IAS

Institute for Advanced Study

Report for the Academic Year 2009–2010

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.

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

Newark, New Jersey

Cover: Members in the School of Social Science participating in "The Dewey Seminar: Education, Schools, and the State" Photo: Cliff Moore

The Institute for Advanced Study exists to encourage and support fundamental research in the sciences and humanities—the original, often speculative, thinking that produces advances in knowledge that change the way we understand the world.

THE SCHOOL OF HISTORICAL STUDIES, established in 1949 with the merging of the School of Economics and Politics and the School of Humanistic Studies, is concerned principally with the history of Western European, Near Eastern, and East Asian civilizations. The School actively promotes interdisciplinary research and cross-fertilization of ideas.

THE SCHOOL OF MATHEMATICS, established in 1933, was the first School at the Institute for Advanced Study. Several central themes in mathematics of the twentieth and twenty-first centuries owe their major impetus to discoveries that have taken place in the School, which today is an international center for research on mathematics and computer science. The School sponsors, jointly with Princeton University, the Program for Women and Mathematics.

THE SCHOOL OF NATURAL SCIENCES, established in 1966, supports research in broad areas of theoretical physics, astronomy, and systems biology. Areas of current interest include elementary particle physics, string theory, quantum theory, and quantum gravity; investigating the origin and composition of the universe; and conducting research at the interface of molecular biology and the physical sciences. The School sponsors Prospects in Theoretical Physics, a program for graduate students and postdoctoral scholars.

THE SCHOOL OF SOCIAL SCIENCE, founded in 1973, takes as its mission the analysis of societies and social change and is devoted to a multidisciplinary, comparative, and international approach to social research and the examination of historical and contemporary problems.

SPECIAL PROGRAMS include the Program in Interdisciplinary Studies, which explores different ways of viewing the world; the Artist-in-Residence Program; Director's Visitors; the IAS/Park City Mathematics Institute, which aims to increase awareness of the roles of professionals in all mathematics-based occupations; and the Science Initiative Group, dedicated to building science capacity in the developing world.

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Institute for Advanced Study

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The Institute for Advanced Study is a community of scholars whose primary purpose is the pursuit of advanced learning and scholarly exploration. Here Leonardo Senatore, Member in the School of Natural Sciences, works on an outdoor chalkboard with Matias Zaldarriaga, Professor in the School of Natural Sciences.

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 Caroline Bamberger 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 remained committed to its founding principles, and its record of definitive scholarship and scientific achievement is unsurpassed.

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 new directions in their research or to complete a major piece of work away from the many obligations of working life at a university. At a time when pure research and scholarly activities are undervalued, the opportunities that the Institute provides have never been more necessary. 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.

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 permanent Faculty of twenty-eight eminent 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 scholars.

The Faculty defines the major themes and questions that become the focus of each School's seminars and other activities, and selects and works closely with visiting Members. Small in number and organized into four Schools (Historical Studies, Mathematics, Natural Sciences, and Social Science), the Faculty and Members interact with one another without any departmental or disciplinary barriers.

Each year the Institute awards fellowships to some 190 visiting Members from about one hundred universities and research institutions throughout the world. The Institute's more than six thousand former Members hold positions of intellectual and scientific leadership in the United States and abroad. Some twenty-two Nobel Laureates and thirty-eight out of fifty-two Fields Medalists, as well as many winners of the Wolf and MacArthur prizes, have been affiliated with the Institute. The Institute does not receive income from tuition or fees; resources for operations come from endowment income, grants from private foundations and government agencies, and gifts from corporations and individuals.

Report of the Chairman

More than eighty years ago, Louis Bamberger and his sister Caroline Bamberger Fuld, entrepreneurs who had made a fortune from their department stores, were in search of a philanthropic use of a large sum of money. They approached Abraham Flexner, an expert on higher education, and the leading expert on medical education, who persuaded the Bambergers that what was needed in the United States, and beyond, was an institution dedicated to advancing the frontiers of knowledge. Hence, the Institute for Advanced Study was established in Princeton in 1930 with Flexner as its founding Director.

From its beginnings, benefactors have played an enormously important role in the continuance of the Institute's mission of providing a place where scholars from around the world would be freed from administrative and teaching duties and could devote themselves to curiosity-driven rather than objective-driven research. This mission produces benefits not only in fundamental research and the personal development of its scholars; it also has served as inspiration for the proliferation of institutions that have followed the Institute's example.

Last fall, the Institute completed a Decadal Review that reached three conclusions: that the mission of the Institute remains at least as relevant today as at its founding; that the size and scope of the Institute are now appropriate for its mission and that its essential character would not benefit from further expansion; and that its endowment must be strengthened in order to secure the Institute's ability to provide its Faculty and Members with complete academic freedom. The Institute's Trustees take their responsibility toward the realization of these goals immensely seriously as demonstrated by the $10 million per year commitment that they have made toward operating costs for three years through 2012.

CLIFF MOORE

In the past year, we were very pleased to welcome three new Trustees: Harold T. Shapiro, President Emeritus and Professor of Economics and Public Affairs of Princeton University; E. Robert Fernholz, Founder and Chief Investment Officer of INTECH; and John S. Hendricks, Founder and Chairman of Discovery Communications.

We are grateful for the exceptional dedication of three Trustees who retired from the Board in May and were elected Trustees Emeriti: Richard B. Black, President and Chief Executive Officer of ECRM Incorporated, the outgoing Vice Chairman of the Board who served as a Trustee since 1990; Martin A. Chooljian, President of CH Capital Investments, who served as a Trustee since 1997; and James D. Wolfensohn, Chairman and Chief Executive Officer of Wolfensohn & Company, who served as a Trustee since 1979 and was Chairman of the Board from 1986 to 2007. We are also grateful to David K.P. Li, Chairman and Chief Executive of the Bank of East Asia, who was elected Trustee Emeritus in October.

It is highly encouraging that two donor groups, the Friends of the Institute, which provides the Institute with its largest source of unrestricted income, and the Association of Members of the Institute for Advanced Study, achieved records for the number of donors and total gift amount in the last year. We are deeply appreciative to Martin Chooljian and his wife Helen, Friends since 1992, who put forth a generous challenge gift to the Friends, increasing contributions substantially.

The Institute depends on, and is grateful to, the Centennial Council, its most generous individual contributors, as well as the foundations, corporations, and other benefactors who make it possible for the Institute to provide what Flexner described as "more light." In announcing the appointment of Albert Einstein as a Professor in the Institute's School of Mathematics in 1932, Flexner explained that what the world needed was "more light to illuminate what is obscure" and articulated his view that the Institute's dedication to enabling scholars "of superior wisdom and capacity to indulge their curiosity and to promote understanding will in due course produce consequences of which neither they nor we now dream." The Board and I look forward to continuing to work with the Director, Faculty, Staff, and our many supporters throughout the world to facilitate the illuminating consequences of this most worthwhile endeavor.

Charles Simonyi
Chairman

Report of the Director

On May 20, 1930, a certificate of incorporation was filed with the State of New Jersey, marking the creation of the Institute for Advanced Study. Established to be neither a university nor a research institute, in the narrow sense of being dedicated to specific projects, the Institute fulfilled the dreams with which its first Director, Abraham Flexner, inspired its founders, Louis Bamberger and his sister Caroline Bamberger Fuld, who designed it solely to encourage and support fundamental scholarship.

To celebrate its eightieth anniversary, the Institute has planned two weekends for the fall of 2010, which will illustrate the work of its Schools and celebrate the Institute's history and continued vitality. To bring up to date the 1980 publication *A Community of Scholars: The Institute for Advanced Study 1930–1980*, produced for the fiftieth anniversary, the Institute has published a list on its website of the scholars and scientists who have been Members or Visitors at the Institute from its founding to the present day—more than seven thousand historians, mathematicians, scientists, and social scientists, drawn from around the world. A photographer was in residence throughout the academic year, living within our academic village and capturing the Institute's daily intellectual, social, and family life. A selection of the photographs taken will be exhibited throughout the fall term and a book, containing more of them, together with essays about the Institute by members of its wider community, will be published next spring.

All of this helps to convey what is very evident to those of us here today—that the Institute remains a uniquely stimulating and productive environment. Flexner and the Bambergers were clear that the Institute should not allow itself to be seduced into pursuing preset objectives or employing superficial short-term indicators to judge its success.


CLIFF MOORE

Ultimately, the real criteria by which the work of the Institute should be judged are the long-term significance of the new ideas developed here and the impact the Institute has on the intellectual lives of its Members. In the past year, a number of Faculty and Members were acknowledged for the importance of their contributions to knowledge: Avishai Margalit, George F. Kennan Professor in the School of Historical Studies, was awarded the Israel Prize in Philosophy; in the School of Mathematics, Enrico Bombieri, IBM von Neumann Professor, received the King Faisal International Prize, Professor Jean Bourgain was awarded the Shaw Prize in Mathematics, and Bao Châu Ngô, a Member in the School for the last three and a half years, was awarded a Fields Medal; Edward Witten, Charles Simonyi Professor in the School of Natural Sciences, was the recipient of the Lorentz Medal of the Royal Netherlands Academy of Arts and Sciences and the Isaac Newton Medal of the Institute of Physics.

We are immensely pleased that Angelos Chaniotis, formerly Senior Research Fellow in Classics at All Souls College, Oxford, will join the Institute as a Professor in the School of Historical Studies in July. Angelos works in innovative ways on a wide variety of topics: war, memory, identity, emotions, the communicative aspects of rituals, and strategies of persuasion in the ancient world. We look forward to the continued participation in our community of Stephen Adler, Professor in the School of Natural Sciences, and Heinrich von Staden, Professor in the School of Historical Studies, who will become Professors Emeriti at the beginning of July.

We were profoundly saddened by the death in February of Carl Kaysen, Director of the Institute from 1966–76, who was responsible for the founding of the School of Social Science in 1973. As Freeman Dyson, Professor Emeritus in the School of Natural Sciences, observed, "Carl had a wonderful gift for demolishing lofty pretensions with simple facts. He lived in the real world. He did not expect our gratitude, but he earned it."

In a world in which funding bodies tend to support research that has specific outcomes promised in advance, the freedom provided by the Institute to its permanent Faculty and Members is increasingly rare. The Institute's continuing commitment to its original mission reflects both its growing relevance and, crucially, the independence provided by the Institute's endowment. In light of this and the global economic climate, we appreciate deeply the crucial financial support provided by the Board of Trustees and the record level of donations made in the last year by former Members and the current Friends of the Institute.

The Decadal Review, which concluded last fall, reaffirmed the Institute's world-leading role as an institution devoted to disinterested research, driven by intellectual curiosity towards the discovery of what could not have been conceived in advance. I am profoundly grateful to all of the members of our community—Trustees, Faculty, Members, Friends, Staff, and other benefactors—for their contributions to the Institute and their support of its mission, which matters even more today than eighty years ago.

Peter Goddard
Director

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Beyond the individual research projects pursued, many events drew groups of scholars together for lectures and discussions that facilitated the exchange of ideas across fields and regions. Professor Patricia Crone (left) spent the year working on her book about the coming of Islam in rural Iran.

School of Historical Studies

Faculty

Yve-Alain Bois

Caroline Walker Bynum

Patricia Crone, Andrew W. Mellon Professor

Nicola Di Cosmo, Luce Foundation Professor in East Asian Studies

Jonathan Israel

Avishai Margalit, George F. Kennan Professor

Heinrich von Staden

Professors Emeriti

Glen W. Bowersock

Giles Constable

Oleg Grabar

Christian Habicht

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 on Greek and Roman civilization, medieval, early modern and modern European history, history of art, and the history of science, but over time the School's interests have been enlarged to include Islamic culture, the history of China and Japan, modern international relations, and more recently, music studies. Over two thousand scholars have come to the School since its founding, and their work in these and other areas of research regularly has been enriched by the fruitful interaction of disciplines in a small and collegial community.

The School's broad interpretation of the meaning of "Historical Studies" continued to be reflected in the research projects pursued by the forty-four Members and twelve Visitors who joined the School for the academic year 2009–10. Their research spanned a diverse range of historical subjects, including the history of art, philosophy, music, religion, international relations, literature, science, and medicine, as well as ancient history and Classics. The periods studied ranged from as far back as 1420 B.C.E. to the late twentieth century. Research carried out in the School also extended over a wide geographic range, including Europe, the Middle East, and East and South Asia. Members received support both from the Institute's own funds and from a variety of external sources, including the National Endowment for the Humanities, the Andrew W. Mellon Foundation, the Gerda Henkel Stiftung, the Delmas Foundation, and the American Council of Learned Societies.

Beyond the individual research projects pursued, many events drew groups of scholars together for lectures and discussions that facilitated the exchange of ideas across fields and regions. These included a regular series

of presentations by individual Members to the School as a whole at the Monday Lunchtime Colloquia, as well as invited lectures, seminars, and a number of smaller groups that met on a regular basis to present and discuss topics of mutual interest. (See the list of events at the end of this section.)

ACADEMIC ACTIVITIES

In 2009–10, Professor **Yve-Alain Bois** finished his work on the catalogue raisonné of the Henri Matisse holdings in the Barnes Foundation (Merion, Pennsylvania), whose publication is forthcoming. He concentrated his work on a single long-term project, the catalogue raisonné of the paintings and sculptures of the American artist Ellsworth Kelly, which he would like to bring to fruition within the next two academic years. As a result, he declined all writing commissions but one, that of an essay on the Belgian artist Georges Vantongerloo (1886–1965) for the catalogue of his retrospective exhibition at the Museo Reina Sofía in Madrid.

In the fall, he gave a lecture on John Cage at the Mildred Lane Kemper Art Museum and a graduate seminar on "non-composition" at the Sam Fox School of Design & Visual Arts (both at Washington University in St. Louis); in the spring, he held a seminar for curators at the Museum of Modern Art, New York, on the work of the Brazilian artist Lygia Clark (1920–88). In April, he also gave the Clarkson Lecture in the history of architecture at the Department of Architecture of University at Buffalo, The State University of New York, as well as a series of three graduate seminars (on art and architecture, on axonometry, and on horizontality in modern sculpture); in May, he gave lectures on Matisse at the Tampa Museum of Art and at the Art Institute of Chicago, in conjunction with exhibitions in these museums; in June, he gave a lecture on "pseudomorphism," a topic on which he plans to write a book when the Kelly project is finished, at the Institut National d'Histoire de l'Art in Paris. He continued to work with Harvard University graduate students and served on several dissertation committees in other institutions as well. He also participated in a seminar on abstract art jointly held by Professor Hal Foster (Princeton University) and curator Leah Dickerman (Museum of Modern Art). At the Institute, he organized a series of art history seminars (either at lunch and reserved to Members or in the evening and open to scholars from neighboring institutions), and with the Department of Art and Archaeology of Princeton University he coorganized a third series of art history lectures, whose theme this year was "Art and Its Audiences."

While on sabbatical in the fall of 2009, Professor Caroline Bynum (left) traveled to India, where she began to work on the question of why statues that appear to receive quite similar treatment in religious processions in Hinduism and Christianity in fact represent radically different ideas both of the material world and of encounter with the sacred.

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Professor **Caroline Bynum** completed a study of late medieval devotional objects, *Christian Materiality*, which is scheduled to appear from Zone Books in late 2010 or early 2011. She published eight book reviews, an article on graduate teaching, and a study of medieval and early modern devotion to the wound in Christ's side. While on sabbatical in the fall of 2009, she traveled to India, where she began to work on the question of why statues that appear to receive quite similar treatment in religious processions in Hinduism and Christianity in fact represent radically different ideas

both of the material world and of encounter with the sacred. In another move toward comparative study, she has organized with Professor Julia Smith of the University of Glasgow (a former School of Historical Studies Member) a workshop to take place at the Institute in July 2010 on objects that have been thought of as "relics" in Islam, Christianity, Buddhism, and several indigenous African religions.

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The School's broad interpretation of the meaning of "Historical Studies" continued to be reflected in the research projects pursued by its Members and Visitors, whose research spanned a diverse range of historical subjects, including the history of art, philosophy, music, religion, international relations, literature, science, and medicine, as well as ancient history and Classics.

Bynum lectured at the Academy of Fine Arts and Literature in New Delhi; at the Heyman Center for the Humanities at Columbia University; at Hood College; at Washington University in St. Louis; at the Pingry School in Martinsville, New Jersey; and at the Zentrum für Literatur- und Kulturforschung in Berlin. She gave the Priestley Lectures at the University of Toronto, the Danforth Lecture in the Study of Religion at Princeton, and a response to a Davis Seminar presentation, also at Princeton. Together with Yaakov Blidstein of Ben-Gurion University, she continues to cochair the Commission on the Humanities in Israel, funded jointly by the Israel Council on Higher Education and the Yad-Hanadiv Foundation. Her last graduate student from Columbia University defended a dissertation in the fall of 2009. In the spring of 2010, Bynum again organized the IAS Medieval Table, which met every Wednesday at lunchtime for presentation of individual research and discussion of general methodological issues. She also organized and chaired, with Professor Piet Hut of the Program in Interdisciplinary Studies and Professor Nicola Di Cosmo of the School of Historical Studies, the early evening series After Hours Conversations, designed to increase intellectual exchange across the four Schools at the Institute.

Patricia Crone, Andrew W. Mellon Professor, spent the year working on her book about the (mostly rebellious) response to the coming of Islam in rural Iran. This book has taken much longer than anticipated because understanding the nature of the rural religion proved to require far closer textual knowledge of Zoroastrianism, Manichaeism, Christianity, and Gnosticism than she had imagined. The research could easily continue forever. The point has come, however, where it may be better to call a halt to it for purposes of this book and to continue in separate articles, so in that sense the end is now in sight.

In between working on the book, Crone worked on the so-called polytheists in the Qur'an: where on the religious map of late antiquity do they belong? She completed a long article examining exactly what they said, or are accused of saying, about God and the lesser beings, which is meant to serve as the starting point for a series of articles investigating their beliefs and communal membership. In fact, a second article (examining their concept of messengers) is in press already, but this one will come out first. Crone also drafted a third article on those of them who denied the resurrection and the afterlife altogether. Her article "No Compulsion in Religion" finally appeared, but several other pieces are still languishing in overdue festschrifts and memorial volumes.

Crone ran two groups at the Institute. One was the empire group, revived yet again and proving as stimulating as ever. The other was a Persian reading

group led by Member Mohammad-Reza Shafii-Kadkani, drawing participants from outside the Institute. A third group, planned by a Member in the Classics section, unfortunately did not come off. In November, Crone was surprised to receive an honorary doctorate from her alma mater, the University of Copenhagen, and went there to collect it and to give a seminar in Copenhagen and at Aarhus. She also presented papers in London, Gotha, and Austin, and she will also present a paper at a conference on Zoroastrianism in Oxford in July.

Nicola Di Cosmo, Luce Foundation Professor in East Asian Studies, continued to work on the early history of the Manchus (1590–1640). This study aims to reassess the economic, social, and military transformations that took place in Manchuria before the conquest of China by focusing on the forms of integration between Manchuria and the surrounding powers (Mongolia, China, and Korea) at a time of increased circulation of goods, money, and technology.

In the fall, he coorganized the After Hours Conversations series, and throughout the year he ran the East Asian Seminar with the School's Asianists and some Members from Social Science. In all, fourteen talks were held, ranging from Chinese art, archaeology, and history, to Buddhist philosophy, Japanese history, and medical care in nineteenth-century India.

In the second term of the academic year, Professor Margalit conducted a seminar for Members of the School of Historical Studies dealing with twentieth-century contemporary history, with particular stress on counterfactual accounts of major historical events, namely on possibilities that could have happened but did not.

In October 2009, he presented a paper at the Bard Graduate Center on the connections between Mediterranean and Asian commercial networks in the fourteenth century. In November, he coorganized with Zvi Ben-Dor of New York University a workshop on the sources of the Mongol Empire (New York University, Florence). In the spring term, he gave the Harn Eminent Scholar Lecture at the University of Florida, "The Materiality of the Inner Asian Nomads: The Relationship between Archaeology and History in a Nomadic Context." He also spoke at the University of Virginia and Harvard University.

A volume he coedited, *The Cambridge History of Inner Asia: The Chinggisid Age* (Cambridge University Press), was published in October 2009. The following essays were also published: "Sobre los Orígenes de la Gran Muralla" in *La Construcción del Poder en la China Antigua*, edited by Alicia Relinque Eleta (Granada, 2009); "The Manchu Conquest in World-Historical Perspective: A Note on Trade and Silver" in *Journal of Central Eurasian Studies* 1 (2010); "La 'Guerra Giusta' nella Conquista Mancese della Cina" in *Nuova Rivista Storica* 93:2 (2009); "Black Sea Emporia and the Mongol Empire: A Reassessment of the Pax Mongolica" in *Journal of the Social and Economic History of the Orient* 53 (2010); "Gli Imperi Nomadi nella Storia della Cina Imperiale" in *La Cina Vol. 2: Dai Tre Regni ai Qing*, edited by Mario Sabattini and Maurizio Scarpari (Torino, 2010); "Ethnography of the Nomads and 'Barbarian' History in Han China" in *Intentional History: Spinning Time in Ancient Greece*, edited by Lin Foxall, et al. (Stuttgart, 2010); "Han Frontiers: Towards an Integrated View" in *Journal of the American Oriental Society* 129:2 (2009); "Impero e Frontiere nella Cina Antica: 200 BC–200 AD" in *Gli Imperi: dall'Antichità all'età Contemporanea*, edited by Ruth Ben-Ghiat (Il Mulino, 2009).

Professor **Jonathan Israel** brought the third part of his general history of the Western Enlightenment, covering the period 1750 to the beginning of the French Revolution, almost to completion. It will be the largest of the three

volumes in the trilogy. Besides intensive writing and rewriting in rounding off the volume, he carried out final research at the British Library, Göttingen, the Vienna Hofbibliothek, the Archivo de Indias in Seville, and Wolfenbüttel. He expects to deliver the final version of the manuscript in August 2010.

He delivered public lectures and gave papers at international conferences during this year at São Paulo, Campinas (Brazil), Kingston (Jamaica), Harvard, Bloomington, New York (Columbia University), University College London, Aarhus (Denmark), and Seville and had discussion classes and meetings at several of these places with graduate students, advising on research.

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Professor Nicola Di Cosmo (right) continued to work on the early history of the Manchus in an effort to reassess the economic, social, and military transformations that took place in Manchuria before the conquest of China.

Besides book reviews, his publications during this year were a short book, *A Revolution of the Mind: Radical Enlightenment and the Intellectual Origins of Modern Democracy* (Princeton, 2010); the article "Democracy and Equality in the Radical Enlightenment: Revolutionary Ideology Before 1789" in *Rethinking the Atlantic World: Europe and America in the Age of Democratic Revolutions,* edited by Manuela Albertone and Antonino de Francesco (New York, 2009); and a review essay on seventeenth-century Anglo-Dutch cultural exchange for the *New York Review of Books*. He also participated in an exchange of views with another Enlightenment scholar, Margaret Jacob, published as "Lumières Radicales, Radicalisme des Lumières," interviews with Margaret Jacob and Jonathan Israel in *Lumières: Publication du Centre Interdisciplinaire Bordelaise d' étude des Lumières* XIII (2009), edited by Jean Mondot and Cécile Revauger. During this year, his *Radical Enlightenment* (2001) appeared in Portuguese translation at São Paulo and his *Enlightenment Contested* (2006) in Dutch translation at Franeker.

Avishai Margalit, George F. Kennan Professor, published his book *On Compromise and Rotten Compromises* (Princeton University Press). In October, he delivered the Marie Claire lecture, "Betraying Your Class," in the Chapel Hill Colloquium in Philosophy. The lecture is part of Margalit's work on political betrayal to be published next year as a book by Harvard University Press.

In the second term of the academic year, Margalit conducted a seminar for Members of the School of Historical Studies dealing with twentieth-century contemporary history, with particular stress on counterfactual accounts of major historical events, namely on possibilities that could have happened but did not. In April, Margalit received the Israel Prize, the highest civic prize in Israel, for philosophical inquiry.

In August, Professor **Heinrich von Staden** participated in the Congress of the International Federation of Classical Studies at Humboldt University in Berlin; he served as president of this federation of classical associations, representing all parts of the world, from 2004–09.

From January to May, von Staden held the Sather Professorship of Classical Literature at the University of California, Berkeley. In addition to teaching a graduate seminar at Berkeley, he gave the Sather Classical Lectures (a series of six public lectures) on "The Scientific Lives of Animals: Ancient Greece

and Rome." In April and May, he also presented lectures on aspects of this topic at Stanford University and at various branches of the University of California, including Los Angeles, Santa Barbara, and Davis. In April, he also gave a talk at the University of Lausanne on current methodological issues in the history of medicine at a workshop for doctoral and postdoctoral researchers from a variety of European countries. On the occasion of the meeting of the Institute's Board of Trustees in early May, von Staden gave a public lecture at the Institute on animal experimentation in ancient biology and medicine. Also in May, he presented some of his research on animals in ancient science to the Bay Area History of Medicine Club in San Francisco. In June, he gave the second annual public CMG Lecture at the Berlin-Brandenburgische Akademie der Wissenschaften.

During the academic year, Professor Bowersock published articles on the epigraphy of Mount Hermon from Lebanon and Syria, on the Christian kingdom of Axum in Ethiopia, on the memory of Rome in the late antique Near East, and on pantomimes.

In early June, the University of Lausanne awarded von Staden an honorary doctorate, for which he was nominated jointly by the university's Faculty of Letters and its Faculty of Biology and Medicine. This joint nomination was a first in the long history of the University of Lausanne, according to a presentation read at the award ceremony.

In addition to several book reviews, von Staden published several articles in the academic year 2009–10, including "Staging the Past, Staging Oneself: Galen on Hellenistic Exegetical Traditions" in *Galen and the World of Knowledge*, edited by Christopher Gill, Tim Whitmarsh, and John Wilkins (Cambridge University Press, 2009); and "The Hellenistic character of Celsus, Artes X–XI: History, Structure, and System," in *Fito-zooterapia Antigua y Altomedieval: Textos y Doctrinas*, edited by Arsenio Ferraces Rodríguez (Universidade da Coruña, 2010). Most of his research this year was focused on animals in ancient science, medicine, and natural history. In May and June, he started revising and amplifying his Sather Classical Lectures for publication.

Professor Emeritus **Glen W. Bowersock** went to Moscow in September 2009 to participate in an international conference organized by the Russian Academy of Sciences in memory of former Institute Member Gregory Bongard-Levin. In addition to personal evocations of Bongard-Levin, he delivered a paper on the Pontic king Mithridates Eupator in connection with recent Russian discoveries at the excavation of Phanagoreia. In New York, in February 2010, he delivered a paper, including personal recollections, about the eminent historian of Greek and Jewish antiquity, Elias Bickerman (another former Institute Member), on the occasion of the publication of a biography of Bickerman by Albert Baumgarten. Bowersock continued his supervision of the Fonds Louis Robert at the Académie des Inscriptions et Belles-Lettres in Paris, and he also continued to serve on the advisory/search committee for the Institute for the Study of the Ancient World, founded by Institute Trustee Shelby White at New York University. He traveled to Florence in the spring to chair a meeting of the Consiglio Scientifico of the Istituto Italiano di Studi Umanistici. At the same time, he resumed his work as panel chair for grants to advanced scholars in the humanities and social sciences from the European Research Council in Brussels.

