEN, *IAS*

Geometry Seminar: “Kähler–Einstein Metrics on Quasi-projective Manifolds”

S.T. YAU, *Harvard University*

School of Social Science

Luncheon Seminar: “Science in a Pluralistic World”

PIET HUT, *IAS*

Applied Mathematics–Math Physics Seminar: “Zero Relaxation Limit for Conservation Laws”

GUI-QIANG CHEN, *University of Chicago*

IAS, Princeton University, Rutgers University
Harmonic Analysis and Number Theory Seminar
“Repartition of Cubic Roots Mod p and the 7 Cubes Problem”

OLIVIER RAMARÉ, *IAS*

March 26

School of Social Science

Science Studies Seminar: History of Modern Economics, Discussion of Yuval Yonay, “From Marshall to Samuelson: The Great Watershed in Economic Science,” “The Sovereignty of Consumers in Science,” and “The Theory of Value and the Value of Theory”

YUVAL YONAY, *IAS*

School of Natural Sciences

Theoretical Physics Seminar: “Some Developments Related to String Phenomenology”

VADIM KAPLUNOVSKY, *University of Texas*

March 29

School of Mathematics

Members Seminar: “Eisenstein Cohomology and the p -adic Class Number Formula”

HARTMUT MAENNEL, *IAS*

School of Mathematics

Special PDE Seminar: “Transitional One-dimensional Hydrodynamic Flow with a Mobile Bed”

PABLO JACOVKIS, *Massachusetts Institute of Technology*

School of Natural Sciences

Theoretical Physics Seminar: “A New Approach to the Green–Schwarz Superstring”

NATHAN BERKOVITS, *King’s College, London*

March 30

School of Mathematics

PDE Seminar: “Translating Solutions of the Mean Curvature Flow”

STEVEN ALTSCHULER, *IAS*

Geometry Seminar: "Invariant Properties for Actions of Lie Groups and Their Discrete Subgroups"

ALESSANDRA IOZZI, *IAS*

School of Natural Sciences

Theoretical Physics Seminar: "A New Approach to the Green-Schwarz Superstring"

NATHAN BERKOVITS, *Kings College, London*

March 31

School of Mathematics

Superrigidity Seminar: "Finite Energy Retractions of Locally Symmetric Manifolds"

LESLIE SAPER, *IAS*

Geometry Seminar: "The Structure of Branch Points of Least Area Surfaces"

MARIO MICALEF, *University of Warwick, U.K.*

School of Natural Sciences

Condensed Matter Seminar: "To Wet or Not to Wet — Whether to be First Order or Critical?"

MICHAEL E. FISHER, *Institute of Physical Science and Technology, University of Maryland*

April 1

School of Historical Studies

Art History Colloquium: "Sassanian Influence on Early Medieval Bulgarian Art"

OXSANA MINAEVA, *IAS*

School of Mathematics

Quantum Algebraic Geometry Seminar: "Sigma Models" (continued)

EDWARD WITTEN, *IAS*

Applied Mathematics-Math Physics Seminar: "Chaotic Dynamics in Nearly Integrable PDE's"

YANGUANG LI, *Princeton University*

IAS, Princeton University, Rutgers University Harmonic Analysis and Number Theory Seminar

A. ATKIN, *University of Illinois at Chicago*

School of Natural Sciences

Special Theoretical Physics Seminar: "Some Questions of Flavor in Supersymmetry"

MICHAEL DINE, *University of California, Santa Cruz*

School of Social Science

Luncheon Seminar: "American Intellectuals and Civil Rights: The White Liberal Mainstream, 1954-1960"

WALTER JACKSON, *IAS*

April 2-3

A Celebration of Mathematics:

"Incompressible Transformations that Minimize Momentum"

LUIS CAFFARELLI, *IAS*

"Polylogarithms"

PIERRE R. DELIGNE, *IAS*

"The Verlinde Algebra and the Cohomology of the Grassmannian"

EDWARD WITTEN, *IAS*

"Space, Time, Mathematics"

G. DANIEL MOSTOW, *Yale University*

"Mathematics — From Servant to Partner"

PHILLIP A. GRIFFITHS, *IAS*

"Science — From Intellectual Quest to Social Contribution"

