INSTITUTE FOR ADVANCED STUDY
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INSTITUTE
for ADVANCED STUDY

REPORT

FOR THE ACADEMIC YEAR

2001 – 2002

PRINCETON · NEW JERSEY

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

Newark, New Jersey.

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

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INSTITUTE FOR ADVANCED STUDY
BACKGROUND AND PURPOSE

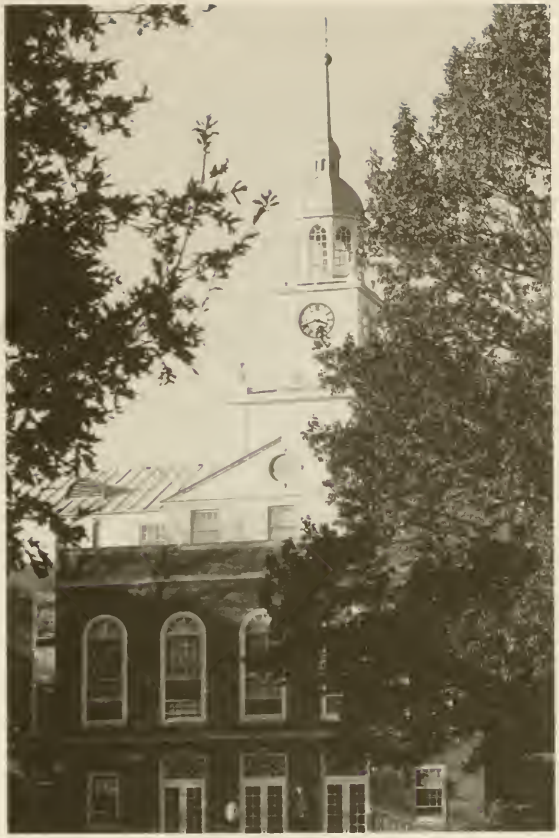
The Institute for Advanced Study was founded in 1930 with a major gift from New Jersey businessman and philanthropist Louis Bamberger and his sister, Mrs. Felix Fuld, who wished to use their fortunes to make a significant and lasting contribution to society. They sought the advice of educator Abraham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

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

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

Each year the Institute awards fellowships to some 190 visiting Members from universities and research institutions throughout the world. The Institute's 5,000 former Members hold positions of intellectual and scientific leadership in the United States and abroad. More than a dozen Nobel laureates have been Institute Faculty or Members, and many more are winners of the Wolf or MacArthur prizes. Thirty out of forty-three Fields Medalists have been Institute Faculty or Members.

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



"It seemed to me that the time was ripe for the creation in America of an institute in the field of general scholarship and science ... not a graduate school, training men in the known and to some extent in methods of research, but an institute where everyone — faculty and members — took for granted what was known and published, and in their individual ways endeavored to advance the frontiers of knowledge."

— Abraham Flexner, Founding Director (1930-39) of the Institute, Memorandum to the Board of Trustees of the Institute for Advanced Study, September 26, 1931

Fuld Hall

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"The Institute is esteemed worldwide as a real touchstone of excellence in physics. The optimists among physicists hope that we will indeed come to understand the bedrock nature of the physical world and if they're right, the smart money would be that the key ideas will be sparked right here. And the Institute will then have achieved Einstein's vision, and Bloomberg Hall will be one of the historic buildings of the 21st century."

— Sir Martin Rees, Trustee, Institute for Advanced Study, and Royal Society Research Professor, University of Cambridge

At the dedication of Bloomberg Hall on May 3, 2002: Michael Bloomberg, (left) Mayor of New York City and former Institute Trustee, and Edward Witten, Institute Faculty member in the School of Natural Sciences

REPORT OF THE CHAIRMAN 2001-02

Over the course of this past year, many of us have looked more carefully and critically at the choices we are making in our lives, and at the organizations with which we are involved and which we support. As I think about the Institute for Advanced Study in this context, I realize that more than ever, the advancement and dissemination of knowledge is of critical importance, and I very much value the opportunity to help sustain the Institute's ability to continue making significant contributions to knowledge.

The Institute exists to encourage and support fundamental scholarship, the original and often speculative thinking that is at the source of new knowledge. When the Institute was founded 72 years ago, no similar institution existed. Subsequently, centers focusing on research and postdoctoral scholarship have been created and continue to be created, both in this country and abroad. As broader recognition of the value and importance of fundamental scholarly research has developed, opportunities for post-doctoral researchers and senior visiting scholars have grown.

The Institute for Advanced Study continues to be unique as a residential community composed of both a permanent Faculty and an international group of nearly two hundred annually renewed visiting Members. It is the interaction between these two lively groups - Faculty and Members - that is central to life at the Institute, and neither our permanent Faculty nor our community of visiting scholars would be fully productive without the inspiration of the other. Another distinguishing feature of the Institute is its strong emphasis on interdisciplinary work, and the very broad range of the sciences and humanities across which Institute Faculty and Members pursue their research.

Providing the very best environment possible for scholarship is the Institute's first priority, and this commitment is illustrated by the range and degree of support provided to each individual scholar. Institutional independence - combined with a long history of close and productive cooperation with other nearby academic institutions - means that scholarly work can be completely curiosity-driven. Both the Institute's distinguished Faculty, and the extraordinary number of the world's leading scholars and scientists who have begun and/or enhanced their careers at the Institute, have built a history of accomplishment and achievement that is woven throughout the fabric of this institution, and inspires those who come here. Over the past seven decades, more than 5,000 scholars have spent time at the Institute, and subsequently returned to their home institutions all around the globe. From the very beginning, the Institute has been an international community, and this past year nearly two-thirds of the visiting scholars have come from countries outside the United States.

The Institute has enjoyed a long tradition of having a strongly committed and effective Board of Trustees, which has had an ongoing and successful focus on ensuring the financial health of this institution. In this context, I am very pleased to announce that the Board welcomes new Trustees Fernando Henrique Cardoso, W. Robert Connor, and Nancy B. Peretsman. In addition, Helene L. Kaplan has accepted our invitation to become a Trustee Emerita.

Fernando Henrique Cardoso has been the President of Brazil since January 1, 1995. In his earlier years as a sociology professor and an opponent of Brazil's military dictators, he taught university courses while living in exile from 1964 to 1968 in Chile and France. He has taught at Stanford University, the University of Paris, and the University of Cambridge, among other institutions. Dr. Cardoso has been a visiting Member in the Institute's School of Social Science three times: in 1974-75, 1975-76, and in 1977-78. He founded the Center for Analysis and Research in 1968, and the Brazilian Center of Analysis and Planning in 1981. Dr. Cardoso was elected a member of the Brazilian Senate from 1983-92, and served as Foreign Affairs Minister in 1992-93 and Finance Minister in 1993-4.

It is with sadness that I note the death of Institute Trustee John D'Arms on January 22, 2002. Dr. D'Arms, whose scholarly work focused on the history and archaeology of Ancient Rome and the Bay of Naples, was most recently the President of the American Council of Learned Societies and an Adjunct Professor of History and Classics at Columbia University. During his distinguished career he taught at the University of Michigan for many years, and he was the Director of the American Academy in Rome from 1977-80. He was a member in the School of Historical Studies at the Institute in 1975-76. We were very pleased to welcome him to our Board at the October 2001 Trustees' Meeting as the Academic Trustee for the School of Historical Studies, and we will miss his presence.

The new academic Trustee for the School of Historical Studies, W. Robert Connor, is President and Director of the National Humanities Center. Previously, he was the Andrew Fleming West Professor of Classics at Princeton University, where he was on the faculty for twenty-five years. His published works include several books concerning the Greek world, including *The New Politicians of Fifth Century Athens* (1971) and *Thucydides* (1984). In 1996, he was one of the organizers of an independent commission that looked at the future of the Fulbright program and issued the influential report *Fulbright at Fifty*. He has served on many committees and advisory panels concerned with strengthening teaching, and is a member of the President's Committee on the Arts and the Humanities.

Nancy B. Peretsman, Executive Vice President and Managing Director of Allen & Co., has pursued an extraordinary career on Wall Street, and is widely recognized for her noteworthy accomplishments in the world of investment banking. Ms. Peretsman joined Allen & Co. in 1995 and has led transactions for major corporations including CBS and MediaOne. Prior to joining Allen & Co., she headed the worldwide media investment banking practice at Salomon Brothers. She serves on the boards of Charter Communications, Priceline.com, several privately-held companies, and The New School, where she has been a force behind The New School's Distance Learning Program. She is also an Emerita Trustee of Princeton University.

In May, the Institute community came together to dedicate the new home of the Institute's School of Natural Sciences: Bloomberg Hall, named in honor of Michael Bloomberg, former Institute Trustee and Mayor of New York City. Although the School itself was established 36 years ago, Bloomberg Hall provides the first opportunity for all of the physicists and astrophysicists working in the School to be housed together in one building. At the dedication, Sir Martin Rees, Institute Trustee and Royal Society Research Professor at the University of Cambridge, noted, "The Institute is esteemed worldwide as a real touchstone of excellence in physics. The optimists among physicists

hope that we will indeed come to understand the bedrock nature of the physical world and if they're right, the smart money would be that the key ideas will be sparked right here. And the Institute will then have achieved Einstein's vision, and Bloomberg Hall will be one of the historic buildings of the 21st century."

As pleased as we were to see Michael Bloomberg elected Mayor of New York City last fall, we regretted in equal measure that this required his subsequent resignation from our Board. During his five years on the Institute's Board, Mike was a strong leader of the Development Committee and was very actively involved in all matters of concern to the Executive Committee. We admired and respected the fine example his leadership set for all of us, and we deeply appreciate his great personal generosity to the Institute. At the dedication of Bloomberg Hall last spring, U.S. Representative Rush Holt (NJ-12) noted, "Mayor Bloomberg has built corporate empires by providing answers that people in business are seeking, but he has shown here at the Institute that he is also interested in empires of the mind."

The Institute's strength depends directly upon the efforts of the many individuals who are committed to its health and success. I wish it were possible to specifically thank every one who has contributed his or her unique efforts in support of this institution: the Director, the Faculty, current and past Members, Friends, Trustees, and Staff. To each person, I express my gratitude and appreciation.

James D. Wolfensohn
Chairman

REPORT OF THE DIRECTOR 2001-02

At the time of the tragic events of September 11, 2001, members of the Institute community were just arriving, many with family and children, to begin the new academic year. Most - nearly two-thirds of our approximately 190 visiting scholars - were coming from countries outside the United States.

The Institute community gathered in Wolfensohn Hall on September 14th for a period of remembrance and reflection, and those who wanted to speak shared some of their thoughts and feelings. One of the Members said that among his first reactions was a feeling of helplessness, as his occupation did not qualify him to be directly involved in the work of responding to the attacks. But as he continued to think about the significance of a life devoted to scholarship and scientific research, his belief that knowledge is truly the essential resource and the hope of civilization re-emerged strongly.

This is indeed the Institute's work and its contribution: to focus on the creation of new knowledge, and to share that new knowledge widely. The Institute is organized to create and support the best environment for scholarship in every way possible. A strong belief in the value of the best work of which the human mind is capable is at the heart of the Institute. It is within this context that I report briefly on some specific aspects of this past year.

Our Faculty of 24 distinguished scholars is at the very center of life here. These individuals are not only extremely active in their own areas of specialty, but are also equally committed to their other major role, which is to serve as resources to visiting scholars and scientists. I am pleased to announce four new appointments to the Institute Faculty: Juan Maldecena, Kirk Varnedoe, Vladimir Voevodsky, and Caroline Walker Bynum.

The art historian Kirk Varnedoe joined the Faculty of the School of Historical Studies in January 2001. Immediately prior to coming to the Institute, Professor Varnedoe was the Chief Curator of the Department of Painting and Sculpture at the Museum of Modern Art in New York. Prior to joining MoMA in 1985, Professor Varnedoe was a tenured full Professor at the Institute of Fine Arts, New York University, where he had been on the Faculty since 1980. He previously taught at Columbia Law School, Columbia University, Stanford University, Williams College, and Oxford University. A fellow of the American Academy of Arts and Sciences since 1993, Professor Varnedoe was awarded a MacArthur Foundation Fellowship in 1984, a Knighthood of the Royal Order of Donnebroge (Denmark) in 1983 and a National Endowment for the Humanities Fellowship in 1977, among other honors. He is the author of numerous articles and of twelve books, and the co-author, editor, or co-editor of six additional books. Professor Varnedoe earned a bachelor's degree from Williams College in 1967 and a doctorate from Stanford University in 1972. He is an Officier of the Ordre des Arts et des Lettres, a Member of the American Philosophical Society, a trustee of the National Humanities Center, a member of the Steering Committee of The New York Public Library's Center for Scholars and Writers, and the recipient of two honorary degrees.

Juan Maldacena, a theoretical physicist, is known for his work in string theory. Professor Maldacena, who had been Distinguished Visiting Professor in the School of Natural Sciences since September 2000, became a member of the permanent faculty effective

January 1, 2001. After studying physics at the University of Buenos Aires, Professor Maldacena received his master's degree from the Universidad de Cuyo, Bariloche, in 1991, and his Ph.D. in physics from Princeton University in 1996. Following a postdoctoral fellowship at Rutgers University, he joined the Harvard University faculty in 1997 as visiting associate professor. In 1999 he was named Cabot Associate Professor, and then Professor of Physics. He spent the spring semester of 1999 as a member at the Institute for Advanced Study. Professor Maldacena has published many papers on string theory, quantum gravity, and high-energy theoretical physics. The recipient of numerous honors, he received a grant from the John D. and Catherine T. MacArthur Foundation in 1999. In the same year he also received the UNESCO Husein Prize for Young Scientists. He received the 2000 Sackler Prize in Physical Sciences, awarded by Tel-Aviv University to recognize "dedication to science, originality, and excellence" in young scientists, and the 2001 International Xanthopoulos Award for Gravitation and Cosmology.

Vladimir Voevodsky, who was born in Russia on June 4, 1966, is known for his work in the homology theory of schemes, algebraic K-theory, and interrelations between algebraic geometry and algebraic topology. Professor Voevodsky received his B.S. in mathematics from Moscow State University in 1989, and his Ph.D. in mathematics from Harvard University in 1992. He held visiting positions at the Institute for Advanced Study, Harvard University, and the Max-Planck-Institut fuer Mathematik before joining the faculty of Northwestern University in 1996. A Member in the Institute's School of Mathematics since 1998, he was appointed a Faculty member in the School in 2002. Professor Voevodsky was a Sloan Fellow in 1996-98, and has twice received grants from the National Science Foundation. He won a Clay Prize Fellowship in 1999 and 2000. He is coauthor (with A. Suslin and E.M. Friedlander) of *Cycles, Transfers and Motivic Homology Theories* (Princeton University Press, 2000). A recipient of the 2002 Fields Medal, presented at the International Congress of Mathematicians in Beijing, Professor Voevodsky was recognized for developing new cohomology theories for algebraic varieties, thereby providing new insights into number theory and algebraic geometry.

Caroline Walker Bynum, an historian of medieval religious thought and practice with a special interest in women's piety, is currently University Professor at Columbia University, and will begin her appointment at the Institute for Advanced Study on January 1, 2003. Over the course of her career, Professor Bynum has taught all aspects of late antique and medieval history (political, military, social, economic, religious, and intellectual); church history from the early church through the Reformation; and intellectual history from Plato to the 17th century. Professor Bynum's scholarly interests, which initially focused on aspects of the spirituality of monks and canons in the 12th century, grew to include analyses of the concepts of individuality and community in religious orders. Professor Bynum received her B.A. degree with high honors from the University of Michigan in 1962. She received M.A. and Ph.D. degrees from Harvard University in 1963 and 1969, respectively, and has taught at Harvard University, Harvard Divinity School, and the University of Washington. In 1999, she became the first woman to be named University Professor, Columbia's highest faculty honor. The co-editor of five volumes and the author of numerous articles and reviews, Professor Bynum has also written six books. She is the recipient of many awards and honors, including eight honorary degrees. From 1986 through 1991 she was a MacArthur Fellow, and in March of 1999 she was chosen by the National Endowment for the Humanities as the Jefferson Lecturer in the Humanities. In June 2001, she received the Centennial Medal of the Harvard Graduate School of Arts and Sciences for contributions to society.

For many years, the great majority of the work done at the Institute has been organized into the four Schools that we have today. I urge you to gain a sense of the depth and breadth of the work done in each School by reading its detailed report on its activities, but I would like to briefly comment here on a few of the activities that have taken place at the Institute this year that reflect our commitment to extending our resources to the larger community.

"Can Our Democracies Rise to the Global Challenges of the 21st Century?" was the topic of a lecture organized by José Cutileiro, the George F. Kennan Professor in the School of Historical Studies, and given by Martti Ahtisaari, the former President of the Republic of Finland, on April 17 in Wolfensohn Hall. President Ahtisaari believes that the root cause of terrorism is a lack of democracy and accountability, and he is convinced that the ability of our democracies to rise to global challenges will depend on our ability to build more ambitious transatlantic co-operation.

The School of Mathematics began a joint sponsorship, with Princeton University, of the Mentoring Program for Women in Mathematics, which for the past nine years had been a part of the IAS/Park City Mathematics Institute (PCMI). In May, forty women gathered on the Institute campus for the ten-day residential program, whose research topic was quantum field theory, supersymmetry, and enumerative geometry. The program brought together undergraduate and graduate students in mathematics - especially those who wished to explore the area where mathematics and physics meet - and postdoctoral researchers in the field.

The School of Natural Sciences developed an entirely new project, Prospects in Theoretical Physics (PiTP), which will be a two-week residential summer program, on the Institute campus, for graduate students considering a career in theoretical physics. The program will reach out to women and minorities, as well as to graduate students in small universities who typically do not have the same opportunities and access to leaders in the field as graduate students in large research institutions.

In February, with the guidance of faculty member Eric Maskin, School of Social Science, the Institute sponsored a day-long series of lectures titled "Strategy, Competition and Coordination: Game Theory after Half a Century." The program was designed to provide a lay audience with the opportunity to explore the development of game theory and discuss some of its applications in various fields. The history of game theory is closely tied to the Institute for Advanced Study, and Institute Professor John von Neumann is generally regarded as the father of the subject. The event was moderated by John von Neumann's daughter, Institute Board member Marina von Neumann Whitman, a faculty member at the University of Michigan.

The Program in Theoretical Biology, led by Martin Nowak, sponsored five public lectures on subjects that ranged from "Why Cells in an Embryo Do What They Do: What We Still Need to Know" to "The Human Genome and the Origins of Cancer." The Program also sponsored a two- day immunology workshop, and, with the School of Mathematics, started a new nine-part seminar series in the spring term.

The Institute Concert Series completed its ninth season with twelve performances in Wolfensohn Hall. Organized by Artist-in-Residence Jon Magnussen, the series included

appearances by the New York Percussion Quartet; composer and pianist Noel Lee; baritone Sanford Sylvan; pianist Robert Taub; and composer and violinist Mari Kimura. In addition to pre-concert talks before each of the programs, Jon Magnussen presented two events in the "Talking About New Music" series. His new work, *Psalm*, was premiered, under the direction of the composer, at the 2002 Salt Lake Winter Olympic Arts Festival. Commissioned by the José Limón Dance Foundation to accompany José Limón's classic 1967 ballet of the same name, *Psalm* was composed in Princeton during the winter of 2001-2002. Excerpts from the work will have their New York premiere on November 3 in Carnegie Hall.

This is the ninth year that the Institute for Advanced Study has sponsored the IAS/Park City Mathematics Institute (PCMI), a program designed for mathematics educators at the secondary and post-secondary level, and mathematics researchers and students at the post-secondary level. PCMI includes a three-week residential Summer Session, a year-round program of professional development for high school teachers, and a publication program. Over 275 participants attended the 12th annual Summer Session held June 30-July 20, 2002 in Park City, Utah. The rich mathematical experience combined with interaction among all participants results in greatly increased understanding and awareness of the issues confronting mathematics and mathematics education today.

At our last Board of Trustees meeting, I informed our Trustees of my intention to step down as Director and to accept the School of Mathematics' invitation to become a Faculty member, as has long been planned. A search committee has begun the process of identifying a new Director.

Over the last twelve years, it has been both my privilege and a great pleasure to serve this extraordinary institution. One of our Trustees, Vartan Gregorian, has provided perhaps the best succinct description of the Institute as "the university to universities." The Institute for Advanced Study is, in my view, one of the great institutions of the world. It is superb at what it does, and deploys its resources more effectively than any other educational institution which I know. In looking at the Institute's future, I agree strongly with a thought captured in the summary of our Decadal Review: the Institute for Advanced Study should remain true to its fundamental mission but be flexible in its implementation. In particular, it should continue its current process of experimenting with work in areas new to the Institute as well as with different combinations of areas of scholarship.

It has been a marvelous experience working with the Faculty. It is a great privilege to work with people who are the best at what they do. The Board of Trustees is incomparable, and the support and guidance that it provides the Institute is exceptional. Finally, it is because of the ongoing efforts of the Faculty and the staff that the experience of the visiting Members is as rich and rewarding as it is. I would like to express my deepest gratitude to all who take part in building the strength of this unique institution and who do their best to ensure that this source of new knowledge continues to flourish.

Phillip A. Griffiths
Director

OFFICE OF THE DIRECTOR
RECORD OF EVENTS

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

Academic Year 2001-02

September 25
New Member Reception

October 2
Institute Playreading Series
A Cry *of Players* by William Gibson

October 3
Institute Lecture
"America in the World Today"
JACK F. MATLOCK, Jr., *Professor 1996-2001, School of Historical Studies, Institute for Advanced Study*

October 4
Member Family Barbecue

October 5
Institute Concert Series
Talking About New Music
"Music and Technology: A Composer's Point of View"
JON MAGNUSSEN, *Artist-in-Residence, Institute for Advanced Study*

October 9
Institute Film Series
Paths of Glory

October 12
Friends of the Institute
Friends Culture & Cuisine Series
"The Renaissance of Gastronomic Pleasure"
PIETRO FRASSICA, *Director, Program in Italian Studies, Princeton University*

October 13
Institute Trip
Metropolitan Museum of Art

October 16
Faculty Reception

October 17, 19
Institute Concert Series: "From the Four Corners"
Nigel Westlake: *Omphalo Centric Lecture;* Iannis Xenakis: *Okho;* Joseph Pereira: *Repoussé;* William Bolcom: *Recuerdos: Two Latin American Dances;* Jon Magnussen: *Ko'olau Sketches;* Dave Hollinden: *The Whole Toy Laid Down;* Steve Reich: *Drumming, Part One*
NEW YORK PERCUSSION QUARTET

October 19
Institute Concert Series
Concert Discussion
JON MAGNUSSEN, *Artist-in-Residence, Institute for Advanced Study* and NEW YORK PERCUSSION QUARTET

October 24
Friends of the Institute
Friends' Forum
"New Findings in Cosmology"
MATIAS ZALDARRIAGA, *Keck Visiting Associate in Cosmology, School of Natural Sciences, Institute for Advanced Study*

October 28
Institute Trip
QED on Broadway

October 30
Institute Film Series
Don't Look Now

October 31
Children's Halloween Celebration

November 6
Institute Playreading Series
Fortinbras by Lee Blessing

November 10
Institute Trip
Barnes Foundation

November 11
Friends of the Institute
Fireside Chat
"The Continuing Deterioration of U.S. Media"
DONALD M. WILSON, *Publisher, Business News New Jersey*

November 14
Institute Film Series
Dr. Strangelove

December 14
Faculty/Colleague Dinner

January 2
Institute Lecture
"How and Why Did Fairness Norms Evolve?"
KEN BINMORE, *Visitor, School of Social Science, Institute for Advanced Study*

January 31
Institute Film Series
Shakespeare in Love

February 1
Institute Trip
Philadelphia Art Museum

February 4
Friends of the Institute
Holiday Reception for Friends and Faculty

February 8
Institute Playreading Series
Mad William by Naomi Claire Wallace

February 13, 14, 16
Institute Concert Series
Franz Schubert: *Sonata in F Minor, D. 625*; Maurice Ravel: *Valses nobles et sentimentales*; Henri Dutilleux: *Le jeu des contraires*; Jon Magnussen: *Toccare!*; Noël Lee: *Distances*; Claude Debussy: *Masques, D'un cahier d'esquisses, L'Isle Joyeuse*
NOËL LEE, *pianist*

February 15
Children's Holiday Celebration
THE GIVE & TAKE JUGGLERS

February 14
Institute Concert Series
Concert Discussion
JON MAGNUSSEN, *Artist-in-Residence, Institute for Advanced Study* and
NOEL LEE, *pianist*

February 22
Institute Film Series
West Side Story

March 1
Institute Playreading Series
Rosencrantz and Guildenstern are Dead by Tom Stoppard

March 7
Institute Film Series
Mediterraneo

March 12
Institute Lecture
"Transitions and Universality - Some Examples and Conjectures"
THOMAS SPENCER, *Professor, School of Mathematics, Institute for Advanced Study*

March 17
New Member Reception

March 21
Institute Trip
American Museum of Natural History

March 22
Friends of the Institute
Friends Forum
"Controversy That Shaped Christianity: The Gospel of John vs. The Gospel of Thomas?"
ELAINE PAGELS, *Visitor, School of Historical Studies, Institute for Advanced Study*

March 28
Institute Film Series
The Killing

March 31
Institute Concert Series
Talking About New Music
"The Psalm Project: Reconstructing a Modern Dance Classic"
JON MAGNUSSEN, *Artist-in-Residence, Institute for Advanced Study* and CARLA MAXWELL, *Artistic Director, Limón Dance Company*

[illegible]
Game Theory Conference
"Game Theory and Economics"
ERIC S. MASKIN, *Professor, School of Social Science, Institute for Advanced Study*
"Games Computers (and Computer Scientists) Play"
AVI WIGDERSON, *Professor, School of Mathematics, Institute for Advanced Study*
"Games of Evolution"
MARTIN A. NOWAK, *Head, Program in Theoretical Biology, Institute for Advanced Study*

[illegible]
Institute Playreading Series
The Beard of Avon by Amy Freed

[illegible]
Institute Concert Series
Jorge Martìn: *The Glass Hammer*
SANFORD SYLVAN, *baritone* and DAVID BREITMAN, *piano*

[illegible]
Institute Concert Series
Concert Discussion
JON MAGNUSSEN, *Artist-in-Residence, Institute for Advanced Study* and
SANFORD SYLVAN, *baritone* and
DAVID BREITMAN, *piano*

[illegible]
Institute Lecture
"Enlightenment, Counter-Enlightenment, and the Postmodernist Critique of Modernity"
JONATHAN ISRAEL, *Professor, School of Historical Studies, Institute for Advanced Study*

[illegible]
Institute Film Series
Barry Lyndon

[illegible]
Midwinter Party

[illegible]
Friends of the Institute
Friends Forum
"Economics and Identity"
RACHEL KRANTON, *Member, School of Social Science, Institute for Advanced Study*

[illegible]
Institute Playreading Series
Two Shakespearean Actors by Richard Nelson

[illegible]
Institute Trip
Philadelphia Flower Show

March 13
Institute Lecture
"Black Holes and the Structure of Spacetime"
JUAN MALDACENA, *Professor, School of Natural Sciences, Institute for Advanced Study*

March 14
Institute Film Series
An American in Paris

April 2
Institute Playreading Series
Good Night Desdemona (Good Morning Juliet) by Ann-Marie MacDonald

April 3
Faculty/Colleague Dinner

April 5
Friends of the Institute
Friends Culture and Cuisine Series
"Food and Social Responsibility: The Role of the Heirloom Vegetable in Contemporary Cuisine"
WILLIAM WOYS WEAVER, *food historian* and *Professor of Culinary Arts and Food Studies, Drexel University*

April 9
Institute Concert Series
Concert Discussion
JON MAGNUSSEN, *Artist-in-Residence, Institute for Advanced Study* with
ROBERT TAUB, *pianist*

April 10 [illegible], 13
Institute Concert Series
Ludwig van Beethoven: *Sonata in E-flat Major;* Milton Babbitt: *Reflections;*
Liszt/Verdi: *Concert Paraphrase of Rigoletto;*
Robert Schumann: *Davidsbündlertänze, Op.6*
ROBERT TAUB, *pianist*

April 10
Institute Film Series
Othello

April 27
Institute Trip
Winterthur Museum, Garden, and Library

May 5
Friends of the Institute
Friends Fireside Chat
"The Guggenheim Museum Global"
PETER LAWSON-JOHNSTON, *Honorary Chairman, The Solomon R. Guggenheim Foundation*

Institute Playreading Series
I Hate Hamlet by Paul Rudnick

Institute Concert Series
Concert Discussion
JON MAGNUSSEN, *Artist-in-Residence, Institute for Advanced Study* and MARI KIMURA, *Violinist*

Institute Concert Series
Mario Davidovsky: *Synchronisms No. 9*; Conlon Nancarrow: *Tocatta*; Robert Rowe: *Submarine*; Jon Magnussen: *Fantasy for Violin and Synthesizers, and Fantasy Rewired*; Mari Kimura: *Study for Descarga Interactive* and *Six Caprices for Subharmonics*
MARI KIMURA, *Violinist*

Institute Film Screening
Fermat's Last Tango

Friends of the Institute
Friends Forum
"Islam and Afghanistan: The View from the 11th Century"
EVERETT ROWSON, *Member, School of Historical Science, Institute for Advanced Study*

Friends of the Institute
Annual Meeting and Picnic

"The environment for research here has been outstanding. The broad coverage of many areas of expertise has been very fruitful, providing both valuable perspective and ideas for future directions for research."