During the academic year, Bowersock published articles on the epigraphy of Mount Hermon from Lebanon and

Member Judith Pfeiffer presented "The 'Mongol Moment' in the Middle East—Perspectives and Debates" at a lunchtime colloquium.

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Syria, on the Christian kingdom of Axum in Ethiopia, on the memory of Rome in the late antique Near East, and on pantomimes. He also published a number of reviews in the *New York Review of Books*, the *London Review of Books*, and the *New Republic* on such topics as Byzantium, Achilles, Roman epigrams, Greek pederasty, and Sir Maurice Bowra. He has begun preparing a set of three lectures, "Empires in Collision," to be delivered in Jerusalem in memory of Menahem Stern, on the conflict between Byzantium and Persia in the lifetime of Muhammed and during the Islamic conquests that followed his death. This work will serve as the foundation for two books on Arabia and the Near East in late antiquity.

CLIFF MOORE

Professor Emeritus Oleg Grabar (at a School seminar) attended meetings of the Visiting Committees of the Islamic Department at the Metropolitan Museum of Art and of the Sahib Sabanci Museum in Istanbul, as well as a meeting in Berlin about the reorganization of the Islamic galleries there.

Professor Emeritus **Giles Constable** published one book and three articles during the academic year 2009–10. His and William Connell's book on Antonio Rinaldeschi has been translated into Italian and Russian. Two other books are in course of publication. He gave lectures at Princeton University, the Istituto Italiano di Scienze Umane in Florence, and Seton Hall University and spoke at the meetings of the Midwest Medieval History Conference in Notre Dame and the Research Group on Manuscript Evidence (Princeton) and at conferences at Brescia, the Villa Vigoni, Princeton University, and the University of Colorado (Boulder). He attended, and presided at sessions in, meetings at Troyes, the Delaware Valley Medieval Association, the Medieval Academy of America, and Princeton University. He continued to serve on the editorial boards of several book series and scholarly journals, as a reviewer for the American Philosophical Society, and on the selection committee of the Delmas Foundation.

Professor Emeritus **Oleg Grabar** attended meetings of the Visiting Committees of the Islamic Department at the Metropolitan Museum of Art and of the Sahib Sabanci Museum in Istanbul, as well as a meeting in Berlin about the reorganization of the Islamic galleries there. He published three books: *Images en Terres d'Islam* (RMN, Paris, 2009) with an English translation, *The Decorated Page*; *Where Heaven and Earth Meet*, edited with Benjamin Kedar (Jerusalem, 2009); facsimile edition of the Paris 1199 *Kitab al-Diryaq* (London, 2008); and the following articles: "Introduction," "The Haram al-Sharif as a Work of Art," and "Epilogue" in *Where Heaven and Earth Meet*; "Seeing and Believing" in the *New Republic* (November 4, 2009); "Schreiben, Lesen, Verzieren" in *Taswir Islamische Bildwelten und Moderne* (Berlin, 2009); "Introductory Remarks" in *The Knowledge Economy*, edited by Myriam Wissa (Barcelona, 2010); "Entretien: l'Art Islamique et l'Antiquité" in *Anabases* 11 (2010); and "Riegl, the Arabesque, and Islamic Art" in *Alois Riegl Revisited* edited by Peter Noeven, et al. (Vienna, 2010).

Professor Emeritus **Christian Habicht** read the proofs for the first two volumes of Polybius's *The Histories*, a new bilingual edition (Greek and English) of the Loeb Classical Library, to which he contributed the introduction, select bibliography, notes to the text, and indices. In September, he participated in an International Ptolemaic Colloquium "Ptolemaic Waterways and Power," organized by Kostas Buraselis, a former Member in the School, and held in Athens. At the opening, he delivered a tribute to the late Frank W. Walbank, to whose memory the symposium was dedicated; gave a paper,

Professor Paret analyzed Ernst Barlach's drawings on the medieval Nibelungen epic in relation to Barlach's sculptural and graphic work, against the seven-hundred-year-long reception of the poem in Germany, and the interaction of ideology and modernism in the Weimar Republic and the Third Reich.

"Eudoxos of Kyzikos and the Ptolemaic Exploration of the Sea-Route to India"; and chaired a session. A festschrift in Habicht's honor, *Attic Epigraphy*, was presented to him at a ceremony held at the Greek Epigraphic Society. His publications were "How I Came to Greek Epigraphy" in *Attic Epigraphy* (Athens, 2010); "Ehren für Cn. Domitius Calvinus in Nysa," written with Wolfgang Blümel and T. Corey Brennan, in *Zeitschrift für Papyrologie und Epigraphik* 169 (2009). Other papers written during the year are awaiting publication. In April, volumes 1 and 2 of Polybius's *The Histories* were published by Harvard University Press, translated by W. R. Paton, revised by Frank W. Walbank and Christian Habicht.

Professor Emeritus **Irving Lavin** gave his annual seminar in Italian at the Istituto Italiano per gli Studi Filosofici in Naples, Italy. He participated in two major colloquia, both held in Rome, Italy: the five hundredth anniversary of the founding of the Basilica of New St. Peter's (organized by the Biblioteca Apostolica Vaticana), where he spoke on the bronze baldachin of Gian Lorenzo Bernini; and the hundredth anniversary of the birth of Giulio Carlo Argan, the distinguished art historian and mayor of Rome (organized by the Università degli Studi di Roma, La Sapienza), where he spoke on Argan's contribution to the study of rhetoric in the history of art. He participated as a member of the final jury of Frank Gehry's graduate seminar at the School of Architecture, Yale University. Lavin's publications during this year include the second volume of his collected works on Bernini, *Visible Spirit: The Art of Gian Lorenzo Bernini* (The Pindar Press, 2009). He also published his first article to appear online: "Picasso's Lithograph(s) 'The Bull(s)' and The History of Art in Reverse (with a postscript on Picasso's Bulls in American Retrospect: John Cage, Jasper Johns and Roy Lichtenstein)" in *Ojo* 10 (May 2010), in a journal published by the Administration Picasso in Paris (www.picasso.fr/us/picasso_page_index.php).

Professor Emeritus **Peter Paret** and Helga Thieme of the Ernst Barlach Foundation in Germany completed their manuscript on Ernst Barlach's drawings on the medieval Nibelungen epic, in which they analyze the drawings in relation to Barlach's sculptural and graphic work, against the background of the seven-hundred-year-long reception of the poem in Germany, and the interaction of ideology and modernism in the Weimar Republic and the Third Reich. Paret also wrote an essay on comparative history, "Two Historians on Defeat in War and its Causes," which was published in *Historically Speaking* XI (June 2010). He is currently preparing lectures, which he will give in Germany this fall and in the coming year.

The Lees Knowles Lectures that Paret gave at the University of Cambridge in 2008, *The Cognitive Challenge of War*, were published by Princeton University Press in the fall of 2009, and early this year Cambridge University Press reprinted his volume of essays on cultural history and the history of art, *German Encounters with Modernism, 1840–1945*, which first appeared in 2002.

Professor Emeritus **Morton White** has completed a manuscript of a book that now bears the title *Reflections on the Roots of Rationalism*, a critical exposition of views on necessary truth, a central concept in the writings of Descartes, Hobbes, Leibniz, and Kant. It will soon be submitted to a publisher and the author hopes that it will appear during his lifetime. By contrast, he hopes that a book he first published in 1962 with the late Lucia Perry White—*The Intellectual versus The City: From Thomas Jefferson to Frank Lloyd Wright*—will soon be reissued with a new introductory essay by N. S. Slabbert.

MEMBERS AND VISITORS

f First Term ✦ *s* Second Term ✦ *v* Visitor

John Baines
Egyptology ✦ University of Oxford
Funding provided by The Andrew W. Mellon Foundation

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George William Cottrell, Jr. Member

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Funding provided by The Andrew W. Mellon Foundation

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Hetty Goldman Member

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Classics, History of Science ✦ Institute for Research in Classical Philosophy and Science, Princeton, New Jersey ✦ *v*

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Hans Kohn Member; additional funding provided by the Willis F. Doney Membership

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Funding provided by The Andrew W. Mellon Foundation Fellowships for Assistant Professors

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Funding provided by the National Endowment for the Humanities and The Andrew W. Mellon Foundation

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Funding provided by the National Endowment for the Humanities; additional funding provided by the Willis F. Doney Membership

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Fulbright Visiting Scholar

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Frederick Burkhardt Fellowship funded by the American Council of Learned Societies

Ginger Suzanne Frost
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Hans Kohn Member

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Hetty Goldman Member

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Funding provided by The Herotodus Fund

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Elizabeth and J. Richardson Dilworth Fellow in Historical Studies

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Felix Gilbert Member

Jinah Kim
Art History ✦ Vanderbilt University
Funding provided by The Andrew W. Mellon Foundation Fellowships for Assistant Professors

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Elizabeth and J. Richardson Dilworth Fellow in Historical Studies; additional funding provided by the Willis F. Doney Membership

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Friends of the Institute for Advanced Study Member

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Early Modern European History ✦ Universität Heidelberg ✦ *v, s*

Nicholas McDowell
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Funding provided by The Herotodus Fund

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Funding provided by the Florence Gould Foundation Fund

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Funding provided by The Andrew W. Mellon Foundation

Lauren Nauta Minsky
South Asian History of Science and Medicine ✦ New York University Abu Dhabi
Funding provided by The Andrew W. Mellon Foundation Fellowships for Assistant Professors

Frances Nethercott
Russian History ✦ University of St Andrews
Funding provided by the Patrons' Endowment Fund

Nicholas Lithgow Paul
Medieval History ✦ Fordham University
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David Petrain
Art History, Classics ✦ Vanderbilt University
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Judith Pfeiffer
Islamic History ✦ University of Oxford
Gerda Henkel Stiftung Member

Verity Jane Platt
Classical Art History ✦ The University of Chicago ✦ *s*
Funding provided by The Andrew W. Mellon Foundation Fellowships for Assistant Professors

Christine Proust
History of Science ✦ CNRS and Université Paris Diderot ✦ *f*
Funding provided by the Otto Neugebauer Fund

Susan K. Rankin
Musicology ✦ University of Cambridge ✦ *f*
Edward T. Cone Member in Music Studies; additional funding provided by The Andrew W. Mellon Foundation

James Boykin Rives
Ancient History ✦ University of North Carolina at Chapel Hill
Funding provided by the National Endowment for the Humanities and The Andrew W. Mellon Foundation

Klaas Ruitenbeek
Chinese Studies ✦ Royal Ontario Museum, Toronto ✦ *v, f*

Mohammad-Reza Shafii-Kadkani
Islamic Religious History and Literature ✦ University of Tehran
Funding provided by The Andrew W. Mellon Foundation

William G. Thalmann
Classics ✦ University of Southern California ✦ *s*
Funding provided by The Andrew W. Mellon Foundation

Lluís To-Figueras
Medieval History ✦ University of Girona
Agnes Gund and Daniel Shapiro Member

Stephen V. Tracy
Greek History and Epigraphy ✦ The American School of Classical Studies at Athens ✦ *v*

Franciscus Verellen
East Asian Studies ✦ École Française d'Extrême-Orient
Edwin C. and Elizabeth A. Whitehead Fellow; additional funding provided by The Andrew W. Mellon Foundation

Q. Edward Wang
Chinese History and Comparative Historiography ✦ Rowan University ✦ *s*
The Starr Foundation East Asian Studies Endowment Fund Member; additional funding provided by The Andrew W. Mellon Foundation

Don Wyatt
Chinese Intellectual History ✦ Middlebury College ✦ *v, s*

İpek Kocaomer Yosmaoğlu
Ottoman History ✦ University of Wisconsin–Madison
Funding provided by The Andrew W. Mellon Foundation Fellowships for Assistant Professors

Susan Youens
Musicology ✦ University of Notre Dame ✦ *s*
Edward T. Cone Member in Music Studies

RECORD OF EVENTS

September 30
East Asian Studies Seminar ✦ *Material Traces of a General in the Ming-Qing War: Zu Dashou (ca. 1565–1656)* ✦ **Klaas Ruitenbeek**, Royal Ontario Museum, Toronto; Visitor, School of Historical Studies

October 1
Modern History (Pre-1850) Historians Workshop ✦ *Introductory Session* ✦ **Jonathan Israel**, Professor, School of Historical Studies

October 5
Historical Studies Lunchtime Colloquia Series ✦ *Introductions* ✦ **Jonathan Israel**, Professor, School of Historical Studies

October 9
Empire Group Seminar ✦ *Introductory Meeting* ✦ **Patricia Crone**, Andrew W. Mellon Professor, School of Historical Studies

October 12
Historical Studies Lunchtime Colloquia Series ✦ *A Royal Hunting Party in Egypt, ca. 1875 B.C.* ✦ **John Baines**, University of Oxford; Member, School of Historical Studies

October 14
Art History Seminar ✦ *Introductory Session* ✦ **Yve-Alain Bois**, Professor, School of Historical Studies

October 19
Empire Group Seminar ✦ *The Roman Empire* ✦ **James Rives**, University of North Carolina at Chapel Hill; Member, School of Historical Studies

Historical Studies Lunchtime Colloquia Series ✦ *Unheard Voices: Women's Role in Early Medieval Buddhist Artistic Productions and Religious Practices in South Asia* ✦ **Jinah Kim**, Vanderbilt University; Member, School of Historical Studies

October 22
Modern History (Pre-1850) Historians Workshop ✦ *Mortalism and the Early Modern Imagination* ✦ **Nicholas McDowell**, University of Exeter; Member, School of Historical Studies

October 26
Historical Studies Lunchtime Colloquia Series ✦ *The Tabulae Iliacae: Text, Image, and Narrative in a Group of Early Imperial Roman Reliefs* ✦ **David Petrain**, Vanderbilt University; Member, School of Historical Studies

November 2
Empire Group Seminar ✦ *How Far Were the Crusader States an Imperial Enterprise?* ✦ **Nicholas Paul**, Fordham University; Member, School of Historical Studies

Historical Studies Lunchtime Colloquia Series ✦ *Divine Law and Autonomy in Plato's Political Philosophy* ✦ **Carlos Fraenkel**, McGill University; Member, School of Historical Studies

November 3
East Asian Studies Seminar ✦ *The Meaning of "Tatar" from Asia to Europe (Eighth–Fifteenth Centuries)* ✦ **Marie Favereau-Doumenjou**, Institut Français d'Archéologie Orientale; Visitor, School of Historical Studies

November 4
Ancient Studies Seminar ✦ *Animal Sacrifice and Cultural Identity in the Roman Empire* ✦ **James Rives**, University of North Carolina at Chapel Hill; Member, School of Historical Studies

Art History Seminar ✦ *Research on John Cage* ✦ **Yve-Alain Bois**, Professor, School of Historical Studies

November 9
Empire Group Seminar ✦ *Archaeological Comparison of Ancient Chinese and Egyptian Empires* ✦ **John Baines**, University of Oxford; Member, School of Historical Studies

Historical Studies Lunchtime Colloquia Series ✦ *Fragmenting the Fathers: New Styles of Reading in the Early Middle Ages* ✦ **David Ganz**, King's College London; Member, School of Historical Studies

November 10

East Asian Studies Seminar ✦ *The Jiaqing Emperor's Failed Battle with Lebao, Commander-in-Chief in the White Lotus War* ✦ **Yingcong Dai**, William Paterson University of New Jersey; Member, School of Historical Studies

November 16

Historical Studies Lunchtime Colloquia Series ✦ *Dangerous Emotions, Divisive Discourses, and the Abandoned Alliance, 1945* ✦ **Frank Costigliola**, University of Connecticut; Member, School of Historical Studies

November 18

Modern History (Pre-1850) Historians Workshop ✦ *The Christian Hebraist Quest for Jewish Wisdom* ✦ **Stephen Burnett**, University of Nebraska–Lincoln; Member, School of Historical Studies

November 20

Ancient Studies Seminar ✦ *Why Do Colophons Matter? Old Babylonian Mathematical Tablets* ✦ **Christine Proust**, CNRS and Université Paris Diderot; Member, School of Historical Studies

November 23

Historical Studies Lunchtime Colloquia Series ✦ *Alexander of Aphrodisias and Peripatetic Psychology in the Second Century* ✦ **Inna Kupreeva**, The University of Edinburgh; Member, School of Historical Studies

November 30

Historical Studies Lunchtime Colloquia Series ✦ *Not to Be Born Is Best: On the Difference between Scholarship and Theodicy* ✦ **Michael Lurie**, The University of Edinburgh; Member, School of Historical Studies

December 4

Ancient Studies Seminar ✦ *The Dicta of Cato and Molestiae Nuptiarum* ✦ **Serena Connolly**, Rutgers, The State University of New Jersey; Member, School of Historical Studies

December 7

Historical Studies Lunchtime Colloquia Series ✦ *Science, Politics, and Earthquakes in Communist China* ✦ **Fa-ti Fan**, Binghamton University, State University of New York; Member, School of Historical Studies

December 8

East Asian Studies Seminar ✦ *Summarizing Vasubandhu: Must a Buddhist Philosopher Have a Philosophy?* ✦ **Jonathan C. Gold**, Princeton University

December 9

Ancient Studies Seminar ✦ *The Carolingian Reception of the Classics with a Special Focus on Virgil* ✦ **David Ganz**, King's College London; Member, School of Historical Studies

Modern History (Pre-1850) Historians Workshop ✦ *Women, Freedom, and Equality in the Political Thought of Margaret Cavendish (1623–74) and Mary Astell (1666–1731)* ✦ **Sarah Hutton**, Aberystwyth University; Member, School of Historical Studies

December 14

Historical Studies Lunchtime Colloquia Series ✦ *The Art of Lists: A Mathematical Cuneiform Tablet from the Old Babylonian Period* ✦ **Christine Proust**, CNRS and Université Paris Diderot; Member, School of Historical Studies

December 15

East Asian Studies Seminar ✦ *The Hospital as Healing Shrine: Rethinking Colonial India's "Medical Masala"* ✦ **Lauren Minsky**, New York University Abu Dhabi; Member, School of Historical Studies

December 16

Ancient Studies Seminar ✦ *Egyptian Biographies of the Ptolemaic Period* ✦ **John Baines**, University of Oxford; Member, School of Historical Studies

December 17

Empire Group Seminar ✦ *The Golden Horde* ✦ **Marie Favereau-Doumenjou**, Institut Français d'Archéologie Orientale; Visitor, School of Historical Studies

January 11

Historical Studies Lunchtime Colloquia Series ✦ *Introductions* ✦ **Jonathan Israel**, Professor, School of Historical Studies

January 18

Historical Studies Lunchtime Colloquia Series ✦ *Wedding Trousseaux and Cloth Trade in the Late Middle Ages* ✦ **Lluís To-Figueras**, University of Girona; Member, School of Historical Studies

January 19

East Asian Studies Seminar ✦ *Rashid al-Din's Universalism at the Crossroads of Political Thought, Theology, and Historiography* ✦ **Judith Pfeiffer**, University of Oxford; Member, School of Historical Studies

Modern History (Pre-1850) Historians Workshop ✦ *On the Concept of a Philosophical Religion and Its Role in Spinoza and Lessing* ✦ **Carlos Fraenkel**, McGill University; Member, School of Historical Studies

Twentieth-Century Contemporary History Seminar ✦ *Introduction to Counterfactual History* ✦ **Avishai Margalit**, George F. Kennan Professor, School of Historical Studies

January 20

Medieval Table Lunchtime Colloquium ✦ *Dynastic Narrative, Monastic Ritual, and Other "Miscellaneous" Things: Paris BNF MS lat. 5132 of Santa Maria de Ripoll* ✦ **Nicholas Paul**, Fordham University; Member, School of Historical Studies

Art History Seminar ✦ *Kandinsky-Hegel-Kojeve* ✦ **Lisa Florman**, The Ohio State University

January 25

Empire Group Seminar ✦ *America as an Empire* ✦ **Peter Katzenstein**, Cornell University; Member, School of Social Science

Historical Studies Lunchtime Colloquia Series ✦ *Blinks of Light—Rays of Perception: Thoughts on the Agency of Roman Lamps* ✦ **Ruth Bielfeldt**, Harvard University; Member, School of Historical Studies

January 26

East Asian Studies Seminar ✦ *The Cultural Frontier in Western China during the 1940s* ✦ **Sarah Fraser**, Northwestern University; Member, School of Historical Studies

January 27

Medieval Table Lunchtime Colloquium ✦ *Sex Ratios and Women's Health in England, 1000–1500* ✦ **Sandy Bardsley**, Moravian College; Member, School of Historical Studies

Art History Seminar ✦ *Electric Light and Modern Architecture* ✦ **Sandy Isenstadt**, University of Delaware; Member, School of Historical Studies

February 1

Historical Studies Lunchtime Colloquia Series ✦ *Narrating the Nation: China, Japan, and the West in Comparative Historiography* ✦ **Q. Edward Wang**, Rowan University; Member, School of Historical Studies

February 3

Art History Seminar ✦ *Chinese Archaeology and Photography* ✦ **Sarah Fraser**, Northwestern University; Member, School of Historical Studies

February 4

Twentieth-Century Contemporary History Seminar ✦ *Presentation of Research Topics* ✦ **İpek Kocaomer Yosmaoğlu**, University of Wisconsin–Madison; Member, School of Historical Studies ✦ **Frances Nethercott**, University of St Andrews; Member, School of

Historical Studies ✦ **Thomas Hegghammer**, Harvard University; Member, School of Historical Studies ✦ **Fa-ti Fan**, Binghamton University, State University of New York; Member, School of Historical Studies ✦ **Frank Costigliola**, University of Connecticut; Member, School of Historical Studies ✦ **Igor Khristoforov**, Russian Academy of Sciences, Moscow; Member, School of Historical Studies

February 8

Empire Group Seminar ✦ *The Late Russian Empire* ✦ **Igor Khristoforov**, Russian Academy of Sciences, Moscow; Member, School of Historical Studies

Historical Studies Lunchtime Colloquia Series ✦ *Races, Nations, Arts: Vegetal Metaphors in Art History's Narratives of the Past Two Centuries* ✦ **Eric Michaud**, École des Hautes Études en Sciences Sociales, Paris; Member, School of Historical Studies

February 16

East Asian Studies Seminar ✦ *The Tenth-Century Kingdom of Shu 蜀: Cultural Innovation and the Politics of Secession* ✦ **Franciscus Verellen**, École Française d'Extreme-Orient; Member, School of Historical Studies

February 17

Medieval Table Lunchtime Colloquium ✦ *The Altar that Moved: Classical Canon Law and the Management of Sacred Objects* ✦ **Charles de Miramon**, CNRS and École des Hautes Études en Sciences Sociales, Paris; Member, School of Historical Studies

February 18

Twentieth-Century Contemporary History Seminar ✦ *The 1980s Arab Afghan Mobilization without Abdallah Azzam* ✦ **Thomas Hegghammer**, Harvard University; Member, School of Historical Studies

February 22

Empire Group Seminar ✦ *Nationalism and the Ottomans* ✦ **İpek Kocaomer Yosmaoğlu**, University of Wisconsin–Madison; Member, School of Historical Studies

Historical Studies Lunchtime Colloquia Series ✦ *Scholars, Popularizers, and Ideologues: The Image of the Historian in Nineteenth-Century Russia* ✦ **Frances Nethercott**, University of St Andrews; Member, School of Historical Studies

February 23

East Asian Studies Seminar ✦ *Treaty Ports, Outcasts, and the Meaning of "Liberation": Revisiting Meiji Japan's Emancipatory Moment* ✦ **Daniel Botsman**, University of North Carolina at Chapel Hill; Member, School of Historical Studies

February 24

Art History Seminar ✦ *Michel, Roussel, et Moi* ✦ **Susan Laxton**, University of California, Riverside; Member, School of Historical Studies

Modern History (Pre-1850) Historians Workshop ✦ *Debating China and Japan* ✦ **Jonathan Israel**, Professor, School of Historical Studies

March 1

Historical Studies Lunchtime Colloquia Series ✦ *Logic and Legitimacy in Violence: Scenes from Ottoman Macedonia ca. 1900* ✦ **İpek Kocaomer Yosmaoğlu**, University of Wisconsin–Madison; Member, School of Historical Studies

March 2

Twentieth-Century Contemporary History Seminar ✦ *Political Violence in Ottoman Macedonia* ✦ **İpek Kocaomer Yosmaoğlu**, University of Wisconsin–Madison; Member, School of Historical Studies

March 3

Medieval Table Lunchtime Colloquium ✦ *Sound in a Prayer Book ca. 1300* ✦ **Emma Dillon**, University of Pennsylvania; Visitor, School of Historical Studies

March 8

Empire Group Seminar ✦ *Eurasia in World History* ✦ **Fa-ti Fan**, Binghamton University, State University of New York; Member, School of Historical Studies

Historical Studies Lunchtime Colloquia Series ✦ *In Search of "The Divine (*To Theion*)" in Roman Anatolia: Epigraphic Evidence and Scholarly Hermeneutics* ✦ **Nicole Belayche**, École Pratique des Hautes Études, Paris; Member, School of Historical Studies

March 9

East Asian Studies Seminar ✦ *Chopsticks: "Bridges" of Culture in East Asia* ✦ **Q. Edward Wang**, Rowan University; Member, School of Historical Studies

March 10

Medieval Table Lunchtime Colloquium ✦ *Religious Festivals in Cross-Cultural Perspective* ✦ **Alexandra Cuffel**, Visitor, School of Historical Studies

March 15

Historical Studies Lunchtime Colloquia Series ✦ *Freedom Without Slavery? The Case of the Maria Luz and the Question of Emancipation in Nineteenth-Century Japan* ✦ **Daniel Botsman**, University of North Carolina at Chapel Hill; Member, School of Historical Studies

March 16

East Asian Studies Seminar ✦ *New Wine in Old Bottles: Nationalism, Internationalism, and the Preservation of Antiquities in Republican China* ✦ **Fa-ti Fan**, Binghamton University, State University of New York; Member, School of Historical Studies

March 17

Medieval Table Lunchtime Colloquium ✦ *Robert of Anjou's View of Troy and Constantinople* ✦ **Marilynn Desmond**, Binghamton University, State University of New York; Visitor, School of Historical Studies

Art History Seminar ✦ *Pictures, Movement, and Unfolding of a Sacred Space* ✦ **Jinah Kim**, Vanderbilt University; Member, School of Historical Studies

Modern History (Pre-1850) Historians Workshop ✦ *The Virgin and Her State: Representing the Body Politic through Metaphors of Marital Status* ✦ **Thomas Maissen**, Universität Heidelberg; Visitor, School of Historical Studies

March 18

Twentieth-Century Contemporary History Seminar ✦ *Works in Progress: "Aristocracy in Search for Social and Cultural Identity in Fin-de-siècle Russia" and "Russians Writing History, 1755–2005: Scholarship, Ideology, and Myth"* ✦ **Igor Khristoforov**, Russian Academy of Sciences, Moscow; Member, School of Historical Studies and **Frances Nethercott**, University of St Andrews; Member, School of Historical Studies