FRANK PRESS, *President, National Academy of Sciences*

April 5

School of Mathematics

Special Mirror Symmetry Seminar: "Quantum Cohomology Rings"

VICTOR BATYREV, *MSRI/University of Essen*

April 6

School of Mathematics

PDE Seminar: "Large Time Behavior of Scalar Conservation Laws"

WEINAN E, *IAS*

April 7

School of Mathematics

Superrigidity Seminar: "Finite Energy Retractions of Locally Symmetric Manifolds" (continued)

LESLIE SAPER, *IAS*

April 8

School of Historical Studies

Medieval Seminar: "Art and Ideology in Pre-Christian Bulgaria"

OXSANA MINAEVA, *IAS*

School of Mathematics

Quantum Algebraic Geometry Seminar: "Sigma Models" (continued)

EDWARD WITTEN, *IAS*

Applied Mathematics-Math Physics Seminar: "Numerical Schemes for Hyperbolic Conservation Laws with Stiff Source Terms and their Applications"

SHI JIN, *Courant Institute*

IAS, Princeton University, Rutgers University
Harmonic Analysis and Number Theory Seminar
H. DARMON, *Princeton University*

School of Social Science
Luncheon Seminar: “Why Korea is Richer than
India, or Inside Strong and Weak States”
ROBERT WADE, *IAS*

April 12
School of Natural Sciences
Theoretical Physics Seminar: “Information
Consumption in Reissner Nordstrom Black
Holes”
SANDIP TRIVEDI, *California Institute of Technology*

April 14
School of Natural Sciences
Condensed Matter Seminar: “Quantum
Interferences in Multi-Connected Geometries:
Superconducting Micro Networks”
FRANCO NORI, *University of Michigan*

April 15
School of Mathematics
IAS, Princeton University, Rutgers University
Harmonic Analysis and Number Theory
Seminar: “Adding Prime Numbers”
JOHN FRIEDLANDER, *University of Toronto*

School of Social Science
Luncheon Seminar: “ ‘Boundary Disputes’:
Criminal Justice and Psychiatry in Germany,
1750–1850”
DORIS KAUFMANN, *IAS*

April 16
School of Mathematics
Several Complex Variables — PDE Seminar:
“Homotopy Kernels of Treves and Hölder
Estimates for $\bar{\partial}$ -b”
SAGUN CHANILLO, *Rutgers University*

School of Natural Sciences
Lunchtime Seminar: “New QCD Results from
Superstring Theory”
ZVI BERN, *IAS*

School of Social Science
Science Studies Seminar: Interfaces between
Disciplines, Discussion of Walter Alvarez *et al.*,
“Uniformitarianism and the Response of Earth
Scientists to the Theory of Impact Crises”; and
“Report of the NASA International Near-Earth-
Object Detection Workshop”
PIET HUT, *IAS*

April 20
School of Mathematics
Mirror Symmetry Seminar: “Ulterior Motives”
DAVID MORRISON, *IAS*

PDE Seminar: “On the Free Boundary Problem
Involving Certain Degenerate Parabolic
Equations”
HI JUN CHOE, *South Korea*

School of Natural Sciences
Lunchtime Seminar: “New QCD Results from
Superstring Theory — Part II”
ZVI BERN, *IAS*

April 21
School of Natural Sciences
Condensed Matter Seminar: “Three Particle
Correlations and Breakdown of Electronic
Quasiparticles in One-Dimensional Systems”
BENOIT DOUCOT, *NEC and CNRS Grenoble*

April 22
School of Mathematics
Quantum Algebraic Geometry Seminar: “Sigma
Models” (conclusion)
EDWARD WITTEN, *IAS*

Special PDE Seminar: “Estimates of the
Projection Operators, Strong Unique
Continuation and Absence of Positive
Eigenvalues for a Sub-elliptic Operator”
NICOLA GAROFALO, *Purdue University*

IAS, Princeton University, Rutgers University
Harmonic Analysis and Number Theory
Seminar: “Quantum Chaos”
DENNIS HEJHAL, *IAS*

April 23
School of Mathematics
Special PDE Seminar: “Quasilinear Hyperbolic-
parabolic PDE”
TAI-PING LIU, *Stanford University*

April 26

School of Mathematics
 Special Seminar: "Group Actions and Mori Theory"

MICHEL BRION, *Université de Grenoble*

School of Natural Sciences

Theoretical Physics Seminar: "Calabi-Yau Cosmic Yarn"