— Member, School of Natural Sciences

On February 2 the Institute held a day-long program about game theory. Speakers included (from left) Avi Wigderson, Institute Faculty member, School of Mathematics; Martin Nowak, Head of the Program in Theoretical Biology; Marina von Neumann Whitman, Institute Trustee and Faculty member at the University of Michigan; and Eric Maskin, Institute Faculty member, School of Social Science

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I feel that I am really a different person as a scholar after a year here. I have learned so many new things both about how research is done in different historical fields and also about my own interests and about the directions my research is likely to take over the next decade or so. The Institute offers a unique blend of freedom to work combined with a supportive and warm atmosphere that is hard to find anywhere else in the world."

— Member, School of Historical Studies

Reading in the Common Room, Fuld Hall

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PATRICIA CRONE, *Andrew W. Mellon Professor*
JOSÉ CUTILEIRO, *George F. Kennan Professor*
JONATHAN ISRAEL
KIRK VARNEDOE *(as of 1-1-02)*
HEINRICH von STADEN

JOSHUA FOGEL

MARSHALL CLAGETT
OLEG GRABAR
CHRISTIAN HABICHT
GEORGE F. KENNAN
IRVING LAVIN
PETER PARET
MORTON WHITE

The School of Historical Studies is concerned principally with the history of Western European, Near Eastern, and East Asian civilizations. Both inside and outside these broad areas of study Faculty and Members have pursued a wide range of topics. The emphasis has been traditionally strong in the fields of Greek and Roman civilization, western medieval history, early modern and modern European history, but over time the School's interests have been enlarged to include Islamic culture, the history of China and Japan, international relations, the history of art, science, and ideas, and most recently music studies. Well over one thousand Members have come to the School since its foundation, and their work here in these and other areas of research has regularly been enriched by the fruitful interaction of disciplines in a small and collegial community.

The various fields represented by 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, Benjamin Dean Meritt, a specialist in Greek epigraphy, 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's work ranged across 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 palaeographer; Ernst Herzfeld, a Near Eastern archaeologist, and Hetty Goldman, a pioneering woman archaeologist, who worked at Tarsus in Turkey. 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 Roman history and numismatics. Medieval history came to the Institute Faculty with Ernst Kantorowicz, whose interests ranged in time from the later phases of classical antiquity to the sixteenth century. The art historical tradition was taken over from Panofsky by Millard Meiss, who completed his work on Burgundian manuscript painting during his years at the Institute.

Additional fields came with the appointments of Sir Ernest Llewelyn Woodward in diplomatic history, James F. Gilliam in Roman military history and papyrology, Kenneth M. Setton in medieval relations between the Papacy and the Levant, and Felix Gilbert in Renaissance as well as modern German history. A new term professorship in honor of George F. Kennan brought Jack F. Matlock, Jr. to the School as the first Kennan professor in international relations. Many of the major scholars who came to the Institute in the decades after World War II are still active in School affairs. These are the current faculty and emeriti, whose reports appear below. Their work illustrates the School's continued dedication to fields of historical inquiry that it has long supported, while maintaining an ongoing openness to new areas. A new membership dedicated to music studies has now assured a place for a subject that had formerly been pursued here only occasionally. East Asian history, represented hitherto by a series of term appointments at the faculty level, will soon have its own permanent faculty position. As in the past, the School will continue in the years to come to encourage the exploration or creation of new fields of historical inquiry and the breaking down of traditional academic boundaries.

ACADEMIC ACTIVITIES

FALL 2001

PROFESSOR GLEN BOWERSOCK returned to Turkey in June and July of 2001 to revisit several sites that have been important in his work (notably Gemiler Adası, Aperlae, Xanthos, Olympus, Phaselis, and Aphrodisias). He went to Helsinki in October and again in May to continue, with former Institute Member Alan Bowman, his supervision of the Petra projects sponsored by the Academy of Finland. In October and April, he traveled to Florence to participate in meetings of the Consiglio Scientifico of the newly established *Istituto di studi umanistici*. In November, he chaired an external committee in Paris to evaluate the CNRS program in ancient architecture.

In November, Professor Bowersock contributed a paper to an international conference, held at Princeton University, on the scope and consequences of the revolt of Bar Kokhba in Judaea during the reign of Hadrian. His paper on the Tel Shalem arch and its

inscription will be published in Germany in a volume of the proceedings. His research on the date of the original basilica of St. Peter's on the Vatican in Rome has finally appeared in a supplementary volume of *Antiquité Tardive* and will be republished by the Cambridge University Press in a forthcoming volume on the Vatican. This work undertakes to demonstrate that Constantine was not responsible for the first St. Peter's. Other publications to have appeared in the past year include studies of the use of the classical past in late antiquity, a newly published mosaic from Edessa, a new Nabataean inscription at Petra, the historian Zosimus, and new evidence for the emperor Lucius Verus in the Near East. Professor Bowersock's book *Martyrdom and Rome* was published by Flammarion in a French translation under the title *Rome et le Martyre*.

During the academic year 2001-02 PROFESSOR GILES CONSTABLE published three articles, one on the historiography of the crusades, one on the monastery of St. Vincent at Valencia, and one (very brief) on 'Cluny avant Cluny: le legs carolingien'. He wrote prefaces to two books, three memoirs (two in collaboration with colleagues), and two book reviews. He spoke at conferences on the crusades in Teruel (Spain) in July, on medieval record-keeping at the College of New Jersey in November, and on monastic epistolography in Paris in December, and gave lectures at Yale University in November, at the Institut de France in Paris in December, at the Central European University in Budapest in March, and at the University of Aix-en-Provence in April. He also participated in conferences in Orléans in September, Harvard University in November, the British Museum in March, New York (The Medieval Academy) in April, Poitiers in April, and Princeton University in May. As usual, he arranged a meeting of the Delaware Valley Medieval Association at the Institute for Advanced Study in December.

PROFESSOR PATRICIA CRONE completed the first draft of her book on medieval Islamic political thought and started revising in the light of the first readers' comments. She taught a graduate seminar on tenth-century intellectual history at Princeton University in the fall semester, and two graduate reading classes at the same university in the spring semester, one on women and the other on how to edit and translate and date a small polemical text in Arabic written by a Shiite of one type against Shiites of another type, clearly in Yemen, probably in the tenth century, but of uncertain authorship. This class will have to continue informally until the task is finished, whenever that may be. In March, she gave the annual Bennett lecture at the Faculty of Oriental Studies in Cambridge, but political events caused her to cancel her delivery of the Stern lectures in Jerusalem, and her participation in the new school for comparative history, also in Jerusalem. As has now become traditional, she ran two different kinds of seminars at the Institute, one monthly for all Islamicists at the Institute and University, and occasional other participants, and a much smaller one for people interested in reading medieval texts. But this year was unusual in that the participants switched from Arabic to Persian texts in the second semester. One of the most exciting event this year from Professor Crone's own point of view was her appointment to the editorship of a new series entitled "Makers of the Muslim World", to be published by Oneworld. The series is modeled on the "Past Masters" and "Modern Masters" series of Oxford University Press and Fontana, but devoted to the Islamic world alone and will include both thinkers and "doers". So far, some twenty titles have been commissioned.

PROFESSOR JOSÉ CUTILEIRO lectured to the Council on European Studies and the Program on European Studies of Yale University on the role of the international

community in Bosnia and Kosovo, and ran a seminar on Euro-American relations at the Yale Center for the Study of Globalization. He participated in the Sixth Arrábida Meeting, chaired by Lord Carrington, on ethnicity and conflict-prevention, and co-chaired a seminar on ethnicity, conflict and terrorism, in Arrábida, near Lisbon. He participated in meetings of the Business Council for International Understanding, the Council on Foreign Relations, the Foreign Policy Association, and the International Institute of Strategic Studies, in Princeton, New York, and Washington.

He published two articles "Honra, Interesse e Medo", in *Negócios Estrangeiros*, nr. 3, February 2002; "O Eixo do Mal", in *Política Internacional*, nr. 25, Spring-Summer, 2002 and book reviews in *Análise Social*, the review of the Institute of Social Sciences of the University of Lisbon. He kept a regular column of international affairs commentary in *Expresso*, the best known and most prestigious Portuguese weekly.

He pursued his research for a book on the involvement of foreign powers and international organizations in the successive Yugoslav crises of the last decade, traveling to Britain, France, Germany, Greece, and Switzerland, and is preparing a short one on the subject commissioned by a Portuguese academic publisher.

He is a member of the Steering Committee of Arrábida Meetings, a co-director of the Arrábida Conflict Prevention Initiative, Lisbon, and has been invited to join the Council of International Advisors of the Crisis Management Group, Cambridge, Massachusetts.

As Special Representative of the United Nations Commission on Human Rights for Bosnia and Herzegovina and the Federal Republic of Yugoslavia, he visited each of these two countries twice, in July and September 2001 and February and March 2002. In November 2001 and March 2002, he presented his reports on those field missions to the United Nations General Assembly in New York and to the Human Rights Commission in Geneva, respectively. In Geneva, he also held a briefing session on the subject with non-governmental organizations, and participated in the ninth annual meeting of special raporteurs, representatives, independent experts, and chairpersons of working groups of the Commission on Human Rights.

PROFESSOR JOSHUA FOGEL's edited volume, *Sagacious Monks and Bloodthirsty Warriors: Chinese Views of Japan in the Ming-Qing Period*, will be published in summer 2002 by East Bridge Press. Based on an international conference held in Santa Barbara, California in 1997 and supported in the first instance by the University of California Pacific Rim Research Program, this volume, the first of this topic in any language, brings together eleven essays by scholars from four countries (China, Japan, Canada, and the United States). In addition to writing the introduction, "Placing Japan in Late Imperial China", Fogel penned a contribution to the volume entitled "Chinese Understanding of the Japanese Language from Ming to Qing." Fogel also translated several of the essays from Chinese and Japanese for the book. Another volume edited by Fogel, entitled *Historiography and Japanese Consciousness of Values and Norms*, will be published by the International Research Center for Japanese Studies in the summer of 2002. This work is the result of two conferences held, respectively, at University of California, Los Angeles and University of California, Santa Barbara in January 2001. In addition to an introductory essay, Fogel contributed a piece entitled "Japanese Travelers to Shanghai in the 1860s."

Many years in the making, the *Encyclopedia of World History* (Houghton Mifflin) finally appeared in 2001, and Professor Fogel was an associate editor and author of all chapters concerned with East Asia. Another work which had taken him five years to complete, Fogel's translation of Chin Shunshin's massive historical novel, *The Taiping Rebellion*, was published by M. E. Sharpe in 2001. More modest in scope, Fogel's translation, *Travels in Manchuria and Mongolia: A Feminist Poet from Japan Encounters Prewar China* by Yosano Akiko, the great poetess, was brought out by Columbia University Press late in 2001. His introductory essay to that volume, "Yosano Akiko and Her China Travelogue of 1928," sets the work in the context of her life and her other work, the history of modern Sino-Japanese relations, and the history of travel writing about China by Japanese creative writers.

Based on a conference paper delivered in Japanese at Kyoto University in November 1999, Professor Fogel's essay, "Chugoku ni okeru dentō no sōzo to Nihon no kōken: Sai Jutsu no baai" (The Japanese contribution to the Chinese invention of tradition, the case of Cui Shu), was published by Kyoto University Press (2001) in *Seiyo kindai bunmei to Chuka sekai* (Modern Western civilization and the universe of China), edited by Hazama Naoki. He examines the late nineteenth and early twentieth century "rediscoveries" in Japan and China, respectively, of the great eighteenth century Chinese thinker Cui Shu and places both "rediscoveries" in their modern intellectual and political contexts. Based on a lecture delivered in Japan at Kobe University in late 1999, Fogel's essay, "Sobieto Roshia to Chugoku ni okeru Ajiateki seisan yōshiki ronsō" (Debates on the Asiatic mode of production in Soviet Russia and China), appeared in *Kōbe daigaku shigaku nenpō* (Kobe University historical studies annual review) in May 2001. His "'Like Kissing through a Handerchief': *Traduttore Traditore*" was a featured article in the journal *China Review International* (Spring 2001), offering a critique of a recent work, *Tokens of Exchange: The Problem of Translation in Global Circulations* (ed. Lydia Liu), and similar theoretical work in the field of translation studies.

Professor Fogel continued to edit the journal, *Sino-Japanese Studies*, which he founded in 1989. Volume 13.2 and 14 appeared over the past year, and Fogel published one translation in each of them: Yanabu Akira, "The Concept of 'Rights'" (March 2001), concerns the entrance into the modern Chinese and Japanese languages (and the interplay between them) of the idea of "rights" in the late nineteenth century; and Suzuku Shuji, "Terminology Surrounding the 'Tripartite Separation of Powers'" (April 2002), deals with the emergence of the notion of three separable branches of governmental power in modern China and Japan (and, again, the interplay between them). Fogel also wrote a number of book reviews for such journals as the *American Historical Review*, *Journal of Economic History*, *China Review International*, *The Journal of Interdisciplinary History*, and *The Journal of Asian Studies*. In conjunction with his work as editor of a series of books, "Asian Interactions and Comparisons," jointly published by the Association for Asian Studies and the University of Hawaii Press, Fogel authored the preface to the third book in that series, in *The Genesis of East Asia, 221 B.C.-A.D. 907*, by Charles Holcombe (University of Hawaii Press, 2001). Several more volumes in the series are scheduled to appear in 2002.

Professor Fogel also gave talks at a number of scholarly venues. His paper, "Naitō Konan (1866-1934) and Chinese Historiography," was delivered in Heidelberg in May 2001 and will appear shortly in the inaugural issue of a new on-line journal entitled *Historiography East and West*. In November 2001, he lectured at Columbia University on the topic of

"Japanese Travelers to Shanghai in the 1860s." In April 2002, he gave two talks at Harvard University: "Japanese Visitors and Settlers in Shanghai in the 1860s and Thereafter" and "Chinese Representations of the Japanese Language Over the Past 650 Years."

In the first year of his term at the School of Historical Studies, Fogel organized a series of events sponsored by the The Andrew J. Mellon Foundation. This included a regular Tuesday morning (10-12) "East Asian Studies Seminar" and brought together roughly twenty scholars from the Institute and the Princeton University community for presentations and lively discussions of them. His own presentation on the topic of his current research, the Japanese community of Shanghai in the nineteenth and twentieth centuries, led off the series on October 9, 2001. Fogel also organized a major workshop in February 2002 and cosponsored a second in March 2002 with Princeton University's East Asian Studies Program. The former, entitled "How Did 'China' Become China and How Did 'Japan' Become Japan: Teleologies of the Modern Nation-State, brought together Members from the School of Historical Studies with scholars from Harvard University (William Kirby), Princeton University (David Howell), University of Pennsylvania (Victor Mair), New School University (Eiko Ikegami), Emory University (Mark Ravina), University of California, Santa Barbara (Luke Roberts), Massachusetts Institute of Technology (Peter Perdue), and Dartmouth College (Pamela Crossley), among others. The latter, entitled "New Explorations: Histories of Natural History in East Asia," featured six speakers from Princeton (Willard Peterson, David Howell, Ruth Rogaski), Harvard (Bridie Andrews), Georgetown (Carol Benedict), and State University of New York, Binghampton (Fa-ti Fan).

During the academic year 2001-02, PROFESSOR JONATHAN ISRAEL researched in archives and collections of rare books in The Netherlands, Germany, and Britain, as well as the United States, and besides continuing his work on radical trends in the European Enlightenment completed his new book on Sephardic Jewish and crypto-Jewish diasporas in Europe, Latin America and the Islamic World from the sixteenth to the eighteenth century. His recently published book *Radical Enlightenment. Philosophy and the Making of Modernity, 1650-1750* (Oxford, 2001) which received the American Historical Association's Leo Gershoy Prize for 2001, will be reappearing in an Oxford University Press paperback edition, in July.

Professor Israel participated in September as general commentator in an international symposium organized by the University of Athens on the role of trade diasporas in history, held on Corfu. In October, he delivered a public lecture at the gathering in the Mennonite Church, in Leiden, to mark the 100th anniversary of the Dutch Church History Association. In February, he presented his latest research on the Enlightenment to the History Department at Johns Hopkins University, Baltimore, and delivered the annual School Lecture in History here, at the Institute, entitled 'Enlightenment, Counter-Enlightenment and the Postmodernist Critique of Modernity'. Also in February, he lectured at the public conference organized in Amsterdam by the commander-in-chief of the Dutch Navy to celebrate the four hundredth anniversary of the Dutch East India Company as well as to a congress of Dutch town planners and civic councilors on what made cities flourish in the Dutch Golden Age. During the same visit to the Netherlands he was interviewed by the Dutch magazine *Vrij Nederland* which published the interview in April.

During April he gave a lunchtime talk on the Radical Enlightenment to the Center for Scholars and Writers, based under the directorship of Peter Gay in the New Public

Library, and again lectured in the Netherlands, giving the keynote address, on the international significance of Dutch history, at the commemoration held in the Royal Theatre in The Hague, to mark the hundredth anniversary of the main series of Dutch national historical documentary publications. He also participated in a public debate in Amsterdam together with three Dutch political figures as to the relevance or otherwise of the egalitarian and libertarian values of the Enlightenment in contemporary European politics and in the building of a future politically more integrated Europe. In addition, he introduced the panel discussion of his book, *Radical Enlightenment*, held in the Teylers Science Museum, in Haarlem, to commemorate the twenty-fifth anniversary of the Jacob Campo Weyerman Stichting, the Dutch society for eighteenth-century studies.

Publications during this session include an edited volume of conference proceedings, *Dutch Jewry. Its History and Secular Culture (1500-2000)* (Leiden, 2002), edited together with Reinier Salverda, in which Professor Israel contributed both the Introduction and a paper entitled 'Philosophy, Commerce and the Synagogue: Spinoza's Expulsion from the Amsterdam Portuguese Jewish Community in 1656'. His other publications were 'Handelsmessen und Handelsrouten - die Memoiren der Glikl und das Wirtschaftsleben der deutschen Juden im späten 17. Jahrhundert' in M.Richarz (ed.) *Die Hamburger Kauffrau Glikl. Jüdische Existenz in der frühen Neuzeit* (Hamburg, 2001) and 'Orobio de Castro and the Early Enlightenment' in H. Méchoulan and G. Nahon (eds.) *Mémorial I.S.Révah, Études sur le marranisme, l'hétérodoxie juive et Spinoza* (Paris-Louvain, 2001).

He remains a member of the British and Royal Netherlands Academies and of the Low Countries Studies Committee of University College London as well as of the editorial boards of Brill's Studies in Intellectual History series and of *Studia Rosenthaliana* (University of Amsterdam). He has recently been appointed one of the three-member 'curatorium' of the University of Amsterdam's research Instituut voor Cultuur en Geschiedenis.

PROFESSOR KIRK VARNEDOE lectured extensively during his first term at the Institute, beginning January, 2002. He talked on Vincent van Gogh's portraits of the postman Joseph Roulin at Wellesley College, in the annual Ruth Bakwin Distinguished Lecture in Art History, and also presented the same talk at Smith College. He was the first non-artist to be invited to give the annual James Speyer Lecture at The Art Institute of Chicago, where he talked on the work of Jasper Johns. He addressed the American Philosophical Society on the theme "Why Modern Art Matters Now," and also gave keynote addresses for the Curatorial Forum of The American Federation of the Arts and Art Table, as well as remarks on the artist Ellsworth Kelly at a dinner given by The Drawing Center in New York to honor Kelly. In early June, he lectured on the present state of museums at The Los Angles County Museum of Art, and presented two dialogues in Los Angeles: one with the writer Adam Gopnik, in connection with the LACMA lecture, and another with the artist John Baldessari in regard to the work of Andy Warhol, at the Los Angeles Museum of Contemporary Art.

Additionally, Professor Varnedoe appeared as a principal speaker in a film commissioned by the BBC on the painter and filmmaker Julian Schnabel, and in another made by Italian television on Jackson Pollock. Professor Varnedoe was also the featured guest in a one-hour interview on the Charlie Rose program on National Public Television.

Professor Varnedoe continued his service on the Board of Trustees of The National Humanities Center, on the selection and advisory panel of The Center for Scholars and Writers at the New York Public Library, and on the American Advisory Panel for the Praemium Imperiale.

Professor Varnedoe published an essay on Cy Twombly's series of paintings on the battle of Lepanto, in a catalogue issued by the Gagosian Gallery, New York. He served as one of six international curators who organized a major exhibition examining the lifelong dialogue between Pablo Picasso and Henri Matisse. This exhibition opened at the Tate Modern Gallery in London in May, and the accompanying catalogue contained several entries by Professor Varnedoe.

PROFESSOR HEINRICH von STADEN participated in an international conference on the history of Chinese science at the City University of Hong Kong October 9-12, 2001. In late October, he gave the Carson Lecture on literacy and medicine in ancient Greece at Oregon State University (department of History) as well as a lecture on Hippocratic medicine. At the invitation of the GlaxoSmithKline Foundation, he gave a lecture at the end of October 2001 on the role of prediction in early Greek medicine, with particular focus on the relations between divination, prognosis, and ethics; the occasion was a symposium on 'Predictive Medicine' at Kloster Seeon, Germany. In November 2001, he served as chair and commentator for a panel of four papers on "Techne and Expert Knowledge in Ancient Greece and Rome" at the annual meeting of the History of Science Society in Denver. In February 2002, he gave a lecture in Munich on Galen's views of the relation between science, morality, and the public display of knowledge; the lecture was sponsored by the Siemens Foundation. In early June 2002, he gave a lecture at a two-day symposium on "Medical Texts on Papyri" at the Istituto Papirologico 'G. Vitelli" in Florence, Italy. The subject of the lecture was the 'canon' attributed to Demosthenes Philalethes by papyrologists and historians of medicine. In June 2002, he participated in the annual meeting of the "Arbeitskreis Alte Medizin" at the Institute for the History of Medicine of the University of Mainz, Germany. At the invitation of the Institut de France (Académie des Inscriptions et Belles-Lettres), he gave a lecture on "La lecture comme thérapie dans la médicine gréco-romaine" in Paris at the end of June 2002.

His publications in the academic year 2001-01 included "La medicina nel mondo ellenistico-romano," in *Storia della Scienza*, volume I: *La scienza antica*, editor-in-chief of Sandro Petruccioli (Rome: Enciclopedia Italiana, 2001), pp. 708-735 (Professor von Staden also serves on the editorial board of this new multi-volume history of science); "Affinities and Elisions: Helen and Hellenocentrism," in *The Scientific Enterprise in Antiquity and the Middle Ages*, edited by Michael H. Shank (University of Chicago Press, 2001), pp. 178-195 (reprinted from *Isis*); the articles "Erasistratus" and "Herophilus" in the *Encyclopedia of Life Sciences* (London: Macmillan Publishers, 2001), initially published on-line; and several book reviews. He continued serving on the 'Comité scientific international' of the *Dictionnaire d'histoire et philosophie de la medécine* (Presses Universitaires de France), on the 'Comité scientifique' of the journal *Methodos: Savoirs et Texts* (Université de Lille), on the scientific board of *Ordia Prima*, and on the editorial boards of *Configurations: Literature, Science and Technology* (Johns Hopkins University Press) and *Filologia antica e moderna*. He also continued as a member of a research unit ('U.P.R.E.S.A.') of the Comité National de Recherche Scientifique at the Sorbonne (Université de Paris-IV).

PROFESSORS EMERITI

PROFESSOR MARSHALL CLAGETT, while continuing the preparation of the fourth and last volume of his *Ancient Egyptian Science*, also began new studies of the *Liber Calculationum* of the fourteenth century philosopher and logician, Richard Swineshead of Merton College, Oxford. He also continued serving on committees of the American Philosophical Society and editorial boards of journals in the history of science.

PROFESSOR OLEG GRABAR lectured or participated in seminars at Trinity College, San Antonio, Texas, the University of New Mexico, the Richmond Museum of Art, the University of Erlangen, the Berlin Technische Hochschule, the Ecole des Hautes Etudes in Paris in conjunction with UNESCO, the Monument Conservancy in New York, the Asia Society in New York, and the Chicago Council for Foreign Affairs. He joined Professor S. Čurčič in teaching a seminar on domes in the Middle Ages at Princeton University and supervised a PhD thesis at the Université de Lausanne.

The following is a list of his publications which appeared during the year: *Islamic Art and Architecture 650-1250* (with M. Jenkins-Madina and the late Richard Ettinghausen), new and totally revised edition (London and New Haven, 2001) 344 pages, 494 figures; "From the Museum to the University and back." *Eleventh presentation of the Charles Lang Freer Medal* (Freer gallery of Art, Washington, 2001); "A preliminary Note on two eighteenth century representations of Mekka and Median," *Jerusalem Studies in Arabic and Islam* 25 (2001), pp. 268-74; "Die ethische Dimension des Ornaments," Isabelle Frank und Freia Hartung, hrsg., *DieRhetorik des Ornaments* (München 2001), pp. 59-75; "Islamic Ornament and Western Abstraction," Markus Brüderlein ed., *Ornament and Abstraction* (Beyeler Foundation, Basel, 2001), pp. 70-73; "Art and Architecture and the Qur'an," Jane D. McAuliffe, *Encyclopaedia of the Qur'an*, vol. I (Leiden, 2001), pp. 161-175; "L'Art sous les Ayyoubides," S. Makariou ed., *L'Orient de Saladin* (Paris, 2001), pp. 218-19; (With Cynthia Robinson), edited *Islamic Art and Literature* (Princeton, 2001); "Seeing Things: Why Pictures in Texts?," in *Islamic Art and Literature*, pp. 1-4; "Memorie dell'arte classica nel mondo islamico," S. Settis ed., *I Greci*, vol. 3 (Turin, 2001), pp. 797-215; "Two Safavid Miniatures, an interpretation," (with Mika Natif), *Muqarnas* 18 (2001), pp. 173-202; and "Space and Holiness in Medieval Jerusalem," *Islamic Studies* 40 (2001), 681-92.

PROFESSOR CHRISTIAN HABICHT attended an international conference in Athens on "The Macedonians in Athens, 323-229 B. C." and spoke on "Athens after the Chremonidean War. Some Second Thoughts." Guided by Professor Petros Themelis, the excavator, he visited Messene, the site and the Museum. He chaired a session in another international symposium, "The Hellenistic Gymnasion", held in honor of Klaus Bringmann at the University of Frankfurt. He gave the keynote address at the retirement party for the recently elected director of the American School of Classical Studies in Athens, Stephen Tracy (Ohio State University). He had to decline other invitations to speak: at an international conference held in Chios, Greece, in memory of W. G. Forrest, and at the 100th anniversary of the Institute for Ancient History at the University of Munich. He was made a member of the honorary committee to preside over the induction of Philippe Gauthier into the Académie des Inscriptions et Belles Lettres in Paris.

He served on a committee of the American Philosophical Society, as a referee for the Austrian Academy of Science in Vienna and as one of two examiners for the PhD thesis

of A. W. Bayliss, "Athens under Macedonian Domination: Athenian Politics and Politicians from the Lamian War to the Chremonidean War", Macquarie University, Sydney, Australia. He reviewed texts and comments on some thirty Athenian decrees of the fourth century B. C., submitted for his scrutiny by one of the editors of the new edition of Athenian decrees for *Inscriptiones Graecae*. He continued his efforts to produce an inventory of the Institute's collection of some 25,000 squeezes of Greek inscriptions.

His publications were: "Tod auf der Gesandtschaftsreise", *Studi Ellenistici* 13, 2001, 9-17; "Zum Gesandtschaftsverkehr griechischer Gemeinden mit römischen Instanzen während der Kaiserzeit", *Archaiognosia* 11, 2001-2002, 11-28; "Danksagungen Geretteter an die Götter", *Hyperboreus* 7, 2001-2002, 301-307; "Die Ehren der Proxenoi: Ein Vergleich", *Museum Helveticum* 59, 2002, 13-30; "Späte Wiederaufzeichnung eines athenischen Proxeniedekrets", *Zeitschrift für Papyrologie und Epigraphik* 137, 2001, 113-116; "Pinax: An Athenian Ghost Name", *ibidem* 117-118; "Beiträge zu koischen Inschriften des 2. Jahrhunderts v. Chr.", *Festschrift Jürgen Deininger* (June 2002), and a review of John S. Traill, *Persons of Ancient Athens*, vol. 7 (1998), in *Gnomon* 73, 2001, 413-416.

PROFESSOR GEORGE KENNAN, now in his 99th year of age, enjoys himself, when strength permits, by reading literature, historical, and purely literary, which he should have read, but did not succeed in reading, many years ago.

PROFESSOR IRVING LAVIN continues to serve on the editorials boards of a number of scholarly journals, including *Quaderni d'italianistica*, *History of European Ideas*, *Art e Dossier*, *Palladio, rivista di storia dell' architettura e restauro*. He participated as a member of the jury for a seminar in architectural design conducted by Frank Gehry at Yale University, and joined the Board of Trustees of the SacraTech Foundation at St. Louis University. Professor Lavin gave a course of lectures at the Istituto Italiano per gli Studi Filosofici in Naples, and a number of lectures and papers presented at symposia, including: Accademia di San Luca, Rome; Bibliotheca Hertziana, Rome; Museo Capitolino, Rome; Humboldt University, Berlin; Zentral Institut für Kunstgeschichte, Munich; Jörg Traeger Colloquium, Regensburg; Victoria and Albert Museum, London; Accademia Lincei, Rome.