March 22

Historical Studies Lunchtime Colloquia Series ✦ *An Unsavory Lunch in Liège around 1110: Secular Clerical Identity and the Rhetorics of Law* ✦ **Charles de Miramon**, CNRS and École des Hautes Études en Sciences Sociales; Member, School of Historical Studies

March 23

East Asian Studies Seminar ✦ *Chinese Self, Alien Other, and the Emergence of a Racialized Worldview* ✦ **Don Wyatt**, Middlebury College; Visitor, School of Historical Studies

March 24

Medieval Table Lunchtime Colloquium ✦ *The Physician as a Charismatic Hero: Urso of Salerno on Efficacious Language in Medicine, Magic, and Religion* ✦ **Maaike van der Lugt**, École des Hautes Études en Sciences Sociales, Paris

March 25

Art History Seminar ✦ *Envisioning the Divine in the Ancient World* ✦ **Verity Platt**, The University of Chicago; Member, School of Historical Studies

Twentieth-Century Contemporary History Seminar ✦ *The Origins of the Cold War: A Counterfactual Argument* ✦ **Frank Costigliola**, University of Connecticut; Member, School of Historical Studies

March 29

Empire Group Seminar ✦ *The Chinese and the Color of Outsiders* ✦ **Don Wyatt**, Middlebury College; Visitor, School of Historical Studies

Historical Studies Lunchtime Colloquia Series ✦ *The "Mongol Moment" in the Middle East—Perspectives and Debates* ✦ **Judith Pfeiffer**, University of Oxford; Member, School of Historical Studies

March 30

East Asian Studies Seminar ✦ *Sādhus, Ācāryas, and Their Sons: Lay Buddhist Practitioners and the Production of Medieval Indian Buddhist Books* ✦ **Jinah Kim**, Vanderbilt University; Member, School of Historical Studies

March 31

Medieval Table Lunchtime Colloquium ✦ *The Rhetoric of Incoherence: Making an Argument for Norms in Geniza Mercantile Texts* ✦ **Jessica Goldberg**, University of Pennsylvania; Member, School of Historical Studies

April 6

East Asian Studies Seminar ✦ *The Making of Bronzes, Marble Carvings, and Bone Objects: Craft Production and Political Economy in the Shang Dynasty Capital at Anyang* ✦ **Yung-ti Li**, Institute of History and Philology, Academia Sinica

April 7

Medieval Table Lunchtime Colloquium ✦ *The Virgin and Her State: Representing the Body Politic through Metaphors of Marital Status* ✦ **Thomas Maissen**, Universität Heidelberg; Visitor, School of Historical Studies

April 14

Art History Seminar ✦ *Seeing and Framing: Some Thoughts about Medieval Images* ✦ **Nino Zchomelidse**, Princeton University

Modern History (Pre-1850) Historians Workshop ✦ *Facing Up to Tragedy: Sophocles in the History of European Thought and Dramatic Theory 1500–1900* ✦ **Michael Lurie**, The University of Edinburgh; Member, School of Historical Studies

April 21

Art History Seminar ✦ *Untitled Presentations—Work Accomplished* ✦ **John Baines**, University of Oxford, and **Sarah Fraser**, Northwestern University; Members, School of Historical Studies

May 26

Modern History (Pre-1850) Historians Workshop ✦ *Spinoza's Critique of Humility* ✦ **Julie Cooper**, The University of Chicago; Member, School of Social Science

June 10

Workshop: The Early Modern Ottoman Empire as a Contact Zone ✦ *Ottoman Borderlands, Frontiers, and Contact Zones* ✦ **Linda Darling**, The University of Arizona ✦ *"Frontiers of Learning"—Transborder Military Learning and the Example of Central European Lessons Learned from the Military Border with the Ottoman Empire* ✦ **Peter Trummer**, Universität Heidelberg ✦ *The Frontier Man and the Espionage in the Habsburg Information Gathering in the Ottoman Capital* ✦ **Emrah Safa Gürkan**, Georgetown University ✦ *Ottoman, Mughal, Littérateur, and Spy: The Case of Monsieur Raymond or Haji Mustafa, d. 1791* ✦ **Abhishek Kaicker**, Columbia University ✦ *An Agent of Contact: The Mission of Marie-Louis Descorches, Envoyé Extraordinaire to the Sublime Porte 1793–95* ✦ **Pascal Firges**, Universität Heidelberg ✦ *A European Consul in the Ottoman Empire on the Eve of the Tanzimat* ✦ **Gülay Tulasoğlu**, Universität Heidelberg

June 11

Workshop: The Early Modern Ottoman Empire as a Contact Zone ✦ *The Common Life: Religious Tolerance in Ottoman Bosnia* ✦ **Bruce Burnside**, Columbia University ✦ *Renegades in the Ottoman Empire, ca. 1580–1610: Preliminary Reflections* ✦ **Tobias Graf**, Universität Heidelberg ✦ *Two Christian Creditors at the Ottoman Na'ib Court of Kos* ✦ **Christian Roth**, Universität Heidelberg ✦ *The Dissemination and Reception of Birgivi Mehmed Efendi's al-Tariqa al-Muhammadiyya* ✦ **Katharina A. Ivanyi**, Princeton University ✦ *The Early Modern Ottoman Empire as a Contact Zone—Concluding Remarks* ✦ **Christine Philliou**, Columbia University

ANDREA KANE

Professor Peter Sarnak (left) with Professor Emeritus Pierre Deligne (center, front) and Members Zhiwei Yun (right) and Mark Goresky (far center)

School of Mathematics

Faculty

Enrico Bombieri, IBM von Neumann Professor

Jean Bourgain

Helmut Hofer

Robert MacPherson, Hermann Weyl Professor

Peter Sarnak

Thomas Spencer

Vladimir Voevodsky

Avi Wigderson, Herbert H. Maass Professor

Professors Emeriti

Pierre Deligne

Phillip A. Griffiths

Robert P. Langlands

During both terms of the academic year of 2009–10, the School of Mathematics held a special program on analytic number theory. The program organizers were **Enrico Bombieri**, IBM von Neumann Professor, and Professor **Peter Sarnak**.

The seminars during the special program on analytic number theory focused on topics that included the distribution of prime numbers, sieves, L-functions, and special sequences, as well as additive and combinatorial methods, exponential sums, spectral analysis, and modular forms. There were many collaborations between younger and more senior Members and Visitors that resulted in progress on various problems and numerous publications. The weekly seminars were of a very high quality and well attended. Highlights included the mini-courses by Member Kannan Soundararajan relating to his work on "weak subconvexity"; Jonathan Pila of the University of Bristol on his work about the "Andre-Oort Conjectures"; Manjul Bhargava of Princeton University on his work regarding average ranks of elliptic curves; and the Weyl Lecture by Umberto Zannier of the Scuola Normale Superiore, which offered new insights into his work with Pila on torsion points on abelian varieties.

Throughout both terms, the junior and mid-career Members organized and held various learning seminars that gave accounts of some novel techniques and also resulted in facilitating collaborations. School Member Antoine Chambert-Loir gave four talks about equidistribution theorems in Arakelov geometry. The topics covered metrized line bundles, the proof of the Bogomolov conjecture by Emmanuel Ullmo and Shou-Wu Zhang and Xinyi Yuan's theorem, and equidistribution in arithmetic dynamics. In his final lecture, Chambert-Loir discussed his construction of measures associated with metrized line bundles on Berkovich spaces and its relevance for p-adic equidistribution theorems.

Another seminar, organized by Member Michael Temkin, involved a series of talks on non-archimedean analytic geometry developed by Vladimir Berkovich.

In March, there was a week-long workshop that attracted a large audience from neighboring universities. Speakers and participants included Valentin Blomer, Universtiy of Toronto; Regis De La Breteche, Institut de

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Professor Enrico Bombieri (right) was recognized with the 2010 King Faisal International Prize in Science (Mathematics) for his pioneering contributions to various branches of mathematics, including number theory, algebraic geometry, complex analysis, and minimal surfaces.

Mathématiques de Jussieu; Ben Green, University of Cambridge; Gergely Harcos, Alfréd Rényi Institute of Mathematics; Member Roger Heath-Brown, University of Oxford and Institute for Advanced Study; Henryk Iwaniec, Rutgers, The State University of New Jersey; Nick Katz, Princeton University; Member Xiaoqing Li, University at Buffalo, The State University of New York, and Institute for Advanced Study; Hugh Montgomery, University of Michigan; Peter Sin, University of Florida; John Thompson, University of Cambridge; Peter Varju, Princeton University; Robert Vaughan, The Pennsylvania State University; Trevor Wooley, University of Bristol; and Professor **Jean Bourgain** of the Institute.

Professor **Helmut Hofer** set forth a new geometry/dynamical systems seminar that met weekly, and the computer science and discrete mathematics seminar of **Avi Wigderson**, Herbert H. Maass Professor, met twice a week throughout the year. The joint Princeton University and Institute number theory seminar met regularly, and a seminar on "Geometry and Materials" organized by **Robert MacPherson**, Hermann Weyl Professor, and Members Randall Kamien and Jeremy Mason met throughout the year. The analysis math-physics seminar met every week during the second term.

There was a small program on A^1-homotopy theory and its recent developments during the second term, organized by Professor **Vladimir Voevodsky** and Member Fabien Morel.

The "Workshop on Topology" activities continued this year, organized by MacPherson and Professor Konstantin Mischaikow of Rutgers, the State University of New Jersey. The workshop brought together pure mathematicians, mathematicians involved with doing large computer simulations, and scientists who work in areas where such mathematical ideas may be relevant. The goal is to bring ideas of pure mathematics, particularly topology, to bear on problems arising in science and engineering. The workshop participants met on the first Wednesday of each month starting in November, alternating their meeting locations between the campuses of the Institute and Rutgers. Speakers were Gunnar Carlsson, Stanford University; Sarah Day, College of William & Mary; Daniel Koditschek, University of Pennsylvania; Alexander Grosberg, New York University; Marian Gidea, Northeastern Illinois University; Yuliy Barysyhnikov, Bell Laboratories; Stanislas Leibler, Professor, School of Natural Sciences and The Rockefeller University; Mark Dennis, University of Bristol; Arnold J. Levine, Professor, School of Natural Sciences; Paul Fendley,

Professor Avi Wigderson (left) organized a computer science and discrete mathematics seminar that met twice a week throughout the year.

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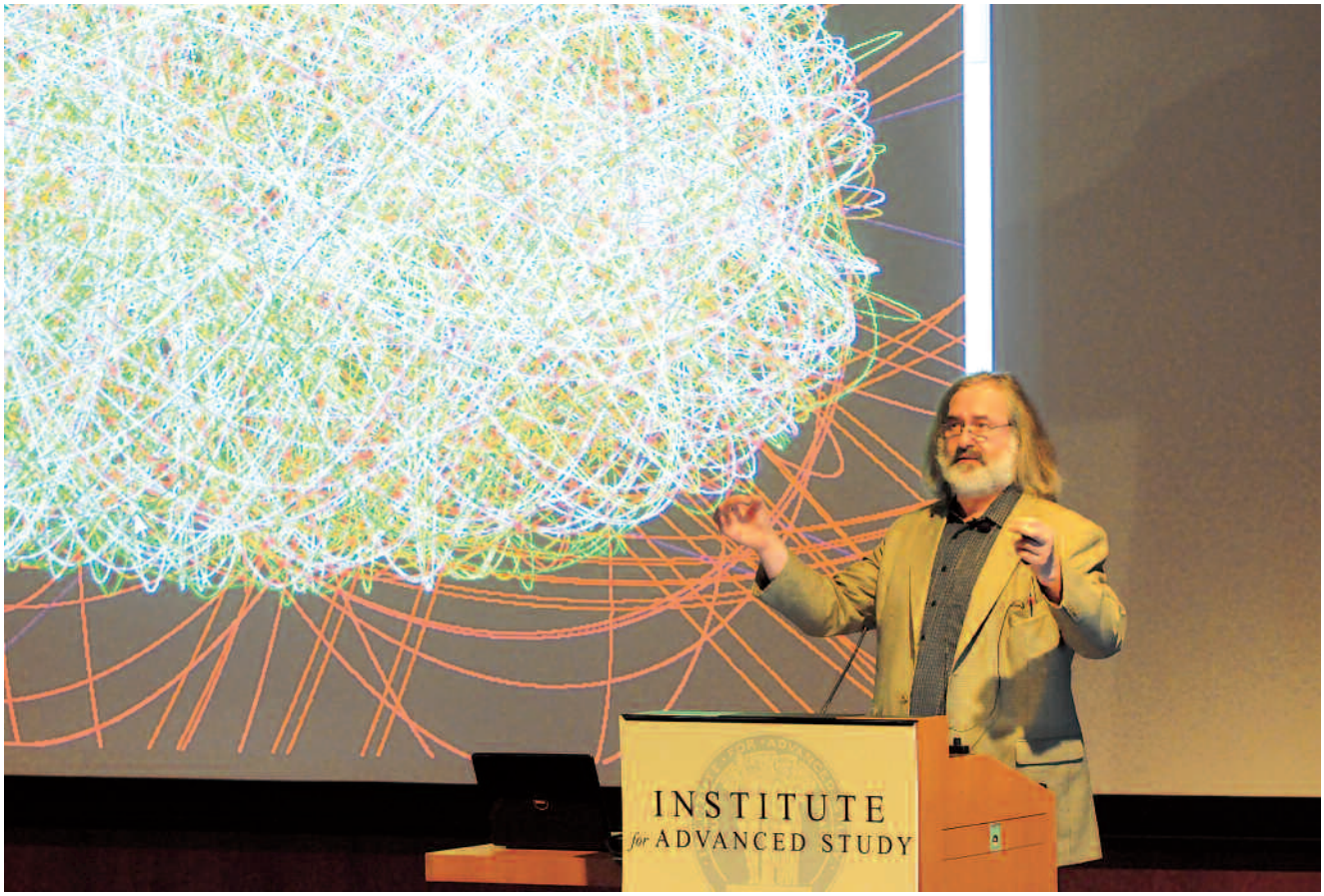
University of Virginia; Peter Landweber, Rutgers; MacPherson; and Jean-Philippe Lessard of Rutgers.

In April, the Marston Morse Memorial Lectures were given by Paul Seidel of the Massachusetts Institute of Technology. Seidel gave three talks, "Cotangent Bundles and Their Relative," "Monodromy and Its Categorification," and "Symplectic Topology as Sheaf Theory?"

In June, the School held a week-long workshop on "Pseudorandomness in Mathematical Structures." The workshop was organized by Bourgain, Sarnak, Wigderson, and Visiting Professor Russell Impagliazzo. The goal of the workshop was to highlight parallels and connections between approaches to pseudorandomness in different areas of mathematics and between the mathematical and computational approaches to pseudorandomness. Tutorials were held on the first two days of the workshop, and during the remaining three days there were a series of survey lectures. Sixty-five students registered for the workshop activities as well as eighty-five Ph.D. participants. Speakers for the tutorials were Ben Green, University of Cambridge; Visiting Professor Russell Impagliazzo, University of California, San Diego, and Institute for Advanced Study; Professor Avi Wigderson, Institute for Advanced Study; and Luca Trevisan, University of California, Berkeley. Survey lectures were given by Timothy Gowers, University of Cambridge; Fan Chung Graham, University of California, San Diego; Professor Jean Bourgain, Institute for Advanced Study; Benjamin Weiss, Einstein Institute of Mathematics, The Hebrew University of Jerusalem; Alexander Gamburd, University of California, Santa Cruz; Ryan O'Donnell, Carnegie Mellon University; Alex

The workshop on topology, which aims to bring ideas of pure mathematics, particularly topology, to bear on problems arising in science and engineering, brought together pure mathematicians, mathematicians involved with doing large computer simulations, and scientists who work in areas where such mathematical ideas may be relevant.

Professor Helmut Hofer gave a public lecture on celestial mechanics and a geometry based on area.



BENTLEY DREZNER

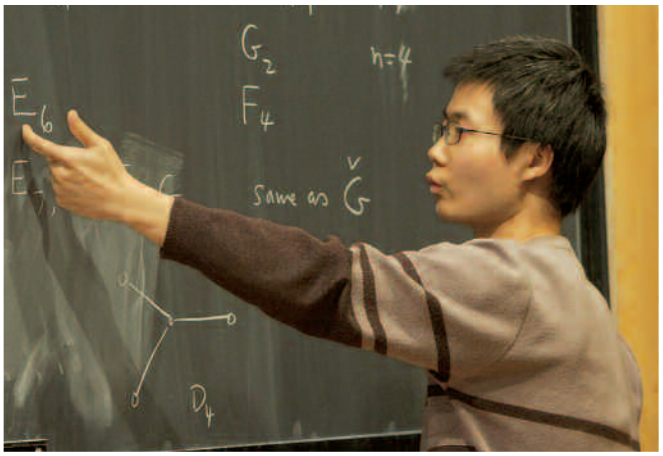
The workshop on psuedorandomness in mathematical structures sought to highlight parallels and connections between approaches to pseudorandomness in different areas of mathematics and between the mathematical and computational approaches to pseudorandomness.

Lubotzky, Einstein Institute of Mathematics, The Hebrew University of Jerusalem; Van Vu, Rutgers; Dimitris Achlioptas, University of California, San Diego, and Research Academic Computer Technology Institute, Greece; Tamar Ziegler, Technion–Israel Institute of Technology; Member Sergei Konyagin, Steklov Mathematical Institute, Russian Academy of Sciences, and Institute for Advanced Study; and Professor Peter Sarnak, Institute for Advanced Study.

Bombieri shared the 2010 King Faisal International Prize in Science (Mathematics) with Terence Chi-Shen Tao, a former Visitor in the School and a Professor at the University of California. Bourgain was awarded the 2010 Shaw Prize in Mathematics and received the Vernadsky gold medal from the National Academy of Sciences of Ukraine. Sarnak received an honorary degree from the Hebrew University of Jerusalem, Professor **Thomas Spencer** was elected to the National Academy of Sciences, and Hofer was elected to the German Academy of Sciences Leopoldina. In March, Hofer gave a public lecture, "Celestial Mechanics and a Geometry Based on Area."

Beginning with the 2009–10 academic year, the School of Mathematics has been recording all mathematical lectures that take place on the Institute's campus. The math videos may be seen at http://video.ias.edu/sm.

CLIFF MOORE



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CLIFF MOORE

Throughout both terms, junior and mid-career Members organized and held various seminars that gave accounts of some novel techniques and also resulted in facilitating collaborations. Clockwise from left: Members John Friedlander, Zhiwei Yun, Lillian Pierce, and Bao Châu Ngô

MEMBERS AND VISITORS

f First Term ✦ *s* Second Term ✦ *m* Long-term Member ✦ *v* Visitor ✦ *vp* Visiting Professor *j* Joint Member School of Natural Sciences ✦ *vri* Veblen Research Instructorship *vnf* von Neumann Fellowship

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Funding provided by the Fund for Mathematics and The Oswald Veblen Fund

RECORD OF EVENTS

September 14

Computer Science/Discrete Math I ✦ *Blackbox Polynomial Identity Testing for Depth 3 Circuits* ✦ **Shubhangi Saraf**, Massachusetts Institute of Technology

September 15

Computer Science/Discrete Math II ✦ *Affine Dispersers from Subspace Polynomials* ✦ **Swastik Kopparty**, Massachusetts Institute of Technology

September 21

Computer Science/Discrete Math I ✦ *Twice-Ramanujan Sparsifiers* ✦ **Nikhil Srivastava**, Yale University

September 22

Computer Science/Discrete Math II ✦ *The Completeness of the Permanent* ✦ **Amir Yehudayoff**, Member, School of Mathematics

Short Talks by Postdoctoral Members ✦ *Contact Structures, Open Books, and Support Genus* ✦ **John Baldwin**, Princeton University; Veblen Research Instructorship, School of Mathematics

Short Talks by Postdoctoral Members ✦ *Big Gaps in Zeros of Functions* ✦ **Jonathan Bober**, Member, School of Mathematics ✦ *Statistics for Traces of Frobenius for Curves over Finite Fields* ✦ **Alina Bucur**, Member, School of Mathematics ✦ *Some Extremal Functions in Fourier Analysis and Applications to Number Theory* ✦ **Emanuel Carneiro**, Member, School of Mathematics

September 24

Short Talks by Postdoctoral Members ✦ *The Yamabe Problem in Conformal Geometry* ✦ **Szu-yu Sophie Chen**, Member, School of Mathematics ✦ *Matrix Rigidity* ✦ **Zeev Dvir**, Member, School of Mathematics ✦ *Coulomb Gas in Two Dimensions* ✦ **Pierluigi Falco**, Member, School of Mathematics ✦ *Geometry of Obstructed Families of Plane Algebraic Curves and Projective Hypersurfaces* ✦ **Anna Gourevich**, Member, School of Mathematics ✦ *Hecke Relations and Amplifiers for GL(3)* ✦ **Roman Holowinsky**, Member, School of Mathematics

September 25

Short Talks by Postdoctoral Members ✦ *Relative Representation Theory of Reductive Groups over Close Local Fields with Applications to Gelfand Pairs* ✦ **Dmitry Gourevitch**, Member, School of Mathematics ✦ *Algebraic Cycles and Lawson Homology* ✦ **Wenchuan Hu**, Member, School of Mathematics ✦ *Fast Methods to Compute the Riemann Zeta Function* ✦ **Ghaith Hiary**, Member, School of Mathematics

September 29

Computer Science/Discrete Math II ✦ *Span Programs and Quantum Query* ✦ **Ben Reichardt**, University of Waterloo

Short Talks by Postdoctoral Members ✦ *Graph Patches and Their Applications* ✦ **Alexandra Kolla**, Member, School of Mathematics ✦ *Counting Kissing Circles* ✦ **Alex Kontorovich**, Brown University; Member, School of Mathematics ✦ *The Distribution of Values of the Riemann Zeta Function and Dirichlet L-Functions on the 1-Line* ✦ **Youness Lamzouri**, Member, School of Mathematics ✦ *Coherent Cohomology of Automorphic Bundles* ✦ **Kai-Wen Lan**, Princeton University; Veblen Research Instructorship, School of Mathematics ✦ *Integral Points and Holomorphic Curves on Certain Affine Varieties* ✦ **Aaron Levin**, Member, School of Mathematics ✦ *Analysis of Crystallographic Texture as a Probability Distribution Function of Quaternions* ✦ **Jeremy Mason**, Member, School of Mathematics

September 30

Short Talks by Postdoctoral Members ✦ *Group Representation Patterns in Digital Signal* ✦ **Shamgar Gurevich**, Member, School of Mathematics ✦ *Probabilistically Checkable Proofs (PCP): What Theoretical Computer Science Discovered about Mathematical Proofs* ✦ **Dana Moshkovitz**, Member, School of Mathematics ✦ *Discrete Analogues in Harmonic Analysis* ✦ **Lillian Pierce**, Member, School of Mathematics ✦ *Perfect Numbers and Their Friends* ✦ **Paul Pollack**, Member, School of Mathematics ✦ *Semilinear Wave and Schrödinger Equations* ✦ **Tristan Roy**, Member, School of Mathematics

October 1

Joint IAS/PU Number Theory Seminar ✦ *Even Galois Representations and the Fontaine-Mazur Conjecture* ✦ **Frank Calegari**, Northwestern University

October 2

Short Talks by Postdoctoral Members ✦ *On Desingularization of Schemes* ✦ **Michael Temkin**, Member, School of Mathematics ✦ *Local Harmonic Analysis and Automorphic Forms* ✦ **Nicolas Templier**, Member, School of Mathematics ✦ *Some Connections between the (Weak) Regularity Lemma, Complexity Theory, and Additive Combinatorics* ✦ **Madhur Tulsiani**, Member, School of Mathematics ✦ *The Structure of Cylinder Intersections* ✦ **Amir Yehudayoff**, Member, School of Mathematics ✦ *Homology of Loop Groups via Langlands Dual Groups* ✦ **Zhiwei Yun**, Member, School of Mathematics ✦ *Symplectic Measurements and Convex Geometry* ✦ **Yaron Ostrover**, Member, School of Mathematics

October 5

Computer Science/Discrete Math I ✦ *The Detectability Lemma and Quantum Gap* ✦ **Itai Arad**, The Hebrew University of Jerusalem

Members Seminar ✦ *Recent Progress on QUE (Quantum Unique Ergodicity)* ✦ **Peter Sarnak**, Professor, School of Mathematics

October 6

Computer Science/Discrete Math II ✦ *The Completeness of the Permanent* ✦ **Amir Yehudayoff**, Member, School of Mathematics

October 8

Analytic and Geometric Number Theory Seminar ✦ *Sifting the Least Prime in Arithmetic* ✦ **Henryk Iwaniec**, Rutgers, The State University of New Jersey

Joint IAS/PU Number Theory Seminar ✦ *An Arithmetic Fundamental Lemma for Unitary Group of Three* ✦ **Wei Zhang**, Harvard University

October 12

Computer Science/Discrete Math I ✦ *On the Complexity of Circuit Satisfiability* ✦ **Ramamohan Paturi**, University of California, San Diego

Members Seminar ✦ *Enrico Bombieri and the Prime Number Theorem* ✦ **John Friedlander**, University of Toronto Scarborough; Member, School of Mathematics

October 13

Computer Science/Discrete Math II ✦ *Using Local Conductance to Give Improved Algorithms for Unique Games* ✦ **William Matthews**, University of California, San Diego

Geometry and Materials Seminar ✦ *Ideal 2D Foams and Spherical Foams from Mancini's Equations* ✦ **Bryan Chen**, University of Pennsylvania

October 14

Analytic and Geometric Number Theory Mini-Course ✦ *Mean-Values of Multiplicative Functions and Weak Subconvexity* ✦ **Kannan Soundararajan**, Stanford University; Member, School of Mathematics

October 15

Analytic and Geometric Number Theory Seminar ✦ *Erdos-Kac, Renyi-Turan, Keating-Snaith, Katz-Sarnak* ✦ **Emmanuel Kowalski**, Université Bordeaux 1; von Neumann Fellowship, School of Mathematics

Joint IAS/PU Number Theory Seminar ✦ *Volume Estimates in Analytic and Adelic Geometry* ✦ **Antoine Chambert-Loir**, Université de Rennes 1; von Neumann Fellowship, School of Mathematics

October 19

Computer Science/Discrete Math I ✦ *PCPs of Sub-Constant Error via Derandomized Direct Product* ✦ **Or Meir**, Weizmann Institute of Science

Members Seminar ✦ *The Decomposition Theorem and Abelian Fibrations* ✦ **Bao Châu Ngô**, Université Paris-Sud 11; Member, School of Mathematics

October 20

Computer Science/Discrete Math II ✦ *Hardness of Projection Games* ✦ **Dana Moshkovitz**, Member, School of Mathematics

October 22

Analytic and Geometric Number Theory Seminar ✦ *Toward Schmidt's Theorem for Algebraic Points of Bounded Degree* ✦ **Aaron Levin**, Member, School of Mathematics