TRISTAN HUBSCH, *Howard University*

April 27

School of Natural Sciences
 Lunchtime Seminar: "New QCD Results from Superstring Theory — Part III"

ZVI BERN, *IAS*

April 28

Chaos, Order, and Creativity:
 An Interdisciplinary Colloquium
 Introduction

IRVING LAVIN, *IAS*

Loops, Primes and Membranes: A Non-Euclidean Look at Quantum Chaos

DENNIS HEJHAL, *IAS*

Evolution and Entropy

STEPHEN BRUSH, *IAS*

Science, Reason, and Passion

ILYA PRIGOGINE, *Instituts Internationaux de Physique et de Chimie, Université Libre de Bruxelles*

Chair: FRANK WILCZEK, *IAS*

Leonardo's Watery Chaos

IRVING LAVIN, *IAS*

Spirals of Life: D'Arcy Thompson Looking Backwards and Forwards

MARTIN KEMP, *University of St. Andrews*

Symmetry in Science, Art, and Thought

FRANK WILCZEK, *IAS*

Chair: IRVING LAVIN, *IAS*

April 29

School of Mathematics
 IAS, Princeton University, Rutgers University
 Harmonic Analysis and Number Theory
 Seminar: "The Intersection Cohomology of the Reductive Borel Serre Compactification"

LESLIE SAPER, *IAS*

April 30

School of Natural Sciences
 Lunchtime Seminar: "Line Liquids and the Landau-Peierls Instability"

RANDY KAMIEN, *IAS*

School of Social Science

Science Studies Seminar: Is Theory-Choice Determined by Evidence or Social Interests?, Discussion of Larry Laudan, "Demystifying Underdetermination"; and Peter Slezak, "Bloor's Bluff: Behaviourism and the Strong Programme"

LARRY LAUDAN, *IAS*

May 4

School of Natural Sciences
 Theoretical Physics Seminar: "New Techniques in Perturbative QCD"

DAVID KOSOWER, *CERN*

May 5

School of Natural Sciences
 Condensed Matter Seminar: "Kinetic Roughening Phenomena"

TIM HALIPIN-HEALY, *Barnard College, Columbia University*

May 6

School of Mathematics
 IAS, Princeton University, Rutgers University
 Harmonic Analysis and Number Theory Seminar
 S. GELBART, *Weizmann Institute*

May 7

Faculty Lecture
 "Primordial Loyalties and Standing Entities: Anthropological Reflections on the Politics of Identity"

CLIFFORD GEERTZ, *IAS*

May 10

School of Natural Sciences
 Theoretical Physics Seminar: "Masses and Coupling Constants for QCD in the Valence Approximation"

D. WEINGARTEN, *IBM Research*

May 11

School of Mathematics
 PDE Seminar: "Boundary Value Problems for Surfaces of Constant Gauss Curvature"

JOEL SPRUCK, *Johns Hopkins University*

Geometry Seminar: "Extremal Metrics on a Riemann Surface with a Curvature Forcing Term"

XIU-XIONG CHEN, *University of Pennsylvania*

School of Natural Sciences

Theoretical Physics Seminar: “Quantum
Background Independence in String Theory”

EDWARD WITTEN, *IAS*

May 12

School of Mathematics

Geometry Seminar: “Some Geometry and
Dynamics Around Manifolds of Negative
Curvature”

CHENGBO YUE, *Penn State*

May 14

School of Natural Sciences

Lunchtime Seminar: “The Many Faces of KP”

JEREMY SCHIFF, *IAS*

May 18

School of Mathematics

PDE Seminar: “The Spectrum of the Laplacian
on Forms and Applications”

JOSE ESCOBAR, *Indiana University*

May 20

School of Mathematics

PDE Seminar: “The Location of Singularities of
P-harmonic Maps”

BOB HARDT, *Rice University*

Geometry Seminar: “Local Solvability of
Degenerate Systems of PDE”

DENNIS DETURCK, *University of Pennsylvania*

May 21

School of Social Science

Science Studies Seminar: Models of Science-
Society Networks, Discussion of M. Norton
Wise, “Mediations: Enlightenment Balancing
Acts, or the Technologies of Rationalism”;
Michel Callon, “Four Models for the Dynamics
of Science”; and Michel Callon and John Law,
“Social Ordering: Some Lessons from the
Sociology of Science and Technology”