Publications include a book and several papers in Italian and English: [With Marilyn Aronberg Lavin] *The Liturgy of Love: Images from the Song of Songs in the Art of Cimabue, Michalangelo, and Rembrandt* [The Franklyn D. Murphy Lectures XIV], Lawrence, KA, 2001]); [With Marilyn Aronberg Lavin] "Rembrandt's Jewish Bride: Sister and Spouse," in M. Mösseneder and G. Schüssler, "*Bedeutung in den Bildern.*" *Festschrift für Jörg Traeger zum* 60. *Geburtstag*, Regensburg, 2002, 147-86; "Georges de La Tour. The Tears of St. Peter and the 'Occult' Light of Penitence," in M. Seidel, ed., *L'Europa e l'arte italiana*, Venice, 2000, 352-75 (French Translation in P. Choné, et al., *L'Âge d'or du nocturne*, Paris, 2001, 183-228, 241-8); "The Problem of the Choir of Florence Cathedral," in T. Verdon and A. Innocenti, eds. *La cattedrale come spazio sacro. Saggi sul duomo di Firenze (Atti del VII centenario del Duomo di Firenze*, II, 2, Florence, 2001, 397-420 (Italian translation in *Santa Maria del Fiore*); "Santa Maria del Fiore: Image of the Pregnant Madonna," in T. Verdon and A. Innocenti, eds. *La cattedrale e la città. Saggi sul duomo di Firenze (Atti del VII centenario del Duomo di Firenze*, I, 2, Florence, 2001, 669-92 (Italian translation in *Santa Maria del Fiore*); and "Caravaggio Revolutionary or the Impossibility of Seeing," in K. Bergdolt and G. Bonsanti, eds., *Opere e giorni. Studi su mille anni di arte europea dedicati a Max Seidel*, Venice, 2001, 625-44 (French translation in P. Choné, et al., *L'Âge d'or du nocturne*, Paris, 2001, 138-82, 236-41).

PROFESSOR PETER PARET completed a monograph on the sculptor and dramatist Ernst Barlach, *An Artist against the Third Reich: Ernst Barlach, 1933-1938*, a companion volume to his recent collection of essays on the interaction of art and politics in Nineteen- and Twentieth-Century Germany. As was the earlier work, it will be published by Cambridge University Press. This spring Professor Paret is taking part in preparing an exhibition, to be held at the Ernst Barlach Foundation in Güstrow, Germany, that documents the artist's working relationship with his long-time galerist and publisher, Paul Cassirer.

PROFESSOR MORTON WHITE's book, *A Philosophy of Culture: The Scope of Holistic Pragmatism*, will be published by Princeton University Press early in 2003. He is now at work on a study that is tentatively called *The Decline and Fall of Classical Rationalism in the Philosophy of Culture*; it will treat the historical background of the holistic pragmatism that he defends in *A Philosophy of Culture*. Professor White has agreed to give three lectures at Keio University in Tokyo during the fall of 2002; the topics are not yet fixed. He continued to serve on the Council of the American Philosophical Society and on its committee to award fellowships in the humanities.

THE SCHOOL OF HISTORICAL STUDIES

MEMBERS, VISITORS, AND RESEARCH STAFF

FIROUZA ABDULLAEVA
Iranian Philology, Persian Art, and Islamic Studies
St. Petersburg State University · *s*

JEREMY ADELMAN
Latin American History
Princeton University

ANDREA BACCHI
Art History
University of Trento, Italy · *f*

EGBERT BAKKER
Classics
University of Montreal · *f*

SANDRA BERMANN
Comparative Literature
Princeton University · *vf*

ALAN BERNSTEIN
Medieval History
University of Arizona

MICHAL BIRAN
Central Asian Muslim and Chinese History
The Hebrew University of Jerusalem

GREGORY M. BONGARD-LEVIN
Ancient Near Eastern History
Russian Academy of Sciences

WARREN BRECKMAN
Modern European History
University of Pennsylvania · *f*

ALAIN BRESSON
Greek History
University of Bordeaux III · *f*

J. CHRISTOPH BÜRGEL
Islamic Studies
University of Bern · *s*

CELIA CHAZELLE
Medieval History
The College of New Jersey · *s*

ALLISON COUDERT
Early Modern European History
Arizona State University

FRANÇOIS DE CALLATAŸ
Ancient Economic History, Greek Numismatics
Royal Library of Belgium · *f*

MALCOLM de MOWBRAY
European History
Institute for Advanced Study · *a*

LUDGER DERENTHAL
History of Art
Ruhr-Universität Bochum, Germany

HARRIET FLOWER
Roman History
Franklin & Marshall College · *n*

YOHANAN FRIEDMANN
Islamic Studies
The Hebrew University of Jerusalem · *s*

JASON GLENN
Medieval Europe, Early Middle Ages
University of Southern California

DANIELLE GOUREVITCH
History of Medicine
École Pratique des Hautes Études · *s*

RUDOLF HAENSCH
Roman and Late Antique History
University of Cologne · *f*

MARK HANSEN
Cultural and Art History and Theory
Princeton University · *n*

DON HARRAN
Musicology
The Hebrew University of Jerusalem · *f*

GERALD HAWTING
Islamic History
School of Oriental and African Studies, London · *s*

SCOTT HENDRIX
European Reformation History
Princeton Theological Seminary · *vf*

JOCELYN HILLGARTH
Medieval History
University of Toronto and Pontifical Institute of Mediaeval Studies · *vs*

PING-CHEN HSIUNG
Chinese History
Academia Sinica, Taiwan · *f*

a Research Assistant · *f* First Term · *n* NEH Supported · *s* Second Term · *v* Visitor

YOSHIHIRO ISHIKAWA
Modern Chinese History
Kyoto University

ASKOLD IVANTCHIK
Ancient History
Centre National de la Recherche Scientifique, Bordeaux

GERALD IZENBERG
Modern European Intellectual History
Washington University

CATHERINE JAMI
History of Chinese Science
Centre National de la Recherche Scientifique, Paris · *s*

MARTIN JAY
European Intellectual History
University of California, Berkeley · *n*

JACQUES JOUANNA
Classical Greek Literature
University of Paris IV, Sorbonne · *f*

JOAN JUDGE
Modern Chinese Cultural History, Print Culture, and Women's History
University of California, Santa Barbara

HOMA KATOUZIAN
Iranian Culture and Society
University of Oxford · *f*

DALE KENT
Italian Renaissance Studies
University of California, Riverside

AKRAM KHABIBULLAEV
Medieval Arabic Literature
Beruni Institute for Oriental Studies, Tashkent

MARYANN KOWALESKI
Medieval History
Fordham University · *f*

GEOFFREY KOZIOL
Medieval History
University of California, Berkeley · *f*

LILLIAN LI
Chinese History
Swarthmore College · *f*

CLAUDIA LIEBESKIND
History of Islam in South Asia; History of Medicine
Auburn University

ELIO LO CASCIO
Roman Economic History
University of Naples, Federico II · *f*

HOWARD LOUTHAN
Early Modern Europe
University of Notre Dame

KARLHEINZ LÜDEKING
Art History
Akademie der bildenden Künste, Nürnberg · *vs*

KARIN MacHARDY
Early Modern Europe
University of Waterloo, Canada · *f*

EDWARD MATHEWS
Early Eastern Christianity
Independent Scholar

DIETRICH NEUMANN
History of Modern Architecture
Brown University · *s*

JÖRG OBERSTE
Medieval History
Institute for Advanced Study · *a*

ELAINE PAGELS
Religious History
Princeton University · *v*

MEGAN REID
Islamic History
Institute for Advanced Study · *a*

ROGER REYNOLDS
Medieval History
University of Toronto and Pontifical Institute of Mediaeval Studies

GISELA RIPOLL
Late Antique Archaeology and Art
University of Barcelona · *f*

EVERETT ROWSON
Arabic and Islamic Studies
University of Pennsylvania · *n*

PAUL SCHALOW
Japanese Literature
Rutgers University, New Brunswick

GERHARD SEEL
Ancient Philosophy, German Idealism, Semantics
University of Bern

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

NICOLAS STANDAERT
Chinese Studies
Catholic University Leuven, Belgium · s

MATTHEW STRICKLAND
Anglo-Norman Chivalric Culture
University of Glasgow

JOHAN THOM
Classics, Early Christian Literature
University of Stellenbosch, South Africa

ROBERT von FRIEDEBURG
Early Modern History and Political Thought
University of Bielefeld, Germany · s

JOHN WALSH
Art History
J. Paul Getty Museum · s

HOWARD WEINBROT
Comparative Literature
University of Wisconsin, Madison · v5

s Second Term · v Visitor

THE SCHOOL OF HISTORICAL STUDIES

RECORD OF EVENTS

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

Historical Studies Colloquium: Introductions

Historical Studies Colloquium: "Hell and the Conscience in Late Antiquity and the Early Middle Ages"
ALAN BERNSTEIN, *University of Arizona; Member, Institute for Advanced Study*

East Asian Studies Seminar: "Japanese Travelers to Shanghai in the 1860s"
JOSHUA A. FOGEL, *Mellon Visiting Professor, Institute for Advanced Study*

Historical Studies Colloquium: "The Patronage of Cosimo de' Medici, 1389-1464"
DALE KENT, *University of California, Riverside; Member, Institute for Advanced Study*

East Asian Studies Seminar: "Words and Deeds: The Republican Origins of Modern Chinese Leadership"
DAVID STRAND, *Dickinson College*

The Islamicist Seminar: "Ibadi Settlement Patterns: New Evidence from Jerba"
RENATA HOLOD, *University of Pennsylvania*

Historical Studies Colloquium: "The Christian Kabbalah, Science, and the Enlightenment"
ALLISON COUDERT, *Arizona State University; Member, Institute for Advanced Study*

East Asian Studies Seminar: "'Understanding Is Within One's Grasp': Hand Mnemonics in Chinese Science and Medicine"
MARTA HANSON, *University of California, San Diego*

Medieval Seminar: "Forgery as Disavowal: The 'Diploma' of Boso for Saint-Philibert of Tournus (Nov./Dec.8, 879)"
GEOFFREY KOZIOL, *University of California, Berkeley; Member, Institute for Advanced Study*

Historical Studies Colloquium: "Difficulties and Benefits of Quantifying the Monetary Issues of the Graeco-Roman World"
FRANÇOIS DE CALLATAŸ, *Royal Library of Belgium; Member, Institute for Advanced Study*

East Asian Studies Seminar: "Barbarians, Enemies, and Others: Attitudes toward Foreigners in Ancient Mesopotamia, Egypt, and China"
POO MU-CHOU, *Academia Sinica* and *Columbia University*

Historical Studies Colloquium: "Sustaining Medical Traditions: Unani Tibb in the 20th Century"
CLAUDIA LIEBESKIND, *Auburn University; Member, Institute for Advanced Study*

Medieval Seminar: "Living from the Sea: Constructing an Ethnography of Maritime Communities in Medieval England"
MARYANNE KOWALESKI, *Fordham University; Member, Institute for Advanced Study*

School of Historical Studies Lecture: "The Allegory of Despair"
ALEXANDER MURRAY, *University College, Oxford*

School of Historical Studies Lecture: "The Islamic Dimension of Usama bin Ladin's Attack"
BERNARD HAYKEL, *New York University*

[illegible]
Historical Studies Colloquium: "Another David, Another Song: David Sacerdote and the Early Modern Beginnings of Art Music by Jewish Composers"
DON HARRÁN, *The Hebrew University of Jerusalem; Member, Institute for Advanced Study*

[illegible]
East Asian Studies Seminar: "Manuscripts and Memory in Ancient China: The Early History of the Canon of Poetry"
MARTIN KERN, *Princeton University*

[illegible]
Historical Studies Colloquium: "Time and Eternity in Homeric Epic"
EGBERT BAKKER, *University of Montreal; Member, Institute for Advanced Study*

[illegible]
East Asian Studies Seminar: "The Domestic, the Personal, and the Intimate: Father-Daughrer Bonds in Late Imperial China"
HSIUNG PING-CHEN, *Academia Sinica; Member, Institute for Advanced Study*

Medieval Seminar: "Who Wrote the Epistolae Duorum Amantium?"
GILES CONSTABLE, *Professor, Institute for Advanced Study*

[illegible]
Historical Studies Colloquium: "The Problem of the Sources of Herodotus' Scythicos Logos: The Funeral of Scythian Kings (IV, 71-72)"
ASKOLD IVANTCHIK, *Centre National de la Recherche Scientifique, Paris; Member, Institute for Advanced Study*

[illegible]
The Islamicist Seminar: "The Chagadaid Mongols and Islam: The Conversion of Tarmashirin Khan"
MICHAL BIRAN, *The Hebrew University of Jerusalem; Member, Institute for Advanced Study*

[illegible]
Meeting of the Delaware Valley Medieval Association (three papers):
"The Liturgy of Rome in the 11th Century: Past Research and Future Opportunities"
ROGER REYNOLDS, *Pontifical Institute of Mediaeval Studies; Member, Institute for Advanced Study*
"William of Auvergne and the Cathars"
ALAN BERNSTEIN, *University of Arizona; Member, Institute for Advanced Study*
"Treason, Feud, and the Growth of State Violence: Edward I and the 'War of the Earl of Carrick (Robert Bruce)', 1306-7"
MATTHEW STRICKLAND, *University of Glasgow; Member, Institute for Advanced Study*

[illegible]
Historical Studies Colloquium: "A Poetics of Courtly Male Friendship in Heian Japan"
PAUL SCHALOW, *Rutgers University; Member, Institute for Advanced Study*

[illegible]
East Asian Studies Seminar: "Reassessing a Chinese Female Cultural Icon in Light of Japanese Sources: The Case of Qiu Jin"
JOAN JUDGE, *University of California, Santa Barbara; Member, Institute for Advanced Study*

Medieval Seminar: "From Barley Bread to Carrion: Varieties of Fasting in Medieval Islam, 1150-1450 C.E."
MEGAN REID, *Research Assistant, Institute for Advanced Study*

[illegible]
Historical Studies Colloquium: "'Monumenta Liturgica Beneventana': A Program of Manuscript Research on Liturgical Practices in Southern Italy and Dalmatia"
ROGER REYNOLDS, *Pontifical Institute of Medieval Studies; Member, Institute for Advanced Study*

[illegible]
East Asian Studies Seminar: "The Early Modern State and Grain Markets: Qing China and Tokugawa Japan"
LILLIAN LI, *Swarthmore College; Member, Institute for Advanced Study*

[illegible]
Historical Studies Colloquium: "Overpopulation in the Roman World?"
ELIO LO CASCIO, *University of Naples, Federico II; Member, Institute for Advanced Study*

[illegible] 1
The Islamicist Seminar: "Jacob of Sarugh on the Flood"
EMMANUEL PAPOUTSAKIS, *Princeton University*

[illegible] 4
Historical Studies Colloquium: Introductions

[illegible] 5
East Asian Studies Seminar: "The Vocabulary of Male Friendship in Heian Japan"
PAUL SCHALOW, *Rutgers University; Member, Institute for Advanced Study*

Medieval Seminar: "Historians and Community in 10th-Century Reims"
JASON GLENN, *University of Southern California; Member, Institute for Advanced Study*

[illegible]
Historical Studies Colloquium: "Language as the Mediator Between the Individual, Society, and Politics in Humboldt and Habermas"
GERALD IZENBERG, *Washington University; Member, Institute for Advanced Study*

[illegible]
School of Historical Studies Lecture: "After the Shipwreck: New Horizons for History-Writing"
CAROL GLUCK, *Columbia University*

[illegible]
The Islamicist Seminar: "On Miracles"
CLAUDIA LIEBESKIND, *Auburn University; Member, Institute for Advanced Study*

[illegible] 2
Historical Studies Colloquium: "The Pythagorean Akousmata"
JOHAN THOM, *University of Sellenbosch; Member, Institute for Advanced Study*

[illegible]
East Asian Studies Seminar: "Emotion and Morality in a Family in Late Qing Shanxi"
HENRIETTA HARRISON, *Leeds University; Member, Institute for Advanced Study*

[illegible] 4
Historical Studies Colloquium: "'If You Know What Is Best, You Do It'. Socratic Intellectualism in Plato and in Xenophon"
GERHARD SEEL, *University of Bern; Member, Institute for Advanced Study*

[illegible]
East Asian Studies Seminar: "Fashioning Cultures of Thrift in Modern Japan and Contemporary Asia: A Transnational Perspective"
SHELDON GARON, *Princeton University*

Medieval Seminar: "1277 and All That - Students and Disputations"
MALCOLM de MOWBRAY, *Research Assistant, Institute for Advanced Study*

[illegible]
Historical Studies Colloquium: "Chinese Marxism in the Early 20th Century and Japan"
YOSHIHIRO ISHIKAWA, *Kyoto University; Member, Institute for Advanced Study*

[illegible]
East Asian Studies Seminar: "Mongols, Muslims, or Chinese: The Khitans after the Mongol Conquest"
MICHAL BIRAN, *The Hebrew University of Jerusalem; Member, Institute for Advanced Study*

Medieval Seminar: "Towards a History of Clemency? Ransom, Restraint, and the Transformation of Conduct in Medieval Warfare"
MATTHEW STRICKLAND, *University of Glasgow; Member, Institute for Advanced Study*

[illegible]
Historical Studies Colloquium: "Experience at the Cusp of Modernity: Montaigne and Bacon"
MARTIN JAY, *University of California, Berkeley; Member, Institute for Advanced Study*

[illegible]
The Islamicist Seminar: "Greek-Arabic Dictionaries of the Middle Ages"
MARIA MAVROUDI, *Center for Hellenic Studies, Princeton*

February 4-5

East Asian Studies Workshop:
"How Did 'China' Become China and How Did 'Japan' Become Japan: Teleologies of the Modern Nation-State"
JOSHUA FOGEL, *Mellon Visiting Professor, Institute for Advanced Study*
"The Emergence of Aesthetic Japan as a Social Construct: Popular Books and Tokugawa Civilized Knowledge"
EIKO IKEGAMI, *New School University*
"The Making of Modern 'China' under Three Republics (1911-, 1928-, 1949-)"
WILLIAM KIRBY, *Harvard University*
"The Japanese Nation vs. The Japanese State: The Political Thought of Saigō Takamori"
MARK RAVINA, *Emory University*
"The Northern People and the Recurrent Origins of the Chinese State"
VICTOR MAIR, *University of Pennsylvania*
"Civilization and Enlightenment: Markers of Nationhood in 19th Century Japan"
DAVID HOWELL, *Princeton University*
"Nationality and Difference in China: The Post-Imperial Dilemma"
PAMELA CROSSLEY, *Dartmouth College*
"Local History as a Method of Denationalizing History"
LUKE ROBERTS, *University of California, Santa Barbara*
"Writing the History of the Qing Conquest of Central Asia: From Empire to Nation"
PETER PURDUE, *Massachusetts Institute of Technology*

February 23

Historical Studies Colloquium: "Cultural Contact Between China and Europe in the 17th Century: Some Methodological Issues"
NICOLAS STANDAERT, *Catholic University Leuwen; Member, Institute for Advanced Study*

February 26

Medieval Seminar: "Ramon Lull: The Contemporary Life and the Documents"
JOCELYN HILLGARTH, *University of Toronto* and *Pontifical Institute of Mediaeval Studies; Visitor, Institute for Advanced Study*

March 4

Historical Studies Colloquium: "China, Nomads and Islam: The Qara Khitai (Western Liao) Dynasty (1124-1218)"
MICHAL BIRAN, *The Hebrew University of Jerusalem; Member, Institute for Advanced Study*

March 5

East Asian Studies Seminar: "Western Learning and the Construction of Imperial Science in Early Qing China"
CATHERINE JAMI, *Centre National de la Recherche Scientifique, Paris; Member, Institute for Advanced Study*

March 11

Historical Studies Colloquium: "Galen's Patients (Rome, II c. A.D.): From Case-Histories to History"
DANIELLE GOUREVITCH, *École Pratique des Hautes Études; Member, Institute for Advanced Study*

March 12

Medieval Seminar: "Hell and the Carolingians"
ALAN BERNSTEIN, *University of Arizona; Member, Institute for Advanced Study*

March 15-16

East Asian Studies Workshop: "New Explorations: Histories of Natural History in East Asia"
(co-sponsored by Princeton University and The Institute for Advanced Study)
"Natural History and 'The Coherence of Things'"
WILLARD PETERSON, *Princeton University*
"Classifications of Tobacco in Qing Materia Medica"
CAROL BENEDICT, *Georgetown University*
"Fecal Matters: Excremental Knowledge in Tokugawa Japan"
DAVID HOWELL, *Princeton University*
"Plant Taxonomies in Early 20th-Century China"
BRIDIE ANDREWS, *Harvard University*
"Nature and National Narratives in Early 20th-Century China"
FA-TI FAN, *State University of New York, Binghamton*
"An Empire of Birdwatchers: Studying Nature in Manchukuo"
RUTH ROGASKI, *Princeton University*

March 14

History of Medicine and Science Workshop:
"Understanding is Within One's Grasp: Hand Mnemonics in Classical Chinese Medicine."
MARTA HANSON, *University of San Diego*

Historical Studies Colloquium: "Exemplary Women and the Uses of History in Modern Chinese Nationalism"
JOAN JUDGE, *University of California, Santa Barbara; Member, Institute for Advanced Study*

East Asian Studies Seminar: "Anti-Manchu Racism and the Rise of Anthropology in Early 20th-Century China"
ISHIKAWA YOSHIHIRO, *Kyoto University; Member, Institute for Advanced Study*

History of Medicine and Science Workshop: "Changes in the Transmission of Unani Medicine in India, c. 1880-1950."
CLAUDIA LIEBESKIND, *Auburn University; Member, Institute for Advanced Study*

Historical Studies Colloquium: "Erasure in Roman Inscriptions"
HARRIET FLOWER, *Franklin and Marshall College; Member, Institute for Advanced Study*

East Asian Studies Seminar: "Visual Representations of Ritual Dances in Late Ming China"
NICOLAS STANDAERT, *Catholic University Leuven; Member, Institute for Advanced Study*

Medieval Seminar: "The Customary of the Canons of St Ruf in Ste Maria d'Estany"
ROGER REYNOLDS, *Pontifical Institute of Mediaeval Studies; Member, Institute for Advanced Study*

The Islamicist Seminar: "Shells and Kernels in Islamic Neoplatonism"
EVERETT ROWSON, *University of Pennsylvania; Member, Institute for Advanced Study*

Historical Studies Colloquium: "Monarchy and Fatherlands in Early-Modern German History"
ROBERT VON FRIEDEBURG, *University of Bielefeld; Member, Institute for Advanced Study*

Medieval Seminar: "Theodulf and Alcuin at the Court of Charlemagne"
CELIA CHAZELLE, *The College of New Jersey; Member, Institute for Advanced Study*

The Islamicist Seminar: "Early Representations of the Prophet Muhammad: The Operation, Origins, and Modern Consequences of a Myth"
OLEG GRABAR, *Professor Emeritus, Institute for Advanced Study*

School of Historical Studies Lecture: "Can Our Democracies Rise to the Global Challenge of the 21st Century?"
MARTTI AHTISAARI, *former President of Finland*

History of Medicine and Science Workshop: "Galenic vs. Prophetic Medicine: A Paradigm of Cultural Change in Islam."
J. CHRISTOPH BÜRGEL, *University of Bern; Member, Institute for Advanced Study*

History of Medicine and Science Workshop: "*Pestis Galenica*: Smallpox?"
DANIELLE GOUREVITCH, *Ecole Pratique des Hautes Etudes, Paris; Member, Institute for Advanced Study*

History of Medicine and Science Workshop: "Scientific Medicine in Early Modern Europe"
MALCOLM de MOWBRAY, *Research Assistant, Institute for Advanced Study*

History of Medicine and Science Workshop: "'A Woman Does Not Become Ambidextrous': The Culture of Scientific Commentary in the Ancient World"
HEINRICH von STADEN, *Professor, Institute for Advanced Study*

In addition to the events listed above, some groups also met informally. This included weekly gatherings over lunch for Members and Visitors in art history, who met to discuss ongoing projects and specific problems encountered in their research, and Islamic historians who met periodically for an informal seminar to study specific Islamic texts. Individual Faculty members also occasionally arranged informal talks by invited speakers. Although these do not appear on the above list, which reflects only formal activities of the School, these informal gatherings also played an important role in the intellectual life of the School.

"It has been a rewarding year for me to stay in the unique, very stimulating environment of the Institute. I have learned a lot from participating in a broad range of intellectual activities, and yet been able to make substantial progress on my own planned research projects. When I look back on my past year, I feel that I am fully recharged and re-geared towards future work."

— Member, School of Mathematics

Simonyi Hall, home of the School of Mathematics

THE SCHOOL OF MATHEMATICS

Faculty

ENRICO BOMBIERI, *IBM von Neumann Professor*
JEAN BOURGAIN
PIERRE DELIGNE
ROBERT P. LANGLANDS, *Hermann Weyl Professor*
ROBERT D. MacPHERSON
THOMAS SPENCER
VLADIMIR VOEVODSKY *(as of 1-1-02)*
AVI WIGDERSON

Professors Emeriti

ARMAND BOREL
ATLE SELBERG

ACADEMIC ACTIVITIES

During the Academic Year 2001-02, the School of Mathematics conducted a special program on symplectic geometry and the theory of holomorphic curves. The goal of the program was to explore different aspects of the theory of holomorphic curves in their interaction with symplectic geometry, low-dimensional topology, integrable systems, enumerative algebraic geometry in mathematics, and with mirror symmetry and string theory in physics. The program was organized primarily by Yakov Eliashberg, who was Distinguished Visiting Professor during the year. About twenty other Members participated, including Helmut Hofer, Boris Dubrovin, and Dusa McDuff, as well as many visitors and local area mathematicians.

The formal part of the program included four components. The first was a weekly seminar consisting of 1½ hour lectures in which Members and visitors spoke on their own research. The second was several smaller learning seminars, each lasting for about a month. They were organized by the participants, and worked through the details of significant recent papers. The third was a series of minicourses, each consisting of three to six lectures, given by an expert in some area of current research interest. The fourth consisted of two week-long conferences, culminating the two terms of the program. Each of these conferences involved about twenty lectures, many by mathematicians who came just for the conference.

There were two learning seminars of longer duration. The first was on quantum cohomology, starting with the definition and leading up to the mirror theorem, following the lecture notes on a course by Givental at Berkeley. The second was on Taubs work on holomorphic curves in S1 X S2. There were other, more informal learning seminars.

The following are the minicourses that were given as part of the program.

"Frobenius manifolds and integrable systems" by Boris Dubrovin, October — November 2001
"Algebraic structures arising in Symplectic Field Theory" by Yakov Eliashberg, November — December 2001
"Floer Cohomology and Picard-Lefschetz Theory" by Paul Seidel, January — February, 2002
"Holomorphic disks and invariants for 3-manifolds and smooth 4-manifolds" by Peter Ozsvath and Zoltan Szabo, February — March 2002
"Topological String Theory" by Robbert Dijkgraaf, March 2002
"Multivalued Morse Theory, Asymptotic Analysis and Mirror Symmetry" Kenji Fukaya, March 2002)
"Supersymmetry and Mirror Symmetry" by Kentaro Hori, April 2002
"Gromov-Witten Theory of CP^1" by Rahul Pandharipande, April — May 2002

The first term of the program ended with the conference "Gromov-Witten Invariants and Integrable Systems" (December 8-13, 2001). It included lectures by B. Dubrovin, X. Liu, P. Seidel, C. Hertling, R. Kaufmann, R. Pandharipande, A. Okounkov, J.S. Song, E. Getzler, R. Donagi, R. Dijkgraaf, E. Ionel, and J. Bryan.

In connection with this conference A. B. Givental delivered the 25^{th} Marston Morse Memorial Lectures, a three-lecture series entitled "Quantum Riemann-Roch and Lefschetz".

The second term culminated in a conference on "Holomorphic Curves and Low-Dimensional Topology" (March 24-29, 2002). It included lectures by P. Seidel, I. Smith, L. Ng, S. Akbulut, D. McDuff, Z. Szabo, D. Ruberman, R. Stern, T. Mrowka, J. Morgan, M. Hutchings, D. Kotschick, P. Sisca, S. Bauer, G. Tian, D. Auroux, K. Cieliebak, D. Salamon, H. Hofer, K. Fukaya, and D. Sullivan.

In connection with this conference C.H. Taubes delivered the Herman Weyl Lectures, a series of four lectures around the topic, "A Role for Symplectic Geometry in Low Dimensional Topology".

A number of new developments and new collaborations resulted from the program. Here are a few examples:

E. Ionel and T. Parker defined a new Gromov-Witten type invariant for Calabi-Yau 3-folds which is based on counting embedded holomorphic curves, thus making significant progress towards proving the Gopakumar-Vafa conjecture.

M. Hutchings, M. Thaddeus in cooperation with Y. Eliashberg and H. Hofer defined a new invariant, called embedded contact homology for contact 3-manifolds. There is a well-founded hope that a further research in this area may lead to new invariants of 4-manifolds which potentially could distinguish smooth homotopy 4-spheres.

B. Dubrovin, R. Dijkgraaf and Y. Eliashberg cooperated on a work which shed new light in our understanding of why completely integrable systems emerge in connection with the theory of holomorphic curves.

K. Fukaya initiated a research in a new area, which he called a "Asymptotic Analysis of Holomorphic Curves".

One of the goals of his program is to find some bounds on the growth of the number of holomorphic curves in a Calabi-Yau 3-fold representing a given homology class, depending upon the symplectic area of the class. As Fukaya has shown the finding of efficient bounds of this kind is crucial for an understanding of the Homological Mirror Symmetry.

Significant progress was made towards building foundations of Symplectic Field Theory (SFT), the project which was originally initiated by Y. Eliashberg, A. Givental and H. Hofer. In particular, F. Bourgeois, Y. Eliashberg, H. Hofer, K. Wysocki and E. Zehnder completed a paper on compactness results in SFT. H. Hofer, K. Cielibak and K. Wysocki are completing an extensive paper which will give an appropriate treatment to a difficult problem of transversality in SFT.

As always, in addition to the primary special program described above, there were many other scientific activities in the School of Mathematics. There was a weekly series of lectures by Vladimir Voevodsky, lasting the whole academic year, on "Cross Functors". This was part of the multi-year program on Motivic Homotopy Theory.