Joint IAS/PU Number Theory Seminar ✦ *Torsion in the Homology of Arithmetic Groups* ✦ **Akshay Venkatesh**, Stanford University

October 26

Members Seminar ✦ *The Algebra and Combinatorics of Box Splines* ✦ **Olga Holtz**, University of California, Berkeley; von Neumann Fellowship, School of Mathematics

October 29

Analytic and Geometric Number Theory Seminar ✦ *Global Divisibility of Heegner Points and Tamagawa Numbers* ✦ **Dimitar Jetchev**, New York

Joint IAS/PU Number Theory Seminar ✦ *Generalizations of the Sato-Tate Conjecture* ✦ **David Geraghty**, Harvard University

October 30

Joint IAS/PU Number Theory Seminar ✦ *Modularity Lifting for N-Dimensional Ordinary Galois Representations* ✦ **David Geraghty**, Harvard University

November 2

Computer Science/Discrete Math I ✦ *Grothendieck Inequalities, XOR Games, and Communication Complexity* ✦ **Troy Lee**, Rutgers, The State University of New Jersey

Members Seminar ✦ *Smectic Topology, Tomography, and Topography* ✦ **Randall D. Kamien**, University of Pennsylvania; Member, School of Mathematics

November 3

Computer Science/Discrete Math II ✦ *Constructions of Expanders Using Group Theory* ✦ **Martin Kassabov**, Cornell University; von Neumann Fellowship, School of Mathematics

November 4
Workshop on Topology: Identifying Order in Complex Systems ✦ *Functoriality, Generalized Persistence, and Hierarchy* ✦ **Gunnar Carlsson**, Stanford University ✦ *Computational Topology in the Study of Discrete Dynamical Systems* ✦ **Sarah Day**, College of William & Mary

November 5
Analytic and Geometric Number Theory Seminar ✦ *Prime Chains and Applications* ✦ **Kevin Ford**, University of Illinois at Urbana-Champaign

Joint IAS/PU Number Theory Seminar ✦ *Mean Values with GL(2) Times GL(3) Functions* ✦ **Matthew Young**, Texas A&M University; Member, School of Mathematics

November 9
Computer Science/Discrete Math I ✦ *Why Sex?* ✦ **Adi Livnat**, University of California, Berkeley

Members Seminar ✦ *Deformation Spaces of Geometric Structures* ✦ **Anna Wienhard**, Princeton University; Visitor, School of Mathematics

November 10
Computer Science/Discrete Math II ✦ *Graph and Subgraph Sparsification and Its Implications to Linear System Solving and Transforming Graphs into Expanders* ✦ **Alexandra Kolla**, Member, School of Mathematics

November 11
Analytic and Geometric Number Theory Mini-Course ✦ *Introduction to Sieves, Theory and Practice* ✦ **John Friedlander**, University of Toronto Scarborough; Member, School of Mathematics

November 12
Analytic and Geometric Number Theory Seminar ✦ *O-Minimality and Some Cases of the Andre-Oort Conjecture* ✦ **Jonathan Pila**, University of Bristol

Joint IAS/PU Number Theory Seminar ✦ *On the Areas of Rational Triangles or How Did Euler (and How Can We) Solve Xyz(x+y+z)=a* ✦ **Noam Elkies**, Harvard University

November 16
Members Seminar ✦ *The Riemann Hypothesis—150 Years and Counting* ✦ **Brian Conrey**, American Institute of Mathematics; Member, School of Mathematics

November 18
Analytic and Geometric Number Theory Mini-Course ✦ *Introduction to Sieves, Theory and Practice* ✦ **John Friedlander**, University of Toronto Scarborough; Member, School of Mathematics

November 19
Analytic and Geometric Number Theory Seminar ✦ *Small Gaps between Primes, and between Almost Primes* ✦ **C. Y. Yildirim**, Boğaziçi University; Member, School of Mathematics

Joint IAS/PU Number Theory Seminar ✦ *Slope Filtrations in Families* ✦ **Kiran Kedlaya**, Massachusetts Institute of Technology; Member, School of Mathematics

November 20
Special Seminar Lecture ✦ *Spectral Edge Statistics of Random Band and Sparse Matrices* ✦ **Alexander Sodin**, Tel Aviv University

Special Geometry of Materials Seminar ✦ *What Does the Modular Group Have to Do with Materials?* ✦ **Robert MacPherson**, Hermann Weyl Professor, School of Mathematics

November 23
Computer Science/Discrete Math I ✦ *Privacy of Dynamic Data: Continual Observation and Pan Privacy* ✦ **Moni Naor**, Weizmann Institute of Science

Members Seminar ✦ *Number Theory Related to Quantum Chaos* ✦ **Pär Kurlberg**, KTH Royal Institute of Technology, Stockholm; Member, School of Mathematics

November 24
Computer Science/Discrete Math II ✦ *Arithmetic Progressions in Primes* ✦ **Madhur Tulsiani**, Member, School of Mathematics

November 30
Members Seminar ✦ *Moduli Spaces of Bundles—With Some Twists* ✦ **Jochen Heinloth**, University of Amsterdam; Member, School of Mathematics

December 1
Computer Science/Discrete Math II ✦ *Algorithmic Dense Model Theorems, Decompositions, and Regularity Theorems* ✦ **Russell Impagliazzo**, University of California, San Diego; Visiting Professor, School of Mathematics

December 2
Analytic and Geometric Number Theory Mini-Course ✦ *Mean-Values of Multiplicative Functions and Weak Subconvexity II* ✦ **Kannan Soundararajan**, Stanford University; Member, School of Mathematics

Workshop on Topology: Identifying Order in Complex Systems ✦ *Knots in Proteins* ✦ **Alexander Grosberg**, New York University ✦ *Topological Methods in the Arnold Diffusion Problem* ✦ **Marian Gidea**, Northeastern Illinois University ✦ *Electrical and Systems Engineering* ✦ **Daniel Koditschek**, University of Pennsylvania

December 3
Analytic and Geometric Number Theory Seminar ✦ *Half-Dimensional Sieve, Multiplicative Functions, and Rational Points* ✦ **Ritabrata Munshi**, Member, School of Mathematics

Joint IAS/PU Number Theory Seminar ✦ *Hilbert Modular Surfaces through K3 Surfaces* ✦ **Abhinav Kumar**, Massachusetts Institute of Technology; Princeton University

December 4
Special Geometry of Materials Seminar ✦ *Using Betti Numbers to Quantify Complicated Time Dependent Patterns* ✦ **Konstantin Mischaikow**, Rutgers, The State University of New Jersey

December 7
Special Guest Lecture ✦ *The Tame Algebra* ✦ **Yuval Flicker**, The Ohio State University

Computer Science/Discrete Math I ✦ *The NOF Communication Complexity of Multiparty Pointer Jumping* ✦ **Joshua Brody**, Dartmouth College

Members Seminar ✦ *Finding the Symmetry Group and the Three-Dimensional Shape of Symmetric Molecules That We Don't Know How to Crystallize* ✦ **Shamgar Gurevich**, Member, School of Mathematics

December 8
Computer Science/Discrete Math II ✦ *Algorithmic Dense Model Theorems, Decompositions, and Regularity Theorems* ✦ **Russell Impagliazzo**, University of California, San Diego; Visiting Professor, School of Mathematics

Geometry and Materials Seminar ✦ *How Do Mechanical Interactions Generate Surface Tension in Tissues?* ✦ **M. Lisa Manning**, Princeton University

December 10
Analytic and Geometric Number Theory Seminar ✦ *The Inverse Conjectures for the Gowers Norms* ✦ **Ben Green**, University of Cambridge; Harvard University

Joint IAS/PU Number Theory Seminar ✦ *An Effective Proof of the Oppenheim Conjecture* ✦ **Elon Lindenstrauss**, Princeton University; Visitor, School of Mathematics

December 14
Computer Science/Discrete Math I ✦ *A Parallel Repetition Theorem for Any Interactive Argument* ✦ **Iftach Ilan Haitner**, Microsoft Research New England

Members Seminar ✦ *Function Theory on Symplectic Manifolds* ✦ **Leonid Polterovich**, The University of Chicago

December 15
Computer Science/Discrete Math II ✦ *An Algorithmic Proof of Forster's Lower Bound* ✦ **Moritz Hardt**, Princeton University

January 11
Members Seminar ✦ *Pseudoholomorphic Curves and Dynamics in Dimension Three* ✦ **Helmut Hofer**, Professor, School of Mathematics

January 18
Members Seminar ✦ *Gelfand Pairs and Invariant Distributions* ✦ **Dmitry Gourevitch**, Member, School of Mathematics

January 19
Computer Science/Discrete Math II ✦ *Limits of Randomly Grown Graph Sequences* ✦ **Katalin Vesztergombi**, Eötvös Loránd University

January 20
Special Geometry/Dynamical Systems Seminar ✦ *Using Dvir's Polynomial Method in Euclidean Space* ✦ **Larry Guth**, University of Toronto

January 21
Analytic and Geometric Number Theory Seminar ✦ *The Positive Density Conjecture for Integral Apollonian Packings* ✦ **Elena Fuchs**, Princeton University

January 25
Computer Science/Discrete Math I ✦ *Expanders and Communication-Avoiding Algorithms* ✦ **Oded Schwartz**, Technische Universität Berlin

Members Seminar ✦ *Pretentiousness in the Analytic Theory of Numbers* ✦ **Andrew Granville**, Université de Montréal; Member, School of Mathematics

Geometry and Materials Seminar ✦ *Liquid Crystals, Minimal Surfaces, and Elliptic Functions* ✦ **Randall Kamien**, University of Pennsylvania; Member, School of Mathematics

January 26
Computer Science/Discrete Math II ✦ *Representation Theory and Expansion in Groups* ✦ **Avi Wigderson**, Herbert H. Maass Professor, School of Mathematics

Geometry/Dynamical Systems Seminar ✦ *Rabinowitz-Floer Homology* ✦ **Urs Frauenfelder**, Seoul National University

January 28
Analytic and Geometric Number Theory Seminar ✦ *Bounds toward Ramanujan over a Number Field* ✦ **Farrell Brumley**, Université Henri Poincaré; Visitor, School of Mathematics

January 29
Analysis Math-Physics Seminar ✦ *Nodal Sets for Eigenfunctions of the Laplacian and Lattice Points on Circles and Spheres* ✦ **Zeev Rudnick**, Member, School of Mathematics

February 1
Computer Science/Discrete Math I ✦ *A New Approach to the Inverse Littlewood-Offord Problem* ✦ **Hoi Nguyen**, Rutgers, The State University of New Jersey

Members Seminar ✦ *An Extension Criterion for Lattice Actions on the Circle* ✦ **Marc Burger**, Eldgenössische Technische Hochschule Zürich

February 2
Computer Science/Discrete Math II ✦ *Representation Theory and Expansion in Groups* ✦ **Avi Wigderson**, Herbert H. Maass Professor, School of Mathematics

Geometry/Dynamical Systems Seminar ✦ *Ideal Valued Measures and Topology of Maps* ✦ **Misha Gromov**, Courant Institute of Mathematical Sciences, New York University, and Institut des Hautes Études Scientifiques

February 3
Workshop on Topology: Identifying Order in Complex Systems ✦ *Caging and Linking* ✦ **Yuliy Baryshnikov**, Bell Laboratories ✦ *Protein Sectors: From Evolutionary Correlations to 3rd Functional Structures* ✦ **Stanislas Leibler**, Professor, School of Natural Sciences ✦ *Knotted, Linked, and Tangled Nodal Lines in Optical Fields* ✦ **Mark Dennis**, University of Bristol

Analytic and Geometric Number Theory Seminar ✦ *A Subconvexity Bound for Automorphic L-Functions for SL(3,Z)* ✦ **Liangyi Zhao**, Nanyang Technological University, Singapore, and Max-Planck-Institut für Mathematik

February 4
Analytic and Geometric Number Theory Seminar ✦ *On the Sup-Norm of Maass Forms of Large Level* ✦ **Nicolas Templier**, Member, School of Mathematics

Joint IAS/PU Number Theory Seminar ✦ *Generalized Modular Functions* ✦ **Winfried Kohnen**, Universität Heidelberg

February 5
Analysis Math-Physics Seminar ✦ *Entropy Bounds for Eigenstates of Anosov Manifolds* ✦ **Stephane Nonnenmacher**, Commissariat à l'Énergie Atomique, Gif-sur-Yvette Cedex, France; von Neumann Fellowship, School of Mathematics

February 8
Computer Science/Discrete Math I ✦ *Interpreting Polynomial Structure Analytically* ✦ **Julia Wolf**, Rutgers, The State University of New Jersey

Members Seminar ✦ *Heegaard Floer Homology, Khovanov Homology, and Contact Geometry* ✦ **John Baldwin**, Princeton University; Veblen Research Instructorship, School of Mathematics

February 9
Computer Science/Discrete Math II ✦ *Representation Theory and Expansion in Groups* ✦ **Avi Wigderson**, Herbert H. Maass Professor, School of Mathematics

February 11
Analytic and Geometric Number Theory Seminar ✦ *Quadratic Polynomials Represented by Norms* ✦ **Tim Browning**, University of Bristol; Member, School of Mathematics

Joint IAS/PU Number Theory Seminar ✦ *Some Remarks on Quadratic Twists of L-Functions* ✦ **Vinayak Vatsal**, University of British Columbia

February 12
Analysis Math-Physics Seminar ✦ *Gaussian Subordination for the Beurling-Selberg Extremal Problem* ✦ **Emanuel Carneiro**, Member, School of Mathematics

February 15
Computer Science/Discrete Math I ✦ *Graph Expansion and the Unique Games Conjecture* ✦ **David Steurer**, Princeton University

February 16
Computer Science/Discrete Math II ✦ *Complexity of Constraint Satisfaction Problems: Exact and Approximate* ✦ **Prasad Raghavendra**, University of Washington

Joint IAS/PU Number Theory Seminar ✦ *Real Quadratic Analogues of Values of the J-Function at CM Points* ✦ **William Duke**, University of California, Los Angeles; Member, School of Mathematics

February 19
Joint IAS/PU Mathematical Physics Seminar ✦ *Superconcentration* ✦ **Sourav Chatterjee**, University of California, Berkeley, and Courant Institute of Mathematical Sciences, New York University

February 22
Computer Science/Discrete Math I ✦ *Average Sensitivity of Polynomial Threshold Functions* ✦ **Rocco Servedio**, Columbia University

Members Seminar ✦ *Algebraic Properties of the Quantum Homology* ✦ **Yaron Ostrover**, Member, School of Mathematics

Geometry and Materials Seminar ✦ *Unusual Classical Ground States of Matter* ✦ **Salvatore Torquato**, Princeton University

February 23

Computer Science/Discrete Math II ✦ *Testing Correlations and Inverse Theorems* ✦ **Hamed Hatami**, Princeton University; Veblen Research Instructorship, School of Mathematics

Special Talk on A1-Homotopy Theory and Its Recent Developments ✦ *The Friedlander-Milnor Conjecture* ✦ **Fabien Morel**, Ludwig-Maximilians-Universität München; Member, School of Mathematics

Geometry/Dynamical Systems Seminar ✦ *Lipschitz Maps from Spaces with Many Rectifiable Curves* ✦ **Jeff Cheeger**, Courant Institute of Mathematical Sciences, New York University

February 24

Special Talk on A1-Homotopy Theory and Its Recent Developments ✦ *The Friedlander-Milnor Conjecture* ✦ **Fabien Morel**, Ludwig-Maximilians-Universität München; Member, School of Mathematics

February 25

Special Talk on A1-Homotopy Theory and Its Recent Developments ✦ *The Friedlander-Milnor Conjecture* ✦ **Fabien Morel**, Ludwig-Maximilians-Universität München; Member, School of Mathematics

Analytic and Geometric Number Theory Seminar ✦ *Analytic Methods to Compute Dirichlet L-Functions and Character Sums* ✦ **Ghaith A. Hiary**, Member, School of Mathematics

Joint IAS/PU Number Theory Seminar ✦ *On Eisenstein Series and the Cohomology of Arithmetic Groups* ✦ **Joachim Schwermer**, Universität Wien and Erwin Schrödinger International Institute for Mathematical Physics

February 26

Analysis Math-Physics Seminar ✦ *Loop-Erased Random Walk on Planar Graphs* ✦ **Amir Yehudayoff**, Member, School of Mathematics

March 1

Computer Science/Discrete Math I ✦ *A Theory of Cryptographic Complexity* ✦ **Manoj Prabhakaran**, University of Illinois at Urbana-Champaign

Members Seminar ✦ *L-Functions and Random Matrix Theory* ✦ **Michael Rubinstein**, University of Waterloo; Member, School of Mathematics

Geometry and Materials Seminar ✦ *Unusual Classical Ground States of Matter* ✦ **Salvatore Torquato**, Princeton University

March 2

Computer Science/Discrete Math II ✦ *Computational Complexity and Information Asymmetry in Financial Products* ✦ **Boaz Barak**, Princeton University

Geometry/Dynamical Systems Seminar ✦ *Floer Homology and Loop Space Topology I* ✦ **Matthias Schwarz**, Universität Leipzig

March 3

Analytic and Geometric Number Theory Mini-Course ✦ *The Parameterization of Algebraic Structures and Applications I* ✦ **Manjul Bhargava**, Princeton University

Workshop on Topology: Identifying Order in Complex Systems ✦ *The Structure of Large Data Sets of Biological Information: Tracking the Meaning of Evolutionary Changes* ✦ **Arnold J. Levine**, Professor, School of Natural Sciences ✦ *Topological Order in Quantum Statistical Mechanics* ✦ **Paul Fendley**, University of Virginia ✦ *Topological Robotics, Topological Complexity, and Euclidean Embeddings of Real Projective Spaces* ✦ **Peter Landweber**, Rutgers, The State University of New Jersey

Geometry/Dynamical Systems Seminar ✦ *Floer Homology and Loop Space Topology II* ✦ **Matthias Schwarz**, Universität Leipzig

March 4

Analytic and Geometric Number Theory Seminar ✦ *One Parameter Families of Elliptic Curves with Maximal Galois Representations* ✦ **Alina Cojocaru**, University of Illinois at Chicago; Member, School of Mathematics

Joint IAS/PU Number Theory Seminar ✦ *Geometric Overconvergent Modular Forms* ✦ **Vincent Pilloni**, Columbia University

March 5

Analysis Math-Physics Seminar ✦ *Strongly Correlated Phases in Rapidly Rotating Bose Gases* ✦ **Robert Seiringer**, Princeton University

March 8

Computer Science/Discrete Math I ✦ *Behavioral Experiments in Strategic Networks* ✦ **Michael Kearns**, University of Pennsylvania

March 9

Computer Science/Discrete Math II ✦ *Algorithms vs. Hardness* ✦ **Nisheeth Vishnoi**, Microsoft Research India

March 10

Analytic and Geometric Number Theory Mini-Course ✦ *The Parameterization of Algebraic Structures, and Applications II* ✦ **Manjul Bhargava**, Princeton University

March 11

Analytic and Geometric Number Theory Seminar ✦ *Distribution of Extreme Values of L-Functions in the Strip $1/2 < Re(s) < 1$* ✦ **Youness Lamzouri**, Member, School of Mathematics

Joint IAS/PU Number Theory Seminar ✦ *The Average Rank of Elliptic Curves* ✦ **Manjul Bhargava**, Princeton University

March 15

Workshop on Analytic Number Theory ✦ *Asymptotic Large Sieve and the Critical Zeros* ✦ **Henryk Iwaniec**, Rutgers, The State University of New Jersey ✦ *SL(2,Z), Dirichlet Series, and Gamma^1(15)* ✦ **John Thompson**, University of Florida ✦ *The Burgess Bound for Twisted Hilbert Modular L-Functions* ✦ **Gergely Harcos**, Alfréd Rényi Institute of Mathematics, Hungarian Academy of Sciences, Budapest

Computer Science/Discrete Math I ✦ *Extremal Problems for Convex Lattice Polytopes* ✦ **Imre Barany**, Alfréd Rényi Institute of Mathematics, Hungarian Academy of Sciences, Budapest

March 16

Workshop on Analytic Number Theory ✦ *Subconvexity for Twisted L-Functions on GL(3)* ✦ **Valentin Blomer**, University of Toronto ✦ *Linear Approximate Groups* ✦ **Ben Green**, University of Cambridge ✦ *Total Eigenfunctions and the Distribution of Lattice Points on Spheres* ✦ **Jean Bourgain**, Professor, School of Mathematics

Computer Science/Discrete Math II ✦ *Pseudorandom Generators for Regular Branching Programs* ✦ **Amir Yehudayoff**, Member, School of Mathematics

Geometry/Dynamical Systems Seminar ✦ *Symplectically Non-Fillable Contact Manifolds and the Weinstein Conjecture* ✦ **Chris Wendl**, Humboldt Universität zu Berlin

March 17

Workshop on Analytic Number Theory ✦ *L-Functions for High Rank Groups* ✦ **Xiaoqing Li**, University at Buffalo, The State University of New York; von Neumann Fellowship, School of Mathematics ✦ *Rational Points and Weyl Sums* ✦ **Trevor Wooley**, University of Bristol

March 18

Workshop on Analytic Number Theory ✦ *Anomalous Intersections* ✦ **Enrico Bombieri**, IBM von Neumann Professor, School of Mathematics ✦ *Mysteries around Heilbronn Sums* ✦ **Nick Katz**, Princeton University ✦ *The Affine Sieve* ✦ **Peter Sarnak**, Professor, School of Mathematics

Joint Biology/Math Seminar ✦ *Images of Life: Exploring Plant Development with Visual Models and Simulations* ✦ **Przemyslaw Prusinkiewicz**, University of Calgary

March 19

Workshop on Analytic Number Theory ✦ *Methods from Analytic Number Theory to Count Rational Points on Châtelet Surfaces* ✦ **Régis de la Bretèche**, Institut de Mathématiques de Jussieu, Université Paris Diderot ✦ *Expansion in SLd(Z/qZ), q Square-Free* ✦ **Peter Varju**, Princeton University ✦ *Counting Rational Points on Cubic Curves* ✦ **Roger Heath-Brown**, University of Oxford; Visitor, School of Mathematics

March 22

Computer Science/Discrete Math I ✦ *Product Rules in Semidefinite Programming* ✦ **Rajat Mittal**, Rutgers, The State University of New Jersey

Members Seminar ✦ *Explicit Automorphic Forms for the Rational Function Field, and Their Galois Representations* ✦ **Zhiwei Yun**, Member, School of Mathematics

March 24

Analytic and Geometric Number Theory Mini-Course ✦ *Artin's Conjecture on Zeros of p-adic Forms* ✦ **Roger Heath-Brown**, University of Oxford; Visitor, School of Mathematics

March 25

Analytic and Geometric Number Theory Seminar ✦ *Metaplectic Ramanujan Conjecture and Ternary Quadratic Forms over Function Fields* ✦ **Jacob Tsimerman**, Princeton University

Joint IAS/PU Number Theory Seminar ✦ *An Estimate for the Counting Function of Prime Chains with Applications* ✦ **Florian Luca**, Universidad Nacional Autónoma de México

March 29

Members Seminar ✦ *Discrete Analogues in Harmonic Analysis* ✦ **Lillian Pierce**, Member, School of Mathematics

March 30

Computer Science/Discrete Math II ✦ *A Combinatorial Proof of the Chernoff-Hoeffding Bound with Applications to Direct-Product Theorems* ✦ **Valentine Kabanets**, Simon Fraser University; von Neumann Fellowship, School of Mathematics

Geometry/Dynamical Systems Seminar ✦ *Ideal Valued Measures and Topology of Maps* ✦ **Misha Gromov**, Courant Institute of Mathematical Sciences, New York University; Institut des Hautes Études Scientifiques

April 1

Analytic and Geometric Number Theory Seminar ✦ *Twists of L-Functions* ✦ **Alberto Perelli**, Università degli Studi di Genova

Joint IAS/PU Number Theory Seminar ✦ *On a p-adic Automorphic Construction of Euler Systems* ✦ **Eric Urban**, Columbia University

April 2

Analysis Math-Physics Seminar ✦ *Global Existence of Smooth Solutions to a Barely Supercritical Wave Equation* ✦ **Tristan Roy**, Member, School of Mathematics

April 5

Computer Science/Discrete Math I ✦ *Compressing Bounded-Round Communication* ✦ **Mark Braverman**, Microsoft Research New England

Members Seminar ✦ *Vanishing Theorem for Torsion Automorphic Sheaves* ✦ **Kai-Wen Lan**, Princeton University; Veblen Research Instructorship, School of Mathematics

April 6

Computer Science/Discrete Math II ✦ *Mobius Randomness and Dynamics* ✦ **Peter Sarnak**, Professor, School of Mathematics

Marston Morse Lecture ✦ *Cotangent Bundles and Their Relatives* ✦ **Paul Seidel**, Massachusetts Institute of Technology

April 7

Special Lecture ✦ *Berkovich Spaces as Pro-Definable Spaces* ✦ **Francois Loeser**, École Normale Supérieure, Paris

Marston Morse Lecture ✦ *Monodromy and Its Categorification* ✦ **Paul Seidel**, Massachusetts Institute of Technology

Workshop on Topology: Identifying Order in Complex Systems ✦ *Measuring Shape with Homology* ✦ **Robert MacPherson**, Hermann Weyl Professor, School of Mathematics

Toward a Computational Morse Theory ✦ *Rigorous Computations of Equilibria and Connecting Orbits* ✦ **Jean-Philippe Lessard**, Rutgers, The State University of New Jersey

April 8

Marston Morse Lecture ✦ *Symplectic Topology as Sheaf Theory?* ✦ **Paul Seidel**, Massachusetts Institute of Technology

Joint IAS/PU Number Theory Seminar ✦ *Proof, via Smooth Homology, of the Existence of Rational Families of H-Invariant Linear Forms on G-Induced Representations, when G/H Is a Symmetric, Reductive, p-adic Space, via Smooth Homology* ✦ **Philippe Blanc**, Institut de Mathématiques de Luminy, Marseille, France

April 12

Computer Science/Discrete Math I ✦ *Cover Times, Blanket Times, and Majorizing Measures* ✦ **James Lee**, University of Washington

April 13

Computer Science/Discrete Math II ✦ *Critical Slowdown for the Ising Model on the Two-Dimensional Lattice* ✦ **Eyal Lubetzky**, Microsoft Research Redmond

Geometry/Dynamical Systems Seminar ✦ *The Picard Lefschetz Theory of Complexified Morse Functions* ✦ **Joseph Johns**, Columbia University

April 14

Analytic and Geometric Number Theory Mini-Course ✦ *Artin's Conjecture on Zeros of p-adic Forms, Part II* ✦ **Roger Heath-Brown**, University of Oxford; Visitor, School of Mathematics

Special Lecture ✦ *Cybersecurity, Mathematics, and Limits on Technology* ✦ **Andrew Odlyzko**, University of Minnesota

April 15

Joint IAS/PU Number Theory Seminar ✦ *Split Reductions of Simple Abelian Varieties* ✦ **David Zywina**, University of Pennsylvania