MICHEL CALLON, *IAS* and M. NORTON WISE,
Princeton University

May 26

School of Mathematics

Geometry Seminar: “Gauss Curvature Flows and
Entropy Inequalities”

BEN ANDREWS, *CMA Canberra*

School of Natural Sciences

Condensed Matter Seminar: “Phase Transitions in
Correlated Random Media: ⁴He in Aerogel”

JON MACHTA, *University of Massachusetts, Amherst*

May 27

School of Mathematics

Geometry Seminar: “On the Behavior of the
Dirichlet Energy for Maps from Spheres”

DONG ZHANG, *Johns Hopkins University*

May 28

School of Natural Sciences

Lunchtime Seminar: “Electroweak Symmetry
Breaking at the SSC and LHC”

JON BAGGER, *Johns Hopkins University*

School of Social Science

Science Studies Seminar: Reality of the Daily
Research Routine, Presentation of Audiotape:
Andor Carius and Ronald Steckel, “Fusion: An
Audio Spectral Analysis of the Princeton Plasma
Physics Laboratory and Its Fusion Test Reactors
TFTR, PLT and PDX”

MICHEL CALLON and KARIN KNORR-CETINA,
IAS

June 24

School of Natural Sciences

Public Lecture: “Dealing with Genes II”

MAXINE SINGER, *President of the Carnegie Institution
of Washington* PAUL BERG, *Discussant, Stanford
University*

July 14

School of Natural Sciences

Theoretical Physics Seminar: “Quantum
Background Independence in String Theory”

EDWARD WITTEN, *IAS*

"I am always delighted but no longer surprised when our quest for the truths of nature leads us to concepts of strange but often stunning beauty. Those of us who are lucky enough to take part in the quest have a responsibility that is also a privilege, to communicate its spirit and meaning."

FRANK WILCZEK

INDEPENDENT AUDITORS' REPORT

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

We have audited the accompanying balance sheet of Institute for Advanced Study—Louis Bamberger and Mrs. Felix Fuld Foundation (the "Institute") as of June 30, 1993, and the related statements of support and revenue, expenses, capital additions and changes in fund balances and of changes in financial position for the year then ended. These financial statements are the responsibility of the Institute's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

In our opinion, such financial statements present fairly, in all material respects, the financial position of the Institute at June 30, 1993 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.

Deloitte & Touche

DELOITTE & TOUCHE

Parsippany, New Jersey

September 13, 1993

BALANCE SHEET

JUNE 30, 1993 (WITH COMPARATIVE TOTALS FOR 1992)

ASSETS	1993	1992
OPERATING FUNDS:		
Cash and temporary investments	\$	\$ 169,772
Accounts receivable	150,182	95,955
Government grants and contracts receivable	1,389,656	814,254
Accrued income on investments	1,585,198	963,088
Prepaid and other assets	328,476	397,306
Due from endowment fund	700,000	600,000
TOTAL OPERATING FUNDS	<u>\$ 4,153,512</u>	<u>\$ 3,040,375</u>
PLANT FUNDS:		
Short-term investments (Note B)	\$ 1,765,000	\$ 7,228,752
Unamortized debt issuance expense	126,148	135,407
Land, buildings and improvements, equipment and rare book collection - net (Note C)	24,555,921	19,024,402
TOTAL PLANT FUNDS	<u>\$ 26,447,069</u>	<u>\$26,388,561</u>
ENDOWMENT AND SIMILAR FUNDS:		
Investments, at cost (Notes B & D)	\$208,616,746	\$206,305,411
TOTAL ENDOWMENT AND SIMILAR FUNDS	<u>\$208,616,746</u>	<u>\$206,305,411</u>