The program on Theoretical Computer Science and Discrete Mathematics continued during this year, with a formal program consisting of several lectures each week. A notable feature of this year's program was a series of survey lectures, designed to be accessible to a broad range of mathematicians. The survey lectures were: "Arithmetic Complexity" by A. Wigderson, "Do Algorithms Need Randomness?" by A. Wigderson, "Polynomials in Discrete Mathematics" (two lectures) by N. Alon, "Quantum Computing" (two lectures) by A. Ambainis, "Proof Complexity" (two lectures) by A. Razborov, and "Randomness Conductors" (two lectures) by O. Reingold. Lecture notes for these are available on the School's website.

In the spring, a special series of lectures on mathematical biology was organized jointly with the IAS Program in Theoretical Biology. It was called "Mathematical Problems in Biology". The purpose was to give expositions, accessible to a broad spectrum of mathematicians, of interesting problems in mathematics that arise from questions in biology. The lectures were "Architecture and Dynamics of the Primary Visual Cortex" by D. McLaughlin, "Active Learning of Biological Systems" by S. Kasif, "Geometric Inequalities via Micelles" by M. Gromov, "Emergence of Scaling in Complex Networks: From the topology of the www to the cell's genetic network" by A.-L. Barabasi, "Fermi Function, Support Vector Machines, and Transcription Factor Binding Sites" by A. Sengupta, "Why Do Animals and Humans Become More Impatient with Time?" by E. Maskin, "Electrophysiology of Neural Tissue: A Non-network Approach to Neurla Science" by C. Peskin, "Reading the Regulatory Regions of a Genome" by E. Siggia, and "Virus Dynamics" by M. Nowak.

In addition, there were many other seminar series. As usual, there was the joint Princeton/Rutgers/IAS seminar on Number Theory, and the joint Princeton/Rutgers/IAS Seminar on Nonlinear Analysis. Other seminars included an Analysis/Mathematical Physics Seminar in the fall term, a Statistical Mechanics Seminar in the spring term, an Automorphic Forms seminar in the spring term, and the traditional Members Seminar, a seminar on many different topics not covered by the other seminars.

In January, we welcomed Vladimir Voevodsky as Professor in the School of Mathematics. His research has been largely concerned with a synthesis of algebraic geometry and homotopy theory, two major branches of modern mathematics. In the past two years, Voevodsky has conducted a lecture series on "Motivic Cohomology", giving a systematic exposition of motivic homotopy theory.

Robert MacPherson together with Mark Goresky received the American Mathematical Society's Steele Prize for a "seminal contribution to research" in January. In May, Enrico Bombieri was awarded the Cavaliere di Gran Croce al Merito della Repubblica by the President of Italy, and in June, Robert Langlands received an Honoris Causa Doctorate from Laval University in Canada.

MEMBERS AND VISITORS

SELMAN AKBULUT
Geometry and Topology
Michigan State University · s

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

ANDRIS AMBAINIS
Quantum Computation, Computational Complexity
University of California, Berkeley

JAMES ARTHUR
Automorphic Forms and Trace Formulas
University of Toronto and Institute for Advanced Study

ABBAS BAHRI
Partial Differential Equations and Geometry
Rutgers University, New Brunswick · s

JINHO BAIK
Integrable Systems and Random Permutations
Institute for Advanced Study · *i*

RICHARD BEIGEL
Computational Complexity
Temple University

MANJUL BHARGAVA
Number Theory
Princeton University

FEDERICO BONETTO
Nonequilibrium Statistical Mechanics
Universtá di Roma

ALEXEI BORODIN
Representation Theory, Random Matrices
University of Pennsylvania

ANA CANNAS DA SILVA
Symplectic Geometry
Instituto Superior Técnico, Portugal · *f*

MICHAEL CAPALBO
Graph Theory
The Johns Hopkins University

WILLIAM CASSELMAN
Automorphic Forms
University of British Columbia · *f*

WEIMIN CHEN
Symplectic Topology
State University of New York, Stony Brook

JIH-HSIN CHENG
CR Geometry, Contact Topology
Institute of Mathematics, Academia Sinica, Taiwan · *v*

NIKOLAI CHERNOV
Dynamics
University of Alabama, Birmingham · s

HERB CLEMENS
Algebraic Geometry
University of Utah · *dv*

MARK DE CATALDO
Algebraic Geometry
State University of New York, Stony Brook

IRIT DINUR
Computational Complexity
Tel Aviv University

MARGHERITA DISERTORI
Statistical Mechanics
Institute for Advanced Study

BORIS DUBROVIN
Integrable Systems
Scuola Internazionale Superiore di Studi, Italy

YAKOV ELIASHBERG
Symplectic Geometry
Stanford University · *dvp*

CHARLES EPSTEIN
Holomorphic Curves
University of Pennsylvania · *v*

MEHMET ERDOĞAN
Harmonic Analysis
California Institute of Technology

dv Director's Visitor · *dvp* Distinguished Visiting Professor · *f* First Term
i Veblen Research Instructorship · s Second Term · *v* Visitor

ERIC FREEMAN
Diophantine Equations and Inequalities
University of Colorado

KENJI FUKAYA
Symplectic Geometry
Kyoto University, Japan · *s*

ANDREAS GATHMANN
Enumerative Geometry
Harvard University

EZRA GETZLER
Symplectic Geometry
Northwestern University · *s*

MARK GORESKY
Geometry, Automorphic Forms
Institute for Advanced Study

NADYA GUREVICH
Automorphic Forms
Institute for Advanced Study · *i*

FENGBO HANG
Geometric Analysis, Partial Differential Equations
Courant Institute · *i*

RICHARD HIND
Symplectic, Contact and Complex Geometry
University of Notre Dame · *vs*

HELMUT HOFER
Differential Equations and Dynamical Systems
Courant Institute of Mathematical Sciences · *f*

MICHAEL HUTCHINGS
Symplectic Geometry
Stanford University

ELENY-NICOLETA IONEL
Gromov-Witten Invariants
University of Wisconsin, Madison · *f*

NICHOLAS KATZ
Arithmetic Algebraic Geometry
Princeton University · *vs*

ROWAN KILLIP
Differential Operators
Institute for Advanced Study · *f*

JU-LEE KIM
Representation Theory of P-adic Groups
University of Michigan, Ann Arbor

SANG SEON KIM
Symplectic and Contact Topology
Stanford University

ANTHONY KNAPP
Lie Groups and Representation Theory
State University of New York, Stony Brook · *v*

HORST KNÖRRER
Mathematical Models in Condensed Matter Physics
Eidgenössische Technishe Hochschule Zürich · *s*

JOEL LEBOWITZ
Mathematical Physics
Rutgers University, New Brunswick

TONG LI
Partial Differential Equations
University of Iowa · *vs*

ANDREA MALCHIODI
Nonlinear Analysis, Partial Differential Equations
Rutgers University, Piscataway

MARGARET McDUFF
Differential Topology
State University of New York, Stony Brook · *s*

GEORGIY MEDVEDEV
Partial Differential Equations
Institute for Advanced Study · *i*

ROY MESHULAM
Combinatorics
Institute for Advanced Study · *f*

GRIGORY MIKHALKIN
Topology of Algebraic Varieties
University of Utah · *f*

TAKURO MOCHIZUKI
Algebraic Geometry
Osaka City University, Japan

LENHARD NG
Contact Topology, Symplectic Topology
Massachusetts Institute of Technology

f First Term · *i* Veblen Research Instructorship · *s* Second Term · *v* Visitor

NATHAN NG
Analytic Number Theory
University of British Columbia · *s*

YONG-GEUN OH
Symplectic Geometry
University of Wisconsin, Madison

THOMAS PARKER
Gromov-Witten Invariants
Michigan State University

STEFANIE PETERMICHL
Harmonic Analysis, Singular Integrals
Michigan State University

FLORIAN POP
Algebra, Number Theory
University of Bonn, Germany · *vf* · *s*

ALEXANDER RAZBOROV
Theoretical Computer Science
Institute for Advanced Study

ODED REGEV
Approximation Methods, Scheduling
Tel Aviv University

OMER REINGOLD
Cryptography, Computational Complexity
Institute for Advanced Study · *v*

PETER SARNAK
Analytic Number Theory, Automorphic Forms
Princeton University and Institute for Advanced Study · *s*

WILHELM SCHLAG
Harmonic Analysis, Partial Differential Equations
Princeton University · *f*

PAUL SEIDEL
Symplectic Geometry, Homological Algebra
École Polytechnique, France

ZLIL SELA
Geometric Group Theory
The Hebrew University of Jerusalem

NADYA SHIROKOVA
Contact Manifolds, Three Manifolds
University of Illinois, Urbana-Champaign · *vf*

CLIFFORD SMYTH
Discrete Math and Discrete Probability
Rutgers University, Piscataway

BENJAMIN SUDAKOV
Combinatorics
Institute for Advanced Study · *i*

JANET TALVACCHIA
Differential and Symplectic Geometry
Swarthmore College · *v*

MICHAEL THADDEUS
Algebraic Geometry and Gauge Theory
Columbia University · *f*

LISA TRAYNOR
Symplectic and Contact Geometry
Institute for Advanced Study · *v*

TAI-PENG TSAI
Nonlinear Partial Differential Equations
Courant Institute

VLADIMIR VOEVODSKY
K-theory and Arithmetical Algebraic Geometry
Institute for Advanced Study · *f*

LIHE WANG
Harmonic Analysis, Nonlinear Differential Equations
University of Iowa · *s*

SONG WANG
Number Theory, Automorphic Forms
California Institute of Technology

ANDREW WILES
Algebraic Number Theory
Princeton University and Institute for Advanced Study · *s*

YISONG YANG
Mathematical Physics
Polytechnic University, New York

f First Term · *i* Veblen Research Instructorship · *s* Second Term · *v* Visitor

THE SCHOOL OF MATHEMATICS

RECORD OF EVENTS

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

Computer Science/Discrete Math Seminar I: "$(1+\varepsilon, \beta)$-spanner Constructions for General Graphs"
MICHAEL ELKIN, *The Weizmann Institute of Science*

Computer Science/Discrete Math Seminar I: "What Can We Do in Sublinear Time?"
RONITT RUBINFELD, *NEC Institute*

Computer Science/Discrete Math Seminar II: "How to Go Beyond the Black-Box Simulation Barrier"
BOAZ BARAK, *The Weizmann Institute of Science*

Symplectic Geometry/Holomorphic Curves Seminar: "The Program of Symplectic Field Theory"
YAKOV ELIASHBERG, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Gromov-Witten Invariants and Classification of Integrable PDEs"
BORIS DUBROVIN, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar I: "What Makes a Graph Be a Ramsey Graph? An Analysis via Random Graphs, a Threshold Phenomenon and Szemerédi (Hypergraph) Regularity"
EHUD FRIEDGUT, *The Hebrew University of Jerusalem*

Computer Science/Discrete Math Seminar II: "Explicit Unique-Neighbor Expanders"
MICHAEL CAPALBO, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Growth of Maps and Symplectic Geometry"
LEONID POLTEROVICH, *Tel Aviv University*

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Frobenius Manifolds and Integrable Systems (Minicourse)"
BORIS DUBROVIN, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Decomposition into Pairs-of-Pants for Complex Algebraic Hypersurfaces"
GRIGORY MIKHALKIN, *Institute for Advanced Study*

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Frobenius Manifolds and Integrable Systems (Minicourse)"
BORIS DUBROVIN, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar I: "Zero Knowledge and Chosen-Ciphertext Security"
AMIT SAHAI, *Princeton University*

Computer Science/Discrete Math Seminar II: "On the Hardness of Approximating Vertex Cover"
IRIT DINUR, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Frobenius Manifolds and Integrable Systems (Minicourse)"
BORIS DUBROVIN, *Institute for Advanced Study*

Analysis/Math Physics Seminar: "On Time Decay of Solutions to Schröedinger Equations with Rough and Time Dependent Potentials (Joint Work with Igor Rodnianski)"
WILHELM SCHLAG, *Institute for Advanced Study*

[illegible] 24
Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Special Combinatorics Seminar: "Phase Transition in the Hard-Core Model on Zd"
DAVID GALVIN, *Rutgers University*

[illegible] 25
Special Symplectic Geometry Seminar: "Mirror Symmetry and Deformation Quantization"
YAN SOIBELMAN, *Kansas State University*

Princeton University and IAS Joint Number Theory Seminar: "Boundary Value Distributions of Automorphic Forms and Constructions of L-functions"
STEVE MILLER, *Rutgers University*

[illegible] 27
Symplectic Geometry/Holomorphic Curves Seminar: "Relative Gromov-Witten Invariants and the Mirror Formula"
ANDREAS GATHMANN, *Institute for Advanced Study*

Special Seminar: "Can We Recognize in a Reasonable Time That a Given Linear Space Is Far from Euclidean?"
VITALI MILMAN, *Tel Aviv University*

[illegible] 28
Computer Science/Discrete Math Seminar I:
"A Practical Shortest Path Algorithm with Linear Average Time"
ANDREW V. GOLDBERG, *InterTrust STAR Lab*

[illegible] 30
Computer Science/Discrete Math Seminar II:
"On the Hardness of Approximating Vertex Cover (Continued)"
IRIT DINUR, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Real and Complex Morse Theory in Two Variables"
PAUL SEIDEL, *Institute for Advanced Study*

Analysis/Math Physics Seminar: "On Time Decay of Solutions to Schröedinger Equations with Rough and Time Dependent Potentials (Joint Work with Igor Rodnianski) (Continued)"
WILHELM SCHLAG, *Institute for Advanced Study*

[illegible] ember 31
Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

[illegible]
Novembe[illegible]
Symplectic Geometry/Holomorphic Curves Seminar: "Frobenius Manifolds and Integrable Systems (Minicourse)"
BORIS DUBROVIN, *Institute for Advanced Study*

Novembe[illegible]
Computer Science/Discrete Math Seminar I: "How to Generate a Random Polygon?"
ANDREW YAO, *Princeton University*

Members Seminar: "Harmonic Analysis on the Infinite Symmetric Group"
ALEXEI BORODIN, *Institute for Advanced Study*

Novembe[illegible] 6
Computer Science/Discrete Math Seminar II:
"The Unsplittable Flow Problem"
ODED REGEV, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Floer Homology and Filtered A-Infinity Algebras"
YONG-GEUN OH, *Institute for Advanced Study*

Novembe[illegible] 7
Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Analysis/Math Physics Seminar: "Almost Everywhere Convergence of a Subsequence of Partial Fourier Sums"
SERGEI KONYAGIN, *Institute for Advanced Study*

[illegible] 9
Symplectic Geometry/Holomorphic Curves Seminar: "Algebraic Structure of Symplectic Field Theory (Minicourse)"
YAKOV ELIASHBERG, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar I: "Informational Complexity and the Direct Sum Problem for Simultaneous Message Complexity"
AMIT CHAKRABARTI, *Princeton University*

Members Seminar: "Group Algebras, Expanders and Codes"
ROY MESHULAM, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar II: "Reimer's Inequality and Rudich's Conjecture"
CLIFFORD SMYTH, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Gromov-Witten Invariants for Symplectic Sums, Part I"
THOMAS PARKER, *Institute for Advanced Study*

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Analysis/Math Physics Seminar: "Asymptotic Dynamics of Nonlinear Schrödinger Equations with Multiple Bound States"
TAI-PENG TSAI, *Institute for Advanced Study*

Princeton University and IAS Joint Number Theory Seminar: 'Finiteness of Integral Values for the Ratio of Two Linear Recurrences"
UMBERTO ZANNIER, *Institute for Advanced Study and Istituto Universitario di Architettura di Venezia*

Symplectic Geometry/Holomorphic Curves Seminar: "Algebraic Structure of Symplectic Field Theory (Minicourse)"
YAKOV ELIASHBERG, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar I: "A Tower-type Lower Bound for Szemerédi's Regularity Lemma"
TIM GOWERS, *Cambridge University and Princeton University*

Symplectic Geometry/Holomorphic Curves Seminar: "D-Branes and Geometry"
MICHAEL DOUGLAS, *Rutgers University*

Members Seminar: "Birational Arithmetic/Algebraic Geometry and Elementary Equivalence"
FLORIAN POP, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar II: "Quantum Coin Flipping"
ANDRIS AMBAINIS, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Existence of Folded Symplectic Forms"
ANA CANNAS DA SILVA, *Institute for Advanced Study*

Analysis/Math Physics Seminar: "Selection of the Ground State in Nonlinear Schrödinger Systems"
MICHAEL WEINSTEIN, *Lucent Technologies*

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar I: "Estimates for Lp Norms of Exponential Sums"
SERGEI KONYAGIN, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "D-Branes and Geometry (Continued)"
MICHAEL DOUGLAS, *Rutgers University*

Computer Science/Discrete Math Seminar II: "Reimer's Inequality and Rudich's Conjecture (Continued)"
CLIFFORD SMYTH, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Singularities in String Theory"
EDWARD WITTEN, *Institute for Advanced Study*

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Gromov-Witten Invariants for Symplectic Sums, Part II"
ELENY IONEL, *Institute for Advanced Study*

Analysis/Math Physics Seminar: "The Sharp Bound for the Weighted Beurling-Ahlfors Transform and an Attempt for the p-1 Problem"
STEFANIE PETERMICHL, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Algebraic Structures in Symplectic Field Theory (Minicourse Continued)"
YAKOV ELIASHBERG, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar I: "Capacity Achieving Sequences"
AMIN SHOKROLLAHI, *Digital Fountain*

Members Seminar: "Word Processing in Coxeter Groups"
WILLIAM CASSELMAN, *Institute for Advanced Study*

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Analysis/Math Physics Seminar: "Remarks on the Spectrum of Schrodinger Operators"
JEAN BOURGAIN, *Institute for Advanced Study*

Analysis/Math Physics Seminar: "Trace Formulae and Tri-diagonal Matrices"
ROWAN KILLIP, *Institute for Advanced Study*

Princeton University and IAS Joint Number Theory Seminar: "On Mu-Invariants of Elliptic Curves Over Q"
MAK TRIFKOVIC, *Harvard University*

Symplectic Geometry/Holomorphic Curves Seminar: "Algebraic Structures in Symplectic Field Theory (Mincourse Continued)"
YASHA ELIASHBERG, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Algebraic Structures in Symplectic Field Theory (Mincourse Continued)"
YASHA ELIASHBERG, *Institute for Advanced Study*

Gromov-Witten Invariants and Integrable Systems Conference

Gromov-Witten Invariants and Integrable Systems Conference

Gromov-Witten Invariants and Integrable Systems Conference

Computer Science/Discrete Math Seminar I: "On Statistical Mechanics and Capacity Approaching Codes"
NICOLAS SOURLAS, *École Normale Supérieure, Paris*

Gromov-Witten Invariants and Integrable Systems Conference

Computer Science/Discrete Math Seminar II: "Arithmetic Complexity – A Survey"
AVI WIGDERSON, *Institute for Advanced Study*

Marston Morse Memorial Lecture: "Quantum Riemann-Roch and Lefschetz"
ALEXANDER GIVENTAL, *University of California, Berkeley*

Gromov-Witten Invariants and Integrable Systems Conference

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Marston Morse Memorial Lecture: "Quantum Riemann-Roch and Lefschetz"
ALEXANDER GIVENTAL, *University of California, Berkeley*

Gromov-Witten Invariants and Integrable Systems Conference

Marston Morse Memorial Lecture: "Quantum Riemann-Roch and Lefschetz"
ALEXANDER GIVENTAL, *University of California, Berkeley*

Symplectic Geometry/Holomorphic Curves Seminar: "Algebraic Structure of Symplectic Field Theory (Minicourse Continued)"
YAKOV ELIASHBERG, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Algebraic Structure of Symplectic Field Theory (Minicourse Continued)"
YAKOV ELIASHBERG, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar I: "Testing Monotonicity of Functions and Ruzsa-Szemerédi Type Graphs"
ILAN NEWMAN, *NEC Institute*

Members Seminar: "Spaces of Higgs Bundles as SYZ Mirror Partners"
MICHAEL THADDEUS, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar II: "Do Algorithms Need Randomness? A Survey"
AVI WIGDERSON, *Institute for Advanced Study*

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Analysis/Math Physics Seminar: "Universalities and Some Group Integrals in Random Matrix Theory"
EDOUARD BRÉZIN, *École Normale Supérieure, Paris*

Computer Science/Discrete Math Seminar I: "Recent Developments Concerning Vertical Decompositions"
VLADLEN KOLTUN, *Tel Aviv University*

Computer Science/Discrete Math Seminar II: "Learning a Hidden Matching"
RICHARD BEIGEL, *Institute for Advanced Study*

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Floer Cohomology and Picard-Lefschetz Theory"
PAUL SEIDEL, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar I: "Reduction of Dimensionality in Euclidean Space that Preserve Volumes, and Applications"
AVNER MAGEN, *NEC Research Institute*

Computer Science/Discrete Math Seminar IA: "Space Lower Bounds for Distance Approximation in the Data Stream Model"
XIAODONG SUN, *Rutgers University*

Members Seminar: "Phase Transitions and Other Puzzles in Simple Cooperative Systems"
JOEL LEBOWITZ, *Institute for Advanced Study* and *Rutgers University*

Computer Science/Discrete Math Seminar II: "Learning a Hidden Matching (Continued)"
RICHARD BEIGEL, *Institute for Advanced Study* and NOGA ALON, *Institute for Advanced Study* and Tel *Aviv University*

Symplectic Geometry/Holomorphic Curves Seminar: "The Geometry of Grauert Tubes and Complexification of Symmetric Spaces"
RICHARD HIND, *Institute for Advanced Study* and *University of Notre Dame*

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Statistical Mechanics Seminar: "Large Deviations for Stationary Non-Equilibrium Systems"
JOEL LEBOWITZ, *Institute for Advanced Study* and *Rutgers University*

Symplectic Geometry/Holomorphic Curves Seminar: "Floer Cohomology and Picard-Lefschetz Theory (Minicourse)"
PAUL SEIDEL, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar I: "Property 'Tau' and its Applications in Combinatorics, Computational Group Theory and Geometry"
ALEX LUBOTZKY, *The Hebrew University of Jerusalem*

Computer Science/Discrete Math Seminar II: "Vertex List Coloring by Semirandom Method"
BENJAMIN SUDAKOV, *Institute for Advanced Study* and *Princeton University*

Statistical Mechanics Seminar: "Properties of Stationary Non-Equilibrium States in the Thermostatted Periodic Lorentz Gas: The One and Many Particle System"
FEDERICO BONETTO, *Institute for Advanced Study*

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Statistical Mechanics Seminar: "Dynamics of a Massive Piston in an Ideal Gas: Oscillations, Approach to Equilibrium and Scaling Limit"
NIKOLAI CHERNOV, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Existence of Adapted Open Books in a Contact Manifold"
FRAN PRESAS, *Institute for Advanced Study* and *University of Madrid*

Number Theory Seminar: "Higher Composition Laws and Applications to Number Fields, I: Overview"
MANJUL BHARGAVA, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Floer Cohomology and Picard-Lefschetz Theory (Minicourse)"
PAUL SEIDEL, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar I: "An Application of Hindman's Theorem to a Problem on Communication Complexity"
PAVEL PUDLAK, *Mathematical Institute, Academy of Sciences of the Czech Republic, Prague*

Members Seminar: "The Hilbert Scheme of Curves on a Calabi-Yau Threefold as a Gradient Variety"
HERB CLEMENS, *University of Utah*

Computer Science/Discrete Math Seminar II: "Polynomials in Discrete Mathematics (A Survey Lecture)"
NOGA ALON, *Institute for Advanced Study* and *Tel Aviv University*

Symplectic Geometry/Holomorphic Curves Seminar: "An Introduction to Orbifold Quantum Cohomology"
WEIMIN CHEN, *Institute for Advanced Study*

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Holomorphic Disks and Invariants for 3-Manifolds and Smooth 4-Manifolds (Minicourse)"
ZOLTAN SZABO, *Princeton University*

Automorphic Forms Seminar: "Higher Composition Laws and Applications to Number Fields, II"
MANJUL BHARGAVA, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar IA: "Compact Oracles for Reachability and Approximate Distances in Planar Digraphs"
MIKKEL THORUP, *AT & T Labs - Research*

Symplectic Geometry/Holomorphic Curves Seminar: "Floer Cohomology and Picard-Lefschetz Theory (Minicourse)"
PAUL SEIDEL, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar I: "Independent Deuber Sets in Graphs on the Natural Numbers"
VOJTA RODL, *Emory University*

Members Seminar: "On Asymptotic Behaviour of Harmonic Bundles"
TAKURO MOCHIZUKI, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar II: "Polynomials in Discrete Mathematics, II"
NOGA ALON, *Institute for Advanced Study* and *Tel Aviv University*

Symplectic Geometry/Holomorphic Curves Seminar: "Large Volume Limit of Floer's Perturbed Cauchy-Riemann Equation"
YONG-GEUN OH, *Institute for Advanced Study* and *University of Wisconsin*

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Statistical Mechanics Seminar: "Derivation of the Hartree Equation from a Many-Body Schrödinger Equation"
HORNG-TZER YAU, *Courant Institute of Mathematical Sciences*

Symplectic Geometry/Holomorphic Curves Seminar: "Holomorphic Disks and Invariants for 3-Manifolds and Smooth 4-Manifolds (Minicourse)"
PETER OSZVATH, *Princeton University* and ZOLTAN SZABO, *Princeton University*

Automorphic Forms Seminar: "Higher Composition Laws and Applications to Number Fields, III"
MANJUL BHARGAVA, *Institute for Advanced Study*

Joint Number Theory Seminar: "Asymptotic Formulas for the Number of Solutions of Diophantine Inequalities"
ERIC FREEMAN, *Institute for Advanced Study*

Mathematical Problems in Biology Seminar: "Virus Dynamics"
MARTIN NOWAK, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar I: "Probabilistic Method and Ramsey Theory"
BENJAMIN SUDAKOV, *Institute for Advanced Study* and *Princeton University*

Members Seminar: "Addition, Codes and Subgraphs"
NOGA ALON, *Institute for Advanced Study* and *Tel Aviv University*

Computer Science/Discrete Math Seminar II: "Quantum Computation and Lattice Problems"
ODED REGEV, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Gromov-Witten Invariants and Integrable Systems, Part I"
EZRA GETZLER, *Institute for Advanced Study* and *Northwestern University*

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Statistical Mechanics Seminar: "Quasi Linear Approximation of the Three Dimensional Navier-Stokes System"
YASHA SINAI, *Princeton University*

Symplectic Geometry/Holomorphic Curves Seminar: "Holomorphic Disks and Invariants for 3-Manifolds and Smooth 4-Manifolds (Minicourse)"
PETER OZSVATH, *Princeton University* and ZOLTAN SZABO, *Princeton University*

Statistical Mechanics Seminar: "A Sharp Analog of Young's Inequality on the Sphere and Related Correlation Irregularities"
ERIC CARLEN, *Georgia Institute of Technology*

Automorphic Forms Seminar: "Limiting Forms of the Trace Formula (Beyond Endoscopy)"
AKSHAY VENKATESH, *Princeton University*

Joint Number Theory Seminar: "Non-Negativity of L-functions at the Center of Symmetry"
EREZ LAPID, *Ohio State University*

Mathematical Problems in Biology Seminar: "Reading the Regulatory Regions of a Genome"
ERIC SIGGIA, *Rockefeller University*

Computer Science/Discrete Math Seminar I: "Turan Numbers of Bipartite Graphs and Related Questions"
MICHAEL KRIVELEVICH, *Tel Aviv University*

Members Seminar: "Two Dimensional Fermi Liquids"
HORST KNÖRRER, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar II: "Quantum Computing I (A Survey Lecture)"
ANDRIS AMBAINIS, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Gromov-Witten Invariants and Integrable Systems, Part II"
EZRA GETZLER, *Institute for Advanced Study* and *Northwestern University*

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Statistical Mechanics Seminar: "Fluctuations of the Entropy Production in Anharmonic Chains"
LUC REY-BELLET, *University of Virginia*

Symplectic Geometry/Holomorphic Curves Seminar: "Holomorphic Disks and Invariants for 3-Manifolds and Smooth 4-Manifolds (Minicourse)"
PETER OZSVATH, *Princeton University* and ZOLTAN SZABO, *Princeton University*

Statistical Mechanics Seminar: "Green's Functions for Many Fermion Systems"
HORST KNÖRRER, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Topological String Theory (Minicourse)"
ROBBERT DIJKGRAAF, *Institute for Advanced Study* and *University of Amsterdam*

Joint Number Theory Seminar: "Automorphisms of Even Unimodular Lattices"
BENEDICT GROSS, *Harvard University*

Mathematical Problems in Biology Seminar: "Electrophysiology of Neural Tissue: A Non-Network Approach to Neural Science"
CHARLES S. PESKIN, *Courant Institute of Mathematical Sciences* and *Center for Neural Science New York University*

Symplectic Geometry/Holomorphic Curves Seminar: "Topological Properties of Hamiltonian Circle Actions"
DUSA MCDUFF, *Institute for Advanced Study* and *State University of New York, Stony Brook*

Computer Science/Discrete Math Seminar I: "Putting A Junta to the Test"
SHMUEL SAFRA, *Tel Aviv University*

Symplectic Geometry/Holomorphic Curves Seminar: "Langrangian Surfaces in the 4-Space"
KLAUS MOHNKE, *State University of New York, Stony Brook*

Special Math Physics Seminar: "Fermi Liquids (Continued)"
HORST KNÖRRER, *Institute for Advanced Study*

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Statistical Mechanics Seminar: "Aging and Scaling Limits in 1 + 1 Dimensions"
CHARLES NEWMAN, *Courant Institute of Mathematical Sciences*