April 16

Analysis Math-Physics Seminar ✦ *The Decay of Fourier Modes in Solutions of the 2-Dim Navier-Stokes System* ✦ **Yakov Sinai**, Princeton University

April 19

Computer Science/Discrete Math I ✦ *Can Complexity Theory Ratify the Invisible Hand of the Market?* ✦ **Vijay Vazirani**, Georgia Institute of Technology

Geometry and Materials Seminar ✦ *Coarsening and Drainage and Coarsening in Wet Foams* ✦ **Douglas Durian**, University of Pennsylvania

April 20

Computer Science/Discrete Math II ✦ *Matching Vector Codes* ✦ **Zeev Dvir**, Member, School of Mathemtics

Geometry/Dynamical Systems Seminar ✦ *Loop Products and Closed Geodesics* ✦ **Nancy Hingston**, The College of New Jersey

Geometry/Dynamical Systems Seminar ✦ *On the Multiplicity of Periodic Orbits for Tonelli Systems* ✦ **Marco Mazzucchelli**, Max-Planck-Institut für Mathematik in den Naturwissenschaften

April 21

Special Mathematical Physics Seminar ✦ *On Quantum Sigma Models with Non-Abelian Winding* ✦ **Reimundo Heluani**, University of California, Berkeley

April 22

Geometry/Dynamical Systems Seminar ✦ *Refining and Generalizing Gromov's Compactness Theorem for J-Curves* ✦ **Joel Fish**, Stanford University

Joint IAS/PU Number Theory Seminar ✦ *Deformation Rings of Group Representations* ✦ **Bart de Smit**, Leiden University

April 26

Geometry and Materials Seminar ✦ *Equilibrium Shapes for Anisotropic Surface Energies* ✦ **Bennett Palmer**, Idaho State University

April 27

Computer Science/Discrete Math II ✦ *Hardness of Approximately Solving Linear Equations over Reals* ✦ **Dana Moshkovitz**, Member, School of Mathemtics

April 28

Special Mathematical Physics Seminar ✦ *Mathematical Structures in N=2 Gauge Theory* ✦ **Davide Gaiotto**, Member, School of Natural Sciences

April 29

Joint IAS/PU Number Theory Seminar ✦ *Deformation Rings of Group Representations* ✦ **Bart de Smit**, Leiden University

May 3

Extreme Gaps in the Spectrum of Random Matrices ✦ **Gerard Arous**, Courant Institute of Mathematical Sciences, New York University

May 4

Computer Science/Discrete Math II ✦ *Explicit Construction of RIP Matrices, Matrices with Small Coherence, and Related Problems* ✦ **Sergei Konyagin**, Steklov Mathematical Institute, Russian Academy of Sciences; Member, School of Mathemtics

Hermann Weyl Lectures ✦ *An Overview of Some Problems of Unlikely Intersections* ✦ **Umberto Zannier**, Scuola Normale Superiore de Pisa; Visitor, School of Mathematics

May 5

Hermann Weyl Lectures ✦ *Unlikely Intersections in Multiplicative Groups and the Zilber Conjecture* ✦ **Umberto Zannier**, Scuola Normale Superiore de Pisa; Visitor, School of Mathematics

May 6

Joint IAS/PU Number Theory Seminar ✦ *Selmeer Ranks of Twists of Elliptic Curves* ✦ **Karl Rubin**, University of California, Irvine

May 11

Computer Science/Discrete Math II ✦ *Small-Bias Sets* ✦ **Amir Yehudayoff**, Member, School of Mathematics

May 12

Hermann Weyl Lectures ✦ *About the André-Oort Conjecture* ✦ **Umbertro Zannier**, Scuola Normale Superiore de Pisa; Visitor, School of Mathematics

May 18

Computer Science/Discrete Math II ✦ *Reductions between Expansion Problems* ✦ **Madhur Tulsiani**, Member, School of Mathematics

May 24

Computer Science/Discrete Math I ✦ *Subsampling Mathematical Relaxations and Average-Case Complexity* ✦ **Boaz Barak**, Princeton University

Geometry and Materials Seminar ✦ *Conic Sections, Lorentz Covariance, and Smectic Liquid Crystals* ✦ **Randall D. Kamien**, University of Pennsylvania; Member, School of Mathematics

May 25

Computer Science/Discrete Math II ✦ *The Stepanov Method* ✦ **Avi Wigderson**, Herbert H. Maass Professor, School of Mathematics

May 26

Special Women and Mathematics Colloquium Talk ✦ *Automorphic Forms and Galois Representations* ✦ **Matthew Emerton**, Northwestern University

June 7

Geometry and Materials Seminar ✦ *A Universal and Complete Descriptor of Material Microstructures* ✦ **Salvatore Torquato**, Princeton University

June 14

Pseudorandomness in Mathematical Structures Workshop ✦ *Approximate Algebraic Structure (Groups, Fields, Homomorphisms, . . .)* ✦ **Ben Green**, University of Cambridge ✦ *Computational Pseudorandomness and Extractors* ✦ **Russell Impagliazzo**, University of California, San Diego; Visiting Professor, School of Mathematics

June 15

Pseudorandomness in Mathematical Structures Workshop ✦ *Expander Graphs: Applications and Combinatorial Constructions* ✦ **Avi Wigderson**, Herbert H. Maass Professor, School of Mathematics ✦ *Regularity Lemmas in Graph Theory, Additive Combinatorics, and TCS* ✦ **Luca Trevisan**, University of California, Berkeley

June 16

Pseudorandomness in Mathematical Structures Workshop ✦ *Quasirandom Groups* ✦ **Timothy Gowers**, University of Cambridge ✦ *Quasirandom Graphs and Hypergraphs* ✦ **Fan Chung Graham**, University of California, San Diego ✦ *Expansion in Lie Groups and Applications* ✦ **Jean Bourgain**, Professor, School of Mathematics ✦ *Random-Like Behavior in Deterministic Systems* ✦ **Benjamin Weiss**, Einstein Institute of Mathematics, The Hebrew University of Jerusalem

June 17

Pseudorandomness in Mathematical Structures Workshop ✦ *Group Expansion and the Affine Sieve* ✦ **Jean Bourgain**, Professor, School of Mathematics ✦ *Quasirandom Boolean Functions, and Inapproximability* ✦ **Ryan O'Donnell**, Carnegie Mellon University ✦ *Randomness in Group Theory* ✦ **Alex Lubotzky**, Einstein Institute of Mathematics, The Hebrew University of Jerusalem ✦ *Random Matrices and Their Spectra* ✦ **Van Vu**, Rutgers, The State University of New Jersey

June 18

Pseudorandomness in Mathematical Structures Workshop ✦ *Structure of Solutions to Random Constraint Satisfaction Problems* ✦ **Dimitris Achlioptas**, University of California, Santa Cruz, and Research Academic Computer Technology Institute, Greece ✦ *An Inverse Theorem for the Gowers Norms over Finite Fields* ✦ **Tamar Ziegler**, Technion–Israel Institute of Technology ✦ *Pseudorandom Matrices and Explicit Constructions Related to Sparse Signal Recovery* ✦ **Sergei Konyagin**, Steklov Mathematical Institute; Member, School of Mathematics ✦ *Pseudorandomness of the Mobius Function* ✦ **Peter Sarnak**, Professor, School of Mathematics

Geometry and Materials Seminar: Topological Defects in Liquid Crystals ✦ *Beyond Homotopy Groups* ✦ **Bryan Chen**, University of Pennsylvania

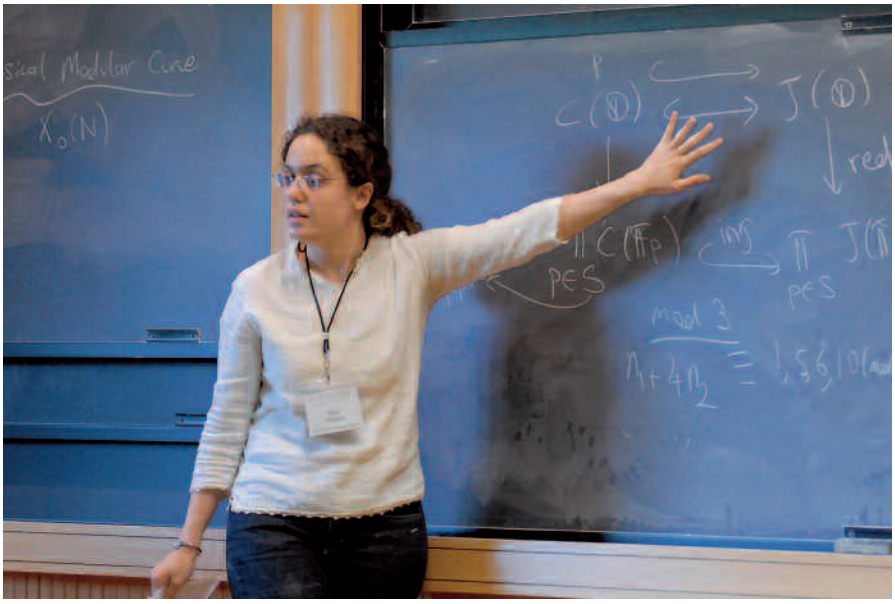
Program for Women and Mathematics

The seventeenth annual Program for Women and Mathematics was held at the Institute for Advanced Study during the period of May 17–28, 2010. The program activities were sponsored by the Institute and Princeton University and generously supported by the National Science Foundation.

The goal of the program is to encourage undergraduate and graduate students to continue their math education. Research mathematicians give lectures and seminars focusing on a particular topic. The subject of this year's program was "p-adic Langlands Program." Mentoring, discussions regarding peer relations, and an introduction to career opportunities were also part of the program.

The total number of participants in the program was fifty-six. That number includes twenty-two undergraduates, twenty-three graduate students, and eleven postdoctoral mathematicians. Everyone was accommodated in the Institute's housing complex, giving them an opportunity to meet Institute scholars from other parts of the country and the world.

Ingrid Daubechies of Princeton University was the organizer of the program this year with the help of Tanya Khovanova, a research affiliate at Massachusetts Institute of Technology. Advanced course lectures were given by Ariane Mézard of the Université de Versailles Saint-Quentin-en-Yvelines and Marie-France Vigneras of the Institut de Mathematiques de Jussieu. Beginning course lectures were given by Elena Mantovan of the California Institute of Technology and Rachel Ollivier of the Université de Versailles Saint-Quentin-en-Yvelines.



CLIFF MOORE

ANDREA KANE

Ramla Abdellatif of the Université Paris-Sud 11 and Ana Caraiani of Harvard University served as teacher assistants for the advanced course lectures, and Laura Peskin of the California Institute of Technology and Katherine Korner of Harvard University were beginning course teaching assistants.

Research seminars were as follows: Tanya Khovanova, Massachusetts Institute of Technology, "Integers and Sequences"; Lillian Pierce, Member, School of Mathematics, "Number Theoretic Methods for Discrete Analogues in Harmonic Analysis"; Ila Varma, Leiden Uni-

Top: Ekin Ozman of the University of Wisconsin; bottom: Ingrid Daubechies (center, left), Tanya Khovanova (center, right), and Cathleen Morawetz (right) with participants

versity, "Elementary Formulas for Sums of Squares via Modular Forms and Hecke Characters"; Denis Ibadula, University of Constanta Romania, "On the Structure of a Certain Space and Its Applications to the Theory of Igusa Local Zeta Functions"; Tanya Khovanova, Massachusetts Institute of Technology, "Baron Münchhausen's Sequence"; Ekin Ozman, University of Wisconsin, "Local Points on Quadratic Twists of the Classical Modular Curve"; Ramla Abdellatif, Université Paris-Sud 11, "Mod p Representations of $SL_2(Q_p)$"; and Dubravka Ban, Southern Illinois University, "The Langlands Quotient Theorem for Central Extensions of p-adic Groups."

CLIFF MOORE

Ariane Mézard of the Université de Versailles Saint-Quentin

There were seven Women-in-Science Seminars. Andrew Pollington of the National Science Foundation gave "An Introduction to the National Science Foundation and Funding Opportunities"; Ingrid Daubechies and Cathleen Morawetz hosted "A Chat with Ingrid and Cathleen" and "A Day in the Life," with Lillian Pierce of the Institute, Constance Leidy of Wesleyan University, Birgit Rudloff of Princeton University, and Julie Litman of the Center for Communications Research; Janet Mertz, University of Wisconsin, spoke on "Gender, Culture, and Mathematics Performance"; and Shelley Costa, Swarthmore College, discussed "Theory of Differences: How and Why the Most Famous Science Writer in Nineteenth-Century England Could Not Get Her Mathematical Text Book Published" and led a discussion on "The Next Step—Applying and Surviving the Graduate School and a Postdoc Position."

Two colloquia were given during the program, one by Sophie Morel of Harvard University and one by Matthew Emerton of Northwestern University.

On Monday, May 24, the group spent the day at Princeton University where they had lunch, dinner, and a tour of the campus. The highlights of the day's activities were talks by both John Conway of Princeton University and Peter Sarnak, Professor in the School of Mathematics.

The Institute for Advanced Study and the School of Mathematics appreciate the dedication of the senior women who have graciously given their time and talents since the inception of the program in 1994. Organizers, program committee members, and lecturers have all contributed to the growth and success of the women's program. In the past seventeen years, many women in the field of mathematics, or contemplating entering the field, have been encouraged and supported by Karen Uhlenbeck, the program founder, and her collaborator and co-organizer Chuu-Lian Terng. Their commitment to the goals of the program has been unparalleled.

During the course of the workshop, participants were asked for feedback regarding the material level of the lectures. In addition, at the conclusion of each program, surveys were distributed to gain participant opinions about the quality of the Institute's facilities and the structure and organization of the program activities. The questionnaires reveal that both undergraduates and graduate students appreciate being offered the opportunity to participate in the program. Many stated that as a result of the program, they have a renewed sense of excitement about their math and feel fortunate to have been able to meet and work with so many women with common interests and goals. From talking with a few participants, it seemed that while some of the lectures appeared to be too advanced, the evening tutorials helped those individuals "catch up" and thus they benefited from the additional course lectures.

ANDREA KANE

Member Douglas Rudd led a discussion during a joint Princeton University and Institute galactic/extragalactic reading group.

School of Natural Sciences

Faculty

Stephen L. Adler

Nima Arkani-Hamed

Stanislas Leibler

Arnold J. Levine

Juan Maldacena

Nathan Seiberg

Scott Tremaine, Richard Black Professor

Edward Witten, Charles Simonyi Professor

Matias Zaldarriaga

Professors Emeriti

Freeman J. Dyson

Peter Goldreich

ACADEMIC ACTIVITIES

In 2009–10, Professor **Stephen L. Adler** continued his work on possible Earth-bound dark matter, as a potential explanation of the mysterious flyby anomalies. In these anomalies, spacecraft that are put in flyby orbits near Earth have shown unexplained decreases or, more startlingly, increases in velocity. In one new paper this past year, Adler constructed a model of Earth-orbiting dark matter shells, one composed of inelastic scatterers and a second composed of elastic scatterers, and showed that with shell radii of about thirty to thirty-five thousand kilometers these could give a good fit to the data. This work will appear in the proceedings of the Gell-Mann eightieth birthday conference. In a second paper, submitted as a "white paper" to the National Academy of Sciences decadal review on biological and physical sciences in space, Adler showed that if dark matter in Earth orbit is responsible for the flyby anomalies, it will necessarily produce temperature increases in spacecraft passing through the dark matter shells, and so spacecraft calorimetry could be a useful test of the hypothesis. Additionally, Adler wrote up his talk on the flyby anomalies for the Moriond conference proceedings, and put an analysis on his website showing that modifications of general relativity within the parameterized post-Newtonian framework cannot account for the flyby anomalies. Adler also wrote two articles of an expository nature. In an invited article for *Scholarpedia* on the Adler sum rule, he reviewed the history and derivation of this sum rule, and its relationship to the Bjorken scaling hypothesis. The article also included new material, in the form of a detailed evaluation of the current commutator side of the sum rule using the full Cabibbo-Kobayashi-Maskawa mixing matrix. In the second expository article, which appeared as a Perspective in *Science*, Adler and Angelo Bassi reviewed theoretical and experimental issues associated with the quantum measurement problem, focusing specifically on experimental tests that could verify or falsify stochastic reduction models. These models give an objective solution to the measurement problem by postulating a very weak noise field that couples to the Schrödinger equation, in such a way that microscopic physics is virtually unaffected, but effects that accumulate over the large number of particles in a measurement apparatus lead to definite outcomes in measurements. Earlier estimates by Adler suggest that the noise coupling may be larger than originally thought, which may make it possible to contemplate experimental tests within the next decade. Much of Adler's current work has dealt with finding

improved methods for evaluating high dimensional integrals, a topic of interest for both fundamental physics and applications. Adler is currently writing a short monograph containing both the theory of these methods and computer programs that he has developed.

In the 2009–10 academic year, Professor **Nima Arkani-Hamed**'s research has been focused on a deeper understanding of the extraordinary structure of scattering amplitudes in gauge theories that are invisible using standard methods. As an example, the scattering of six gluons in gauge theory involves 220 Feynman diagrams and more than ten thousand terms, and yet the final result is the sum over only three terms that fits on a single line! The reason for all this complexity in the usual formulation of quantum field theory is locality and unitarity, which forces us to use very gauge-redundant descriptions of physics.

This strongly suggests that there is a new way of thinking about field theory where space-time and unitarity will not play a central role, but other hidden physical principles will be made more manifest. In collaboration with Member Freddy Cachazo and his students, Arkani-Hamed has made what he believes is a significant step in uncovering this dual theory by finding a new mathematical structure that seems to be underlying the physics with deep connections to algebraic geometry, twistor space, and twistor string theory.

Last July, Arkani-Hamed and his collaborators proposed a dual formulation for the S Matrix of $N=4$ SYM and have been studying its consequences ever since. In its first incarnation, the dual provides a basis for the "leading singularities" of scattering amplitudes to all orders in perturbation theory. The scattering amplitude for n particles in the sector with k negative helicity gluons is associated with a simple integral over the space of k planes in n dimensions the Grassmannian G(k,n), with the action of parity and cyclic symmetries manifest. The residues of the integrand compute a basis for the leading singularities.

In collaboration with Member Freddy Cachazo and his students, Professor Arkani-Hamed has made what he believes is a significant step in uncovering this dual theory by finding a new mathematical structure that seems to be underlying the physics with deep connections to algebraic geometry, twistor space, and twistor string theory.

This G(k,n) Grassmannian formulation allows a direct understanding of both superconformal and dual superconformal symmetries, something impossible in the usual local formulation of field theory. Locality emerges only when a correct combination of residues is taken, motivated by a natural construction that gives the integral a "particle interpretation." This also reveals a surprising connection with twistor string theory.

Arkani-Hamed and his collaborators have recently also understood the Grassmannian origin of the full quantum loop amplitudes, beyond leading singularities. They arise from a canonical way of removing particles from higher-point amplitudes, associated with an "entangled" contour integral over pairs of points in twistor space.

In recent years, gene sequencing has become relatively easy and inexpensive, thus leading to large data banks of protein sequences. It is now possible to compare the sequences of proteins from a given family and to deduce correlations in amino acid frequencies at different positions along the peptide chain. Such correlations originate mainly from functional constraints shared by different members of the protein family. In collaboration with Olivier Rivoire, a Simons Foundation fellow at the Rockefeller University, and the group of Rama Ranganathan at the University of Texas Southwestern,

BENTLEY DREZNER

Member Nils Baas (standing) discussed new structures in the natural sciences during a Simons Center for Systems Biology seminar.

Professor **Stanislas Leibler** studied the functional constraints in several families of proteins, such as serine proteases. This work uncovered the existence of novel "functional structure" of proteins. It typically consists of several coexisting "protein sectors"—contiguous, quasi-independent groups of amino acids, which do not follow the secondary structure. Each sector can be associated with different functional aspects of the protein family and it seems that different sectors emerge largely under different evolutionary pressures.

Development of theoretical methods to systematically uncover protein sectors and to find their physical origins is a daunting theoretical program. Members Rémi Monasson and Simona Cocco, together with Leibler, have been trying to delineate simple models to study the interplay between functional and historical correlations within the protein families. More generally, they have been interested in the development of theoretical approaches to the inverse statistical problems in biology. In such problems, starting from observed correlations between interacting elements, one is trying to deduce the nature of underlying effective interactions. In particular, Cocco, Leibler, and Monasson applied new theoretical methods to the functioning of vertebrate retina, resulting in the rapid deduction of effective interactions between neurons directly from the recorded neural spike trains.

Together with Member Arvind Murugan, Leibler also began to develop a general theoretical framework to study error corrections in biological systems. The starting point was the classical work of John Hopfield and Jacques Ninio on kinetic proofreading in biochemistry. First generalizations of these results were obtained and some connections to non-equilibrium statistical mechanics were explored.

During the 2009–10 academic year, Professor **Arnold J. Levine**'s research focused on cancer genetics, infectious diseases, genetic causes of autism, and evolutionary biology.

Member Hideaki Mizuno, former Members Alexei Vazquez, now at the Cancer Institute of New Jersey, Gareth Bond, now at the University of Oxford, and Mickey Atwal, now at Cold Spring Harbor Laboratory, and Levine continued exploring associations between allelic variants of single nucleotide polymorphisms (SNPs) in the human population and responses

CLIFF MOORE

Professors Edward Witten (left), Juan Maldacena (center), and Nathan Seiberg at a high energy theory seminar

to chemotherapy and correlations among nearby SNPs as a means to identify candidate SNPs that could play a role in cancer risk and response to treatment (*Clinical Cancer Research* 15, 2009; *Carcinogenesis* 30, 2009; *Cancer Research* 70, 2010; *BMC Genetics* 11, 2010). Separately, Levine and Vazquez looked for small molecules with increased chemotherapeutic activity against specific tumor subtypes for some of the most aggressive tumors (provisional patent filed). Mizuno and Levine also analyzed the association of p53 mutations in breast cancers with stem cell transcriptional signatures. p53 is frequently inactivated in malignant cancer and, recently, it has been shown that p53 functions as a barrier to induced pluripotent stem cell production, leading to the hypothesis that p53 inactivation *in vivo* might act to permit the emergence of variant tumor cells with stem-cell-like properties (manuscript submitted).

Levine collaborated with Member Benjamin Greenbaum and researchers at the California Institute of Technology and New York University to test hypotheses about whether influenza has evolved in humans to avoid a set of sequence motifs that allow it to circumvent the most virulent host immune interferon response, and with Greenbaum to investigate variations, such as copy number variation, in host genetic immune backgrounds.

With Members Ning Lei, Chang Chan, and Asad Naqvi, Levine analyzed Autism Genetic Resource Exchange data to identify genetic mutations that might be associated with autism. Out of four mutations identified, two were in genes previously shown to be associated with autism, and one of the new genes identified is expressed in the hippocampus of the human brain, a region previously associated with autism.

The human genome contains three related transcription factors termed p53, p63, and p73, which are significant in fidelity of DNA replication, formation of epithelial cell layers, and formation of several structures in the central nervous system. A project with Member Vladimir Belyi traced this gene family back through over one billion years of evolution to an ancestor p53/63/73-like gene, showing the continuity as well as expansion and selection of function.

During the past academic year, Professor **Juan Maldacena**'s main research effort has been on the gauge/string duality with particular emphasis on understanding some aspects of gauge theory dynamics.

Maldacena, with Member Davide Gaiotto, studied the gravity description for a large class of $N=2$ supersymmetric quantum field theories. The complete set of equations and boundary conditions that determine a geometry dual to a given quantum field theory was given. Some special cases were constructed explicitly. This gravity description was in precise correspondence with the general construction of $N=2$ quantum field theories given by Gaiotto in a previous paper.

Maldacena, with Dario Martelli, explored a geometry related to an interesting confining supersymmetric quantum field theory. This geometry has also played an important role in recent string constructions. There are two geometries that are closely related, one introduced by Igor Klebanov and Matthew J. Strassler and the other by Chamseddine-Volkov-Maldacena-Nuñez. The relation between the two was clarified by considering a general brane configuration in string theory that can give rise to the two geometries in two distinct limits.

Maldacena, with Member Luis Fernando Alday and Gaiotto, Amit Sever, and Pedro Vieira, studied a problem involving minimal area surfaces in Anti-de-Sitter space. This problem arises when one considers the strong coupling limit of Wilson loops or planar scattering amplitudes in $N=4$ super Yang Mills. This is a simple modification of the classical Plateau problem: the problem of finding a soap bubble that ends on a given contour. Except that now the contour, as well as the surface, live in a curved space with Lorentzian signature. The contour lives on the boundary of anti-de Sitter space and it consists of a sequence of light-like segments. These two papers found a way to compute the area of the surface as a function of the shape of the contour. The problem was solved by using the classical integrability of the equations of motion for a string. It is quite likely that these techniques could be extended to the full quantum theory. In fact, the main motivation for this project has been to compute Wilson loops or scattering amplitudes for all values of the coupling.

Over the past year, Professor **Nathan Seiberg** continued his work on various aspects of supersymmetry and its phenomenology.

Following his earlier work on the most general framework of communicating supersymmetry breaking using gauge interactions, together with Thomas Dumitrescu, and Members Zohar Komargodski and David Shih, he performed a detailed analysis of a large class of models. In these models, the hidden sector consists of two subsectors that are weakly coupled to each other. One sector is made up of messengers and the other breaks supersymmetry. Each sector by itself may be strongly coupled. A unifying framework for such theories was presented and their predictions in different settings were discussed. This framework incorporates all known models of messengers. In the case of weakly coupled messengers interacting with a spurion through the superpotential, the sfermion mass-squared was shown to be positive, and furthermore, a lower bound on the ratio of the sfermion mass to the gaugino mass was established.

With Komargodski he presented a new formalism for finding the low-energy effective Lagrangian of Goldstinos and other fields. This Lagrangian is written using standard superspace and the superfields are constrained to include only the light degrees of freedom. The Goldstino resides in a (constrained) chiral superfield that is naturally identified at short distances. This leads to an exact computation of the IR behavior of some correlation functions even in strongly coupled theories with supersymmetry breaking. The Goldstino couplings above the scale of the matter superpartners are determined by identifying the Goldstino superfield with the standard spurion. At energies below the superpartners' scale, fermions, scalars (including Goldstone bosons), and gauge fields are also described by constrained superfields. This formalism makes it easy to find the leading order terms in the

With Members Ning Lei, Chang Chan, and Asad Naqvi, Professor Levine analyzed Autism Genetic Resource Exchange data to identify genetic mutations that might be associated with autism. Out of four mutations identified, two were in genes previously shown to be associated with autism, and one of the new genes identified is expressed in the hippocampus of the human brain, a region previously associated with autism.

Lagrangian and to control their corrections. It simplifies the derivation of many known results and leads to new ones.

One of Professor Witten's projects involved analytic continuation of the path integral of quantum mechanics, motivated both by the path integral of quantum gravity and by certain recent discoveries involving Chern-Simons gauge theory in three dimensions.