See Notes to Financial Statements

LIABILITIES AND FUND BALANCES	1993	1992
OPERATING FUNDS:		
Accounts payable and accrued expenses	\$ 1,186,616	\$ 1,072,840
Deferred restricted revenue (Note F)	2,931,607	1,925,189
Fund balance - unrestricted	35,289	42,346
	<u>4,153,512</u>	<u>3,040,375</u>
TOTAL OPERATING FUNDS	<u>\$ 4,153,512</u>	<u>\$ 3,040,375</u>
PLANT FUNDS:		
Long-term debt (Note D)	\$ 17,274,470	\$ 17,635,523
Fund balance	9,172,599	8,753,038
	<u>26,447,069</u>	<u>26,388,561</u>
TOTAL PLANT FUNDS	<u>\$ 26,447,069</u>	<u>\$ 26,388,561</u>
ENDOWMENT AND SIMILAR FUNDS:		
Due to operating funds	\$ 700,000	\$ 600,000
Accrued investment management fees	523,140	
Fund balances:		
True endowment	43,291,383	41,273,383
Quasi-endowment:		
Restricted	17,048,594	17,473,828
Unrestricted:		
Designated	12,677,984	12,376,295
Undesignated	134,375,645	134,581,905
	<u>208,616,746</u>	<u>206,305,411</u>
TOTAL ENDOWMENT AND SIMILAR FUNDS	<u>\$208,616,746</u>	<u>\$206,305,411</u>

STATEMENT OF SUPPORT AND REVENUE, EXPENSES, CAPITAL ADDITIONS
AND CHANGES IN FUND BALANCES FOR THE YEAR ENDED JUNE 30, 1993
(WITH COMPARATIVE TOTALS FOR 1992)

	OPERATING FUNDS	
	UNRESTRICTED	RESTRICTED
SUPPORT AND REVENUE:		
Endowment income	\$ 5,636,165	\$2,176,347
Less - management fees	(1,461,296)	(563,749)
Private gifts and grants	1,000	1,020,328
Government grants and contracts	<u> </u>	<u>3,367,940</u>
Total support and revenue	<u>4,175,869</u>	<u>6,000,866</u>
EXPENSES:		
School of Mathematics	1,475,231	2,026,638
School of Natural Sciences	1,575,774	2,355,676
School of Historical Studies	1,709,905	924,468
School of Social Science	<u> </u>	<u>1,480,209</u>
Libraries and other academic expenses	1,545,546	338,797
Administration and general	3,252,156	7,389
Auxiliary activity - tenants' housing expenses, net of unrestricted revenue of \$267,537 in 1993	<u>5,442</u>	<u>73,517</u>
Total expenses	<u>9,564,054</u>	<u>7,206,694</u>
DEFICIENCY OF SUPPORT AND REVENUE OVER EXPENSES BEFORE CAPITAL ADDITIONS	<u>(5,388,185)</u>	<u>(1,205,828)</u>
CAPITAL ADDITIONS:		
Gifts and grants	<u> </u>	<u> </u>
Realized gain on investments - net	<u> </u>	<u> </u>
Gain (loss) on sale of plant assets	<u> </u>	<u> </u>
Total capital additions	<u> </u>	<u> </u>
EXCESS (DEFICIENCY) OF SUPPORT AND REVENUE OVER EXPENSES AFTER CAPITAL ADDITIONS	<u>(5,388,185)</u>	<u>(1,205,828)</u>
FUND BALANCES AT BEGINNING OF YEAR	42,346	
TRANSFERS:		
Plant acquisitions and principal debt service payments and other, net	(915,443)	
Quasi-endowment funds utilized	6,325,701	1,217,877
Transfers to other endowment and similar funds	<u>(29,130)</u>	<u>(12,049)</u>
FUND BALANCES AT END OF YEAR	<u>\$ 35,289</u>	<u>\$ -0-</u>