Symplectic Geometry/Holomorphic Curves Seminar: "Holomorphic Disks and Invariants for 3-Manifolds and Smooth 4-Manifolds (Minicourse)"
PETER OZSVATH, *Princeton University* and ZOLTAN SZABO, *Princeton University*

Statistical Mechanics Seminar: "Large Deviations for Boundary Driven Lattice Gases"
LORENZO BERTINI, *University of Rome*

Symplectic Geometry/Holomorphic Curves Seminar: "Topological String Theory (Minicourse)"
ROBBERT DIJKGRAAF, *Institute for Advanced Study* and *University of Amsterdam*

Symplectic Geometry/Holomorphic Curves Seminar: "Spin Orbifold Quantum Cohomology"
YOHGBIN RUAN, *Hong Kong University of Science and Technology*

Computer Science/Discrete Math Seminar I: "Generating Random Regular Graphs"
VAN H. VU, *University of California, San Diego*

Computer Science/Discrete Math Seminar II: "Quantum Computing, Part II"
ANDRIS AMBAINIS, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Multivalued Morse Theory, Asymptotic Analysis and Mirror Symmetry (Minicourse)"
KENJI FUKAYA, *Institute for Advanced Study* and *Kyoto University, Japan*

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Statistical Mechanics Seminar: "Motion in a Random Rough Vector Field"
ANTTI KUPIAINEN, *University of Helsinki*

Symplectic Geometry/Holomorphic Curves Seminar: "Holomorphic Disks and Invariants for 3-Manifolds and Smooth 4-Manifolds (Minicourse)"
PETER OZSVATH, *Princeton University* and ZOLTAN SZABO, *Princeton University*

Special Math Physics Seminar: "Fermi Liquids (Continued)"
HORST KNÖRRER, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Topological String Theory (Minicourse)"
ROBBERT DIJKGRAAF, *Institute for Advanced Study* and *University of Amsterdam*

Automorphic Forms Seminar: "Eisenstein Series Twisted by the Heat Kernel"
SERGE LANG, *Yale University*

Joint Number Theory Seminar: "Pro-l Birational Anabelian Geometry"
FLORIAN POP, *Institute for Advanced Study* and *University of Bonn*

Mathematical Problems in Biology Seminar: "Why Do Animals and Humans Become More Impatient with Time?"
ERIC MASKIN, *Institute for Advanced Study*

Special Seminar: "Back to the Early Universe by Optimal Mass Transportation"
URIEL FRISCH, *Observatoire de la Cote d'Azur, Nice, France*

Computer Science/Discrete Math Seminar I: "Graph Tiling Problems"
YI ZHAO, *Rutgers University*

Members Seminar: "Diophantine Geometry Over Groups and the Elementary Theory of Free and Hyperbolic Groups"
ZLIL SELA, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar II: "Quantum Computing III"
ANDRIS AMBAINIS, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Multivalued Morse Theory, Asymptotic Analysis and Mirror Symmetry (Minicourse)"
KENJI FUKAYA, *Institute for Advanced Study* and *Kyoto University, Japan*

Lectures on Cross Functors
VLADIMIR VOEVODSKY, *Institute for Advanced Study*

Statistical Mechanics Seminar: "Density of States for Random Band Matrices"
MARGHERITA DISERTORI, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Multivalued Morse Theory, Asymptotic Analysis and Mirror Symmetry (Minicourse)"
KENJI FUKAYA, *Institute for Advanced Study* and *Kyoto University, Japan*

Herman Weyl Lecture: "A Role for Symplectic Geometry in Low Dimensional Topology"
CLIFF H. TAUBES, *Harvard University*

Herman Weyl Lecture: "Open Questions for Folks with Time on Their Hands"
CLIFF H. TAUBES, *Harvard University*

Informal Math Seminar: "Long Time Behavior of a Localized State Subjected to Periodic Forcing"
OVIDIO COSTIN, *Rutgers University*

Holomorphic Curves and Low-Dimensional Topology Conference

Computer Science/Discrete Math Seminar I: "Transversals in Graphs"
PENNY HAXELL, *University of Waterloo* and *Bell Labs*

Computer Science/Discrete Math Seminar II: "Proof Complexity, I (A Survey Lecture)"
ALEXANDER RAZBOROV, *Institute for Advanced Study*

March 7
Statistical Mechanics Seminar: "Differentiability of SRB Measures and Limit Theorems for Partially Hyperbolic Systems"
DMITRY DOLGOPYAT, *Pennsylvania State University*

March 25
Special Math Physics Seminar: "Supersymmetry in Disorder and Chaos"
KONSTANTIN EFETOV, *Ruhr University, Bochum*

Herman Weyl Lecture: "Fun With S1 x S2"
CLIFF H. TAUBES, *Harvard University*

March 27
Herman Weyl Lecture: "More Fun With S1 x S2"
CLIFF H. TAUBES, *Harvard University*

April 1
Computer Science/Discrete Math Seminar I: "Communication Complexity and Secure Function Evaluation"
KOBBI NISSIM, *Center for Discrete Mathematics and Theoretical Computer Science* and *NEC Research Institute*

April 2
Computer Science/Discrete Math Seminar II: "Proof Complexity, II (A Survey Lecture)"
ALEXANDER RAZBOROV, *Institute for Advanced Study*

April 3
Statistical Mechanics Seminar: "Random Matrix Type Models in Combinatorics and Representation Theory"
ALEXEI BORODIN, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Gromov-Witten Theory of CP1 (Minicourse)"
RAHUL PANDHARIPANDE, *Princeton University*

April 4
Symplectic Geometry/Holomorphic Curves Seminar: "Supersymmetry and Mirror Symmetry (Minicourse)"
KENTARO HORI, *Institute for Advanced Study*

April 5
Mathematical Problems in Biology Seminar: "Fermi Function, Support Vector Machines and Transcription Factor Binding Sites"
ANIRVAN SENGUPTA, *Bell Laboratories, Lucent Technologies*

April 8
Computer Science/Discrete Math Seminar I: "Quantum Interactive Proofs"
ALEXEI KITAEV, *California Institute of Technology*

April 9
Computer Science/Discrete Math Seminar II: "Randomness Conductors (A Survey Lecture)"
OMER REINGOLD, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Symplectic Fillings of Links of Isolated Singularities"
KAROU ONO, *Institute for Advanced Study* and *University of Hokkaido*

Mathematical Problems in Biology Seminar: "Emergence of Scaling in Complex Networks: From the Topology of the www to the Cell's Genetic Network"
ALBERT-LASZLO BARABASI, *University of Notre Dame*

April 10
Symplectic Geometry/Holomorphic Curves Seminar: "Gromov-Witten Theory of CP1 (Minicourse)"
RAHUL PANDHARIPANDE, *Princeton University*

Symplectic Geometry/Holomorphic Curves Seminar: "Renormalization in Quantum Field Theory"
MAXIM KONTSEVICH, *Institute for Advanced Study* and *Institut des Hautes Études Scientifiques*

April 12
Mathematical Problems in Biology Seminar: "Word Frequency Distribution under Restriction Avoidance: Evolution of Viral Sequences to Escape Host Defense"
AKIRA SASAKI, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar: "Supersymmetry and Mirror Symmetry (Minicourse)"
KENTARO HORI, *Institute for Advanced Study*

April 15
Symplectic Geometry/Holomorphic Curves Seminar: "Supersymmetry and Mirror Symmetry (Minicourse)"
KENTARO HORI, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar I: "Unique Sink Orientation of Cubes"
TIBOR SZABO, *Eidgenössische Technische Hochschule Zurich*

Computer Science/Discrete Math Seminar II:
"Randomness Conductors (Continued)"
OMER REINGOLD, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar:
"Gromov-Witten Theory of CP1 (Minicourse)"
RAHUL PANDHARIPANDE, *Princeton University*

Joint PU/IAS/Rutgers Non-Linear Analysis Seminar:
"Arnold Diffusion"
JOHN MATHER, *Princeton University*

Statistical Mechanics Seminar: "Non-Equilibrium Systems: Some Recent Results"
BERNARD DERRIDA, *École Normale Supérieure*

Mathematical Problems in Biology Seminar:
"Geometric Inequalities Via Micelles"
MIKHAIL GROMOV, *Institut des Hautes Études Scientifiques de Bures-sur-Yvette*

Joint Number Theory Seminar: "Discrete Moments of the Riemann Zeta Function"
NATHAN NG, *Institute for Advanced Study*

Symplectic Geometry/Holomorphic Curves Seminar:
"Characteristic Classes of Symplectic Fibrations"
JAREK KEDRA, *Institute for Advanced Study*

Computer Science/Discrete Math Seminar I: "Fault Diagnosis: What If the Number of Faulty Processors Is More than Half?"
WILLIAM GASARCH, *University of Maryland*

Computer Science/Discrete Math Seminar II:
"Monotone Graph Properties"
JOZSEF BALOGH, *Institute for Advanced Study*

Statistical Mechanics Seminar: "Renormalization Group and Ward Identities for Interacting Fermionic Systems"
VIERI MASTROPIETRO, *University of Rome, Tor Vergata*

Symplectic Geometry/Holomorphic Curves Seminar:
"Supersymmetry and Mirror Symmetry (Minicourse)"
KENTARO HORI, *Institute for Advanced Study*

Mathematical Problems in Biology Seminar joint session with Computer Science/Discrete Math Seminar: "Active Learning of Biological Systems"
SIMON KASIF, *Boston University*

Computer Science/Discrete Math Seminar II:
"Explicit Unique-Neighbor Expanders"
MICHAEL CAPALBO, *Institute for Advanced Study*

Statistical Mechanics Seminar: "Bipartite Matching and Van Der Waerden Conjectures"
EMANUELE CAGLIOTI, *University of Rome I*

Computer Science/Discrete Math Seminar I: "From Minicript to Cryptomania: Relationships among the Fundamental Cryptographic Primitives"
TAL MALKIN, *AT & T Labs - Research*

Computer Science/Discrete Math Seminar II: "The Hardness of 3-Uniform Hypergraph Coloring"
IRIT DINUR, *Institute for Advanced Study*,
ODED REGEV, *Institute for Advanced Study* and
CLIFFORD SMYTH, *Institute for Advanced Study*

Statistical Mechanics Seminar: "Equality of Bulk and Edge Hall Conductance Revisited"
GIAN MICHELE GRAF, *Eidgenössische Technische Hochschule Zurich*

Symplectic Geometry/Holomorphic Curves Seminar:
"Gromov-Witten Theory of CP1 (Continuation of Minicourse)"
RAHUL PANDHARIPANDE, *Princeton University*

Mathematical Problems in Biology Seminar: "Architecture and Dynamics of the Primary Visual Cortex"
DAVID MCLAUGHLIN, *Courant Institute of Mathematical Sciences*

May 13

Computer Science/Discrete Math Seminar I:
"The Correlation Between Parity and Quadratic Polynomials Mod 3"
FREDERIC GREEN, *Clark University* and *Centrum voor Wiskunde en Informatica, The Netherlands*

Members Seminar: "Algebraic Maps and Algebraic Cycles"
MARK de CATALDO, *Institute for Advanced Study* and *State University of New York, Stony Brook*

May 14

Computer Science/Discrete Math Seminar II:
"Quantum Communication Complexity of Symmetric Predicates"
ALEXANDER RAZBOROV, *Institute for Advanced Study*

May 15

Statistical Mechanics Seminar: "The Uphill Turtle Race; Short Time Behavior of Nucleation Probabilities"
HENK van BEIJEREN, *Utrecht University, Holland*

Statistical Mechanics Seminar: "Perturbative Analysis of Dynamical Localization"
JOAO BARATA, *University of São Paula, Brazil*

May 17

Symplectic Geometry/Holomorphic Curves Seminar:
"Gromov-Witten Theory of CP1 (Continuation of Minicourse)"
RAHUL PANDHARIPANDE, *Princeton University*

Jun

Computer Science/Discrete Math Seminar I:
"Polynomial Approximations and Quantum Lower Bounds"
YAOYUN SHI, *California Institute of Technology*

Jun

Computer Science/Discrete Math Seminar I:
"Approximate Pattern Matching – The Hamming Distance Case"
AMIR AMIHOOD, *AT & T Labs - Research*

"As a whole, the environment for research here has been outstanding. The broad coverage of many areas of expertise has been very fruitful, providing both valuable perspective and ideas for future directions for research."

— Member, School of Natural Sciences

Members of the 2002 Organizing Committee for the Prospects in Theoretical Physics Program (from left) Chiara Nappi, Professor of Physics, Princeton University; Juan Maldacena, School of Natural Sciences Faculty; Institute Members Leopoldo Pando Zayas (University of Michigan, Ann Arbor) and Sunil Mukhi (Tata Institute); and Louise A. Dolan, Professor of Physics, University of North Carolina at Chapel Hill. Missing from photograph are Curtis Callan, Professor of Physics, Princeton University, and Alfred Shapere, Professor of Physics, University of Kentucky

THE SCHOOL OF NATURAL SCIENCES

Faculty

STEPHEN L. ADLER, Particle Physics
New Jersey Albert Einstein Professor

JOHN N. BAHCALL, Astrophysics
Richard Black Professor

PIET HUT, Astrophysics

JUAN MALDACENA, Theoretical Physics *(as of 1-1-02)*

NATHAN SEIBERG, Theoretical Physics

EDWARD WITTEN, Mathematical Physics
Charles Simonyi Professor

Professor Emeritus

FREEMAN J. DYSON, Mathematical Physics and Astrophysics

Visiting Long-Term Professor

PAWAN KUMAR, Astrophysics *1*

Visiting Assistant Professor

MATIAS ZALDARRIAGA, Astrophysics

ACADEMIC ACTIVITIES

Part of PROFESSOR STEPHEN ADLER's work this year dealt with supersymmetric grand unified theories, focusing on the issue of family unification. The other part continued his research on fundamentals of quantum mechanics, in particular his work on stochastic phenomenological modifications of the Schrödinger equation, and on trace dynamics as a possible pre-quantum mechanics.

In grand unified theories, Professor Adler wrote a paper reexamining the question of whether E_8 supersymmetric Yang-Mills might serve as a family unification theory. He gave a mini-review of earlier work in this area, and argued that recent theoretical results of Kovner and Shifman on the condensate structure of supersymmetric Yang-Mills theories, together with recent experimental fits to precision electroweak data, leave open the possibility that an E_8 theory with three mirror families could still be a viable theory. Such a theory would have vectors as the superpartners of the quarks and leptons, rather than scalars as in the MSSM, and so would have a characteristic experimental signature at the LHC. Next year, Professor Adler plans to spend more time on phenomenology, and in particular plans to further investigate the viability of E_8, by studying possible dynamical symmetry breaking schemes when the supergravity induced potential that he calculated last year is added to the basic supersymmetric Yang-Mills action.

In fundamentals of quantum mechanics, Professor Adler wrote several papers. One, completed last summer with Brody, Brun, and Hughston, shows that martingale models for

state vector reduction, as exemplified by the energy driven stochastic Schrödinger equation, lead automatically to the general Lüders projection postulate when the eigenvalue spectrum is degenerate. A second studies environmental influences on the measurement process in stochastic reduction models. It develops a theoretical apparatus for discussing the weak coupling of a system to an environment in the context of stochastic Schrödinger equations. Applied to a simple accretion model, it shows that macroscopically distinguishable measurement outcomes for experiments within the solar system (and even within the galaxy) always differ sufficiently in mass for state vector reduction, in the energy driven model, to be rapidly driven to completion. It also shows that all experiments to date in which coherence is maintained in many particle systems, such as recent superconductive tunneling experiments, give the result expected from the stochastic reduction models, because the energy variances involved in these experiments are very small. A third paper by Professor Adler expands a discussion of decoherence in his paper on environmental influences to argue that recent claims by various authors that decoherence solves the measurement problem are erroneous.

Professor Adler is currently working on a long article (or perhaps a small book) summarizing and extending work by him and various collaborators, on the possibility that the statistical mechanics of matrix models with a global unitary invariance can serve as a pre-quantum mechanics. This work in progress incorporates a number of important advances made by Professor Adler last spring, and also in the course of the current writing project. A first draft should be completed in about a month and will be posted on the Archive and given to a number of people interested in this project for comments. A revised draft will then be used as the basis for lectures next academic year, with the aim of submitting a final version for publication next year.

PROFESSOR JOHN BAHCALL focused on research related to solar neutrinos. During the summer of 2001, Bahcall derived a linear constraint on the different solar neutrino fluxes; this constraint is implied by the fact the Sun derives its energy from nuclear fusion among light elements. He applied this constraint, together with the results of all the available solar neutrino experiments, to show that – without new particle physics – one cannot fit the observed solar neutrino rates.

During the remainder of the academic year, Bahcall collaborated with Concha Gonzalez-Garcia and Carlos Penya of CERN in a series of papers that evaluated the potential of new solar neutrino experiments to define neutrino oscillation parameters. Bahcall, working with V. Barger (Wisconsin) and D. Marfati (Boston University) also wrote a short paper showing that reactor and solar neutrino experiments can together test in the neutrino sector the symmetry CPT with precision.

In April 2002, the Sudbury Neutrino Observatory (SNO) international collaboration announced the first direct measurement of the total flux of high energy neutrinos from the Sun. This result confirmed their previous inference for the total flux, which was based upon a comparison of measurements made with the SNO neutrino detector in Canada and a different neutrino detector in Japan. The results of the direct measurement of the neutrino flux are in good agreement with the results predicted from solar model calculations made during the past four decades by Bahcall, M. Pinsonneault (Ohio State), and R. Ulrich (UCLA) and other collaborators.

PROFESSOR PIET HUT's main research interests lie in the field of stellar dynamics. In order to stimulate the development of hardware, software, and dynamics applications to protect the earth from natural disasters, he co-chaired a meeting on each of those three topics.

He organized Symposium 208 of the International Astronomical Union on Astrophysical Supercomputing Using Particle Simulations, at Tokyo in July 2001, together with Jun Makino from Tokyo University. At this time they unveiled the last product in their project to construct special-purpose computers for stellar dynamics: the GRAPE-6 which won the world speed record in November 2001, at more than 11 Teraflops.

Professor Hut organized a workshop on Integrating Stellar Evolution and Stellar Dynamics, at the American Museum of Natural History in New York in June 2002, together with Michael Shara, chair of the astrophysics department of the Museum. This was the first meeting dedicated to the development of software for large-scale simulations of star clusters, incorporating stellar evolution codes embedded in a stellar dynamics environment. The interdisciplinary character of the workshop was reflected in the range of participants, from specialists in stellar evolution and dynamics to experts in visualization and artificial intelligence.

Together with astronaut and astrophysicist Ed Lu, Professor Hut organized a workshop on Deflecting Asteroids, at the NASA Johnson Space Center in Houston, Texas. They explored the possibility of sending a plasma engine, powered by a nuclear reactor, to an asteroid in order to test the ability to alter the orbit of that asteroid. Following this workshop, they started a follow-up project called B612, after the name of the small asteroid on which the Little Prince lived (from the novel 'Le Petit Prince' by Antoine de St. Exupery).

In addition, Professor Hut continued his activities in interdisciplinary studies. He organized a summer school, titled 'Ways of Knowing,' at Amherst College as the fourth public offering of the Kira Institute, of which he is one of the founders. He gave the inaugural lecture for a colloquium on Science and Philosophy, organized under the joint sponsorship of the Philosophy and Physics departments at Seattle University. The title of his lecture was: "Six ways to view the world: looking through windows from science, phenomenology, and non-duality." He is currently working on a book, tentatively called *Degrees of Freedom*, in which he plans to develop these ideas further. Professor Hut was elected as a member of the advisory board of the Danish National Research Foundation's new Centre for Subjectivity Research.

During the period 2001, PROFESSOR PAWAN KUMAR spent a good fraction of his time trying to understand gamma-ray bursts (GRBs). GRBs are detected at an average rate of once a day and are known to be located at distances of several billion light years. A good fraction of the energy in the explosion seems to be radiated away in gamma-rays in a short duration of a few seconds. However, we continue to receive emission from these events for days to months; this is known as the afterglow emission. At early times, for an hour or so after the burst, much of the radiation is in the x-ray, and subsequently the emission shifts to smaller frequencies -- optical, infrared and radio bands. A number of things have been learned by Kumar and Panaitescu (of Princeton University) about these explosions by modeling the observed broad-band afterglow emission. For instance, there is now increasing evidence that the energy release in these events is comparable to

the energy output of another class of explosions familiar to astronomers called supernovae. Thus, the energy output in a few seconds in a GRB is comparable to, or greater than, the total energy radiated by the Sun over its 4.6 billion year life. Moreover, the energy output does not seem to vary much from one burst to another. This result has been obtained for a small sample of about 20 GRBs. If this is confirmed for a larger sample of bursts, it will provide a very important clue to our understanding of these enigmatic explosions. We are also beginning to explore the property of the medium in the immediate vicinity of these explosions from the afterglow observations. This should provide another important constraint on the nature of these explosion.

In the past academic year, PROFESSOR JUAN MALDACENA, in collaboration with N. Seiberg and G. Moore, has done research on some aspects of D-branes on curved spaces and group manifolds. D-branes are interesting solitons of string theory and their study has produced many interesting results in string theory. Most of these studies have concentrated on the properties of D-branes in flat or weakly curved spaces. Maldacena, Seiberg, and Moore's work concentrated on D-branes on strongly curved spaces, which are spacetimes where the stringy aspects are important. They studied some examples where one could compute exactly several aspects of D-branes, and concluded that despite the strongly curved nature of the geometry one could still obtain a geometric interpretation for these D-branes.

Maldacena's research then concentrated on the study of strings on three dimensional anti-de-Sitter space. This is a particularly interesting case since the time direction appears in a non-trivial manner in the space-time metric. There were several puzzles in connection with this problem which were resolved in a series of papers that H. Ooguri and Maldacena wrote. In the last academic year, Maldacena wrote the third paper in this series which explained in detail how one should compute and interpret quantities in this string theory. There were several aspects that were novel and different from the flat space case.

Maldacena has also studied black holes from the point of view of the ADS/CFT correspondence. He has given the field theory interpretation of several black hole space-times including the region behind the horizon. Maldacena has also pointed out the existence of a mechanism that gives rise to long time correlations in the gravity background which has the right magnitude to explain why information is not lost when an objects falls into a black hole.

More recently, in collaboration with H. Nastase and D. Berenstein, Maldacena has been studying a limit of the ADS/CFT correspondence which is particularly simple and tractable. In this limit one can compute in a simple way the string spectrum in the string theory side and one can extrapolate a weak coupling computation from the field theory side to the string theory case. This explains in a rather explicit way how strings can arise from a four dimensional field theory.

During this period PROFESSOR NATHAN SEIBERG's work had two themes. He studied D-branes and time dependent backgrounds in string theory.

In collaboration with J. Maldacena and G. Moore he showed that one can construct D-branes in parafermionic and WZW theories (and their orbifolds) which have very natural geometrical interpretations, and yet are not automatically included in the standard Cardy construction of D-branes in rational conformal field theory. The relation between these theories and their T-dual description has led to an analogy between these D-branes and the familiar A-branes and B-branes of $N = 2$ theories.

In another paper with J. Maldacena and G. Moore he discussed some physical issues related to the K-theoretic classification of D-brane charges, putting an emphasis on the role of D-brane instantons. The analysis provided a physical interpretation to the mathematical algorithm for computing K-theory known as the "Atiyah-Hirzebruch spectral sequence." Conjecturally, a formulation in terms of D-instantons leads to a computationally useful formulation of K-homology in general. As an application and illustration of this viewpoint some issues connected with D-brane charges associated with branes in WZW models where considered. The special case of $SU(3)$ was analyzed in detail.

In a third paper with these authors the discrete $\mathbf{Z}_k$ D-brane charges (twisted K-theory charges) in five-brane backgrounds was discussed from several different points of view. In particular, it was interpreted as a result of a standard Higgs mechanism. Certain degrees of freedom (singletons) on the boundary of space were shown to extend the corresponding $\mathbf{Z}_k$ symmetry to $U(1)$. Related ideas clarified the role of AdS singletons in the AdS/CFT correspondence.

The second theme of Seiberg's work circled around the topic of time dependence background in string theory.

Together with J. Khoury, B. A. Ovrut, P. J. Steinhardt, and N. Turok, a transition from a contracting big crunch to an expanding big bang universe was proposed. A possible example is 11-dimensional M-theory in which the eleventh dimension collapses, bounces, and re-expands. This possibility opens the door to new classes of cosmological models. For example, it suggests a major simplification and modification of the recently proposed ekpyrotic scenario.

A detailed string analysis of such a scenario was studied with H. Liu and G. Moore. There a string theory in a time dependent orbifold with a null singularity was examined. The singularity separates a contracting universe from an expanding universe, thus constituting a big crunch followed by a big bang. The theory was quantized both in lightcone gauge and covariantly, and tree and one loop amplitudes were examined. The results are compatible with the possibility that strings can pass through the singularity from the contracting to the expanding universe, but they also indicate the need for further study.

PROFESSOR EDWARD WITTEN during the 2001-02 academic year continued his work on compactification of M-theory on a manifold of G_2 holonomy, exploring how to obtain chiral fermions in this context and thus to make semi-realistic models of particle physics. He studied possibilities in this framework for solving the gauge hierarchy problem and getting a sufficiently long proton lifetime, and possible connections with gauge-mediation of supersymmetry breaking at experimentally accessible energies.

He also analyzed an enlarged class of boundary conditions in the AdS/CFT correspondence, and has become interested in the computation of fluctuations in the inflationary universe.

PROFESSOR EMERITUS FREEMAN DYSON spent much of the year giving lectures and attending meetings away from Princeton. As a visitor to the NASA Jet Propulsion Laboratory in California, he proposed a new method of searching for extraterrestrial life in the outer regions of the solar system. It remains to be seen whether this proposal will

find any practical application. In Princeton, Dyson served as chairman of the oversight committee, helping to organize the Science and Ultimate Reality Symposium held in March 2002 to honor John Wheeler on the occasion of his ninetieth birthday. The symposium was a gathering of scientists, many of them students of Wheeler or students of students to the fourth and fifth generations, most of them working in areas of physics where Wheeler was a pioneer. Wheeler himself came to the sessions and enjoyed the spectacle of so many young people exploring the questions that he first raised.