Following their earlier work on Fayet-Iliopoulos (FI) terms in field theory and supergravity, Komargodski and Seiberg analyzed various supersymmetry multiplets containing the supercurrent and the energy-momentum tensor. The most widely known such multiplet, the Ferrara-Zumino (FZ) multiplet, is not always well-defined. This can happen once FI terms are present or when the Kahler form of the target space is not exact. A new multiplet, which always exists, was presented. This understanding of the supersymmetry current led to new results about the possible IR behavior of supersymmetric theories. It also streamlined the coupling of rigid supersymmetric theories to supergravity. The standard coupling, which is based on the FZ-multiplet, cannot be used when this multiplet is ill-defined. Instead, the new current can be gauged. The resulting theory has, in addition to the graviton and the gravitino, another massless chiral superfield, which is essential for the consistency of the theory. Some of the moduli of various string models play the role of this superfield. These general considerations, which are based on the consistency of supergravity, show that such moduli cannot be easily lifted, thus leading to constraints on gravity/string models.

The centers of most galaxies contain black holes of millions to billions of times the mass of the Sun. The closest of these is the black hole at the center of our own Milky Way galaxy, which is surrounded by a cluster of stars some one hundred million times denser than the stellar neighborhood of the Sun. Understanding the behavior of stars in this exotic system informs us about how black holes grow, about star formation in extreme environments, and even about the rate and properties of gravitational waves that may be detected by spacecraft in the next decade. Richard Black Professor **Scott Tremaine** and Bence Kocsis of Harvard University have investigated the properties of disks of young, short-lived stars found near the Galaxy's black hole and have shown that the pronounced warps in these disks arise naturally and inevitably from resonant gravitational interactions with the surrounding cluster stars. They have also found intriguing analogies between the properties of the stellar distribution in dense environments and phase transitions in condensed-matter systems such as liquid crystals. With Andreas Burkert of the University of Munich, Tremaine has shown that the masses of black holes in nearby galaxies appear to correlate remarkably well with the population of globular clusters in the host galaxy, suggesting that both form or grow in the same processes.

Much of our understanding of black holes in galaxies and of the distribution of stars in the galaxies themselves is derived from fitting the observed properties of the galaxies—light distribution, rotation speed, velocity dispersion, etc.—to self-consistent models of stellar systems based on the collisionless Boltzmann equation. Almost all such models are constructed by a technique pioneered some three decades ago by Martin Schwarzschild at Princeton University. Tremaine has collaborated with Mir Abbas Jalali of the Sharif Institute of Technology on a new modeling tool based on the finite element methods used in engineering design. The greater accuracy of finite-element models of galaxies will become increasingly important as powerful new telescopes and instruments provide more accurate data on the galaxy properties.

Tremaine is collaborating with Member Subo Dong to investigate the implications of new discoveries of extrasolar planets made by NASA's Kepler spacecraft. Kepler detects planets when they pass in front of their host star and temporarily block a fraction of the stellar light; its first data release contains over seven hundred stars with viable candidate events, including five systems with candidate events from multiple planets. The Kepler data is likely to provide our first clean evidence on whether extrasolar planets generally are formed in a disk, like the planets in our own solar system.

Edward Witten, Charles Simonyi Professor, has worked primarily on three projects during 2009–10. The first, in collaboration with Nikita Nekrasov, involved trying to explain surprising new properties of supersymmetric gauge theories (with the so-called Ω-deformation) that have been discovered in recent years, at the Institute and elsewhere. Nekrasov and Witten were at least partially successful in explaining some of the surprises. The second project involved analytic continuation of the path integral of quantum mechanics, motivated both by the path integral of quantum gravity and by certain recent discoveries involving Chern-Simons gauge theory in three dimensions. Richard Feynman conceived of the path integral as an integral over real phase space variables. Complexification of the integration variables has often been considered on an ad hoc basis for specific purposes. Witten reformulated the path integral more systematically as an integral over a middle-dimensional real cycle in an infinite-dimensional complex space. At least for certain applications, this reformulation has proved to be quite illuminating.

The third project involves the theory of knots in three-dimensional space. More than twenty years ago, Witten used Chern-Simons gauge theory to give a manifestly invariant description of the celebrated but then-mysterious Jones polynomial of knots. In the last decade, mathematicians such as Mikhail Khovanov, following earlier ideas of Igor Frenkel and others, developed knot homology theories that extend the Jones polynomial in an unexpected way. A manifestly invariant description of Khovanov homology has been lacking. Can the physics-based understanding of the Jones polynomial be extended to Khovanov homology? Progress in this direction was made some years ago by Sergei Gukov, Albert Schwarz, and Cumrun Vafa, using string theory methods. Witten has succeeded in extending and simplifying the arguments in this area and has obtained a much more complete picture.

Among other research, Professor Scott Tremaine (below) collaborated with Member Subo Dong to investigate the implications of new discoveries of extrasolar planets made by NASA's Kepler spacecraft.



ANDREA KANE

ANDREA KANE

Professor Matias Zaldarriaga discussed the early universe and cosmology during a joint Princeton University and Institute lunch.

In 2009–10, Professor **Matias Zaldarriaga** worked on a variety of topics in cosmology, ranging from early universe cosmology to the study of the Lyman alpha cooling radiation associated with galaxy formation.

Member Leonardo Senatore and Zaldarriaga constructed single field inflationary models that are not tuned but have a four point function large enough to be detectable by the next generation of observations. This opened a new window to constrain inflationary models. In a separate paper, they computed loop corrections to correlation functions of inflationary perturbations in two sets of models, one where the inflaton has a large cubic self interaction and the other in which it interacts gravitationally with N additional massless scalar fields. The computations showed that contrary to previous results, quantum correction to the two point function does not induce a logarithmic running with the wavenumber or make the super-horizon correlation function time dependent.

Members Daniel Baumann and Senatore, together with Alberto Nicolis of Columbia University and Zaldarriaga, constructed a long wavelength effective theory for describing the universe on large scales. This theory can be used to address issues of back-reaction of the short wavelength perturbations on the dynamics of the expansion of the universe as well as on the evolution of the large-scale inhomogeneities in the universe. This approach can be the basis for new calculation techniques that could be used to make predictions for upcoming large-scale structure measurements.

Max Tegmark of the Massachusetts Institute of Technology and Zaldarriaga continued to pursue a novel radio telescope array design that could result in vastly larger collecting areas for the same computational cost. This innovation could lead to sensitive telescopes to observe the large-scale structure of the universe at early times using the 21 centimeter line of hydrogen. These investigations resulted in three papers that studied the array configurations for which this reduction of computational cost would apply; developed new calibration techniques for such arrays; and presented a solution for the so-called corner turning problem.

Together with Jaiyul Yoo and Lars Hernquist of Harvard University, Zaldarriaga studied a method to reconstruct the masses of galaxy clusters using the gravitational lensing effect they produce on the polarization of the microwave background. With Yoo and Liam Fitzpatrick of Boston University, Zaldarriaga studied general relativistic effects on galaxy clustering statistics.

Claude-André Faucher-Giguère, a graduate student at Harvard University, Hernquist, and Zaldarriaga studied the Lyman alpha cooling emission

associated with galaxy formation. Using a newly developed Lyman alpha radiative transfer code, they studied how gas accreted into galaxies in the cold mode could result in the observed Lyman-alpha blobs and other high redshift Lyman alpha sources.

Professor Emeritus **Freeman J. Dyson** did no significant research during the year 2009–10. He spent most of his time writing reviews of books for the *New York Review of Books* and writing keynote speeches for various formal occasions. The most interesting of the keynote speeches was written for the "John von Neumann Distinguished Lecture Series" at Brown University, with the title "A Walk through Johnny von Neumann's Garden." Another historical lecture, with the title "Birds and Frogs," was published in the *Notices of the American Mathematical Society* 56 (2009).

Each of the outer planets—Jupiter, Saturn, Uranus, and Neptune—host a system of planetary rings. Saturn's rings are the most prominent and thoroughly investigated. They are broad, bright, separated by narrow gaps, and are composed of centimeter- to meter-size particles of water ice. Much has also been learned about the rings of Uranus. They form almost the negative image of Saturn's—narrow, dark, widely separated—but are likely also composed of ice particles, albeit covered with a dark organic residue.

Sharp edges are a common feature of both ring systems. These are characterized by abrupt drops in optical depth from order unity to essentially zero over scales no larger than hundreds of meters. Some edges are maintained by shepherd satellites, which tidally transfer angular momentum away from an outer edge and to an inner edge. This prevents the edges from spreading due to collisional stresses that transport angular momentum outward in differentially rotating rings.

Some sharp edges appear to lack shepherd satellites. At least none have been discovered by the Cassini spacecraft that has been orbiting Saturn for several years. Professor Emeritus **Peter Goldreich** has been investigating a novel form of shepherding in which angular momentum is transferred across empty space from an outer to an inner edge. The transfer involves the spontaneous excitation of a pair of density waves on the two edges. The waves share a common pattern speed; that is, they appear stationary in a frame rotating with an angular velocity intermediate between that of particles at the outer and inner edge. Spontaneous excitation is possible because the wave on the outer edge has negative energy and angular momentum, whereas both the energy and angular momentum of the wave on the inner edge are positive. Thus the transfer of energy and angular momentum from the outer to the inner edge results in the amplification of both waves while conserving total energy and angular momentum.

Member Daniel Green discussed strong coupling and supersymmetry model building during a physics group meeting.

CLIFF MOORE

MEMBERS AND VISITORS

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RECORD OF EVENTS

Astrophysics Activities

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September 21
Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ Organizers: **Matias Zaldarriaga**, Professor, School of Natural Sciences, and **David Spergel**, Princeton University

Princeton University/Institute for Advanced Study Galread (Galactic/Extragalactic Reading Group) ✦ *z~7-8 Survey Papers* ✦ Discussion Leader: **Andrei Mesinger**, Princeton University

September 22
Astrophysics Seminar ✦ *Structure and Formation of Elliptical and Spheroidal Galaxies—Correlations with Supermassive Black Holes* ✦ **John Kormendy**, University of Texas

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Astrophysics Informal Seminar ✦ *Connecting Galaxies, Halos, and Star Formation Rates across Cosmic Time* ✦ **Risa Wechsler**, Stanford University

September 29
Astrophysics Seminar ✦ *The Saga of the Varying Fine Structure Constant* ✦ **Jacob Bekenstein**, The Hebrew University of Jerusalem; Member, School of Natural Sciences

October 1
Astrophysics Informal Seminar ✦ *Modeling the Flyby Anomalies with Dark Matter Scattering* ✦ **Stephen Adler**, Professor, School of Natural Sciences

October 5
Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ Organizers: **Matias Zaldarriaga**, Professor, School of Natural Sciences, and **David Spergel**, Princeton University

Princeton University/Institute for Advanced Study Computational Cosmology and Galaxy Formation Seminar ✦ *Simulations of AGN Feedback in Clusters and Galaxies* ✦ **Greg Novak**, Princeton University

Princeton University/Institute for Advanced Study Galread (Galactic/Extragalactic Reading Group) ✦ *Dissecting the Red Sequence* ✦ Discussion Leader: **Mariska Kriek**, Princeton University

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Astrophysics Seminar ✦ *Dynamics of the R Mode Instability of Rotating Neutron Stars* ✦ **Ira Wasserman**, Cornell University

October 8
Astrophysics Informal Seminar ✦ *The Dynamics of Spiral Density Waves in Turbulent Accretion Disks* ✦ **Tobias Heinemann**, Member, School of Natural Sciences

October 13
Astrophysics Seminar ✦ *Mechanism of GRB Emission* ✦ **Andrei Beloborodov**, Columbia University

October 19
Astrophysics Informal Seminar ✦ *Fast Radiation Mediated Shocks and SNe Shock Breakouts* ✦ **Boaz Katz**, Weizmann Institute of Science

Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ Organizers: **Matias Zaldarriaga**, Professor, School of Natural Sciences, and **David Spergel**, Princeton University

Princeton University/Institute for Advanced Study Computational Cosmology and Galaxy Formation Seminar ✦ *Reionization: The More We Learn, the Less We Know* ✦ **Andrei Mesinger**, Princeton University

Princeton University/Institute for Advanced Study Galread (Galactic/Extragalactic Reading Group) ✦ *FIR/Radio Correlation* ✦ Discussion Leader: **Claire Lackner**, Princeton University

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Astrophysics Seminar ✦ *Galactic Orbits of Ultracool Subdwarfs* ✦ **Adam Burgasser**, Massachusetts Institute of Technology

October 22

Astrophysics Informal Seminar ✦ *Balancing Outflows and Gas Dilution: The Mass-Metallicity Relation at z=0* ✦ **Molly Peeples**, The Ohio State University

October 27

Astrophysics Seminar ✦ *The First Stars and the Fossil Record* ✦ **Jason Tumlinson**, Space Telescope Science Institute, NASA, Baltimore

October 29

Astrophysics Informal Seminar ✦ *Ly-alpha Emission from Galaxy Formation* ✦ **Claude-André Faucher-Giguère**, Harvard-Smithsonian Center for Astrophysics

November 2

Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ Organizers: **Matias Zaldarriaga**, Professor, School of Natural Sciences, and **David Spergel**, Princeton University

Princeton University/Institute for Advanced Study Computational Cosmology and Galaxy Formation Seminar ✦ *The Thermal History of the IGM, Reionization, and the Ly-alpha Forest* ✦ **Adam Lidz**, University of Pennsylvania

Princeton University/Institute for Advanced Study Galread (Galactic/Extragalactic Reading Group) ✦ *Outer Parts of Disk Galaxies* ✦ Discussion Leader: **Jenny Greene**, Princeton University

November 3

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Astrophysics Seminar ✦ *Chromospheric Activity in Low-Mass Stars* ✦ **Jill Knapp**, Princeton University

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Astrophysics Informal Seminar ✦ *Approaches to Understanding Inflation: Theory, Experiment, and Observation* ✦ **Mark Hertzberg**, Massachusetts Institute of Technology

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Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ Organizers: **Matias Zaldarriaga**, Professor, School of Natural Sciences, and **David Spergel**, Princeton University

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Astrophysics Seminar ✦ *Non-Thermal Pressure in Early-Type Galaxy Atmospheres and AGN Feedback* ✦ **Eugene Churazov**, Max-Planck-Institut für Astrophysik

November 19

Astrophysics Informal Seminar ✦ *The Effective Theory of Quintessence and Its Observational Signatures* ✦ **Guido D'Amico**, Scuola Internazionale Superiore di Studi Avanzati, Trieste, Italy

November 30

Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ Organizers: **Matias Zaldarriaga**, Professor, School of Natural Sciences, and **David Spergel**, Princeton University

December 1

Astrophysics Seminar ✦ *Non-Gaussianities from Inflation* ✦ **Matias Zaldarriaga**, Professor, School of Natural Sciences

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Astrophysics Informal Seminar ✦ *Satellite Galaxies in LCDM: Orbits, Merging, and Disruption* ✦ **Andrew Wetzel**, University of California, Berkeley

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Astrophysics Seminar ✦ *The Fine-Scale Structure of Dark Matter Halos* ✦ **Simon White**, Max-Planck-Institut für Astrophysik

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Astrophysics Informal Seminar ✦ *Cosmology and Astrophysics with Galaxy Clusters* ✦ **Daisuke Nagai**, Yale University

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Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ Organizers: **Matias Zaldarriaga**, Professor, School of Natural Sciences, and **David Spergel**, Princeton University

Princeton University/Institute for Advanced Study Computational Cosmology and Galaxy Formation Seminar ✦ *Kelvin-Helmholtz Instability II: Eulerian Galilean Invariance and What Does Numerical Convergence Really Mean Anyway?* ✦ **Douglas Rudd**, Member, School of Natural Sciences

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Astrophysics Seminar ✦ *Stability, Energy Transport, and Variability of High Luminosity Accretion onto Black Holes* ✦ **Omer Blaes**, University of California, Santa Barbara

January 11

Princeton University/Institute for Advanced Study Computational Cosmology and Galaxy Formation Seminar ✦ *The Submillimeter View of Galaxy Formation* ✦ **Joshua Younger**, Member, School of Natural Sciences

January 12

Astrophysics Informal Seminar ✦ *Testing AGN Evolution Models through the Comparison of Semi-Analytic Simulations and a Large Observational Data Set* ✦ **Amy Kimball**, University of Washington

January 19

Astrophysics Informal Seminar ✦ *Planetary Systems, Turbulence, and Saturn's Rings* ✦ **Hanno Rein**, University of Cambridge

January 21

Astrophysics Informal Seminar ✦ *Exo-Cartography: Time-Resolved Photometry of Exoplanets* ✦ **Nick Cowan**, University of Washington

January 25
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Princeton University/Institute for Advanced Study Computational Cosmology and Galaxy Formation Seminar ✦ *Triaxial Dark Matter Halos: Observations, Theory, and Implications* ✦ **Kathryn Johnston**, Columbia University

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Astrophysics Informal Seminar ✦ *Matter Distribution around Galaxies* ✦ **Masataka Fukugita**, The University of Tokyo

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March 8
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Astrophysics Seminar ✦ *Spiral Structure: What Remains?* ✦ **Alar Toomre**, Massachusetts Institute of Technology

March 11
Astrophysics Informal Seminar ✦ *Tidally Interacting Planets and Stars: Fluid Dynamics and the Fate of Planets* ✦ **Gordon Ogilvie**, University of Cambridge

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Astrophysics Seminar ✦ *Equivalence Principle and Cosmic Acceleration* ✦ **Lam Hui**, Columbia University

March 18
Astrophysics Informal Seminar ✦ *Secular Instability: Formation of Hot Jupiters and the Organization of Planetary Systems* ✦ **Yoram Lithwick**, Canadian Institute for Theoretical Astrophysics

March 22
Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ Organizers: **Matias Zaldarriaga**, Professor, School of Natural Sciences, and **David Spergel**, Princeton University

Princeton University/Institute for Advanced Study Computational Cosmology and Galaxy Formation Seminar ✦ *Physical and Numerical Issues in SPH Simulations of Galaxy Formation* ✦ **David Weinberg**, The Ohio State University; Member, School of Natural Sciences

Princeton University/Institute for Advanced Study Galread (Galactic/Extragalactic Reading Group) ✦ *Tracers of Star Formation Rates at High z* ✦ Discussion Leader: **Mariska Kriek**, Princeton University

March 23
Astrophysics Seminar ✦ *Pulsar Magnetic Field Evolution* ✦ **Malvin Ruderman**, Columbia University

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April 15
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April 19
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Princeton University/Institute for Advanced Study Galread (Galactic/Extragalactic Reading Group) ✦ *Sources of the Extragalactic IR Background* ✦ Discussion Leader: **Joshua Younger**, Member, School of Natural Sciences

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Princeton University/Institute for Advanced Study Galread (Galactic/Extragalactic Reading Group) ✦ *Compactness of Massive Galaxies at High-z from HST/WFC3* ✦ Discussion Leader: **Richard Cool**, Princeton University

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May 18
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Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ Organizers: **Matias Zaldarriaga**, Professor, School of Natural Sciences and **David Spergel**, Princeton University

Particle Physics Activities

August 5
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September 16
Physics Group Meeting ✦ *More N=2 S-dualities from Twist Lines* ✦ **Yuji Tachikawa**, Member, School of Natural Sciences

September 18
High Energy Theory Seminar ✦ *Aspects of SUSY Breaking* ✦ **Zohar Komargodski**, Member, School of Natural Sciences

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High Energy Theory Seminar ✦ *Non-Fermi Liquids from Holography* ✦ **John McGreevy**, Massachusetts Institute of Technology

September 23
Physics Group Meeting ✦ *Geometric Unification in the F-theory GUT* ✦ **Jonathan Heckman**, Member, School of Natural Sciences

October 1
Informal Phenomenology Seminar ✦ *Photinoverse* ✦ **Nathaniel Craig**, Stanford University

October 2
High Energy Theory Seminar ✦ *Collapse Models with Non-White Noise* ✦ **Stephen Adler**, Professor, School of Natural Sciences

October 5
High Energy Theory Seminar ✦ *Probing the Strong Coupling N=4 SYM Theory* ✦ **Alfred Mueller**, Columbia University

October 7
Physics Group Meeting ✦ *Geometric Unification in F-theory GUT—Part 2* ✦ **Jonathan Heckman**, Member, School of Natural Sciences

October 14
Physics Group Meeting ✦ *Comments on N=2 Gauge Theories and the Quantization of Teichmüller Spaces* ✦ **Joerg Teschner**, Deutsches Elektronen-Synchrotron (DESY)

October 16
High Energy Theory Seminar ✦ *Indirect Probes of the Hidden Sector* ✦ **Tomer Volansky**, Member, School of Natural Sciences

October 19
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October 30
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November 2
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November 3
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November 5
Informal Phenomenology Seminar ✦ *Hadronization, Spin, and Lifetimes* ✦ **Yuval Grossman**, Cornell University

November 6
Informal Phenomenology Seminar ✦ *Signals of a Sneutrino NLSP at the LHC* ✦ **Andrey Katz**, University of Maryland

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Special High Energy Theory Seminar ✦ *Exact Symmetries for N=4 SYM Scattering Amplitudes* ✦ **Tristan McLoughlin**, Max-Planck-Institut für Gravitationphysik

November 11
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November 12
Informal Phenomenology Seminar ✦ *Direct Detection of Leptophilic Dark Matter* ✦ **Jure Zupan**, CERN/University of Ljubljana, Slovenia

November 17
Informal Phenomenology Seminar ✦ *The Fermi Haze?* ✦ **Tracy Slatyer**, Harvard University

November 18
Physics Group Meeting ✦ *Strong Coupling and SUSY Model Building* ✦ **Daniel Green**, Member, School of Natural Sciences

November 25
Physics Group Meeting ✦ *Fusing Tree Amplitudes into Loops without Using Unitarity* ✦ **Simon Caron-Huot**, Member, School of Natural Sciences

November 30
High Energy Theory Seminar ✦ *Quantum Integrability and Supersymmetric Gauge Theories or TBA from Instantons* ✦ **Nikita Nekrasov**, Institut des Hautes Études Scientifiques

December 3
Informal Phenomenology Seminar ✦ *Form Factor Dark Matter* ✦ **Andrew Liam Fitzpatrick**, Boston University

December 4
High Energy Theory Seminar ✦ *Superconformal Flavor Simplified* ✦ **David Poland**, Harvard University

December 7
High Energy Theory Seminar ✦ *Exact Integrability in Planar AdS/CFT* ✦ **Pedro Vieira**, Perimeter Institute for Theoretical Physics

December 14
High Energy Theory Seminar ✦ *Quantum Integrability as Discrete Hirota Dynamics: From 2D Sigma Models to AdS/CFT* ✦ **Vladimir Kazakov**, École Normale Supérieure, Paris

December 18
High Energy Theory Seminar ✦ *From Gauge Theory to Liouville via Coisotropic Branes* ✦ **Edward Witten**, Charles Simonyi Professor, School of Natural Sciences

January 11
High Energy Theory Seminar ✦ *Matrix Models and Supersymmetric Theories in Four Dimensions* ✦ **Cumrun Vafa**, Harvard University

January 18
Informal High Energy Theory Seminar ✦ *Exploring the Mirror TBA* ✦ **Gleb Arutyunov**, Utrecht University

February 1
High Energy Theory Seminar ✦ *The Status and Near-Future of Dark Matter Direct Detection* ✦ **Neal Weiner**, New York University

February 4
Physics Group Meeting ✦ *N=4 SYM and Grassmannian* ✦ **Nima Arkani-Hamed**, Professor, School of Natural Sciences

February 5
High Energy Theory Seminar ✦ *From Gauge Theory to Integrability and Liouville via Coisotropic Branes* ✦ **Edward Witten**, Charles Simonyi Professor, School of Natural Sciences

February 16
High Energy Theory Seminar ✦ *The Lithium Problem and Particle Physics: Possible Connections* ✦ **Maxim Pospelov**, University of Victoria and Perimeter Institute for Theoretical Physics

February 19
High Energy Theory Seminar ✦ *Higher Spin Gauge Theory and Holography* ✦ **Xi Yin**, Harvard University

March 1
High Energy Theory Seminar ✦ *Compact F-theory GUT's with PQ Symmetry* ✦ **Natalia Saulina**, Perimeter Institute for Theoretical Physics

March 5
High Energy Theory Seminar ✦ *Y-system for Scattering Amplitudes* ✦ **Luis Fernando Alday**, Member, School of Natural Sciences

March 22
High Energy Theory Seminar ✦ *New Seiberg Dualities from Elliptic Hypergeometry* ✦ **Grigori Vartanov**, Max-Planck-Institut für Gravitationphysik (Albert-Einstein-Institut)

March 23
Informal High Energy Theory Seminar ✦ *Twistor-Strings for Leading Singularities and the Grassmannian and Box Functions as (Renormalized) AdS Volumes* ✦ **Lionel Mason**, University of Oxford

March 29
Informal High Energy Theory Seminar ✦ *Conformal Symmetry and Integrability in Perturbative N=4 Scattering Amplitudes* ✦ **Niklas Beisert**, Max-Planck-Institut für Gravitationphysik (Albert-Einstein-Institut)

April 5
High Energy Theory Seminar ✦ *S-duality, Superconformal Index and 2d TQFT* ✦ **Shlomo Razamat**, Stony Brook University, The State University of New York

April 7
Physics Group Meeting ✦ *Aspects of Symmetric Product Orbifolds* ✦ **Shlomo Razamat**, Stony Brook University, The State University of New York

April 8 and 9
Workshop on Integrability in Scattering Amplitudes ✦ *Recent Advances in Perturbative Computations* ✦ **Henrik Johansson**, Institut de Physique Théorique, CEA, Saclay ✦ *Amplitudes and the Grassmannian* ✦ **Nima Arkani-Hamed**, Professor, School of Natural Sciences ✦ *Yangian Symmetry in Scattering Amplitudes* ✦ **Johannes Henn**, Humboldt University, and **James Drummond**, Laboratoire de Physique Theorique d'Annecy ✦ *Amplitudes at Strong Coupling and AdS/CFT* ✦ **Juan Maldacena**, Professor, School of Natural Sciences

April 14
Physics Group Meeting ✦ *Octonions and E6* ✦ **Tevian Dray** and **Corrine Manogue**, Oregon State University

April 15
Informal Phenomenology Seminar ✦ *Dark Matter from the Baryon Asymmetry* ✦ **Kathryn Zurek**, University of Michigan

April 16
High Energy Theory Seminar ✦ *Supercurrents* ✦ **Nathan Seiberg**, Professor, School of Natural Sciences

April 19
High Energy Theory Seminar ✦ *The Multiverse and Scale-Factor Cutoff Measure* ✦ **Alan Guth**, Massachusetts Institute of Technology

April 21
Physics Group Meeting ✦ *Recursion Relations in String Theory* ✦ **Brian Wecht** and **Donal O'Connell**, Members, School of Natural Sciences

April 22
Informal Phenomenology Seminar ✦ *More Supersymmetries or No Supersymmetry at the LHC* ✦ **Yasunori Nomura**, University of California, Berkeley

April 23
High Energy Theory Seminar ✦ *General Gauge Mediation with Gauge Messengers* ✦ **Matt Sudano**, Institute for the Physics and Mathematics of the Universe, The University of Tokyo