See Notes to Financial Statements

FINANCIAL STATEMENTS

TOTAL	PLANT FUNDS	ENDOWMENT AND SIMILAR FUNDS	TOTAL 1993 ALL FUNDS	TOTAL 1992 ALL FUNDS
\$ 7,812,512			\$ 7,812,512	\$ 7,594,317
(2,025,045)			(2,025,045)	(1,468,170)
1,021,328			1,021,328	1,142,981
<u>3,367,940</u>			<u>3,367,940</u>	<u>2,985,516</u>
<u>10,176,735</u>			<u>10,176,735</u>	<u>10,254,644</u>
3,501,869	\$ 348,382		3,850,251	3,790,196
3,931,450	334,787		4,266,237	4,038,715
2,634,373	176,133		2,810,506	2,681,729
1,480,209	77,168		1,557,377	1,350,734
1,884,343	153,029		2,037,372	1,732,379
3,259,545	232,310		3,491,855	3,070,192
<u>78,959</u>	<u>132,619</u>		<u>211,578</u>	<u>337,086</u>
<u>16,770,748</u>	<u>1,454,428</u>		<u>18,225,176</u>	<u>17,001,031</u>
<u>(6,594,013)</u>	<u>(1,454,428)</u>		<u>(8,048,441)</u>	<u>(6,746,387)</u>
	966,860	\$ 1,019,825	1,986,685	12,054,652
		8,170,769	8,170,769	16,173,620
	<u>(8,314)</u>		<u>(8,314)</u>	<u>300</u>
	<u>958,546</u>	<u>9,190,594</u>	<u>10,149,140</u>	<u>28,228,572</u>
(6,594,013)	(495,882)	9,190,594	2,100,699	21,482,185
42,346	8,753,038	205,705,411	214,500,795	193,018,610
(915,443)	915,443			
7,543,578		(7,543,578)		
<u>(41,179)</u>		<u>41,179</u>		
<u>\$ 35,289</u>	<u>\$9,172,599</u>	<u>\$207,393,606</u>	<u>\$216,601,494</u>	<u>\$214,500,795</u>

STATEMENT OF CHANGES IN FINANCIAL POSITION
FOR THE YEAR ENDED JUNE 30, 1993 (WITH COMPARATIVE TOTALS FOR 1992)

	OPERATING FUNDS	PLANT FUNDS
RESOURCES PROVIDED:		
Deficiency of support and revenue over expenses before capital additions	\$ (6,594,013)	\$(1,454,428)
Capital additions:		
Gifts and grants		966,860
Realized gain on investments - net		
Gain (loss) on sale of plant assets		(8,314)
Excess (deficiency) of support and revenue over expenses after capital additions	(6,594,013)	(495,882)
Items not using (providing) resources:		
Depreciation		1,454,428
Decrease in restricted cash		
Gain on sale of investments - net		
Proceeds from sale of investments		5,463,751
Increase in long-term debt		
Decrease in receivables		
Decrease in accrued income		
Decrease in unamortized debt service expense		9,260
Increase in payables	113,776	
Increase in accrued management fees		
Increase in deferred restricted revenue	1,006,418	
Decrease in deferred charges	68,830	
Increase in interfund payables		
Total resources provided (used)	<u>(5,404,989)</u>	<u>6,431,557</u>
RESOURCES USED:		
Purchases of investments		
Purchases of plant facilities and equipment		6,985,947
Increase in interfund receivables	100,000	
Increase in receivables	629,629	
Increase in deferred charges	622,110	
Increase in unamortized debt service expense		
Decrease in payables		
Reduction of long-term debt		361,053
Total resources used	<u>1,351,739</u>	<u>7,347,000</u>
TRANSFERS:		
Plant acquisitions and principal debt service payments	(915,443)	915,443
Quasi-endowment funds utilized	7,543,578	
Transfers to other endowment and similar funds	(41,179)	
Total transfers	<u>6,586,956</u>	<u>915,443</u>
INCREASE (DECREASE) IN CASH AND TEMPORARY INVESTMENTS	<u>\$ (169,772)</u>	<u>\$ -0-</u>

See Notes to Financial Statements

FINANCIAL STATEMENTS

ENDOWMENT AND SIMILAR FUNDS	TOTAL 1993 ALL FUNDS	TOTAL 1992 ALL FUNDS
	\$ (8,048,441)	\$ (6,746,387)
\$ 1,019,825	1,986,685	12,054,652
8,170,769	8,170,769	16,173,620
<u> </u>	<u>(8,314)</u>	<u>300</u>
9,190,594	2,100,699	21,482,185
	1,454,428	1,291,710
		458,114
(8,170,769)	(8,170,769)	(16,173,620)
784,436,433	789,900,184	573,726,281
		10,146,088
		106,383
		362,641
	9,260	
9,445,609	9,559,385	6,821,009
523,140	523,140	
	1,006,418	388,398
	68,830	
<u>100,000</u>	<u>100,000</u>	<u>600,000</u>
<u>795,525,007</u>	<u>796,551,575</u>	<u>599,209,189</u>
788,022,608	788,022,608	595,021,330
	6,985,947	3,099,713
	100,000	600,000
	629,629	
	622,110	152,284
		73,265
		873,784
	<u>361,053</u>	
<u>788,022,608</u>	<u>796,721,347</u>	<u>599,820,376</u>
(7,543,578)		
<u>41,179</u>		
<u>(7,502,399)</u>		
<u>\$ -0-</u>	<u>\$ (169,772)</u>	<u>\$ (611,187)</u>