MEMBERS AND VISITORS

ANTHONY AGUIRRE
Astrophysics
Institute for Advanced Study

JEEVA ANANDAN
Particle Physics
University of South Carolina · *v*

DAVID BERENSTEIN
Particle Physics
University of Illinois, Urbana-Champaign

GYAN BHANOT
Computational Physics
IBM Research · *vs*

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

TODD BRUN
Quantum Theory
Institute for Advanced Study

SERGEY CHERKIS
Particle Physics
University of California, Los Angeles

HOOMAN DAVOUDIASL
Particle Physics
Stanford University

ROBBERT DIJKGRAAF
Particle Physics
University of Amsterdam · *v*

RUTH DURRER
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Université de Genève · *f*

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Institute for Advanced Study

ALEXANDER FRIEDLAND
Neutrino Astrophysics
Institute for Advanced Study

SCOTT GAUDI
Astrophysics
Institute for Advanced Study

ERIC GIMON
Mathematical and Particle Physics
Institute for Advanced Study

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Particle Physics
Harvard University

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The Hebrew University of Jerusalem

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King's College London · *v*

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University of California, Santa Barbara · *fm*

BARAK KOL
Mathematical and Particle Physics
Institute for Advanced Study

f First Term · *s* Second Term · *v* Visitor · *m* Long Term Member

ARTHUR KOSOWSKY
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University of Pennsylvania · *f*

CECILIA LUNARDINI
Neutrino Astrophysics
Scuola Internazionale Superiore di Studi Avanzati, Italy

VIATCHESLAV MUKHANOV
Astroparticle Physics and Cosmology
University of Munich · *s*

SUNIL MUKHI
Particle Physics
Tata Institute of Fundamental Research, India

RAMESH NARAYAN
Astrophysics
Harvard University · *f*

HORATIU NASTASE
Particle Physics
Institute for Advanced Study

LEOPOLDO PANDO ZAYAS
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Queen Mary and Westfield College · *v*

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JOOP SCHAYE
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Institute for Advanced Study

PAUL SCHECHTER
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SARA SEAGER
Astrophysics
Institute for Advanced Study · *m*

SAVDEEP SETHI
Particle Physics
University of Chicago · *s*

JACOB SONNENSCHEIN
Particle Physics
Tel Aviv University

MATTHEW STRASSLER
Particle Physics
University of Pennsylvania · *s*

CLAUDIO TEITELBOIM
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Centro de Estudios Científicos, Chile · *dvm*

CHARLES THORN
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University of Florida · *s*

MAXIM TSYPIN
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Rutgers University, Piscataway

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Astrophysics
Ohio State University · *f*

REN-JIE ZHANG
Particle Physics
Institute for Advanced Study

dv Director's Visitor · *f* First Term · *s* Second Term
v Visitor · *m* Long Term Member

THE SCHOOL OF NATURAL SCIENCES

RECORD OF EVENTS

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

September 10

Astrophysics Seminar: "Reionization of the Universe"
TOM THEUNS, *Institute of Astronomy*

September 25

Astrophysics Talk: "MAPmaking"
LYMAN PAGE, *Princeton University*

October 2

Astrophysics Seminar: "CMB Anisotropies: A Window to the Early Universe"
RUTH DURRER, *Institute for Advanced Study* and *Geneva University*

October 9

High Energy Theory Lunchtime Seminar: "Strings in AdS_3 and the SL(2,R) WZW Model"
JUAN MALDACENA, *Institute for Advanced Study*

October 16

Astrophysics Talk: "z ~ 6 Quasars from SDSS: Probing the Reionization Epoch"
XIAO HUI FAN, *Institute for Advanced Study*

High Energy Theory Special Seminar: "Localized Tachyons"
JEFF HARVEY, *University of Chicago*

October 23

Astrophysics Seminar: "Supernova Neutrinos: Earth Matter Effects and Neutrino Mass Spectrum"
CECILIA LUNARDINI, *Institute for Advanced Study*

October 30

High Energy Theory Seminar: "Soft Strings and the Hard Heart of Gauge Theory"
MATT STRASSLER, *University of Pennsylvania*

November 9

Astrophysics Talk: "What Can We Learn from Galaxy Clustering?"
DAVID WEINBERG, *Institute for Advanced Study* and *Ohio State University*

November 13

Astrophysics Seminar: "Angular Momentum in Dark Halos and Galaxies"
JAMES BULLOCK, *Ohio State University*

November 20

High Energy Theory Lunchtime Seminar: "On Heterotic Orbifolds, M Theory and Type I′ Brane Engineering"
JACOB SONNENSCHEIN, *Institute for Advanced Study* and *Tel Aviv University*

November 27

Astrophysics Talk: "Cosmological Implications of the Highest Redshift Supernova (Known)"
ADAM RIESS, *Space Telescope Science Institute*

December 4

Astrophysics Seminar: "Hot Accretion Onto Rapidly Spinning Compact Objects"
MIKHAIL MEDVEDEV, *Canadian Institute for Theoretical Astrophysics*

December 7

High Energy Theory Seminar: "Chiral Four-Dimensional Supersymmetric Orientifolds from Intersecting D6-Branes"
GARY SHIU, *University of Pennsylvania*

December 14

Astrophysics Seminar: "Unidentified Gamma-Ray Sources"
DIEGO TORRES, *Princeton University*

December 17

High Energy Theory Afternoon Seminar: "From Big Crunch to Big Bang"
NATHAN SEIBERG, *Institute for Advanced Study*

December 30

Astrophysics Talk: "Dim Galactic Nuclei"
RAMESH NARAYAN, Harvard University

Astrophysics Seminar: "Detection of CDM Substructure"
NEAL DALAL, *University of California, San Diego*

Astrophysics Talk: "CMB Polarization, the Next Frontier"
MATIAS ZALDARRIAGA, *Institute for Advanced Study* and *New York University*

Astrophysics Seminar: "Hurricanes on Neutron Stars: Extreme Weather During Type I X-Ray Bursts"
ANATOLY SPITKOVSKY, *University of California, Berkeley*

High Energy Theory Lunchtime Seminar: "The dS/CFT Correspondence and Inflation"
ANDREW STROMINGER, *Harvard University*

Astrophysics Talk: "Limits on Neutron Star Cooling from Chandra Observations of 3C58"
PAT SLANE, *Harvard-Smithsonian CfA*

Astrophysics Talk: "A Search for Extrasolar Planets"
SARA SEAGER, *Institute for Advanced Study*

Astrophysics Talk: "Destruction of Stellar and Dark Matter Cusps"
MILOS MILOSAVLJEVIC, *Rutgers University*

Astrophysics Talk: "The Impact of Extra Relativistic Particles on Anisotropies"
ROBERTO TROTTA, *Universite de Geneve*

High Energy Theory Seminar: "Derivative Corrections from Noncommutativity"
SUNIL MUKHI, *Institute for Advanced Study* and *Tata Institute of Fundamental Research*

High Energy Theory Seminar: "D-Branes on Singularities: Resolutions by Matrices"
DAVID BERENSTEIN, *Institute for Advanced Study*

Astrophysics Talk: "Internal Dynamics of Dwarf Elliptical Galaxies"
MARLA GEHA, *University of California, Santa Cruz*

High Energy Theory Seminar: "Status of CP Violation"
FRED GILMAN, *Carnegie Mellon University*

High Energy Theory Seminar: "The Muon Anomalous Magnetic Moment: Theory vs. Experiment"
BILL MARCIANO, *Brookhaven National Laboratory*

Astrophysics Talk: "Determination of Physical Parameters for GRBs"
PAWAN KUMAR, *Institute for Advanced Study*

Astrophysics Talk: "Gap Formation in Gaseous and Planetesimal Disks"
ROMAN RAFIKOV, *Princeton University*

Astrophysics Discussion Group
"General Theory and Applications I"

High Energy Theory Lunchtime Seminar: "Observables of String Field Theory"
AKIKAZU HASHIMOTO, *Institute for Advanced Study*

Astrophysics Talk: "Protoneutron Star Winds: Implications for r-Process Nucleosynthesis"
TODD THOMPSON, *University of Arizona*

Astrophysics Discussion Group
"General Theory and Applications II"

High Energy Theory Seminar: "Geometric Transitions and N=1 Dualities"
FREDDY CACHAZO, *Harvard University*

Astrophysics Talk: "The Bias of Galaxies and the Density of the Universe from the 2dFGRS"
LICIA VERDE, *Rutgers University* and *Princeton University*

Astrophysics Discussion Group
"Strong Lensing"

Astrophysics Talk: "Neutrino Astronomy from Distant Sources"
ELI WAXMAN, *Weizmann Institute of Science*

Astrophysics Early Universe Seminar: Discussion of L. Smolin, "A Quantum Leap for Cosmology" and M. Bojowald, "Dynamical Initial Conditions in Quantum Cosmology"

Astrophysics Discussion Group: "Quasar Microlensing"

High Energy Theory Seminar: "Covariant Quantization of the Supermembrane"
NATHAN BERKOVITS, *Universidade Estadual Paulista, Brazil*

Astrophysics Seminar: "Steady State Eternal Inflation"
ANTHONY AGUIRRE, *Institute for Advanced Study*

Astrophysics Early Universe Seminar: Discussion of G. Amelio-Camelia, et al., "Tests of Quantum Gravity from Observations of Gamma-Ray Bursts"

Astrophysics Discussion Group: "Microlensing in the Local Group"

High Energy Theory Seminar: "Topological D-Branes, Holomorphic Potentials and Extended Moduli Spaces"
CALIN LAZAROIU, *State University of New York, Stony Brook*

Astrophysics Talk: "The Hubble Constant and Other Cosmological Parameters"
WENDY FREEDMAN, *Carnegie Institute of Washington*

Astrophysics Seminar: "Millisecond Oscillations in Thermonuclear X-Ray Bursts"
MIKE MUNO, *Massachusetts Institute of Technology*

Astrophysics Early Universe Seminar: Discussion of D. Spergal and P.J. Steinhardt, "Observational Evidence for Self-Interacting Cold Dark Matter"

Astrophysics Discussion Group: "Weak Lensing"

High Energy Theory Lunchtime Seminar: "A World Sheet Description of Large N(C) Quantum Field Theory"
CHARLES THORN, *Institute for Advanced Study* and *University of Florida*

Astrophysics Talk: "Iron Lines from AGN"
ANDY FABIAN, *Institute of Astronomy, University of Cambridge*

High Energy Theory Special Seminar: "Strings in Flat Space and PP Waves from N=4 Super Yang Mills"
JUAN MALDACENA, *Institute for Advanced Study*

Astrophysics Discussion Group: "Compact Objects and Strong-Field Lensing"

High Energy Theory Seminar: "AdS/CFT and the Black Hole Information Paradox"
SAMIR MATHUR, *The Ohio State University, Columbus*

Astrophysics Talk: "Cluster Surveys and More: The Future of SZ"
GIL HOLDER, *Institute for Advanced Study*

Astrophysics Discussion Group: "Determination of H0"

High Energy Theory Lunchtime Seminar: "Constraints on Large Extra Dimensions from Neutrino Oscillation Experiments"
HOOMAN DAVOUDIASL, *Institute for Advanced Study*

Astrophysics Talk: "Dark-Energy Models with Multiple Scalar Fields"
MARC KAMIONKOWSKI, *California Institute of Technology*

Astrophysics Talk: "Lenslets and Lenses with the Baade (Magellan 1) Telescope"
PAUL SCHECHTER, *Institute for Advanced Study* and *Massachusetts Institute of Technology*

March 6
Astrophysics Seminar: "Star Formation Thresholds and Galaxy Edges, Why and Where"
JOOP SCHAYE, *Institute for Advanced Study*

March 7
Astrophysics Discussion Group: "Dark Matter in the Milky Way"

March 8
High Energy Theory Lunchtime Seminar: "Domain Walls in CFT and Holography"
ROBBERT DIJKGRAAF, *Institute for Advanced Study* and *University of Amsterdam*

March 11
High Energy Theory Seminar: "Affine Quantum Gravity: Principles, Progress and Promise"
JOHN R. KLAUDER, *University of Florida*

March 12
Astrophysics Talk: "Origin and Evolution of Extra-solar Planetary Systems"
PETER GOLDREICH, *California Institute of Technology*

March 14
Astrophysics Discussion Group: "Problems with CDM"

Astrophysics Early Universe Seminar: Discussion of G. Dvali, G. Gabadadze, and M. Shifman, "Diluting Cosmological Constant in Infinite Volume Extra Dimensions" and E. Witten, "The Cosmological Constant from the Viewpoint of String Theory"

March 18
High Energy Theory Seminar: "Signatures of Short Distance Physics in the Cosmic Microwave Background"
ALBION LAWRENCE, *Stanford University*

March 19
Astrophysics Talk:"Astrophysical Probes of Strong-Field Gravity"
DIMITRIOS PSALTIS, *Institute for Advanced Study*

March 20
Astrophysics Seminar: "The Large Area Lyman Alpha Survey"
JAMES ROADS, *Space Telescope Science Institute*

March 21
Astrophysics Discussion Group: "Alternatives to CDM"

March 22
High Energy Theory Lunchtime Seminar: "Hyper-kahler Metrics on Elliptically Fibered Complex Surfaces"
SERGEY CHERKIS, *Institute for Advanced Study*

March 26
Astrophysics Talk: "Resonances, Multiplicity, and Eccentricities"
GEOFF MARCY, *University of California, Berkeley*

March 28
Astrophysics Discussion Group: "Alternatives to CDM II"

April 1
High Energy Theory Seminar: "A Departure from Prediction: Measurement of Electroweak Parameters at NuTeV"
KEVIN McFARLAND, *University of Rochester*

April 2
Astrophysics Talk: "GALEX: The Galaxy Evolution Explorer"
CHRIS MARTIN, *California Institute of Technology*

High Energy Theory Special Seminar: "Quantum Liouville Theory vs. Quantized Teichmueller Spaces"
JOERG TESCHNER, *Freie University Berlin*

April 3
Astrophysics Seminar: "The CORALS Survey for High Redshift Damped Lyman Alpha Systems - Gas Content, Clustering and Chemical Abundances"
SARA ELLISON, *European Southern Observatory*

April 4
Astrophysics Discussion Group: "Dark Matter in Clusters"

April 5
High Energy Theory Lunchtime Seminar: "Strings on a Time Dependent Orbifold"
NATHAN SEIBERG, *Institute for Advanced Study*

April 9
Astrophysics Talk: "Anomalous X-Ray Pulsars"
VICKI KASPI, *McGill University* and *Massachusetts Institute of Technology*

April 11
Astrophysics Seminar: "The Main Belt Structure as Traced by 60,000 Asteroids Observed by SDSS"
ZELJKO IVEZIC, *Princeton University*

High Energy Theory Seminar: "Mirror Symmetry, Superpotentials and Large N Dualities"
MINA AGANAGIC, *Harvard University*

Astrophysics Talk: "Science Opportunities with SIRTF, NASA's Infrared Great Observatory"
TOM SOIFER, SIRTF, *California Institute of Technology*

Astrophysics Seminar: "Microlensing Searches for Extrasolar Planets"
SCOTT GAUDI, *Institute for Advanced Study*

Astrophysics Discussion Group: "Dark Matter in Clusters (continued)"

High Energy Theory Lunchtime Seminar: "World-sheet Descriptions of Wrapped NS Five Branes"
KENTARO HORI, *Institute for Advanced Study*

Astrophysics Early Universe Seminar: Discussion of J.R. Bond, "Cosmic Microwave Background Overview"

Astrophysics Talk: "Probing Dark Energy with the DEEP2 Redshift Survey of Galaxies"
MARC DAVIS, *University of California, Berkeley*

Astrophysics Seminar: "Fixed-Delay Interferometry for Planet Detection and Cosmic Chemical Abundance Study"
JIAN GE, *Pennsylvania State University*

High Energy Theory Seminar: "Lattice QCD and Quark Masses and Mixings"
PAUL MACKENZIE, *Fermilab*

Astrophysics Talk: "Black Holes in the Centers of Nearby Galaxies"
SCOTT TREMAINE, *Princeton University*

Astrophysics Seminar: "Intermediate Mass Black Holes"
COLE MILLER, *University of Maryland*

Astrophysics Discussion Group: "Dark Matter in LSS"

High Energy Theory Lunchtime Seminar: "The 11th Dimension of Heterotic Orbifolds"
VADIM KAPLUNOVSKY, *University of Texas*

Astrophysics Talk: "Accretion onto Black Holes in Normal Galaxies"
ELIOT QUATAERT, *University of California, Berkeley*

Astrophysics Seminar: "Off-Axis Afterglow Emission from Jetted Gamma-Ray Bursts"
JONATHAN GRANOT, *Institute for Advanced Study*

High Energy Theory Seminar: "Worldsheet Derivation of a Large N Duality"
CUMRUN VAFA, *Harvard University*

Astrophysics Seminar: "The Fueling and Duty Cycle of Low-Luminosity AGN"
PAUL MARTINI, *Observatories of the Carnegie Institution of Washington*

High Energy Theory Lunchtime Seminar: "Twisting E8 Five-Branes"
SAVDEEP SETHI, *Institute for Advanced Study* and *University of Chicago*

Astrophysics Seminar: "Observations of the Warm-Hot IGM at $z\sim2.5$"
ROB SIMCOE, *California Institute of Technology*

High Energy Theory Informal Seminar: "A Mean Field Approximation to the Worldsheet Model of Planar Ø3 Theory"
CHARLES THORN, *University of Florida*

High Energy Theory Informal Seminar: "Topology Change in General Relativity"
BARAK KOL, *Institute for Advanced Study*

Astrophysics Seminar: "Markov Chain Monte Carlo Parameter Estimation for Beginners (and Intermediates)"
GIL HOLDER, *Institute for Advanced Study*

"The Institute has mastered the art of providing simply and well for the range of academic and domestic needs of its visiting members. In addition to all that I was able to accomplish here, I leave with a sense of how academic institutions could and should be run — a model for other places."

— Member, School of Social Science

School of Social Science Faculty members (from left) Eric Maskin; Clifford Geertz, Professor Emeritus; Joan Wallach Scott; Albert O. Hirschman, Professor Emeritus; and Michael Walzer

THE SCHOOL OF SOCIAL SCIENCE

Faculty

ERIC S. MASKIN, *Albert O. Hirschman Professor*
JOAN WALLACH SCOTT, *Harold F. Linder Professor*
MICHAEL WALZER, *IAS Foundation Professor*

Professors Emeriti

ALBERT O. HIRSCHMAN
CLIFFORD GEERTZ

Visiting Associate Professor

ADAM ASHFORTH

ACADEMIC ACTIVITIES

Seventeen scholars from the United States and abroad were invited to be part of the School's scholarly community as members and visitors for the 2001-02 academic year, from a pool of 132 individuals who applied for membership. Three visitors and one research assistant also participated in the year's activities. One fellow was funded with a Burkhardt Fellowship through the ACLS, the National Endowment for the Humanities partially or fully funded three fellows, one fellow was designated the Richard B. Fisher Member, and two fellows were named to Deutsche Bank Memberships. Fields of inquiry of the group included anthropology, three; economics, six; English, one; history, two; literature, two; philosophy, two; political science, three; psychology, one; and sociology, one.

The theme during 2001-02 was ethics in business and economics. Faculty and visiting members explored the following sorts of questions: income inequality and distributive justice, the ecological responsibility of business, and the norms of trustworthy behavior that sustain complex trading arrangements.

VISITING ASSOCIATE PROFESSOR ADAM ASHFORTH presented lectures at Princeton University in the Woodrow Wilson School and the Anthropology Department, at Columbia University, and at the University of the Witwatersrand examining the AIDS epidemic in Africa and the political implications of the disease being interpreted as witchcraft for the future of democracy in South Africa. He published three articles relating to the problem of AIDS and witchcraft - 'Quand le sida est sorcellerie. Un défi pour la démocratie sud-africaine' (Critique Internationale, Paris, n°14), 'An Epidemic of Witchcraft? On the Implications of AIDS for the Post-Apartheid State' (African Studies Vol. 61;1), and 'On Living in a World With Witches: Everyday Epistemology and Spiritual Insecurity in a Modern African City' (in *Modernity, Witchcraft and the Occult in Postcolonial Africa*, eds Henrietta Moore and Todd Sanders) - while working on a book exploring the political dimensions of spiritual insecurity in contemporary Africa. He also

began work with researchers from Princeton University on a research project funded by the National Institutes of Health entitled 'Poverty, Inequality and Health in Economic Development' (NIH Grant R01 AG20275-01) studying health, economic wellbeing, and community relations in South Africa.

PROFESSOR EMERITUS CLIFFORD GEERTZ gave public lectures at The Einstein Forum in Berlin, and at Columbia University (Franz Boaz lecture), as well as speaking at a number of seminars and conferences. In March, he was awarded the Bintang Jasa Utama by the Indonesian government for his scholarly work on that country.

Throughout the year, PROFESSOR EMERITUS ALBERT O. HIRSCHMAN participated in various conferences on Latin American economic and political developments.

In March 2002, the European University Institute in Florence, Italy invited Professor Hirschman to travel to Florence in October 2002 to receive an honoris causa doctoral degree. The Institute has decided, in celebration of the twenty-fifth anniversary of its creation, to award honoris causa degrees to three academics of international reputation. Professor Hirschman will receive a degree, in addition to the sociologist Renate Mayntz of Cologne, Germany, and the economist Jacques Drèze of Louvain-La-Neuve, Belgium. Professor Hirschman will travel to Florence accompanied by his wife, his daughter who lives in Paris, and by his sister, who lives in Rome, to attend the ceremony, which is to take place on October 4, 2002.

The paperback edition of Professor Hirschman's *Crossing Boundaries* was published by Zone Books in 2001 (the original hardback edition was published in 1998). Furthermore, the year 2002 marked the twentieth anniversary of the publication of Professor Hirschman's *Shifting Involvements*, and a twentieth anniversary edition, including a foreword by Cornell University Professor of Economics Robert H. Frank, was published by Princeton University Press in January 2002.

Several translations of Professor Hirschman's works were also published during the year. His book *The Rhetoric of Reaction* was published again in Spanish under the title, *Retóricas de la intransigencia*, by Fondo de Cultura Económica of Mexico (first printing in Spanish by this publisher was in 1991). Additionally, *Exit, Voice and Loyalty* was published in Chinese (simplified characters) by The Economic Science Press of Beijing, and a new French edition of *The Passions and the Interests* was published by Presses Universitaires de France. Professor Hirschman was likewise notified of a Greek edition of *The Passions and Interests*, to be published by Editions Paratiritis in June 2002; a Chinese edition (simplified characters) of *The Passions and the Interests*, to be published by Shanghai Literature and Art Publishing House of Shanghai, China in mid to late 2002; a Greek edition of *Exit, Voice and Loyalty* to be published by Papazisis Publishers of Athens, Greece in July 2002; and a Chinese (complex characters) edition of *The Rhetoric of Reaction*, to be published by The Journalist of Taiwan in 2002.

In July 2001, PROFESSOR ERIC MASKIN gave a set of lectures on implementation theory and contracts in the first Economics Summer School, University of Venice. He lectured on the same subject in August at the annual meeting of the European Economic Association in Lausanne. The benefits and drawbacks of increasing the accountability of government officials was the subject of his addresses to the Southeastern International

Trade and Economic Theory conference in Miami, November 2001, and the Canadian Economic Theory conference in Toronto, May 2002. He also gave talks on this subject at the University of Southern California and University of Texas, Austin. He gave a graduate course on voting theory at Princeton University in spring 2002.

In 2001-02, Maskin was an advisor to the British government on designing an auction for allocating incentive money to British firms prepared to reduce their carbon dioxide emissions. The auction ran successfully in March 2002. Maskin spoke on theoretical aspects of the auction design in a lecture for the trustees and faculty of the Institute in October 2001, in his Schwartz Memorial Lecture at Northwestern University, May 2002, and in talks at the NATO Advanced Research Workshop, Istanbul, December 2001, and the Stanford Institute for Theoretical Economics, June 2002.

Maskin was one of the organizers for a day of lectures on game theory at the Institute in February 2002.

PROFESSOR JOAN SCOTT spent most of the year working on a book she is writing on le mouvement pour la parité in late twentieth century France. She edited, with Debra Keates, *Schools of Thought: Twenty-five Years of Interpretive Social Science* (Princeton University Press, 2001). Her other publications include: "Phantasie und Erfharung" *Feministische Studien* (November 2001); "Les Guerres Academiques aux Etats-Unis," in *L'université en questions: Marché des Savoirs, Nouvelle Agora, Tour d'Ivoire?* (ed. Julie Allard, Guy Haarscher, et al.); and "Experiencia," *La Ventana: Revista de estudios de género* (July 2001). She gave the Germaine Brée lecture at the University of Wisconsin, Madison; the Neil Rappaport Memorial Lecture at the American Association of University Professors (AAUP) Conference on Faculty Governance; and the keynote address at the Berkshire Conference on the History of Women. She lectured at Northwestern University; York University (Toronto, Canada); and the Washington University in St. Louis. She participated in conferences and seminars at Princeton University and at New York University. She continues as a senior fellow of the School of Criticism and Theory; as an adjunct professor in history at Rutgers University; and as the chair of the Committee on Academic Freedom and Tenure of the AAUP.

During the academic year 2001-02, PROFESSOR MICHAEL WALZER gave the Aaron-Roland Lecture at Stanford University and the Featherman Lecture at Temple University; he also lectured at the University of California in Los Angeles, Boston University, Concordia University in Montreal, Princeton University, Columbia University, the University of Kansas, Leipzig University, the New School in New York, and the U.S. Military Academy at West Point. He gave the keynote address at a conference on humanitarian intervention at Bielefeld University in Germany, attended a colloquium devoted to his work at the Zentrum für interdisziplinäre Forschung (ZiF) in Bielefeld, and lectured on just war theory for the Einstein Forum in Berlin. A collection of his essays was published in Spain under the title *Guerra, politica y moral*. His book *What It Means to be an American*, which was first published in Italy, came out in a second Italian edition. Basic Books brought out a second edition of *The Company of Critics*, with a new introduction. He continued to work on *The Jewish Political Tradition:* speaking at a panel discussion on volume one at the 2001 meetings of the American Political Science Association; delivering volume two to Yale University Press; and helping to organize a conference on volume three, funded by the Ethikon Institute, in Los Angeles.

THE SCHOOL OF SOCIAL SCIENCE

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THE SCHOOL OF SOCIAL SCIENCE

RECORD OF EVENTS

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

Ethics: Economics and Business Seminar: "Evolution and Mixed Strategies"
KEN BINMORE, *Visitor, School of Social Science*

Social Science Thursday Luncheon Seminar: "What Liberalism Owes to Difference, and How the Zapatistas Move the Debate"
COURTNEY JUNG, *New School University; Member, School of Social Science*

Ethics: Economics and Business Seminar: "Information-Based Relative Consumption Effects"
LARRY SAMUELSON, *University of Wisconsin, Madison*

Social Science Thursday Luncheon Seminar: "The Political Representation of Sexual Difference: Le Movement Pour La Parité in Late 20th-Century France"
JOAN W. SCOTT, *Professor, School of Social Science*

Ethics: Economics and Business Seminar: "Some Observations on the Economic Interaction of Agents with Diverse Abilities to Recognize Patterns (with Michele Piccione)"
ARIEL RUBINSTEIN, *Princeton University*

Social Science Thursday Luncheon Seminar: "Folklore with a Vengeance: A Sumatran Literature of Resistance in the Colonial Indies and New Order Indonesia"
SUSAN RODGERS, *College of the Holy Cross; Member, School of Social Science*

Ethics: Economics and Business Seminar: "Moral Hazard in Teams with Vector Outputs"
MARCO BATTAGLINI, *Princeton University*

Social Science Thursday Luncheon Seminar: "Learning Morality from the Education System in Late19th-Century China"
HENRIETTA HARRISON, *University of Leeds; Member, School of Social Science*

Ethics: Economics and Business Seminar: "The Relation Between Implementability and the Core"
EIICHI MIYAGAWA, *Columbia University*

Social Science Thursday Luncheon Seminar: "Party Formation and Policy Outcomes under Different Electoral Systems"
MASSIMO MORELLI, *Ohio State University; Member, School of Social Science*

Ethics: Economics and Business Seminar: "Fair Social Orderings"
FRANÇOIS MANIQUET, *University of Namur; Member, School of Social Science*

Social Science Thursday Luncheon Seminar: "Can the Public Domain Survive Multiculturalism?"
MICHAEL BROWN, *Williams College; Member, School of Social Science*

Ethics: Economics and Business Seminar: "An Explanation for Hyperbolic Discounting Based on Waiting Costs"
ERIC MASKIN, *Professor, School of Social Science*

Social Science Thursday Luncheon Seminar: "The Seminar: Mode d'emploi. Impure Spaces in the Light of Late Totalitarianism"
MIGLENA NIKOLCHINA, *Sofia University; Member, School of Social Science*

December 3
Ethics: Economics and Business Seminar: "Changing Preferences and Temptation (with Faruk Gul)"
WOLFGANG PESENDORFER, *Princeton University*

December 6
Social Science Thursday Luncheon Seminar: "Malthus and the Culture Concept"
CATHERINE GALLAGHER, *University of California, Berkeley; Member, School of Social Science*

December 10
Ethics: Economics and Business Seminar: "Type Diversity and Virtual Bayesian Implementation"
ROBERTO SERRANO, *Brown University*

December 13
Social Science Thursday Luncheon Seminar: "War, Religious Identity and Interest in Early Modern Habsburg History"
KARIN MACHARDY, *University of Waterloo; Member, School of Historical Studies*

January 31, 2002
Social Science Thursday Luncheon Seminar: "The Norm of Self-Interest"
DALE MILLER, *Princeton University; Member, School of Social Science*

February 4, 2002
Ethics: Economics and Business Seminar: "A Fully Subjective Perspective on Ambiguity (with Paolo Ghirardato and Massimo Marinacci)"
FABIO MACCHERONI, *Bocconi University*

February 7
Social Science Thursday Luncheon Seminar: "Behavioural Psychology and Consumer Behaviour"
CHRISTOPHER HARRIS, *University of Cambridge; Member, School of Social Science*

February 14
Social Science Thursday Luncheon Seminar: "The Nature of Political Obligation"
LIAN CHENG, *Peking University; Member, School of Social Science*

February 18
Ethics: Economics and Business Seminar: "Sequential Coordination, Eductive Stability and Rationalizability"
SAYANTAN GHOSAL, *University of Warwick*

February 21
Social Science Thursday Luncheon Seminar: "Tolerance of Governmentality"
WENDY BROWN, *University of California, Berkeley; Member, School of Social Science*

February 25
Ethics: Economics and Business Seminar: "Law Enforcement Under Incomplete Law: Theory and Evidence from Financial Market Regulation"
CHENGANG XU, *London School of Economics*

February 28
Social Science Thursday Luncheon Seminar: "Economics and Identity"
RACHEL KRANTON, *University of Maryland; Member, School of Social Science*

March 4
Ethics: Economics and Business Seminar: "Partially Informed Investors and the Process of Market Making"
MARTIN CHERKES, *Princeton University*

March 7
Social Science Thursday Luncheon Seminar: "What Can We Learn from the Jewish Political Tradition?"
MICHAEL WALZER, *Professor, School of Social Science*

March 11
Ethics: Economics and Business Seminar: "Collective Choice and Assignment under Dichotomous Preferences (with Anna Bogomolnaia and Richard Stong)"
HERVÉ MOULIN, *Rice University*

March 14
Social Science Thursday Luncheon Seminar: "On the Equivalence Between Welfarism and Equality of Opportunity"
FRANÇOIS MANIQUET, *University of Namur; Member, School of Social Science*

March 18
Ethics: Economics and Business Seminar: "A Vector-Valued Representation of Preferences Under Uncertainty"
MARCIANO SINISCALCHI, *Princeton University*

March 21
Social Science Thursday Luncheon Seminar: "The Commodification of Body Parts and Social Dehumanization"
JOHN EVANS, *University of California, San Diego; Member, School of Social Science*

[illegible]
Ethics: Economics and Business Seminar: "Quality, Contracts, and Gains from Trade: Opium and Textiles in Colonial India"
RACHEL KRANTON, *University of Maryland; Member, School of Social Science*

[illegible]
Social Science Thursday Luncheon Seminar: "Residential Sorting and the Political Economy of the Decentralized Public Sector"
THOMAS ROMER, *Princeton University; Visitor, School of Social Science*

[illegible]
Ethics: Economics and Business Seminar: "When and Why Not to Auction (with Colin Campbell)"
DAN LEVIN, *Ohio State University*

[illegible]
Social Science Thursday Luncheon Seminar: "A Philosophic Entertainment: Walzer, the Virgin Sophia, and the Pythagorean Magic Square"
JUNG SOON PARK, *Yonsei University; Member, School of Social Science*

[illegible]
Ethics: Economics and Business Seminar: "Consistent Rules for the Resolution of Conflicting Claims"
WILLIAM THOMSON, *University of Rochester*

[illegible]
Social Science Thursday Luncheon Seminar: "Marriage as Contract in Victorian England"
SHARON MARCUS, *University of California, Berkeley; Member, School of Social Science*

[illegible]
Ethics: Economics and Business Seminar: "Contract and Exploitation (with Debraj Ray)"
GARANCE GENICOT, *Princeton University*

[illegible]
Social Science Thursday Luncheon Seminar: "Bodily Marks: Genetic Signatures, the Genealogical Principle, and the Politics of Identity"
NADIA ABU EL-HAJ, *University of Chicago; Member, School of Social Science*

[illegible]
Ethics: Economics and Business Seminar: "Social Assets (with George J. Mailath)"
ANDREW POSTLEWAITE, *University of Pennsylvania*

[illegible]
Social Science Thursday Luncheon Seminar: "Does Equality Matter?"
YITZHAK BENBAJI, *Shalom Hartman Institute; Member, School of Social Science*

[illegible]
Ethics: Economics and Business Seminar: "Social Networks and the Determination of Wages and Employment: Patterns, Dynamics, and Inequality"
MATT JACKSON, *California Institute of Technology*

[illegible]
Social Science Thursday Luncheon Seminar: "Identities in Dialogue in a Time of Crisis: The School for Peace Approach Dealing with the Israeli-Palestinian Conflict"
NAVA SONNENSCHEIN, *The School for Peace at Neve Salom Wahat al Salam*

[illegible]
Ethics: Economics and Business Seminar: "Ordinally Bayesian Incentive Compatible Voting Schemes"
ARUNAVA SEN, *Indian Statistical Institute*

[illegible]
Ethics: Economics and Business Seminar: "Non-Deteriorating Choice"
YVES SPRUMONT, *University of Montreal*

[illegible]
Ethics: Economics and Business Seminar: "Agricultural Contracts"
PEYTON YOUNG, *Johns Hopkins University*

"This has been a wonderful opportunity for me to concentrate on my field. I certainly learned a lot, broadened my horizons, and talked to many scholars in related but not identical fields."