May 14
High Energy Theory Seminar ✦ *Hiding the Higgs in Lepton Jets* ✦ **Tomer Volansky**, Member, School of Natural Sciences

May 21
High Energy Theory Seminar ✦ *Cosmological Non-Linearities as an Effective Fluid* ✦ **Leonardo Senatore**, Member, School of Natural Sciences

May 24
High Energy Theory Seminar ✦ *The ATLAS Experiment at the LHC: Status, Performance, and First Results* ✦ **Beate Heinemann**, University of California, Berkeley

May 27
Physics Group Meeting ✦ *On B-Bbar Mixing* ✦ **Michele Papucci**, Member, School of Natural Sciences

May 28
High Energy Theory Seminar ✦ *The Nonrelativistic Limit of AdS/CFT* ✦ **Arjun Bagchi**, Harish-Chandra Research Institute

The Simons Center for Systems Biology Activities

July 30
Autism Group Meeting

August 20
The Simons Center for Systems Biology Seminar ✦ *An Integrated Analysis of Molecular Aberrations in Cancer* ✦ **Chen-Hsiang Yeang**, Institute of Statistical Science, Academia Sinica

September 11
The Simons Center for Systems Biology Group Meeting

September 18
The Simons Center for Systems Biology Group Meeting ✦ *Hunting Genes in Autism* ✦ **Chang S. Chan**, Member, School of Natural Sciences ✦ *Innate Immune Responses to Flu and HIV* ✦ **Benjamin Greenbaum**, Member, School of Natural Sciences

September 21
The Simons Center for Systems Biology Seminar ✦ *Retrovirus Replication and the RT–IN Connection* ✦ **Anna Marie Skalka**, Institute for Cancer Research, Fox Chase Cancer Center; Member, School of Natural Sciences

September 22
The Simons Center for Systems Biology Seminar ✦ *Virus-Host Cell Interactions and Daxx* ✦ **Anna Marie Skalka**, Institute for Cancer Research, Fox Chase Cancer Center; Member, School of Natural Sciences

September 24
Joint Lab Meeting ✦ *Epigenetic Silencing of Viral Gene Expression* ✦ **Natalia Shalginskikh**, Moscow State University ✦ *Role of Rad21 in Epigentic Silencing* ✦ **Dineshkumar Dandekar**, Fox Chase Cancer Center

September 25–26
Joint Meeting on Bioinformatics, The Simons Center for Systems Biology and Institute of Molecular and Cell Biology ✦ *Hunting Genes in Autism* ✦ **Chang S. Chan**, Member, School of Natural Sciences ✦ *Innate Immune Responses to Flu and HIV* ✦ **Benjamin Greenbaum**, Member, School of Natural Sciences ✦ *The Evolution of the p53 Gene Family* ✦ **Arnold J. Levine**, Professor, School of Natural Sciences

October 12
The Simons Center for Systems Biology Seminar ✦ *Rotaviruses* ✦ **Phil Dormitzer**, Novartis Vaccines

October 15
The Simons Center for Systems Biology Talks on Abstract/Conceptual/Quantitative Aspects of Biology ✦ **John Hopfield**, Princeton University

October 22
Joint Lab Meeting ✦ *Functional Screens for Human Epigenetic Silencing Factors* ✦ **Richard Katz**, Fox Chase Cancer Center ✦ *The Structure and Function of Retroviral Integrase Proteins* ✦ **Mark Andrake**, Fox Chase Cancer Center

October 30
The Simons Center for Systems Biology/The Cancer Institute of New Jersey/Johnson & Johnson Asthma Meeting

November 5
The Simons Center for Systems Biology Seminar ✦ *The Persistent Shape of Data* ✦ **Gunnar Carlsson**, Stanford University

The Simons Center for Systems Biology Talks on Abstract/Conceptual/Quantitative Aspects of Biology ✦ **A. James Hudspeth**, The Rockefeller University

November 6
The Simons Center for Systems Biology Seminar ✦ *Statistical Topology and Mapping in High Dimensions* ✦ **Gunnar Carlsson**, Stanford University

November 13
The Simons Center for Systems Biology Seminar ✦ *The Apples of Our Eyes: Innovation, Art, and Intellectual Property in American Fruits* ✦ **Daniel J. Kevles**, Yale University

November 18
Joint Lab Meeting ✦ *Epigenetic Silencing* ✦ **Dineshkumar Dandekar**, Fox Chase Cancer Center ✦ **Natalia Shalginskikh**, Fox Chase Cancer Center

November 19
The Simons Center for Systems Biology Talks on Abstract/Conceptual/Quantitative Aspects of Biology ✦ **Laurent Keller**, Université de Lausanne

November 24
The Simons Center for Systems Biology Group Meeting

November 30
The Simons Center for Systems Biology Group Meeting ✦ *Optimal Drug Combinations and Minimal Hitting Sets* ✦ **Alexei Vazquez**, The Cancer Institute of New Jersey

December 3
The Simons Center for Systems Biology Seminar ✦ *Is the Most Abundant Protein on Earth, Rubisco, Slow and Inefficient, Optimal, or Both?* ✦ **Tsvi Tlusty**, Weizmann Institute of Science

December 4
The Simons Center for Systems Biology/Genstruct Meeting ✦ *Idiosyncratic Drug-Induced Liver Injury (DILI)* ✦ **Daphna Laifenfeld**, Genstruct ✦ *Introduction to Genstruct's Personalized Oncology Platform* ✦ **Renee Kenney**, Genstruct ✦ *Development of CNTO328 Response Biomarkers for Multiple Myeloma Patients—A Collaboration with J&J* ✦ **Renee Kenney**, Genstruct ✦ *Small Molecules with Activity in Cell Lines Containing p53*

Mutations ✦ **Alexei Vazquez**, The Cancer Institute of New Jersey ✦ *Innate Immune Responses to Flu and HIV* ✦ **Benjamin Greenbaum**, Member, School of Natural Sciences ✦ *Systems Analysis of Signal Transduction Pathways* ✦ **Prashanth AK**, Member, School of Natural Sciences

December 7

Joshua Lederberg – John von Neumann Symposium: Toward Quantitative Biology ✦ *Neural Processing of Acoustic Communication Signals: From Biophysics to Biological Function* ✦ **Andreas V. M. Herz**, Ludwig-Maximilians Universität München ✦ *Universals of Genome Evolution and the Prospect of a Postmodern Synthesis of Evolutionary Biology* ✦ **Eugene V. Koonin**, National Institutes of Health ✦ *Mutation and Evolution* ✦ **Michael Lynch**, Indiana University ✦ *Evolutionary "Design" of Proteins* ✦ **Rama Ranganathan**, University of Texas Southwestern Medical Center ✦ *Physics and Biology: Unexpected Connections* ✦ **Boris I. Shraiman**, Kavli Institute for Theoretical Physics ✦ *Geometry and Molecular Information* ✦ **Tsvi Tlusty**, Weizmann Institute of Science

December 16

Joint Lab Meeting ✦ *Retroviral Integrase Structure and Function* ✦ **Ravi Bojja**, Fox Chase Cancer Center ✦ *Epigenetic Silencing* ✦ **Richard Katz**, Fox Chase Cancer Center

December 22

The Simons Center for Systems Biology Group Meeting ✦ *Ghosts of Ancient Viruses* ✦ **Vladimir Belyi**, Member, School of Natural Sciences

January 21

The Simons Center for Systems Biology Talks on Abstract/Conceptual/Quantitative Aspects of Biology ✦ **Larry Abbott**, Columbia University College of Physicians and Surgeons

January 22

Autism Group Meeting

January 27

The Simons Center for Systems Biology Seminar ✦ *p53 Allele Specific Synthetic Lethality* ✦ **Darren Carpizo**, The Cancer Institute of New Jersey

The Simons Center for Systems Biology Seminar ✦ *Stem Cell Signatures in Breast Cancer with p53 Mutations* ✦ **Hideaki Mizuno**, Member, School of Natural Sciences

January 28

The Simons Center for Systems Biology Group Meeting ✦ *Functional Genetic Characterization of Mammary and Cancer Stem Cells* ✦ **Benjamin Spike**, The Salk Institute for Biological Studies

February 18

The Simons Center for Systems Biology Talks on Abstract/Conceptual/Quantitative Aspects of Biology ✦ **Uri Alon**, Weizmann Institute of Science

March 3

The Simons Center for Systems Biology Seminar ✦ *New Structures in the Natural Sciences* ✦ **Nils A. Baas**, Norwegian University of Science and Technology; Member, School of Mathematics; Member, School of Natural Sciences

March 4

The Simons Center for Systems Biology Group Meeting ✦ *Limited Effective Size of the CD8⁺ T Cell Receptor Repertoire Creates Unexpectedly Large Overlap between Individuals* ✦ **Harlan Robins**, Fred Hutchinson Cancer Research Center

Autism Group Meeting

March 5

The Simons Center for Systems Biology Seminar ✦ *Beyond the Double Helix: Reading and Writing the Histone Code* ✦ **C. David Allis**, The Rockefeller University

March 11

The Simons Center for Systems Biology Seminar ✦ *Approximate Learning Algorithm in Boltzmann Machines Using the Bethe Approximation and the Linear Response Relation* ✦ **Muneki Yasuda**, Tohoku University, Sendai, Japan

March 17

The Simons Center for Systems Biology Seminar ✦ *Hunting for Genes and Tracking Loci: Complex Trait Analysis in the Domestic Dog* ✦ **Elaine Ostrander**, National Institutes of Health

March 18

The Simons Center for Systems Biology Seminar ✦ *Images of Life: Exploring Plant Development with Visual Models and Simulations* ✦ **Przemyslaw Prusinkiewicz**, University of Calgary

March 22

The Simons Center for Systems Biology Group Meeting

March 24

Autism Group Meeting

The Simons Center for Systems Biology Seminar ✦ *Genomic Instability and Copy Number Burden in Autism Spectrum Disorder* ✦ **Scott B. Selleck**, The Pennsylvania State University

March 26

The Simons Center for Systems Biology Seminar ✦ *Integrating Mass Screening and Structure Based Design for Novel Antithrombotic Drug Development* ✦ **Barry Coller**, The Rockefeller University

March 29

The Simons Center for Systems Biology Group Meeting

April 15

The Simons Center for Systems Biology Talks on Abstract/Conceptual/Quantitative Aspects of Biology ✦ **Hod Lipson**, Cornell University

April 22

The Governor's Conference on Effective Partnering in Cancer Research: Systems Biology & Cancer ✦ *Genome-Wide Allele-Specific Analyses* ✦ **Andrew Chess**, Massachusetts General Hospital and Harvard Medical School ✦ *The Universe of Normal and Cancer Cell Line Responses to Small Molecules: Lessons for Anticancer Therapy* ✦ **Alexei Vazquez**, The Cancer Institute of New Jersey ✦ *Proteomic and Genetic Analysis of the Ubiquitin System* ✦ **J. Wade Harper**, Harvard Medical School ✦ *Next Generation Quantitative Proteomic Tools for Understanding Epigenetic Mechanisms* ✦ **Benjamin A. Garcia**, Princeton University ✦ *Exploring the Systems Pathology/Biology of Breast Cancer* ✦ **Anne-Lise Børresen-Dale**, Norwegian Radium Hospital, Oslo University Hospital ✦ *Network Polymorphisms and Cancer* ✦ **Gurinder S. Atwal**, Cold Spring Harbor Laboratory ✦ *The Evolution of the p53 Family of Genes: Somatic Cell and Germ Cell Fidelity* ✦ **Arnold J. Levine**, Professor, School of Natural Sciences ✦ *Surprisingly Small Effective Size of the Human TCR Repertoire Creates Large Overlap between Individuals* ✦ **Harlan Robins**, Fred Hutchinson Cancer Research Center

May 18

The Simons Center for Systems Biology/Reproductive Medicine Associates of New Jersey Meeting ✦ *Assessing Embryonic Reproductive Competence* ✦ **Nathan Treff**, **Richard Scott**, and **Deanne Taylor**, Reproductive Medicine Associates of New Jersey ✦ *Introduction to p53, p63, and p73* ✦ **Arnold J. Levine**, Professor, School of Natural Sciences ✦ *The p53 Pathway and Fertility* ✦ **Wenwei Hu**, The Cancer Institute of New Jersey ✦ *Fidelity of Information Transfer in the Germline* ✦ **Arnold J. Levine**, Professor, School of Natural Sciences

June 1

Autism Group Meeting

June 4

The Simons Center for Systems Biology Seminar ✦ *Leptin and the Genetic Basis of Obesity: Dissecting Leptin's Loop* ✦ **Jeffrey M. Friedman**, The Rockefeller University and HHMI

June 7

The Simons Center for Systems Biology Group Meeting ✦ *Detectability of Certain Dark-Genome-Matter Candidates: Algorithms for Assembling Genomes Correctly* ✦ **Bud Mishra**, Courant Institute of Mathematical Sciences, New York University, and New York University School of Medicine

June 9–10

Rita Allen Foundation Scholars Meeting ✦ *Generation of Single Cell Diversity in the Brain* ✦ **Tom Maniatis**, Columbia University Medical Center ✦ *Quiet Time: The Secret Lives of Quiescent Fibroblasts* ✦ **Hilary Coller**, Princeton University ✦ *TAp63 Suppresses Metastasis through Coordinate Transcriptional Regulation of Dicer and miRNAs* ✦ **Elsa Flores**, MD Anderson Cancer Center ✦ *In Vivo Screening to Identify Cancer Drug Targets* ✦ **Michael T. Hemann**, KOCH Institute for Integrative Cancer Research, Massachusetts Institute of Technology ✦ *The Role of PTEN and PHLPP in Prostate Cancer Metastasis* ✦ **Lloyd Trotman**, Cold Spring Harbor Laboratory ✦ Poster Session (RAF Scholars in Pain) ✦ *Integrative Genome-Wide Strategies to Identify Aberrant Transcriptional Networks in Human Cancers* ✦ **Ian Davis**, University of North Carolina at Chapel Hill ✦ *New Functions for Poly(ADP)ribose—The Cytoplasmic Stress Response and RNA Regulation* ✦ **Paul Chang**, Massachusetts Institute of Technology Cancer Research Center ✦ *Higher Order Chromatin Structures in Normal and Cancer Epigenomes* ✦ **Tae Hoon Kim**, Yale University ✦ *The Dark Side of Hematopoietic Stem Cell Quiescence* ✦ **Emmanuelle Passegué**, University of California, San Francisco ✦ *Identification of Stem Cell and Regeneration Regulatory Genes in Planarians* ✦ **Peter W. Reddien**, Massachusetts Institute of Technology–Whitehead Institute ✦ *Cellular Heterogeneity in Models of Cancer and Cell Polarity* ✦ **Steven Altschular**, University of Texas Southwestern Medical Center ✦ *Biochemical Modulation of Nociceptive Circuits* ✦ **Mark J. Zylka**, University of North Carolina at Chapel Hill ✦ *TGF,1 Control of Effector T Cell Differentiation in the Context of Autoimmunity* ✦ **Ming Li**, Memorial Sloan-Kettering Cancer Center ✦ *Roles of Myc in Organ Growth and Homeostasis* ✦ **Laura Johnston**, Columbia University Medical Center

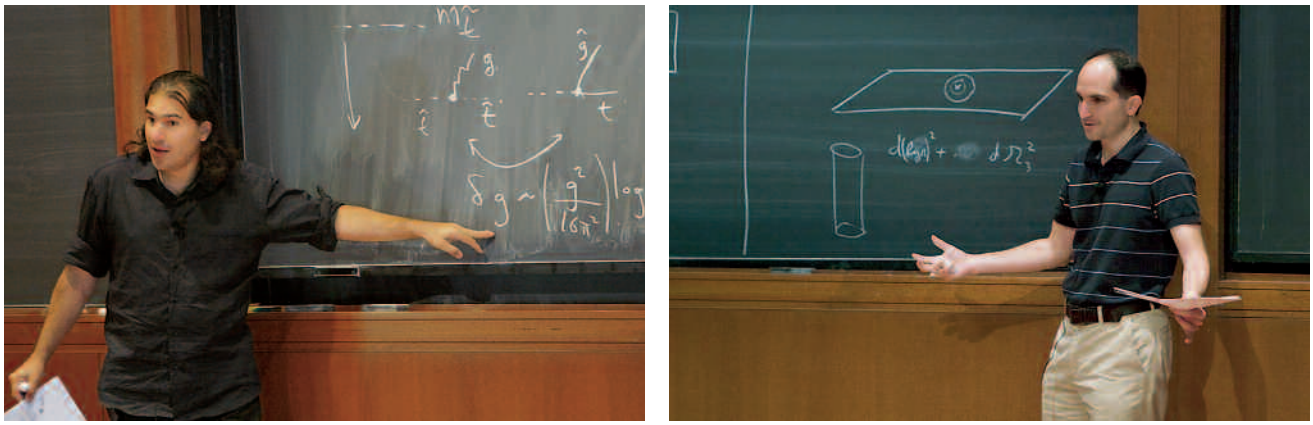
June 14

The Simons Center for Systems Biology Group Meeting ✦ *Systems Biology: Network Structure Determination De Novo and with Prior Knowledge* ✦ **David de Graaf**, Genstruct

RANDALL HAGADORN

Professor Edward Witten (on stage) at the 2010 Prospects in Theoretical Physics

Prospects in Theoretical Physics



(L) ANDREA KANE, (R) RANDALL HAGADORN

Professors Nima Arkani-Hamed (left) and Juan Maldacena (right) gave lectures during PiTP, the focus of which was "Aspects of Supersymmetry."

Prospects in Theoretical Physics (PiTP) is an intensive two-week program for graduate students in theoretical physics, held each summer at the Institute for Advanced Study. Through PiTP, the Institute, which traditionally devotes its attention to the education of scientists at the postdoctoral level, aims to increase its participation in graduate education as well. A special effort is made to involve women and minorities, along with 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.

The 2010 Prospects in Theoretical Physics program was held from July 19 to 30. Its focus was "Aspects of Supersymmetry." This program was designed as an advanced workshop for young physicists specializing in the field, and aimed to give a coherent overview of the fundamental theoretical aspects of the subject, emphasizing the common themes running throughout it, from the major advances made in the second string theory revolution of the 1990s to the most exciting recent developments. The first week of the school was devoted largely to introducing supersymmetry and superspace and their role in quantum field theory and string theory. During the second week, more advanced material was reviewed including new N=2 supersymmetric gauge theories, wall-crossing formula for BPS states, integrability and gauge/gravity duality, M2-branes and Chern-Simons theories, supersymmetric gauge dynamics, and supersymmetric extensions of the Standard Model. The lectures were accessible, well-coordinated, and of high quality throughout the program.

Prospects in Theoretical Physics builds on the strong relationship of the research groups at the Institute and Princeton University, and many Faculty members from both institutions are actively involved in the program, together with scientists from neighboring institutions. This year, the program was directed by Professors Igor Klebanov and Chiara Nappi of Princeton University and Nima Arkani-Hamed, Professor in the School of Natural Sciences at the Institute. Greg Moore, Professor at Rutgers, the State University of New Jersey, was among the lecturers.

The other lecturers were: Jon Bagger (Johns Hopkins University), Katrin Becker and Melanie Becker (Texas A&M University), Freddy Cachazo (Perimeter Institute for Theoretical Physics), Davide Gaiotto (Institute for Advanced Study), Daniel Jafferis (Institute for Advanced Study), Juan Maldacena (Institute for Advanced Study), Nathan Seiberg (Institute for Advanced Study), Pedro Vieira (Perimeter Institute for Theoretical Physics), and Edward Witten (Institute for Advanced Study).

This year, there were 109 participants enrolled in the program, selected out of 198 applicants. Seventy-five of the attendees were from U.S. institutions and thirty-four were from institutions in fifteen countries outside of the United States, including Armenia, Belgium, Brazil, Canada, France, Germany, India, Israel, Italy, Japan, Korea, the Netherlands, Sweden, Switzerland, and the United Kingdom. Thirteen registered participants were postdocs. As usual, the visiting students lived in the Institute's housing complex during the two-week program. Additionally, the program lectures attracted many students, postdocs, and professors from nearby institutions.

ANDREA KANE

Professor Joan Scott during a "Can We? Seminar" that discussed Member Seth Moglen's research "Bethlehem: American Utopia, American Tragedy."

School of Social Science

Faculty

Danielle S. Allen, UPS Foundation Professor

Didier Fassin, James D. Wolfensohn Professor

Eric S. Maskin, Albert O. Hirschman Professor

Joan Wallach Scott, Harold F. Linder Professor

Professors Emeriti

Albert O. Hirschman

Michael Walzer

The School of Social Science invited twenty-two scholars from a pool of 160 applicants from the United States and abroad to be part of the School's scholarly community as Members for the 2009–10 academic year. Nine Visitors and two Research Assistants also participated in the year's activities. Individual Members were supported by funding from the Leon Levy Foundation, Paula and James Crown, Friends of the Institute, the Association of Members of the Institute for Advanced Study, and endowments established by Deutsche Bank, Roger W. Ferguson Jr. and Annette L. Nazareth, Richard B. Fisher, Ralph E. and Doris M. Hansmann, and the Wolfensohn family. Fields of inquiry of the group included political science, history, sociology, education, economics, literature, philosophy, and psychology.

During the 2009–10 academic year, sixteen Members and Visitors joined Faculty for discussions in "The Dewey Seminar: Education, Schools, and the State," which received additional support from the Ford Foundation and the Spencer Foundation. Scholars met bimonthly to discuss work-in-progress on themes ranging from the reauthorization of No Child Left Behind to immigration and education policy, education in Pakistan, and the public authority of scholars in medieval Paris. Scholars also met (again on a bimonthly basis but in the alternate weeks) with a range of educational practitioners—from school superintendents and leaders of networks of K–12 schools to lawyers involved in school finance cases, university and foundation presidents, and chief executive officers of technology companies working in the education field. These practitioners were asked to share reflections on "what presently keeps them up at night" in their pursuit of educational reform. These conversations with practitioners gave scholars an opportunity to refine their understanding of the horizons of the possible and provided an occasion to assess how macro-level policy decisions manifest themselves at the micro-level in the experience of particular institutions and individuals. Finally, a third set of meetings was held on the subject of "Education, Justice, and Democracy." Roughly half of the year-long Members, as well as another eight to ten scholars not in residence, participated in these week-long seminars, the goal of which was to advance our understanding of how better to bring educational policy and the ideals of both justice and democracy into alignment with one another. The cumulative result of these three different kinds of conversation will be a collaborative book under the title "Education, Justice, and Democracy." It is expected that the manuscript will be submitted to a press in late fall 2010.

The School conducted three seminar series—the Social Science Thursday Luncheon Seminar; "The Dewey Seminar," as described above; and the "Can We? Seminar," which drew together those Members whose work was not applicable to the year's formal theme. The School also continued publication of its series of Occasional Papers and Economics Working Papers, which can be accessed online from the School's website, www.sss.ias.edu.

This year also marked the first for the School's newest Professor, Didier Fassin.

ANDREA KANE

During a lunch seminar, Professor Didier Fassin discussed the 2005 riots in France.

Danielle S. Allen, UPS Foundation Professor, led "The Dewey Seminar: Education, Schools, and the State"; the seminar included the School's usual theme workshop and also a three-stage conference funded by the Spencer Foundation and a series of practitioner symposia funded by the Ford Foundation. She began development of a coauthored book, "Education, Justice, and Democracy," as well as writing essays on education and the current structure of the public sphere. She gave lectures at St. John's College, Boston University, and Washington University in St. Louis, and contributed to the work of the MacArthur Foundation Research Network on youth political participation and to the ongoing seminar on "Language, History, and Political Theory" at the University of Chicago.

Didier Fassin, James D. Wolfensohn Professor, gave his first lecture at the Institute, "Critique of Humanitarian Reason," based on the book he coedited, *Contemporary States of Emergency: The Politics of Military and Humanitarian Intervention*, published by Zone Books. He also lectured on humanitarianism at the Department of Anthropology at the University of Toronto, the Institute for Global Law at Harvard University, and the École des Hautes Études en Sciences Sociales in Paris. His analysis on the "politics of life" in the journal *Theory, Culture, and Society*, was further developed in a lecture he delivered at Duke University. The reappraisal he proposed of the concept of "moral economies" was presented at the University of Montreal and Princeton University and appeared as an article in the French journal *Annales.* Invited to give the keynote lecture on "Global Health" for the Medical Anthropology at the Intersections conference, held at Yale University, Fassin gave talks on the same topic for the Critical Global Health Series at Johns Hopkins University and as part of the Global Health Colloquium at Princeton University, and participated in a workshop at New York University. The publication of his book *Les Nouvelles Frontières de la Société Française* (Editions La Découverte) and the organization of an international conference in Paris on "Borders and Boundaries," in collaboration with Columbia University, were followed by a lecture on immigration and asylum at the Pembroke Center at Brown University and a presentation on racialization and policing at the Presidential Panel of the American Anthropological Association in Philadelphia. Other lectures were delivered at Columbia University on the sociology of trauma, at the University of Wisconsin for the "What is Human?" project, and at the New School for Social Research during the conference "Committing Anthropology." Articles were published in the *UN Chronicle* on gender and violence in South Africa and in *Hommes et Migrations* on health issues related to immigration in Europe. As part of the "Ideas" Advanced Grant that he was awarded by the European Research Council for his program "Toward a Critical Moral Anthropology," Fassin continued his fieldwork in France on everyday work in prisons and at the National Court for Asylum.

In July 2009, **Eric S. Maskin**, Albert O. Hirschman Professor, gave the McKenzie Lecture in Ischia, Italy, on the subject of "Elections and Strategic Voting." This was also the subject of his Hurwicz Lecture in Minneapolis and lectures at the Institute, Hong Kong, and the Princeton Political Economy Symposium. In October, he spoke on "Mechanism Design: How to Implement Social Goals" in a speech to the Catalan Parliament. This was also the subject of lectures at Nobel Week at the Free University of Brussels and James Buchanan's ninetieth birthday at Virginia Polytechnic Institute. In December, he gave the Arrow Lecture at Columbia University on "The Arrow Impossibility Theorem." That same month he spoke on "Evolution and Repeated Games" at the Nobel Symposium in Brussels. This was also the subject of lectures in Vienna and the Huntington Memorial Symposium in Moscow. In January, he gave a lecture tour in Thailand and Cambodia through the International Peace Foundation. He also spoke in Nanning, China, on "Lessons from NAFTA" at the opening of the China-ASEAN Free Trade Area. In March, he lectured on "Should Software be Patented" at a meeting of the European Commission in Seville. He also spoke on this subject at the Library of Alexandria. In May, he gave the Griliches Memorial Lectures on the topic of political economy at the New Economic School in Moscow. This was also the subject of the Jerusalem Summer School in Economics, which he directed. In the academic year 2009–10, Maskin was elected to a fellowship in the Royal Spanish Academy of Economics and Finance and to an honorary fellowship at Jesus College, Cambridge. He received honorary degrees from the University of Cambodia and the Free University of Brussels. He was also awarded the Centennial Medal of the Graduate School of Arts and Sciences, Harvard University.