NOTES TO FINANCIAL STATEMENTS · JUNE 30, 1993

A · SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

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

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

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

Basis of Presentation

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

Fund Accounting

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

Fund balances restricted by outside sources are so indicated and are distinguished from unrestricted funds allocated or designated to specific purposes by action of the governing board. Externally restricted funds may only be utilized in accordance with the purpose established by the grantor of such funds. In contrast, the

governing board retains full control over unrestricted funds to use in achieving any of the Institute's objectives.

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

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

Forward Contracts

The Institute enters into forward exchange contracts for the sale of foreign currencies as hedges of investments denominated in foreign currencies. Gains and losses resulting from such forward contracts are deferred and included in the measurement of the gain or loss of the hedged security when sold.

Plant Assets and Depreciation

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

B · INVESTMENTS

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

Endowment and similar funds investments at June 30, 1993 are comprised of the following:

	CARRYING VALUE	MARKET VALUE
Pooled investments:		
Cash equivalents	\$ 4,971,119	\$ 4,971,119
Equity securities	77,534,907	98,732,808
Debt securities	138,425,634	141,190,342
Mortgages and notes receivable from faculty and staff	2,654,840	2,654,840
Investment accounts receivable	12,930,250	12,930,250
Investment accounts payable	<u>(27,946,787)</u>	<u>(27,946,787)</u>
Total pooled investments	<u>208,569,963</u>	<u>232,532,572</u>
Funds invested separately:		
Equity securities	<u>46,783</u>	<u>63,733</u>
Total	<u>\$208,616,746</u>	<u>\$232,596,305</u>

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

Equity securities include the Institute's interest in certain limited partnerships with a carrying value of approximately \$14,273,876 and a market value of approximately \$14,200,420 at June 30, 1993. The Institute accounts for these investments under the equity method and, accordingly, recognizes its proportionate share of ordinary income and net realized gains attributable to the investments of the partnerships. The Institute's proportionate share of ordinary income and net realized gain was \$14,616 and \$2,631,101, respectively, for the year ended June 30, 1993.

Substantially all of the assets of endowment and similar funds are pooled with each individual fund subscribing to or disposing of units on the basis of the market value per unit, determined on a quarterly basis. Earnings per unit of the pooled investments for the year ended June 30, 1993, exclusive of realized gains and losses, amounted to \$234 after deducting management fees.

The following table summarizes changes in carrying and market values of the pooled investment portfolio.

	INVESTMENT PORTFOLIO			MARKET VALUE PER UNIT
	MARKET VALUE	CARRYING VALUE	UNREALIZED APPRECIATION	
June 30, 1992	\$208,926,213	\$206,305,412	\$ 2,620,801	\$8,226
June 30, 1993	232,596,305	208,616,746	<u>23,979,559</u>	9,415
Increase in unrealized appreciation for the year ended June 30, 1993			21,358,758	
Realized net gain for the year ended June 30, 1993			<u>8,170,769</u>	
Net realized and unrealized gain for the year ended June 30, 1993			<u>\$29,529,527</u>	

Short-term investments within the plant fund represent unexpended proceeds of the 1991 NJEFA bonds. Such funds are invested in U.S. Government obligations with maturities of less than one year. At June 30, 1993, the market value of such securities approximates their carrying value.

C · PHYSICAL PLANT

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

A summary of plant assets at June 30, 1993 follows:

Land and improvements	\$ 2,418,138
Buildings and improvements	31,762,691
Equipment	9,618,595
Rare book collection	<u>199,508</u>
Total	43,998,932
Less accumulated depreciation	<u>(19,443,011)</u>
Net book value	<u>\$ 24,555,921</u>

D · LONG-TERM DEBT

A summary of long-term debt at June 30, 1993 follows:

6.275%, 1991 — NJEFA	\$ 17,895,000
Less unamortized bond discount	<u>620,530</u>
Total long-term debt	<u>\$ 17,274,470</u>

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

The bonds are dated September 1, 1991, bear interest, payable semi-annually, at the net average annual rate of 6.275%, are subject to redemption at various prices, and require principal payments and sinking fund installments through June 30, 2021. Bond principal in the amount of \$385,000 (1994), \$405,000 (1995), \$425,000 (1996), \$455,000 (1997) and \$480,000 (1998) will mature in each of the designated years. The remaining balance of \$15,855,000 is payable in semi-annual installments through June 30, 2021. The obligation to pay the Authority on a periodic basis, in the amounts sufficient to cover principal and interest due on the bonds, is a general obligation of the Institute.