— Member, School of Mathematics

Elaine Wolfensohn, IAS/PCMI Oversight Board member (left), with IAS/PCMI Steering Committee members Joan Ferrini Mundy, Associate Dean for Science and Mathematics Education, Professor of Mathematics, and Professor of Teacher Education, Michigan State University; and Gail Burrill, Faculty member in the Division of Science and Mathematics Education, Michigan State University

PROGRAM IN THEORETICAL BIOLOGY
Martin A. Nowak, Head

The current areas of research in the Program in Theoretical Biology include the dynamics of infectious diseases, cancer genetics, evolution of language, and evolutionary theory in general. The program is led by Martin Nowak and includes five Members: Natalia Komarova, David Krakauer, Alun Lloyd, Akira Sasaki (Kyushu University), and Dominik Wodarz. The group also included two Visitors: Viggo Anker Andreasen (Roskilde University) and Anirvan Sengupta (Bell Labs) and two Ph.D. students from Princeton University: Garrett Mitchener and Joshua Plotkin.

Research Projects

Martin Nowak has continued work on the evolutionary dynamics of tumor initiation and progression. In collaboration with Bert Vogelstein and Christoph Lengauer (both Johns Hopkins University), Nowak, Komarova, and Sengupta developed a mathematical approach that led to the radical suggestion that colon cancer is initiated by mutation in genes that induce chromosomal instability rather than by mutation in traditional oncogenes or tumor suppressor genes.

Akira Sasaki and Martin Nowak invented the concept of mutation landscapes. Normally, evolution is seen as optimization on a fitness landscape. Each genome has a specific fitness value, while the mutation rate is either constant or externally regulated. Each genome, however, also encodes its own replication machinery, and therefore each genome has its own specific mutation rate. Thus, evolution is a dynamical process both on a fitness and a mutation landscape. There are some far reaching consequences of this extended perspective: localization in a mutation landscape allows larger genome sizes and, therefore, increasing complexity.

Nowak continued his work on computational and evolutionary perspectives of language. With Partha Niyogi and Natalia Komarova, he formulated a synthesis between formal language theory, learning theory, and evolutionary dynamics. Questions of language have to be studied in the context of acquisition, and questions of acquisition in the context of evolution. Garrett Mitchener and Nowak studied selection among universal grammars. Erez Lieberman, Princeton University undergraduate, and Nowak worked on generalization requirements of finite languages, a problem related to sphere packing.

In May 2002, Dominik Wodarz and Martin Nowak hosted a workshop on immunology, "The Dynamics of T Cell Responses: From Theory to Experiments," at the Institute for Advanced Study. The workshop brought together theoretical and experimental immunologists working on different aspects of T cell responses in different systems. The schedule of lectures is included below.

From the President of Stanford University, Nowak received the David Starr Jordan Prize, one of the highest awards in evolutionary biology.

Natalia Komarova has been working on mathematical models for cancer progression. In particular, she studied the role of genetic instability in cancer initiation. Chromosomal instability (CIN) is a defining characteristic of most human cancers. Mutation of CIN genes increases the probability that whole chromosomes or large fractions of chromosomes are

gained or lost during cell division. The consequence of CIN is an imbalance in the number of chromosomes per cell (aneuploidy) and an enhanced rate of loss of heterozygosity (LOH). A major question of cancer genetics is to what extent CIN, or any genetic instability, is an early event and consequently a driving force for tumor progression. It has been possible to develop a mathematical framework for studying the effect of CIN on the somatic evolution of cancer. Specifically, the conditions have been derived for CIN to initiate the process of colorectal tumorigenesis prior to the inactivation of tumor suppressor genes.

Some other problems Komarova has been working on include the evolution of communication (this is a continuation of her previous work, applied to finite population models) and modeling of anti-viral drug therapy, where a simple relationship was found between timing, efficacy and success in treatment of immunosuppressive diseases such as HIV and hepatitis C.

David Krakauer has continued his research on the evolution of biological sign systems. He has been searching for general patterns in the structure of information propagating systems across different levels of biological organization. Thus he has been working on redundancy and degeneracy at the genetic, and molecular levels, principles of genomic compression, signal parsing through frequency decoding in a signal transduction network, the role of noise in stabilizing genetic information and the evolution of formal signals in ethological models.

Alun Lloyd's research addresses various issues regarding infectious diseases. The main project consists of a study of the historical records of childhood disease incidence in the United States. Using such records, Lloyd is attempting to unravel the various determinants of disease transmission and apply these results to produce improved mathematical models, which could be used to predict the time course of future epidemics and inform the design of vaccination programs. In other projects, Lloyd has been considering infections, which consist of a collection of related 'strains'; examples of such diseases include the common cold, influenza, and HIV. Since treatment, or vaccination, is unlikely to be equally effective against all strains, any attempt to understand the impact of treatment must consider this strain structure. A particularly important question concerns drug resistant strains and the degree to which treatment will increase their prevalence. Lloyd has developed new models to study the potential for the emergence and spread of resistant strains in the face of treatment, with specific reference to the rhinovirus infections responsible for many 'common cold' instances.

Garrett Mitchener's research has focused on exploring population-level dynamics of languages. During the summer and fall of last year, Mitchener finalized some new results on the fully symmetric case of the language dynamical equation. If grammar acquisition by children is too error prone, the population tends to a state in which all grammars are present in equal frequencies. If grammar acquisition is sufficiently accurate, then the population tends to a state in which one grammar is much more common than the others. For intermediate learning reliability, both behaviors are possible. The new work proves that the behavior of the dynamical system in question is limited to these two options, and all equilibria are accounted for. Mitchener has also been working on an extension of that model which allows for multiple universal grammars.

Joshua Plotkin has continued to research both ecological and evolutionary theory.

Plotkin has developed an appropriate mathematical framework for designing an optimal sampling scheme that can discriminate between large, diverse ecosystems. These tools have been applied to study the changing composition of large tracts of tropical forest in Southeast Asia. Plotkin has worked to extend and apply earlier theoretical research with David Krakauer on the evolution and robustness of large genomic populations. In the current research, Plotkin and collaborators at Princeton University have been studying the genomic evolution of the Influenza A virus. Using a large empirical dataset of viral RNA sequences, Plotkin has studied the structure and tempo of influenza evolution over the past two decades. Plotkin has investigated the spatio-temporal distribution of viral swarms and compared it to the time series of the influenza vaccines recommended by the World Health Organization. Plotkin has introduced a new method for predicting future dominant influenza amino acid sequences and studied its relevance to improving annual vaccine choice.

Akira Sasaki explored three research topics in theoretical biology during the past year. First, done in collaboration with David Krakauer, was the theoretical formulation and analysis of the role of non-heritable noise on the origin life (the origin of stable self-replicating molecules). They showed how noise present in hostile early environments can increase the probability of faithful replication by amplifying selection in finite populations. Hence factors formerly considered inimical to the origin of life – environmental noise and drift in small populations – can give rise to conditions favorable to robust replication. Second, done in collaboration with Martin Nowak, Natalia Komarova, and Mayuko Nakamaru (Princeton University), was to extend the dynamical theory of language evolution into spatial dimensions by formulating the spread of a language as a traveling wave. The last topic, in collaboration with Nowak, was on the evolution of "evolvability" of life (the organism's ability to undergo transition to a higher fitness peak in a finite time). They introduced the concept of "mutation landscapes" that incorporate the fact that mutation rates depend on the genomic sequence. The objective was to find the condition for localization at high fidelity/high fitness sequence and to find the optimal mutation landscape that maximizes the rate of transition to a higher fitness peak.

For the past year, Dominik Wodarz's work has included the following topics: (i) continuing the work on the dynamics of immune responses against viral infections. This included thoughts on T cell memory, lytic versus non-lytic effector mechanisms, the role of cross-presentation in T cell regulation, and therapeutic induction of T cell responses against immuno-suppressive infections. (ii) Wodarz and Alun Lloyd worked on mathematical models of drug therapy against rhinovirus infections (common cold). A new drug, Pleconaril, has been developed against cold viruses, and they investigated the evolutionary dynamics of drug resistance. (iii) In cancer biology. Wodarz has studied mathematical models of cancer progression, with special focus on the role of genetic instability. Related to this is the evolution of checkpoints and repair mechanisms. In addition, Wodarz investigated host defenses against cancers and therapeutic control measures. These include models of angiogenesis (limitation of blood supply), immune responses against cancers, gene therapy against cancers, and chemotherapy. (iv) Wodarz explored evolutionary aspects of host-pathogen interactions. In particular, he looked at the use of pathogens as "biological weapons" in host competition. That is, hosts can evolve to have sub-optimal immune responses in order to maintain the pathogens in the population and to transmit them to their competitors.

The Program in Theoretical Biology Lecture Series
Each year, distinguished scientists in diverse areas of biology are invited to lecture at the Institute. The lecture series is coordinated with a similar series at Princeton University. The following lectures were presented during the 2001-02 academic year:

November 7 — "Human Nature and Social Interaction"
Ernst Fehr, *University of Zürich*
Cosponsored by the School of Social Science and the Program in Theoretical Biology

November 14 — "Decoding Life: Genomics, Proteomics, and Systems Biology"
Leroy Hood, *Institute for Systems Biology*

February 20 — "Why Cells in an Embryo Do What They Do: What We Still Need to Know"
Eric Wieschaus, *Princeton University*

April 24 — "Dealing with Virus Infections"
Peter Doherty, *St. Jude Children's Research Hospital*

May 1 — "The Human Genome and the Origins of Cancer"
Arnold J. Levine

Mathematical Problems in Biology Seminar Series
The School of Mathematics and the Program in Theoretical Biology started a new seminar series during the spring term. The organizers were Stephen Adler (IAS School of Natural Sciences), Joel Lebowitz (Rutgers University), Simon Levin (Princeton University), Eric Maskin (IAS School of Social Science), Martin Nowak (IAS Program in Theoretical Biology) and Thomas Spencer (IAS School of Mathematics).

The purpose of the seminars was to discuss cutting edge research in theoretical biology, biophysics, and bioinformatics. The audience consisted of mathematically minded people from all Schools of the Institute for Advanced Study and from Princeton University. Speakers presented some of their most exciting results and emphasized the mathematical aspects of their work. Seminars were held on Fridays from 11:00-12:00 in the seminar room of Simonyi Hall, the main building of the School of Mathematics. Each seminar was followed by lunch at the Institute. The following seminars were held:

February 15 — "Virus Dynamics"
Martin Nowak, *Institute for Advanced Study*

February 22 — "Reading the Regulatory Regions of a Genome"
Eric Siggia, *The Rockefeller University*

March 1 — "Electrophysiology of Neural Tissue: A Non-Network Approach to Neural Science"
Charles Peskin, *Center for Industrial Mathematics and Statistics*

March 15 — "Why Do Animals and Humans Become More Impatient with Time?"
Eric Maskin, *Institute for Advanced Study*

April 5 "Fermi Function, Support Vector Machines and Transcription Factor Binding Sites"
Anirvan Sengupta, *Bell Laboratories, Lucent Technologies*

April 9 "Emergence of Scaling in Complex Networks: From the Topology of the www to the Cell's Genetic Network"
Albert-Laszlo Barabasi, *University of Notre Dame*

April 12 "Word Frequency Distribution under Restriction Avoidance: Evolution of Viral Sequences to Escape Host Defense"
Akira Sasaki, *Institute for Advanced Study*

April 17 "Geometric Inequalities via Micelles"
Mikhail Gromov, *Institut des Hautes Études Scientifiques de Bures-sur-Yvette* and *Courant Institute of Mathematical Sciences*

May 10 "Architecture and Dynamics of the Primary Visual Cortex"
David McLaughlin, *Courant Institute of Mathematical Sciences* and *Center for Neural Studies*

Immunology Workshop
The goal of this workshop was to bring together theoretical and experimental immunologists working on different aspects of T cell responses in different systems. The aim was to look for common underlying principles and explore how theory and experiments can be coupled to further advance our understanding in this field of research.

April 25 "How the Immune System Works"
Charles A. Janeway, Jr., *Section of Immunobiology, Yale University School of Medicine*

"Immune Conversations Mediated by Dendritic Cells"
Polly Matzinger, *Cellular and Molecular Immunology, National Institutes of Health*

"$CD8^+$ T Cells and the Control of Tumor Growth: Three Surprises"
Richard W. Dutton, *Trudeau Institute*

"Immunologic Tales of Paraneoplastic Neurologic Degeneration: The Beginning of the End and the Tip of the Iceburg"
Robert B. Darnell, *Molecular Neuro-Oncology, The Rockefeller University*

"Virus Dynamics and Immune Responses"
Martin Nowak, *Program in Theoretical Biology, Institute for Advanced Study*

"Back of the Envelope Immunology: Quantitative Constraints on Negative Selection"
Sebastian Bonhoeffer, *Theoretical Biology, Eidgenössische Technische Hochschule Zurich*

"Regulation of the Antiviral $CD8^+$ T Cell Response: Role of $CD4^+$ T"
Allan Randrup Thomsen, *Institute of Medical Microbiology and Immunology, University of Copenhagen*

"T Help for CTL"
Stephen Schoenberger, *Division of Immune Regulation, La Jolla Institute for Allergy and Immunology*

April 26

"Perturbing Virus/Host Dynamics in Primary SIV Infection with Transient Post-Inoculation Antiretroviral Treatment"
Jeffrey D. Lifson, *Laboratory of Retroviral Pathogenesis, National Cancer Institute*

"$CD8^+$ T Cell Dynamics and Anti-Viral Therapy"
Dominik Wodarz, *Program in Theoretical Biology, Institute for Advanced Study*

"How does HTLV-1 Persist?"
Charles R. M. Bangham, *Department of Immunology, Imperial College Faculty of Medicine*

"What Limits the Individual MHC Diversity?"
Rob de Boer, *Department of Theoretical Biology, Utrecht University*

"On the Estimation of Viral Parameters from Virus Load Data"
Alun Lloyd, *Program in Theoretical Biology, Institute for Advanced Study*

"Measuring T-Cell Dynamics in HIV Infection"
Ruy Ribeiro, *Theoretical Biology and Biophysics, Los Alamos National Laboratory*

"Modeling the Dynamics of $CD8^+$ Responses"
Rustom Antia, *Department of Biology, Emory University*

"Theoretical Considerations of HIV Vaccines"
Vincent Jansen, *School of Biological Sciences, University of London*

"Effect of Demographic Stochasticity on the Within-Host Viral Evolution"
Akira Sasaki, *Department of Biology, Kyushu University*

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

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

The library has an extensive collection of offprints including those received by Professors Andrew E.Z. Alföldi, Kurt Gödel, Ernst H. Kantorowicz, Elias Avery Lowe, Millard Meiss, Erwin Panofsky, and former Members Robert Huygens and Walther 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 1930s 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 photograph collection.

The Mathematics-Natural Sciences Library [Momota Ganguli, Librarian] is located on the second floor of Fuld Hall and contains some 30,000 volumes (bound periodicals and monographs) plus subscriptions to nearly 180 journals. Its collection of older periodicals is housed in compact shelving on the lower level of the Historical Studies-Social Science Library. The subject areas covered by the library are pure and applied mathematics, astrophysics, and theoretical, particle, and mathematical physics.

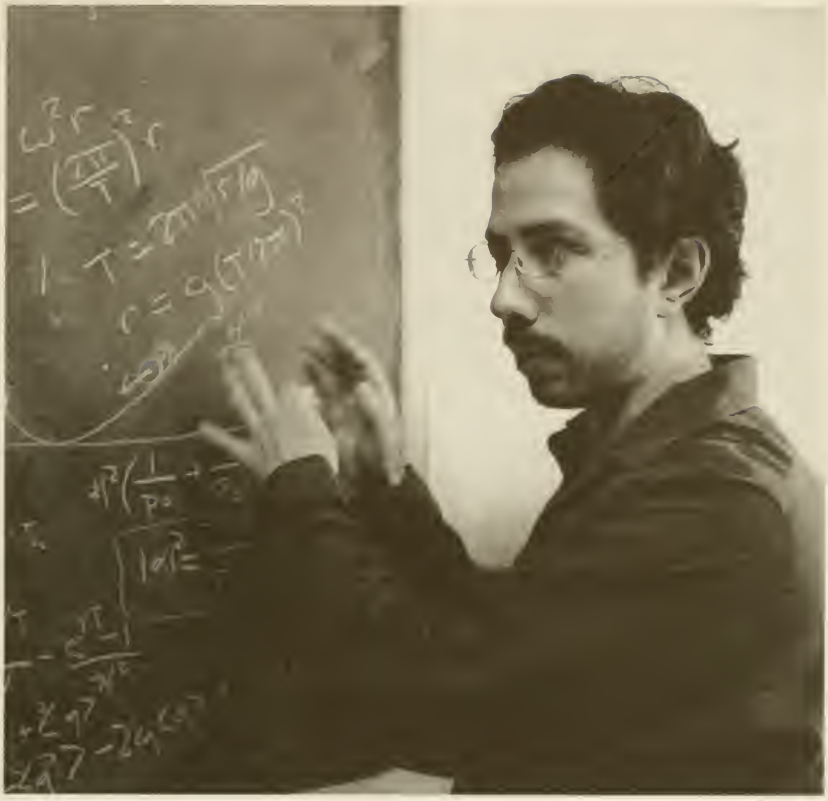
Both of the Institute's libraries participate in the shared cataloging system of the Research Libraries Group, which gives Institute scholars computerized access to a database that contains more than twenty-two million records. Searches of this database retrieve bibliographic information and identify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

which makes available archival electronic versions of many core journals in mathematics and the humanities.

The Historical Studies-Social Science Library maintains a computer center with access to a variety of word processing packages for both PCs and Macintoshes, access to databases in the fields of Classical Studies, the History of Science, Islamic and French studies, and connection software to the Internet for additional information resources. The Mathematics-Natural Sciences Library's electronic resources include an online catalog, a variety of indexes, and a growing collection of full-text journals.

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

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



"I find the Institute to be essentially the perfect place to engage in scientific research. This covers all aspects of life here: the Institute is arranged to allow maximum time to be spent on intellectual pursuits."

— Member, School of Natural Sciences

Astrophysicist Anthony Aguirre

INSTITUTE FOR ADVANCED STUDY/PARK CITY MATHEMATICS INSTITUTE

The IAS/Park City Mathematics Institute (PCMI) is an integrated mathematics program that has been sponsored by the Institute for Advanced Study since 1994. Participants in PCMI include research mathematicians, graduate students, undergraduate students, mathematics education researchers, undergraduate faculty, and high school teachers. The interaction between these diverse groups fosters a stronger sense of the mathematical enterprise as a whole. In addition, it raises awareness of the roles of professionals with diverse responsibilities in the mathematics-based professions.

The annual three-week Summer Session is the flagship activity of PCMI. Additional programs take place throughout the year and include the year-long High School Teacher Program and the Lecture Publication Series.

Summer Session

The 12th annual Summer Session of the IAS/Park City Mathematics Institute (PCMI) was held June 30-July 20, 2002 in Park City, Utah. This year's PCMI Summer Session, with a total of 275 participants, included the following programs:

- Research Program in mathematics
- Graduate Summer School
- Undergraduate Summer Program
- High School Teacher Program
- Undergraduate Faculty Program
- Mathematics Education Research Program
- International Seminar on Mathematics Education

As is the case each year, a specific area of mathematics was chosen to provide the focus for the overall programming. The mathematical topic for the 2002 Summer Session was *Automorphic Forms and Their Applications*, and this topic informed the work of the Graduate Summer School, the Research Program and the Undergraduate Program. The related mathematical topic in the Undergraduate Faculty Program was *Introduction to Ramsey Theory*. The mathematics education topic for 2003 was *Knowledge of Mathematics for Teaching*, while *Applications of the Gaussian Integers* was the topic of the mathematics course offered in the High School Teachers Program.

Each of the programs met daily for its own series of courses and seminars. The groups also met together for an afternoon Cross Program Activity three days per week. A complete listing of course, seminars and activities follows.

PCMI was very pleased to act as a host for the U.S.-Japan *Lesson Study* workshop sponsored by the United States National Commission on Mathematics Instruction (USNCMI). This workshop featured 10 U.S. teachers and 10 Japanese teachers with the charge of preparing an agenda to research the application of the Japanese lesson study method in the setting of US secondary education.

Graduate Summer School and Research Program
Organized by Peter Sarnak, Princeton University, and Freydoon Shahidi, Purdue University, the Graduate Summer School met for three formal lectures and one or two problem sessions each day. The lectures were well attended, drawing research mathematicians, graduate students and undergraduate students. Two introductory lectures, given by Peter Sarnak, explained the overall plan of the forthcoming lecture series. A highlight this year was the series of lectures given by Joseph Bernstein, Tel Aviv University, on his treatment of the theory of meromorphic continuation of Eisenstein series. This treatment has not yet been published and will appear for the first time in print in the PCMI volume of the 2002 Graduate Summer School lectures (PCMI Volume 12, to be published in 2003 by the American Mathematical Society).

Graduate Summer School lecturers and course titles:
Introduction (2 lectures); Peter Sarnak, Princeton University.
Basic Theory and the Theory of Eisenstein Series (10 lectures); Armand Borel, Institute for Advanced Study; Joseph Bernstein, Tel Aviv University.
Langlands-Shahidi Method and Converse Theorems (8 lectures); Freydoon Shahidi, Purdue University; James Cogdell, Oklahoma State University.
Ramanujan Conjectures and Applications, e.g., Ramanujan Graph (10 lectures); Laurent Clozel, Université Paris; Winnie Li, Pennsylvania State University; Alain Valette, Université of Neuchâtel.
Analytic theory of GL(2) forms and L-functions (5 lectures); Philippe Michel, Université Montpellier II.
Arithmetic Quantum Chaos (4 lectures); Zeev Rudnick, Tel Aviv University; Audrey Terras, University of California at San Diego.
Unipotent Flows on Gamma\G and Applications (3 lectures); Alex Eskin, University of Chicago.

The Research Program included two hours of organized seminars each day (divided into two or three lectures). Researchers also attended Graduate Summer School lectures and Undergraduate Program advanced lectures, and joined in informal activities with other participants.

Research Seminars:
Cyclicity of Elliptic Curves Mod p; R. Murty
Extreme values of L-functions at s=1 and applications; W. Duke
Real Zeros of L-functions; K. Soundararajan
Multiplicities of cusp forms; W.T. Gan
Integer orbits in prehomogeneous vector spaces, with applications to number fields; M. Bhargava
Cycles on Hilbert modular fourfolds and poles of L-functions; D. Ramakrishnan
On the cuspidal spectrum for GL_n; W. Müller
Eisenstein series behave better than you think; W. Casselman
Automorphic Distributions, L-functions & Voronoi Summation; S. Miller
Cohomology of Compactifications of Locally Symmetric Spaces: The Rapoport/Goresky-MacPherson Conjecture; L. Saper
Spectrum and homology of complex congruence hyperbolic manifolds; N. Bergeron
Local L-functions and gamma factors; M. Asgari
SO_{2n+1} *and twisted endoscopy for* GL_{2n}; D. Goldberg

Bessel functionals for GSp(4); R. Takloo-Bighash
Families of twisted L-functions; S. Friedberg
Periods of Eisenstein series and moments of L-functions; D. Bump
Ramanujan Conjecture for Hilbert modular forms; D. Blasius
Integer points on a family of homogeneous varieties: a question of Linnik; H. Oh
Estimates for Kloosterman Sums and weighted Weyl laws for SL_2 over a totally real number field; R. Miatello
Gromov's random groups have property (T); L. Silberman
A class of automorphic representations satisfying the generalized Ramanujan conjecture, Part I; M. Harris
A class of automorphic representations satisfying the generalized Ramanujan conjecture, Part II; M. Harris
Invariant measures and arithmetic quantum unique ergodicity; E. Lindenstrauss
Scattering geodesics, flats and scattering matrices of locally symmetric spaces; L. Ji
Generic Representations of p-adic SO (2n+1); D. Jiang
Residues of Eisenstein Series; E. Lapid
Rankin triple products and quantum chaos; T. Watson
L_4 norm on an Automorphic representation of GL(2) and trilinear functionals; A. Reznikov
Cuspidal representations invariant under an automorphism of G; B. Speh
Global Gross-Prasad conjecture for SO(5) and Yoshida's theta liftings; R. Schulze-Pillot
Representing integers by a quadratic form; J. Hanke
L_4 Norms of Eisenstein Series; F. Spinu.

The High School Teacher Program
The High School Teacher Program continued the work of the previous summer with about half of its participants returning and half of them new to PCMI. Each morning was devoted to two courses, one on *Applications of Gaussian Integers* and one on *Math in the Classroom*. An extension of last year's successful number theory course, the course on Gaussian Integers was brought to PCMI by the PROMYS program of Boston University and the Education Development Center of Newton, Massachusetts. The course was a two-hour problem-based session taught solely by high school teachers from the PROMYS program. Engaging the participating PCMI teachers for two hours every day, this course also attracted many visitors from other PCMI programs, fostering lively interaction among the various groups.

The course *Math in the Classroom*, taught by Jane Gorman of the Education Development Center, featured analysis of teaching case studies taken from secondary classrooms.

For two hours each afternoon, the teachers were divided into six small working groups, each devoted to in-depth study of a single topic in math and teaching, to be continued over a 12-24 month period. The purpose of these groups is to make the participants into resources to the mathematics teaching community in the particular topic and to eventually produce a publication that can be shared with that broader community. The work begun last summer by these groups was continued in 2002 and is being published in draft form by the Math Forum web site at Drexel University.

The topics of the working groups were: Algebra and Number Theory, Japanese Lesson Study, Geometry Models, Physics in the Math Curriculum, Analysis of Data, and Mathematics Coordinators. This last group of participants met during the first week of PCMI, each participant being a district or state mathematics supervisor/coordinator. The group's

work will become the basis for PCMI's effort to connect its professional development model with official school district practice.

The remaining time in the High School Teacher Program's daily schedule was devoted to Cross-Program activities, teacher presentations, and some hands-on activities in the evening.

Once again, the High School Teachers at PCMI acted as informal hosts to the participants of the International Seminar on Mathematics Education, which met July 14-18. The interaction between these two groups continues to be strong and beneficial for all concerned.

Undergraduate Program
The Undergraduate PCMI program for 2002 was organized by Roger Howe of Yale University and William Barker of Bowdoin College. The undergraduate courses offered were focused on topics complementary to the research program in Automorphic Forms. As has been the practice, there were two undergraduate courses, one at a fairly advanced level and one more introductory.

The advanced course, *The Riemann Zeta-function and Beyond*, was given by Steve Gelbart, The Weizmann Institute of Science. The introductory course, *Combinatorics, Graphs and Number Theory*, was given by Giuliana Davidoff of Mount Holyoke College.

In addition to the two courses of the Undergraduate Program, many undergraduate students attended the *Introduction to Ramsey Theory* course given in the Undergraduate Faculty Program. Interaction between these two programs was very strong this year, with many of the Undergraduate Faculty acting as research mentors to the undergraduate students.

Undergraduate Faculty Program
The Undergraduate Faculty program, organized by Daniel Schaal, South Dakota State University, was focused on creating a Research Experience for Undergraduates (REU). A mathematical lecture series on Ramsey Theory was utilized as a sample of the kind of course needed to focus an REU, and the PCMI undergraduate students attending this course were mentored by the Undergraduate Faculty participants. In addition, one or two seminars per day were given on topics pertaining to the creation and funding of an REU.

Mathematics Education Research Program
The Mathematics Education Research Program for 2002 was a second installment of the well-received International Seminar on "Mathematics Education: Bridging Policy and Practice." Drawing on the work of last year's group, and with most of the participants from 2001 returning for 2002, this year's seminar focused on teacher preparation and professional development. Teams consisting of one mathematics education policy-maker and one currently practicing secondary mathematics teacher representing each of eight countries (Brazil, Egypt, France, India, Japan, Kenya, Sweden, USA) participated.

Participants from each country presented an overview of the national policy or trends on pre-service and in-service teacher education. Participants from each nation then presented an example that provided details about a specific program for each type of teacher

training. Each presentation included information describing the institutions responsible for setting policy and delivering pre-service and in-service training programs. The pre-service component of each presentation described the prerequisites for entrance to a teacher-training program, the requirements for completion of the program, and an example program or practice used in the training of future secondary mathematics teachers. The in-service component of each presentation described the general requirements for additional training, and a specific approach to meeting those requirements.

Proceedings are being prepared for eventual publication, and a continuation of the dialogue was organized and will be facilitated through a joint PCMI/Math Forum website.

Cross Program Activities

A defining feature of PCMI is its focus on building understanding, professional respect and a sense of shared purpose among all the various constituents of the mathematical enterprise. To that end, a formal Cross Program Activity was held two or three afternoons each week as well as various evening activities and participant-coordinated weekend trips.

Titles of the formal 2002 Cross Program Activities were as follows:
Unique Factorization and Pythagorean Triples; R. Howe
Becoming a better mathematics teacher: Lessons from Japan and the U.S.; United States National Commission on Mathematics Instruction (USNCMI) workshop on Lesson Study
Decoding the PCMI T-Shirt; W. Casselman and S. Soffer
Pre-concert lecture; R. Taub
Sample Lecture: Who wins the battle of the sexes? Dating in the 1950s and 2000s; S. Rudich
Technically Speaking: How To Be Simple; S. Rudich.

There were fewer Cross Program presentations this year in order to allow for more opportunity for informal interaction. Participants made use of their free time in such activities as swimming, hiking, and working on mathematics together. Participants also organized various sports activities that took place daily: biking, soccer, basketball, volleyball, running, etc. Weekend trips also were arranged by PCMI participants and received with enthusiasm.

Evening activities organized for the PCMI participants included:
Two barbecue dinners for participants and their families.
Pizza parties for participants and families.
A piano concert by Robert Taub, former Artist-in-Residence at the Institute for Advanced Study.

Publication Series

PCMI is very pleased to make the proceedings of its Summer Session available to the public. Volume 9 of the Graduate Summer School lectures was published in 2002 and Volume 10 should be published in 2003. The full series, which comprises nearly all of the lectures ever given in PCMI's Graduate Summer School, now includes the following titles:

Volume 1, *Geometry and Quantum Field Theory*
Volume 2, *Nonlinear Partial Differential Equations in Differential Geometry*
Volume 3, *Complex Algebraic Geometry*
Volume 4, *Gauge Theory and Four Manifolds*
Volume 5, *Hyperbolic Equations and Frequency Interactions*
Volume 6, *Probability Theory and Applications*
Volume 7, *Symplectic Geometry and Topology*
Volume 8, *Representation Theory of Lie Groups*
Volume 9: *Arithmetic Algebraic Geometry.*

All titles are available either from the American Mathematical Society or through popular bookstores such as Barnes and Noble.

A Park City Mathematics Institute Subseries was established within the AMS *Student Mathematics Series* last year. These volumes are aimed at undergraduate students and are published independently of the Park City Mathematics Series mentioned above. Published thus far are:

Lectures on Contemporary Probability by Gregory F. Lawler and Lester N. Coyle
An Introduction to the Mathematical Theory of Waves by Roger Knobel
Codes and Curves by Judy L. Walker.

The High School Teacher Program will begin dissemination of its teacher-created materials and other resources sometime in the next two years, either via a special Web site or in printed form.

Funding
The 2002 Summer Session was made possible by the generosity of the following funders:

The National Science Foundation
State of New Jersey
Starr Foundation
Datek Online Holdings
Geraldine R. Dodge Foundation
Mr. and Mrs. Charles L. Jaffin
The George and Delores Doré Eccles Foundation
Bristol Myers Squibb Foundation
Wolfensohn Family Foundation
Chautauqua Programs

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

Chairperson:
Phillip A. Griffiths, Director, Institute for Advanced Study

Board Members:
Hyman Bass, University of Michigan
C. Herbert Clemens, Professor, The Ohio State University

Ronald L. Graham, Professor, University of California at San Diego
Shirley A. Hill, Professor Emeritus, University of Missouri-Kansas City
Robert D. MacPherson, Professor, School of Mathematics, Institute for Advanced Study
Elaine B. Wolfensohn, New York, New York.

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

Chair:
C. Herbert Clemens, Professor, University of Utah
2002 Graduate Summer School/Research Program Organizers:
Peter Sarnak, Professor, Princeton University
Freydoon Shahidi, Professor, Purdue University
Editor, Lecture Series:
David R. Morrison, Professor, Duke University
High School Teachers Program:
Gail Burrill, Instructor, Michigan State University
James R. King, Professor, University of Washington
Carol Hattan, Teacher, Skyview High School
Mathematics Education Research Program:
Joan Ferrini-Mundy, Associate Dean for Science and Mathematics Education, College of Natural Science of Michigan State University
Timothy Kelly, Professor, Hamilton College
Member at large:
John C. Polking, Professor, Rice University
Recruitment:
Nathaniel Whitaker, Professor, University of Massachusetts at Amherst
Research Program:
Karl Rubin, Professor, Stanford University
Undergraduate Faculty Program:
Daniel Goroff, Professor, Harvard University
Undergraduate Program:
William Barker, Professor, Bowdoin College
Roger Howe, Professor, Yale University

The organizer of the 2003 Graduate Summer School/Research Program will be Michael Christ, University of California at Berkeley, on the topic of *Harmonic Analysis*.

MENTORING PROGRAM FOR WOMEN IN MATHEMATICS

The ninth annual Mentoring Program for Women in Mathematics was held at the Institute for Advanced Study from May 14 to May 24, 2002. The area of research was symplectic geometry and holomorphic curves, the focus of the 2001-02 special year in the Institute's School of Mathematics. The program, sponsored by the Institute for Advanced Study and Princeton University, is designed to bring women students in contact with postdoctoral scholars and active professional mathematicians, and to encourage women to further their mathematics education by offering deep mathematical content as well as extensive mentoring opportunities. The program consists of lectures, seminars, working problem groups, and mentoring and networking sessions. Students and mentors take part in the life of the Institute and have the opportunity to meet other mathematicians in residence here and at Princeton University.

Ingrid Daubechies, Princeton University, taught the undergraduate course, *An introduction to Fourier Analysis and Wavelets, with some applications*. The graduate course, *Gromov-Witten invariants in symplectic geometry*, was given by Eleny Ionel, University of Wisconsin, Madison, and Dusa McDuff, State University of New York, Stony Brook, and Member, Institute for Advanced Study. Both the undergraduate and graduate courses had a number of attendees from the Institute for Advanced Study and from Princeton University as well as other institutions in the area. A daily schedule was posted on the web site.

Jaye Talvacchia, Swarthmore College, led the first week of the Women-in-Science Seminar, and Ranee Brylinski, Pennsylvania State University, led the second week of the seminar. Linda Chen, Columbia University, and Csilla Tamás, University of Georgia, organized the Research Seminar. The seminars presented were as follows: Chenchang Zhu, University of California, Berkeley, *Jacobi manifolds and their contact groupoids*; Haydee Herrera, Tufts University, *Classification of quaternion-Kähler manifolds of positive scalar curvature of dimension 12*; Anda Degeratu, Duke University, *Topology of crepant resolutions of Calabi-Yau orbifolds*; Hee Jung Kim, Pennsylvania State University, *Contact metric and almost complex structures;* Mihaela Vajiac, University of Texas at Austin, *Harmonic maps and Virasoro algebras;* Sang Seon Kim, Institute for Advanced Study, *Contact homology for domains in* $R^{2n} \times S^1$; Linda Chen, Columbia University, *Some Geometry of* $\overline{M}_{g,n}$ *and of Fulton-MacPherson spaces;* and Dusa McDuff, *Open problems in symplectic geometry*.

Special lectures included: Yakov Eliashberg, Distinguished Visiting Professor, Institute for Advanced Study, *Comparing Symplectic and Contact Geometries;* Florence Lin, University of Southern California, Expository lecture on applied symplectic mechanics (two lectures); Karen Uhlenbeck, University of Texas at Austin, Expository lecture on integrable systems. Karoline Pershell, University of Tennessee, Martin, gave a participant lecture, *Mersenne Primes in imaginary quadratic number fields*. Other visitors included Susan Tolman, Massachusetts Institute of Technology, and Dorothy Buck, Johns Hopkins Medical School.

Alice Chang, Professor of Mathematics, Princeton University, and member of the Women's Program Organizing Committee, planned a day of lectures and other activities at Princeton University. Shirley Tilghman, President, Princeton University, welcomed the participants and gave a talk on women in science. Charles Fefferman, Professor,

Princeton University, gave a talk on *The Kakeya Needle Problem;* and participants had lunch with members of Princeton's Mathematics Department followed by a tour of campus. Afternoon lectures included Lillian Pierce, Princeton University, Senior, Class of 2002, *The Pair Correlation of the Zeroes of the Riemann Zeta Function;* and Andrea C. Nicoara, Princeton University, Graduate Student, Class of 2002, *Domains of Holomorphy, the Levi Problem, and CR Manifolds*. The day ended with a panel discussion, *The Experiences and Concerns of Women in Mathematics and Science*, arranged by the Noetherian Ring, followed by a reception.

The Women's Program Committee assists in planning and promoting the program and recruiting lecturers and participants. Karen Uhlenbeck, University of Texas at Austin, is the Program Organizer. Other members of the committee include: Ranee Brylinski, Pennsylvania State University; Alice Chang, Princeton University; Ingrid Daubechies, Princeton University; Joan Feigenbaum, Yale University; Antonella Grassi, University of Pennsylvania; Nancy Hingston, The College of New Jersey; Rhonda Hughes, Bryn Mawr College; Robert MacPherson, Institute for Advanced Study; Cynthia Rudin, Graduate Student, Princeton University; Janet Talvacchia, Swarthmore College; and Lisa Traynor, Bryn Mawr College.

Thank you for the opportunity to study at the Institute. It was a wonderful experience that will undoubtedly be the standard of excellence for the rest of my academic career."

— Member, School of Social Science

Walking towards Fuld Hall, with the West facade of Bloomberg Hall in the background

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 the Institute for Advanced Study - Louis Bamberger and Mrs. Felix Fuld Foundation (the "Institute") as of June 30, 2002, and the related statements of activities and cash flows for the year ended June 30, 2002. 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. The prior year's summarized comparative information has been derived from the Institute's June 30, 2001 financial statements, and in our report dated November 21, 2001, we expressed an unqualified opinion on those financial statements.

We conducted our audit in accordance with auditing standards generally accepted in the United States of America. 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, 2002, and the changes in its net assets and its cash flows for the year ended June 30, 2002, in conformity with accounting principles generally accepted in the United States of America.

Deloitte & Touche LLP

October 3, 2002

BALANCE SHEET
JUNE 30, 2002 (WITH COMPARATIVE TOTALS FOR 2001)

ASSETS	2002	2001
CASH	$ 3,315,416	$ 2,882,443
SHORT-TERM INVESTMENTS - Held by Trustee (Note B)	6,513,551	13,146,755
ACCOUNTS RECEIVABLE	251,086	289,450
GOVERNMENT GRANTS AND CONTRACTS RECEIVABLE	1,197,996	1,332,804
ACCRUED INCOME ON INVESTMENTS	1,736,677	1,555,940
PREPAID AND OTHER ASSETS	444,414	311,517
CONTRIBUTIONS RECEIVABLE - NET (Note K)	1,052,784	794,755
UNAMORTIZED DEBT ISSUANCE EXPENSE	734,743	789,446
LAND, BUILDINGS AND IMPROVEMENTS, EQUIPMENT AND RARE BOOK COLLECTION - NET (Note C)	50,685,856	45,290,995
INVESTMENTS (Note B)	360,898,411	363,342,832
TOTAL ASSETS	$426,830,934	$429,736,937

See notes to financial statements.

LIABILITIES AND FUND BALANCES	2002	2001
ACCOUNTS PAYABLE AND ACCRUED EXPENSES	$ 9,390,712	$ 8,475,595
REFUNDABLE ADVANCES (Note A)	7,038,322	6,958,257
TRUST FUND OBLIGATIONS	2,644,820	2,769,922
NOTE PAYABLE (Note C)	977,968	1,033,365
ACCRUED INVESTMENT MANAGEMENT FEES	439,878	1,860,588
LONG-TERM DEBT (Note D)	50,039,739	51,195,043
Total liabilities	70,531,439	72,292,770
NET ASSETS:		
Unrestricted	235,673,809	236,026,790
Temporarily restricted (Notes A, I)	76,440,117	79,021,668
Permanently restricted (Notes A, I)	44,185,569	42,395,709
Total net assets	356,299,495	357,444,167
TOTAL LIABILITIES AND NET ASSETS	$ 426,830,934	$ 429,736,937

STATEMENT OF ACTIVITIES
YEAR ENDED JUNE 30, 2002 (WITH COMPARATIVE TOTALS FOR 2001)

	UNRESTRICTED	TEMPORARIL RESTRICTEI
REVENUES, GAINS AND OTHER SUPPORT:		
Private contributions and grants	$ 7,846,911	$ 3,594,072
Government grants	-	4,026,663
Income on long-term investments	3,033,709	1,976,961
Net realized and unrealized gains and (losses) on long-term investments (includes $3,975,096 and $2,369,158 in unrealized gain and loss in 2002 and 2001, respectively)	6,222,626	3,210,180
Gain (loss) on sale of capital assets	338,886	-
Net assets released from restrictions - satisfaction of program restrictions	15,389,427	(15,389,427)
Total revenues, gains and other support	32,831,559	(2,581,551)
EXPENSES:		
School of Mathematics	6,827,460	-
School of Natural Sciences	5,977,443	-
School of Historical Studies	5,134,357	-
School of Social Science	2,817,533	-
Libraries and other academic expenses	5,309,645	-
Administration and general	6,740,493	-
Auxiliary activity - tenants' housing expenses, net of unrestricted revenue $197,976	377,609	-
Total expenses	33,184,540	-
CHANGES IN NET ASSETS	(352,981)	(2,581,551
NET ASSETS, BEGINNING OF YEAR	236,026,790	79,021,668
NET ASSETS, END OF YEAR	$235,673,809	$76,440,117

See notes to financial statements.

2002

PERMANENTLY RESTRICTED	TOTAL 2002	TOTAL 2001
$ 1,789,860	$ 13,230,843	$ 8,881,472
-	4,026,663	4,711,549
-	5,010,670	6,164,698
-	9,432,806	2,630,476
-	338,886	(140,761)
-	-	-
1,789,860	32,039,868	22,247,434
-	6,827,460	6,307,384
-	5,977,443	5,175,080
-	5,134,357	4,465,924
-	2,817,533	2,858,415
-	5,309,645	5,230,092
-	6,740,493	6,096,539
-	377,609	414,617
-	33,184,540	30,548,051
1,789,860	(1,144,672)	(8,300,617)
42,395,709	357,444,167	365,744,784
$44,185,569	$356,299,495	$357,444,167

STATEMENT OF CASH FLOWS
YEAR ENDED JUNE 30, 2002 (WITH COMPARATIVE TOTALS FOR 2001)

	2002	2001
CASH FLOWS FROM OPERATING ACTIVITIES:		
Change in net assets	$ (1,144,672)	$ (8,300,617)
Adjustments to reconcile change in net assets to net cash used in operating activities:		
Depreciation	3,077,870	2,506,901
Increase in accrued income	(180,737)	(76,327)
Decrease (increase) in accounts and grants receivable	173,172	(354,729)
(Increase) decrease in contributions receivable	(258,029)	488,909
Increase (decrease) in accounts payable	915,117	(62,132)
(Increase) decrease in prepaid and other assets	(132,897)	111,323
Increase in refundable advances	80,065	2,170,430
(Decrease) increase in accrued management fees	(1,420,710)	843,318
Contributions restricted for long-term investments	(1,781,121)	(3,440,410)
Net realized and unrealized gains on long-term investments	(9,432,806)	(2,630,476)
Gain on sale of capital assets	(338,886)	-
Net cash used in operating activities	(10,443,634)	(8,743,810)
CASH FLOWS FROM INVESTING ACTIVITIES:		
Proceeds from sale of capital assets	426,330	156,842
Purchase of capital assets	(8,560,175)	(7,426,931)
Proceeds from sale of investments	662,677,706	97,527,319
Purchase of investments	(650,800,479)	(85,604,926)
Net cash provided by investing activities	3,743,382	4,652,304
CASH FLOWS FROM FINANCING ACTIVITIES:		
Proceeds from contributions restricted for:		
Investment in endowment	1,699,198	3,374,147
Investment in plant	81,923	66,263
	1,781,121	3,440,410
Other financing activities:		
Decrease in trust fund obligations	(125,102)	-
Decrease (increase) in unamortized debt issuance expense	54,703	(108,999)
(Decrease) increase in long-term debt	(1,155,304)	9,728,184
Decrease in note payable	(55,397)	(54,306)
Decrease (increase) in investments held by trustee	6,633,204	(6,778,238)
	5,352,104	2,786,641
Net cash provided by financing activities	7,133,225	6,227,051
NET INCREASE IN CASH	432,973	2,135,545
CASH, BEGINNING OF YEAR	2,882,443	746,898
CASH, END OF YEAR	$ 3,315,416	$ 2,882,443
SUPPLEMENTAL DATA:		
Interest paid	$ 2,585,278	$ 2,473,357

See notes to financial statements.

NOTES TO FINANCIAL STATEMENTS
YEAR ENDED JUNE 30, 2002

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 190 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 Not-for-Profit Organizations issued by the American Institute of Certified Public Accountants.

The reporting of contributions and pledges distinguishes between contributions received that increase permanently restricted net assets, temporarily restricted net assets, and unrestricted net assets. Recognition of the expiration of donor-imposed restrictions occurs in the period in which the restrictions expired.

Net assets and revenue, gains and losses are classified based on the existence or absence of donor-imposed restrictions. Amounts for each of the three classes of net assets – permanently restricted, temporarily restricted and unrestricted – are displayed in the statement of activities.

Restricted Net Assets – The Institute has classified gifts of cash and other assets as restricted net assets, if they are received with donor specifications, as either temporarily restricted or permanently restricted net assets. Temporarily restricted net assets are amounts that have been restricted in purpose and/or time by donor specification. Permanently restricted net assets have resulted from donors' specifications that contributions be invested in perpetuity and that, generally, only the income generated on such amounts be used. When a donor restriction expires, that is, when a stipulated time restriction ends or purpose restriction is accomplished, temporarily restricted net assets are reclassified to unrestricted net assets and reported in the statement of activities as net assets released from restrictions.

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 purposes into funds that are in accordance with activities or objectives specified. Separate accounts are maintained for each fund.

True endowment funds are subject to the restrictions of the gift instruments, which require that the principal be invested in perpetuity; only income earned and gained 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 noncash assets are accounted for in the fund that 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.

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

Plant Assets and Depreciation – Proceeds from the sale of plant assets, if unrestricted, are transferred to operating funds, or, if restricted, to amounts temporarily 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.

Refundable Advances – Conditional amounts, that are recorded initially as deferred restricted revenue, are reported as revenues when expended in accordance with the terms of the condition or transferred to the quasi-endowment funds.

B. INVESTMENTS

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

In June 1998, the Financial Accounting Standards Board ("FASB") issued Statement of Financial Accounting Standards ("SFAS") No. 133, "Accounting for Derivative Instruments and Hedging Activities." The Institute has adopted SFAS 133 and the corresponding amendments under SFAS 138 for the year ended June 30, 2002. The adoption of SFAS No. 133 as amended and interpreted through June 2002, does not have any impact on the Institute's financial statements.

Endowment and similar fund investments at June 30, 2002 are comprised of the following:

	REPORTED AMOUNT	FAIR VALUE
Pooled investments:		
Equity securities	$ 163,974,212	$ 216,052,117
Debt securities	188,811,607	187,937,152
Mortgages from faculty and staff	3,909,462	3,909,462
Total pooled investments	356,695,281	407,898,731
Funds invested separately:		
Charitable remainder and pooled income trusts	4,203,130	4,203,130
Total	$ 360,898,411	$ 412,101,861

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

Equity securities include the Institute's interests in certain limited partnerships with a reported value of approximately $93,151,473 and a fair value of approximately $106,533,304 at June 30, 2002. The Institute accounts for these investments under the equity method and, accordingly, recognizes its proportionate share of ordinary income/expenses and net realized gains/losses attributable to the investments of the partnerships. The Institute's proportionate share of ordinary expense and net realized gain was $1,297,969 and $746,977, respectively, for the year ended June 30, 2002

In addition, equity securities include the Institute's interests in four open-ended investment funds (the "Funds") incorporated in the Cayman Islands with carrying values of $70,822,738 and fair values of $109,518,813 at June 30, 2002. The Institute accounts for these investments at the lower of cost or market value. Fair value is determined as the number of shares held by the Institute multiplied by the net asset value for such shares. Net asset value, as determined by the Funds, reflects the underlying assets held by the Funds and any investment gain or loss. Realized gains and losses are computed based on the actual cost of the investment.

The Institute's interests in limited partnerships and Funds represent 26% and 20%, respectively, 46% collectively of total investments held by the Institute at June 30, 2002. These instruments may contain elements of both credit and market risk. Such risks include, but are not limited to, limited liquidity, absence of regulatory oversight, dependence upon key individuals, emphasis on speculative investments (both derivatives and nonmarketable investments) and nondisclosure of portfolio composition.

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

The following table summarizes the investment return and its classification in the statement of activities for the year ended June 30, 2002:

	UNRESTRICTED	TEMPORARILY RESTRICTED	PERMANENTLY RESTRICTED	TOTAL
Dividends and interest	$ 3,033,709	$ 1,976,961	$ -	$ 5,010,670
Realized gain on investments reported at fair value	3,979,512	2,091,055	-	6,070,567
Realized loss on investments reported at other than fair value	(401,754)	(211,103)	-	(612,857)
Total realized gain	3,577,758	1,879,952	-	5,457,710
Unrealized gain	2,644,868	1,330,228	-	3,975,096
Total realized and unrealized gain	$ 6,222,626	$ 3,210,180	$ -	$ 9,432,806

Short-term investments held by trustee represent the balance of the proceeds from the 1997 and 2001 NJEFA bonds that have not yet been expended for construction purposes. These funds are being held in trust by The Bank of New York. Such funds are invested in U.S. Government obligations with maturities of less than one year. At June 30, 2002, 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, 2002 follows:

Land and improvements	$ 1,184,660
Buildings and improvements	67,015,817
Equipment	18,015,270
Rare book collection	203,508
Joint ownership property	1,221,717
Total	87,640,972
Less accumulated depreciation	(36,955,116)
Net book value	$50,685,856

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

Of the $11,794,600 in cash received by the Institute, $5,625,000 represents monies received from the New Jersey Green Acres Fund to be repaid by the parties to the Easement. The Institute's pro rata share of $977,968 has been recorded as a note payable in the accompanying statement of financial position at June 30, 2002. The note payable bears interest at a rate of 2% and requires semi-annual payments through January 8, 2017.

The note is payable as follows at June 30, 2002:

2003	$ 56,511
2004	57,647
2005	58,805
2006	59,987
2007	61,193
Through 2017	683,825
Total	$ 977,968

D. LONG-TERM DEBT

A summary of long-term debt at June 30, 2002 follows:

Series F & G 1997 - NJEFA	$39,585,000
Series A 2001 - NJEFA	11,000,000
Less unamortized bond discount	(545,261)
Total long-term debt	$50,039,739

Interest expense on long-term debt for the year ended June 30, 2002 was $2,590,991.

In November 1997, the Institute received proceeds of the New Jersey Educational Facilities Authority offering of $16,310,000 Revenue Bonds, 1997 Series F and $26,565,000 Revenue Bonds, 1997 Series G of the Institute for Advanced Study Issue. A portion of the proceeds ($16,969,355) was used to retire the existing Revenue Bonds, 1991 Series. The remainder of the proceeds was used for renovations of members housing. In May 2001, the Institute received proceeds of the New Jersey Educational Facilities Authority offering of $11,000,000 Revenue Bonds, 2001 Series A of the Institute for Advanced Study issue. Proceeds are to be used for the construction of Bloomberg Hall and additional capital projects.

The bonds bear interest at rates ranging from 4% to 5%, payable semi-annually, are subject to redemption at various prices and require principal payments and sinking fund installments through July 1, 2031. The obligation to pay the Authority on a periodic basis, in the amounts sufficient to cover principal and interest due on the bonds, is a general obligation of the Institute.

The bonds are repayable as follows at June 30, 2002:

2003	$ 1,445,000
2004	1,515,000
2005	1,585,000
2006	1,665,000
2007	1,745,000
Through 2031	42,630,000
Total	$ 50,585,000

E. PENSION PLANS AND OTHER POST RETIREMENT BENEFITS

Separate voluntary defined contribution retirement plans are in effect for faculty members and eligible staff personnel, both of which provide for annuities, which are funded, to the Teachers Insurance and Annuity Association and/or the College Retirement Equities Fund. Contributions are based on the individual participants' compensation in accordance with the formula set forth in the plan documents on a nondiscriminatory basis. Contributions for the year ended June 30, 2002 totaled approximately $1,332,800.

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

The components of the periodic expense for these postretirement benefits for 2002 are as follows:

Postretirement Benefit Costs:	
Service Cost - benefits attributable to service during the year	$ 114,517
Interest Cost on Accumulated Postretirement Benefit Obligation	333,983
Total	$ 448,500

The actuarial and recorded liabilities for these benefits, none of which have been funded, are as follows at June 30, 2002:

Accumulated Postretirement Benefit Obligation:	
Retirees	$2,628,961
Fully Eligible Active Plan Participants	878,190
Other Active Plan Participants	1,378,100
Total	$4,885,251

For measurement purposes, an 11.0% trend rate was used for 2001 health care costs, with the rate decreasing ratably until the year 2009, and then remaining constant at 5.0% thereafter. The health care cost trend rate assumption has a significant effect on the amounts reported. For example, a 1% increase in the health care trend rate would increase the accumulated postretirement benefit obligation by $655,732 at June 30, 2002 and the net periodic cost by $85,014 for the year. The weighted average discount rate used in determining the accumulated postretirement benefit obligation was 7.5%.

F. 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 $3,169,903 as of June 30, 2002, and is not included in the accompanying financial statements.

G. FUNCTIONAL ALLOCATION OF EXPENSES

The costs of providing the various programs and other activities have been summarized on a functional basis in the statement of activities and cash flows. Accordingly, certain costs have been allocated among the programs and supporting services benefited. The net costs incurred by the Institute in operating both the Dining Hall ($395,649 net of $705,034 in revenues) and members' housing ($1,781,879 net of $1,267,537 in revenues) have been allocated among the programs and supporting services benefited. Included in the net costs incurred by the Institute that are allocated among the program is $1,283,000 of depreciation expense. An overhead charge is allocated to certain schools generally based upon their ability to recover such costs under the terms of various grants and contracts. Overhead allocated from administration and general expenses to various programs totaled $4,263,597 for the year ended June 30, 2002.

Interest expense on plant fund debt, net of interest income on short-term investments, is allocated to schools based upon their occupancy of academic buildings funded with such debt. Allocated interest expense totaled $2,719,879 and allocated interest income totaled $231,658 for the year ended June 30, 2002.

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

	2002
Expenses incurred were for:	
Salaries, wages, and benefits	$17,729,325
Stipends	5,524,642
Honoraria	227,261
Grants to other organizations	441,362
Supplies and travel	2,212,288
Services and professional fees	1,380,801
Depreciation	3,077,870
Interest	2,590,991
Total expenses	$33,184,540

H. 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.

I. TEMPORARILY AND PERMANENTLY RESTRICTED ASSETS

Temporarily restricted net assets are available for the following purposes:

	2002
Academic Services:	
Educational Programs	$76,440,117
Permanently restricted net assets are restricted to:	
Investments to be held in perpetuity, the income from which is expendable to support academic services	$44,185,569

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

J. DISCLOSURES ABOUT FAIR VALUE OF FINANCIAL INSTRUMENTS

The Institute is required by SFAS No. 107, *Disclosure About Fair Value of Financial Instruments*, to disclose the estimated fair value of financial instruments, both assets and liabilities recognized and not recognized in the balance sheet, for which it is practicable to estimate fair value.

The estimated fair value amounts in the following disclosure have been determined by the Institute using available market information and appropriate valuation methodologies. The estimates are not necessarily indicative of the amounts the Institute could realize in a current market exchange, and the use of different market assumptions or methodologies could have a material effect on the estimated fair value amounts.

June 30, 2002	REPORTED AMOUNT	ESTIMATED FAIR VALUE
Assets:		
Cash	$ 3,315,416	$ 3,315,416
Investments	360,898,411	412,101,861
Grant/contributions Receivable	2,250,780	2,250,780
Liabilities:		
Long-term debt	50,039,739	50,039,739
Note payable	977,968	977,968

The fair value of investments is based on fair market prices. The fair market valuation of grant/contributions receivable was estimated based on past cash collection experience. For long-term debt, the fair values are estimated using the interest rates currently offered for debt with similar terms and remaining maturities. The estimated fair value of mortgages

for faculty and staff is based upon similar terms at which similar institutions would provide as part of an overall compensation package to such individuals. The estimated fair value of the note payable is based on the discounted value of the future cash flows expected to be received from the note.

The fair value estimates presented are based on information available to the Institute as of June 30, 2002, and have not been revalued since that date. While the Institute is not aware of any significant factors that would affect the estimates since that date, current estimates of fair value could differ significantly from the amounts disclosed.

K. DISCLOSURES OF PROMISES TO GIVE (CONTRIBUTIONS RECEIVABLE)

June 30, 2002	
Unconditional promises to give:	
Less than one year	$ 251,965
One to five years	879,216
	1,131,181
Discount on promises to give	(78,397)
Total	$ 1,052,784

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