Interest expense on long-term debt for the year ended June 30, 1993 was \$620,530 net of \$310,000 in interest costs capitalized as a component of construction-in-progress.

The Institute has an unused line of credit for \$256,072.

E · PENSION PLANS AND OTHER POST RETIREMENT BENEFITS

Separate voluntary defined contribution retirement plans are in effect for faculty members and eligible staff personnel, both of which provide for annuities which are funded to the Teachers Insurance and Annuity Association and/or the College Retirement Equities Fund. Contributions are based on the individual participants' compensation in accordance with the formula set forth in the plan documents on a non-discriminatory basis. Contributions for the year ended June 30, 1993 totalled approximately \$818,734.

In addition to providing pension benefits, the Institute provides certain health care and life insurance benefits for retired employees and faculty. Substantially all of the Institute's employees may become eligible for those benefits if they

reach normal retirement age while working for the Institute. The cost of retiree health care and life insurance benefits is recognized as expense as premiums are paid. For fiscal year 1993, those costs totalled approximately \$173,000.

In December 1990, the Financial Accounting Standards Board issued Statement of Financial Accounting Standards No. 106, "Employers' Accounting for Post-retirement Benefits Other Than Pensions" ("SFAS 106"). SFAS 106, effective for fiscal year 1994, will require that the Institute change its method of accounting for postretirement health care and life insurance benefits to an accrual basis. This change in accounting will require the recognition of a transition liability which represents the actuarial present value of benefits attributed to prior employee service. The Institute has not yet determined what effect the adoption of SFAS 106 will have on its financial condition.

F · CHANGES IN DEFERRED RESTRICTED REVENUE

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

	TOTAL DEFERRED RESTRICTED REVENUE
Balance at June 30, 1992	\$1,925,189
Additions:	
Contributions, grants, etc.	5,797,500
Net restricted endowment income	1,758,322
Quasi-endowment funds utilized	<u>1,060,104</u>
Total additions	<u>8,615,926</u>
Deductions:	
Funds expended from contributions, grants, etc.	4,388,268
Funds expended from restricted endowment	2,818,426
Funds expended for plant assets	<u>402,814</u>
Total deductions	<u>7,609,508</u>
Balance at June 30, 1993	<u>\$2,931,607</u>

G · FUNDS HELD IN TRUST BY OTHERS

The Institute is the residuary beneficiary of a trust and, upon the death of the life tenant, will be entitled to receive the corpus thereof. The approximate market value of the trust's assets, as reported by the administrator of the trust, aggregated \$2,108,468 as of June 30, 1993 and is not included in the accompanying financial statements.

H · FUNCTIONAL ALLOCATION OF EXPENSES

The costs of providing the various programs and other activities have been summarized on a functional basis in the statement of support and revenue, expenses, capital additions and changes in fund balances. Accordingly, certain costs have been allocated among the programs and supporting services benefited. The net costs incurred by the Institute in operating both the Dining Hall (\$462,583 net of \$361,638 in revenues) and Members' housing (\$235,607, net of \$992,474 in revenues) have been allocated among the programs and supporting services benefited. An overhead charge is allocated to certain schools generally based upon their ability to recover such costs under the terms of various grants and contracts. Overhead allocated from administration and general expenses to various programs totalled \$1,240,585 for the year ended June 30, 1993.

Interest expense on plant fund debt, net of interest income on short-term investments, is allocated to schools based upon their occupancy of academic buildings funded with such debt. Allocated interest expense totalled \$665,281 and allocated interest income totalled \$53,548 for the year ended June 30, 1993.

I · TAX STATUS

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

AS 36 .I79 .1987-93. 92-540
Institute for Advanced Study.
Annual report. 1987-93

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