In January, Professor Maskin gave a lecture tour in Thailand and Cambodia through the International Peace Foundation. He also spoke in Nanning, China, on "Lessons from NAFTA" at the opening of the China-ASEAN Free Trade Area.

Joan Scott, Harold F. Linder Professor, is one of the founding editors of a new journal, *History of the Present*, to be published by the University of Illinois Press. The first issue is scheduled for June 2011. Her book, *Gender and the Politics of History,* was published in Spanish translation in Mexico by the Fondo de Cultura Económica and the Universidad Autónoma de la Ciudad de México. Another book, *The Politics of the Veil,* was published in an Arabic translation by the Moroccan press Toubkal. Scott gave lectures at the Colegio de México; the University of California, Los Angeles; Columbia University; Brown University; the University of Michigan; Boğaziçi University (Istanbul); and the University of Bergen (Norway). She gave papers at conferences at Columbia Law School, Arizona State University, the University of Pennsylvania, and New York University. She commented on a paper at a session of Princeton University's Davis Center for Historical Studies. She also served on an American Council of Learned Societies selection committee for fellowships for assistant professors.

During the academic year 2009–10, Professor Emeritus **Michael Walzer** traveled to Italy, where he lectured on "Which Socialism for the Future?" at the

Professor Emeritus Michael Walzer (second from left) participated in the School's annual theme, "The Dewey Seminar: Education, Schools, and the State."

CLIFF MOORE

ANDREA KANE

Professor Eric Maskin attended a lunch seminar, "Anonymous: On Silence and the Public Sphere," by Professor Danielle Allen.

University of Turin for the centenary celebration of Norberto Bobbio. In Israel in October, he attended the Second Israeli Presidential Conference. On a return visit in May and June, Walzer participated in a workshop on binationalism, presenting "Five Regimes of Co-Existence"; the Israel Democracy Institute's International Advisory Council Annual Retreat; the International Conference on Religious Education in a Democratic State, delivering the keynote address; and the Hartman Institute Philosophy Conference, at which he presented the Kogod Lecture. Walzer received an honorary degree from Belgrade University, where as keynote speaker at a conference on asymmetric wars, international relations, and just war theory, he lectured on "The Aftermath of War: Reflections on *Jus Post Bellum*." He made several trips to Canada, first to the University of Toronto, where he lectured on "The Politics of Biblical Wisdom" to graduate students in the Department of Political Science and the Centre for Jewish Studies and, second, to give the keynote address for the Association for Israel Studies Conference. In Ottawa, at Carleton University, he delivered the COVE Distinguished Lecture in Values and Ethics on "Trying Political Leaders." In the United States, Walzer was a panelist at the Isaiah Berlin Centenary Conference at Harvard. He also gave the Dewey Lecture in Law and Philosophy at the University of Chicago, and he visited Yale at the invitation of YIISA, the Yale Initiative for the Interdisciplinary Study of Antisemitism. At Georgetown University, he attended a conference on "Ending Wars Well" and spoke again on the topic of *jus post bellum*. He is currently working on the third of four volumes of *The Jewish Political Tradition*, a collaborative project on the history of Jewish political thought. Along with Nicolaus Mills, he edited *Getting Out: Historical Perspectives on Leaving Iraq*, published by the University of Pennsylvania Press in August 2009. Walzer continues as coeditor of *Dissent* magazine.

Member Paul Attewell (center) presented "Educational Imposters and Fake Degrees," as part of "The Dewey Seminar: Education, Schools, and the State." Organized by Professor Danielle Allen (far left), the Dewey Seminar was held throughout the year to discuss work-in-progress on themes ranging from the reauthorization of No Child Left Behind to immigration and education policy.

CLIFF MOORE

MEMBERS, VISITORS, AND RESEARCH STAFF

s Second Term ✦ *v* Visitor
vp Visiting Professor ✦ *a* Research Assistant

Paul Attewell
Sociology ✦ The Graduate Center, The City University of New York
Leon Levy Foundation Member

Julia A. Clancy-Smith
History ✦ The University of Arizona

Julie E. Cooper
Political Theory ✦ The University of Chicago
Ralph E. and Doris M. Hansmann Member

James Doyle
Philosophy ✦ University of Bristol ✦ *v, s*

Crystal N. Feimster
History ✦ University of North Carolina at Chapel Hill ✦ *v, s*

Graham Finlay
Political Theory ✦ University College Dublin
Ginny and Robert Loughlin Founders' Circle Member

Angel L. Harris
Sociology ✦ Princeton University

Jeffrey R. Henig
Politics and Education ✦ Columbia University
Roger W. Ferguson, Jr. and Annette L. Nazareth Member

Robin Marantz Henig
Science Writing ✦ *The New York Times Magazine* ✦ *v*

Yuval Jobani
Hebrew Culture ✦ Tel Aviv University ✦ *a*

Ben Kafka
History and Media Studies ✦ New York University

Myung-Koo Kang
Political Science ✦ Claremont McKenna College ✦ *v, s*

Sheena Kang
Political Science ✦ The University of Chicago ✦ *a, s*

David Karen
Sociology, Education ✦ Bryn Mawr College

Mary Fainsod Katzenstein
Political Science ✦ Cornell University ✦ *v*

Peter J. Katzenstein
Political Science ✦ Cornell University
Louise and John Steffens Founders' Circle Member

Dalenda Largueche
History ✦ Université de la Manouba, Tunis

Humberto Llavador
Economics ✦ Universitat Pompeu Fabra, Barcelona
Deutsche Bank Member

JoAnne Mancini
History ✦ National University of Ireland, Maynooth ✦ *v*

Patrick McGuinn
Political Science ✦ Drew University

Joel S. Migdal
Political Science ✦ University of Washington

Seth Moglen
American Literature and History of American Social Movements ✦ Lehigh University
Friends of the Institute for Advanced Study Member

Matthew J. Nelson
Political Science ✦ University of London
The Wolfensohn Family Member

Mae M. Ngai
History ✦ Columbia University
Funding provided by the Association of Members of the Institute for Advanced Study (AMIAS)

Niels Reeh
Sociology of Religion ✦ University of Copenhagen ✦ *v*

Rob Reich
Political Theory ✦ Stanford University ✦ *vp*

Richard Rothstein
Journalism ✦ Economic Policy Institute ✦ *v*

Jason Schnittker
Sociology ✦ University of Pennsylvania
Deutsche Bank Member

Anna Marie Smith
Political Science ✦ Cornell University
Rosanna and Charles Jaffin Founders' Circle Member

Carola M. Suárez-Orozco
Psychology ✦ New York University

Marcelo M. Suárez-Orozco
Education ✦ New York University
Richard B. Fisher Member

Ian P. Wei
History ✦ University of Bristol

Anat Zohar
Education ✦ The Hebrew University of Jerusalem
Paula and James Crown Member

Noam Zohar
Jewish Studies ✦ Bar-Ilan University ✦ *v*

RECORD OF EVENTS

September 13–17
Spencer Workshop: Education, Democracy, and Justice ✦ Organized by **Danielle S. Allen**, UPS Foundation Professor, School of Social Science, and **Rob Reich**, Stanford University; Visiting Professor, School of Social Science

September 23
Dewey Theme Seminar ✦ *Organizational Meeting* ✦ **Danielle S. Allen**, UPS Foundation Professor, School of Social Science, and **Rob Reich**, Stanford University; Visiting Professor, School of Social Science

October 1
Social Science Thursday Lunch Seminar ✦ *The New Middle East: The U.S., Iran, and Israel* ✦ **Joel S. Migdal**, University of Washington; Member, School of Social Science

October 7
Dewey Theme Seminar ✦ *Brokering Inclusion: Education, Language, and the Immigrant-Middle Class* ✦ **Mae M. Ngai**, Columbia University; Member, School of Social Science

October 8
Social Science Thursday Lunch Seminar ✦ *A Search for Oppositional Culture: Perceptions of Opportunities and Academic Investment among Adolescents* ✦ **Angel L. Harris**, Princeton University; Member, School of Social Science

October 12
Dewey Practitioner Symposium ✦ *Policy* ✦ **Frederick M. Hess**, American Enterprise Institute ✦ **Andrew Rotherham**, Education Sector

October 13
Can We? Seminar ✦ *"He Talk Lie" or The True Story of Ah Jake: Language and Justice in Late Nineteenth-Century Sierra County, California* ✦ **Mae M. Ngai**, Columbia University; Member, School of Social Science

October 15
Social Science Thursday Lunch Seminar ✦ *Introduction to Paperwork* ✦ **Ben Kafka**, New York University; Member, School of Social Science

October 22
Social Science Thursday Lunch Seminar ✦ *No Child Left Behind and the Transformation of Federal Education Policy, 1965–2005* ✦ **Patrick McGuinn**, Drew University; Member, School of Social Science

October 28
Dewey Theme Seminar ✦ *How Scholars Talk about Themselves and Each Other, and Why It Matters: The Emergence of the University of Paris in the Thirteenth Century and the Disappearance of Autobiographical and Biographical Representations of Scholars* ✦ **Ian P. Wei**, University of Bristol; Member, School of Social Science

October 29
Social Science Thursday Lunch Seminar ✦ *Mourning Modernity* ✦ **Seth Moglen**, Lehigh University; Member, School of Social Science

November 2
Dewey Practitioner Symposium ✦ *Urban Reform* ✦ **Joshua Edelman**, D.C. Public Schools Office of School Innovation ✦ **Timothy Knowles**, Urban Education Institute, The University of Chicago

November 3
Can We? Seminar ✦ *Embracing the Ummah: Student Politics beyond State Power in Pakistan* ✦ **Matthew J. Nelson**, University of London; Member, School of Social Science

November 5
Social Science Thursday Lunch Seminar ✦ *Learning to Do Well or Learning to Do Good? Using Twins to Understand the Social and Economic Effects of Schooling* ✦ **Jason Schnittker**, University of Pennsylvania; Member, School of Social Science

November 11
Dewey Theme Seminar ✦ *Toward a New Theory of Secularization: Teaching of Religion in the Danish Mandatory Primary and Secondary Schools from 1720 to 1975* ✦ **Niels Reeh**, University of Copenhagen; Visitor, School of Social Science

November 12
Social Science Thursday Lunch Seminar ✦ *Academic Trajectories of Immigrant Youth* ✦ **Carola M. Suárez-Orozco**, New York University; Member, School of Social Science

November 16
Dewey Practitioner Symposium ✦ *Policy* ✦ **Thomas Payzant**, Harvard Graduate School of Education

November 19
Social Science Thursday Lunch Seminar ✦ *Should That Child Be Saved? Philosophical Reflections from a National Healthcare Commission* ✦ **Noam Zohar**, Bar-Ilan University; Visitor, School of Social Science

November 23
Can We? Seminar ✦ *French Seduction Theory* ✦ **Joan W. Scott**, Harold F. Linder Professor, School of Social Science

December 2
Dewey Theme Seminar ✦ *"Campaign for Fiscal Equity" and the Federal Doctrine* ✦ **Anna Marie Smith**, Cornell University; Member, School of Social Science

December 3
Social Science Thursday Lunch Seminar ✦ *A Tale of Two Planets? Educational Policymaking and Actual Classrooms in the Case of Teaching to Think* ✦ **Anat Zohar**, The Hebrew University of Jerusalem; Member, School of Social Science

December 7
Dewey Practitioner Symposium ✦ *Law, Civil Rights, and Education* ✦ **Howard Manning**, Superior Court Wake County, North Carolina ✦ **Michael Rebell**, Columbia Law School

December 10
Social Science Thursday Lunch Seminar ✦ *Intergenerational Justice in a Warming Planet* ✦ **Humberto Llavador**, Universitat Pompeu Fabra, Barcelona; Member, School of Social Science

December 16
Dewey Theme Seminar ✦ *General Discussion* ✦ **Danielle S. Allen**, UPS Foundation Professor, School of Social Science

January 12
Can We? Seminar ✦ *Asian Objects: Art and War in the Pacific World* ✦ **JoAnne Mancini**, National University of Ireland, Maynooth; Visitor, School of Social Science

January 14
Social Science Thursday Lunch Seminar ✦ *The Unbearable Normalcy of Being an Immigrant: Further Thoughts on Global Immigration* ✦ **Marcelo M. Suárez-Orozco**, New York University; Member, School of Social Science

January 15
Dewey Practitioner Symposium ✦ *Technology and Education* ✦ **Larry Berger**, Wireless Generation ✦ **David Coleman**, The Grow Network ✦ **Jose Ferreira**, Knewton ✦ **Larry Rosenstock**, High Tech High ✦ **Dovi Weiss**, Time-To-Know

January 20
Dewey Theme Seminar ✦ *Does Democracy Matter?* ✦ **David Karen**, Bryn Mawr College; Member, School of Social Science

January 21
Social Science Thursday Lunch Seminar ✦ *Religious Education and the Politics of Pluralism in Pakistan* ✦ **Matthew J. Nelson**, University of London; Member, School of Social Science

January 28
Social Science Thursday Lunch Seminar ✦ *How Research Is Used in Policy Debates: The Case of Charter Schools* ✦ **Jeffrey R. Henig**, Columbia University; Member, School of Social Science

January 29
Dewey Practitioner Symposium ✦ *Reinventing a Research and Development Capacity* ✦ **Tony Bryk**, Stanford University

February 3
Dewey Theme Seminar ✦ *The End of Educational Exceptionalism in the U.S.: The Reabsorption of Public School Policy into General Purpose Governance and Politics* ✦ **Jeffrey R. Henig**, Columbia University; Member, School of Social Science

February 4
Social Science Thursday Lunch Seminar ✦ *Toward a Relational Approach to the Study of Religion* ✦ **Niels Reeh**, University of Copenhagen; Visitor, School of Social Science

February 9
Can We? Seminar ✦ *Monogamy in Islam* ✦ **Dalenda Largueche**, Université de la Manouba, Tunis; Member, School of Social Science

February 11
Social Science Thursday Lunch Seminar ✦ *A Nation of Immigrants: The Cold War and Civil Rights Origins of Illegal Immigration* ✦ **Mae M. Ngai**, Columbia University; Member, School of Social Science

February 17
Dewey Theme Seminar ✦ *Educational Imposters and Fake Degrees* ✦ **Paul Attewell**, The Graduate Center, The City University of New York; Member, School of Social Science

February 18
Social Science Thursday Lunch Seminar ✦ *Anonymous: On Silence and the Public Sphere* ✦ **Danielle S. Allen**, UPS Foundation Professor, School of Social Science

February 24
Dewey Theme Seminar ✦ *Teaching Thinking, Assessment and Accountability* ✦ **Anat Zohar**, The Hebrew University of Jerusalem; Member, School of Social Science

February 25
Social Science Thursday Lunch Seminar ✦ *Vainglory, Modesty, and Political Agency in the Political Theory of Thomas Hobbes* ✦ **Julie E. Cooper**, The University of Chicago; Member, School of Social Science

March 1
Dewey Practitioner Symposium ✦ *Immigration, Religion, and Education* ✦ **Mushirul Hasan**, Jamia Millia Islamia, Delhi ✦ **Djelloul Seddiki**, Al-Ghazali Institute, Paris ✦ **Claire Sylvan**, Internationals Network for Public Schools

March 2
Can We? Seminar ✦ *Withdrawal Slips: Paperwork and Parapraxis* ✦ **Ben Kafka**, New York University; Member, School of Social Science

March 4
Social Science Thursday Lunch Seminar ✦ *Muslim Princes and Catholic Sisters: How Girls Schooling Came to Nineteenth-Century North Africa* ✦ **Julia A. Clancy-Smith**, The University of Arizona; Member, School of Social Science

March 10
Dewey Theme Seminar ✦ *Problems of Cosmopolitan Citizenship Education* ✦ **Graham Finlay**, University College Dublin; Member, School of Social Science

March 11
Social Science Thursday Lunch Seminar ✦ *Art and War in the Pacific World* ✦ **JoAnne Mancini**, National University of Ireland, Maynooth; Visitor, School of Social Science

March 18
Social Science Thursday Lunch Seminar ✦ *Interpellation: Remarks on the French 2005 Riots* ✦ **Didier Fassin**, James D. Wolfensohn Professor, School of Social Science

March 25
Social Science Thursday Lunch Seminar ✦ *The Authority of the University: Medieval and Contemporary* ✦ **Ian P. Wei**, University of Bristol; Member, School of Social Science

April 6
Can We? Seminar ✦ *Bethlehem: American Utopia, American Tragedy* ✦ **Seth Moglen**, Lehigh University; Member, School of Social Science

April 8
Social Science Thursday Lunch Seminar ✦ *Mass Higher Education and the "Dropout Problem"* ✦ **Paul Attewell**, The Graduate Center, The City University of New York; Member, School of Social Science

April 14
Dewey Theme Seminar ✦ *Parental Involvement in Children's Education (Doesn't) Matter: Parenting in the Era of High Stakes Achievement* ✦ **Angel L. Harris**, Princeton University; Member, School of Social Science

April 15
Social Science Thursday Lunch Seminar ✦ *Toleration and Development* ✦ **Graham Finlay**, University College Dublin; Member, School of Social Science

April 20
Dewey Practitioner Symposium ✦ *If Winning Isn't Everything, Why Do They Keep Score?* ✦ **Yuli Tamir**, Tel Aviv University

April 22
Social Science Thursday Lunch Seminar ✦ *Was Kipling Right? Civilizations in World Politics* ✦ **Peter J. Katzenstein**, Cornell University; Member, School of Social Science

April 26
Dewey Seminar Field Trip to International High School at Lafayette in Brooklyn, New York

April 27
Can We? Seminar ✦ *Why Rousseau?* ✦ **Julie E. Cooper**, The University of Chicago; Member, School of Social Science

April 28
Dewey Theme Seminar ✦ *Connecting the Politics of Educational Equity to the Challenge of School Governance and Reform in a Fragmented Federal System* ✦ **Patrick McGuinn**, Drew University; Member, School of Social Science

April 29
Social Science Thursday Lunch Seminar ✦ *The State School Funding Lawsuits: Normative Dilemmas* ✦ **Anna Marie Smith**, Cornell University; Member, School of Social Science

April 30
Dewey Practitioner Symposium ✦ *Higher Education* ✦ **Freeman Hrabowski**, University of Maryland, Baltimore County ✦ **Anthony Marx**, Amherst College ✦ **Diana Chapman Walsh**, Wellesley College

May 5
Dewey Theme Seminar ✦ *(Dis)Locating the Immigrant Family* ✦ **Carola M. Suárez-Orozco** and **Marcelo M. Suárez-Orozco**, New York University; Members, School of Social Science

May 6
Social Science Thursday Lunch Seminar ✦ *Monogamy in Islam: The Case of a Tunisian Marriage Contract* ✦ **Dalenda Largueche**, Université de la Manouba, Tunis; Member, School of Social Science

May 10
Dewey Practitioner Symposium ✦ *Foundations and Education Reform* ✦ **Michele Cahill**, Carnegie Corporation of New York ✦ **Michael McPherson**, Spencer Foundation

May 12
Dewey Theme Seminar ✦ *Bethlehem: American Utopia, American Tragedy* ✦ **Seth Moglen**, Lehigh University; Member, School of Social Science

May 13
Social Science Thursday Lunch Seminar ✦ *Sport as a Model of Meritocracy* ✦ **David Karen**, Bryn Mawr College; Member, School of Social Science

May 19
Dewey Theme Seminar ✦ *Religious Education and the Politics of Pluralism in Pakistan* ✦ **Matthew J. Nelson**, University of London; Member, School of Social Science

May 26
Dewey Theme Seminar ✦ *Wrap-up Meeting* ✦ **Danielle S. Allen**, UPS Foundation Professor, School of Social Science ✦ **Rob Reich**, Stanford University; Visiting Professor, School of Social Science

May 27
Field Trip to Bethlehem, Pennsylvania ✦ **Seth Moglen**, Lehigh University; Member, School of Social Science

June 4–5
Recent Developments in Mechanism Design Conference ✦ Organized by **Eric S. Maskin**, Albert O. Hirschman Professor, School of Social Science, and **Stephen Morris**, Princeton University

June 28–July 2
Spencer Workshop: Education, Democracy, and Justice ✦ Organized by **Danielle S. Allen**, UPS Foundation Professor, School of Social Science, and **Rob Reich**, Stanford University; Visiting Professor, School of Social Science

KATE ABLUTZ

Applicants to the Schools are motivated primarily by their need for free time in which to carry on research and writing.

The Libraries

The Historical Studies–Social Science Library (Marcia Tucker, Librarian) contains some 120,000 volumes and has subscriptions to over 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 HS–SS 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 1930s. 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. Additional volumes have been added through various gifts, most notably through the Leon Levy Fund, expanding the subject scope of the collection. The HS–SS Library continues to process books from the library of Walther Heissig, a noted Central Asian–studies scholar. Walther Heissig's library came to the Institute partly as a gift and partly on deposit from the Princeton University East Asian Studies Department and Princeton University Library.

The HS–SS Library includes books and offprints from past Professors including Kurt Gödel, Ernst H. Kantorowicz, Elias Avery Lowe, Millard Meiss, Erwin Panofsky, Marshall Clagett, and Harry Woolf, and former Members Robert Huygens and Walther Kirchner. The Library also contains the library of Giorgio Tonelli.

The microfilm collections of the HS–SS 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 in 1965 provided the Institute with a microfilm copy of slips presented for the *Thesaurus Linguae Latinae* along with recent additional material on CD. The Library has microfilm copies of the papers of Simone Weil.

The Library houses the Institute archives. The records in the collection of the Shelby White and Leon Levy Archives Center (Christine Di Bella, Archivist) date from the 1930s and consist of official correspondence of the Director's Office, minutes of meetings of the Faculty and the Board of Trustees, correspondence concerning past Faculty and Members, records of the Electronic Computer Project, and the papers of select Faculty members, including astrophysicist John N. Bahcall. The archives also include the Institute's photograph collection and a growing oral history collection. The reading room, located in the annex of the Historical Studies–Social Science Library, opened in October 2009. It provides a space for researchers to consult resources from the archives, as well as a display area featuring selections from the collections. A generous gift from the Leon Levy Foundation supports the ongoing work of the Institute to formally organize and preserve the important historical materials already in its possession and to serve as a repository for essential source materials going forward.

The Mathematics–Natural Sciences Library (Momota Ganguli, Librarian) is based in Fuld Hall, with smaller departmental branches in Bloomberg Hall, and compact shelving spread across campus. The collection, which includes about 30,000 volumes of monographs and bound periodicals as well as 140 print and/or electronic subscriptions, spans pure and applied mathematics, astrophysics, theoretical and mathematical physics, and biology. The M–NS Library has an extensive collection of the collected works of mathematicians, including those of Cauchy, Descartes, Fermat, Gauss, Hardy, and Poincaré. Each year, the M–NS Library adds about three hundred books to its collection.

Both of the Institute's libraries participate in the shared cataloguing system OCLC, which gives Institute scholars computerized access to a database that is in use by 57,000 libraries in 112 countries. The Institute is a member of the RLG Program SHARES partnership, a resource-sharing program. The Institute's Web-accessible online catalogue provides holdings information for the libraries and is accessible via http://library.hs.ias.edu from anywhere in the world.

The Historical Studies–Social Science Library maintains computers that provide access to scanners, a variety of software packages for both PCs and Macintoshes, and databases in the fields of Classics, the history of science, and Islamic and French studies. The M–NS Library's electronic resources include access to Math-SciNet, JSTOR, and arXiv.org. All scholars affiliated with the Institute enjoy the same privileges as Princeton University faculty in the Princeton University Library system. All scholars also have privileges in the Robert E. Speer Library of the Princeton Theological Seminary. The Librarians and the Faculty of all four Schools at the Institute warmly appreciate gifts of books and publications from former and current Faculty, Members, and Visitors of the Institute.

The IAS Community

For eighty years, the Institute for Advanced Study has had a profound influence on the fields of study represented here: Historical Studies, Mathematics, Natural Sciences, and Social Science. Any day at lunch or tea, you will hear leading scientists and scholars from around the world discussing topics as as diverse as the response to terrorism, how to combat the next influenza virus, fourteenth-century Mongolian history, the very latest developments in string theory, the mathematical basis of computer security, attitudes toward AIDS in South Africa, or how to evaluate the signals for supersymmetry at the Large Hadron Collider at CERN.

Members, who typically stay for one year but may stay for up to five years, live together with their families in housing adjacent to the Institute campus in what might be described as a true academic village. Throughout the year, the Office of the Director hosts a broad range of concerts, lectures, programs, and forums, as listed on the following pages. In addition, the Institute offers a series of activities for Members, Visitors, and their families. In the 2009–10 academic year, these included films, play readings, clay modeling classes, yoga, tennis lessons, trips to museums and other cultural sites, and activities for children in the Institute community.

ANDREA KANE

RECORD OF EVENTS

September 22
Member Welcome Reception

September 29
Talk and Exhibit ✦ **Serge J-F. Levy**, Director's Visitor, Institute for Advanced Study

October 2
Friends Forum ✦ *Paul Dirac and the Religion of Mathematical Beauty* ✦ **Graham Farmelo**, Director's Visitor, Institute for Advanced Study

October 9
Friends Culture and Cuisine ✦ *Julia & Michael: America's Food Evolution Evolves* ✦ **Betty Fussell**, Food Historian and Writer

October 14
Friends Forum ✦ *Musical Journeys: Discovering the American Within* ✦ **Derek Bermel**, Artist-in-Residence, Institute for Advanced Study

October 16–17
Edward T. Cone Concert Series ✦ **Derek Bermel**, Artist-in-Residence, clarinet; **Christopher Taylor**, piano

October 17
Edward T. Cone Concert Series Talk ✦ **Anthony Tommasini**, Chief Music Critic, *New York Times*

October 21
Art and Its Audiences Lecture Series ✦ *Who Were Artists in Ancient Egypt and What Audiences Did They Address?* ✦ **John Baines**, University of Oxford; Member, School of Historical Studies

October 23
Public Policy Lecture ✦ *Torture and Accountability in the "War on Terror": What Should Be Done?* ✦ **David Cole**, Professor, Georgetown University Law Center

October 25
Princeton Symphony Orchestra Concert ✦ *Elysian Camerata* ✦ **Barbara Jaffe** and **Fran Berge**, violins; **Louise Jaffe** and **Beth Dzwil**, violas; **Talia Schiff**, cello

October 30
Public Lecture ✦ *The Evolution of Bodies Bound by Gravity* ✦ **Peter Goldreich**, Professor Emeritus, School of Natural Sciences

November 4
Friends Forum ✦ *How Crystals Grow Inside Solids* ✦ **Robert MacPherson**, Hermann Weyl Professor, School of Mathematics

November 6
Writers Conversation ✦ The Daily Show *After Obama* ✦ **Steve Bodow**, Head Writer and Supervising Producer, *The Daily Show with Jon Stewart*

November 11
Public Lecture ✦ *In the Beginning: Modern Cosmology and the Origin of Our Universe* ✦ **Matias Zaldarriaga**, Professor, School of Natural Sciences

November 13
Friends Fireside Chat ✦ *Chinoiserie: The East through Western Eyes* ✦ **Judith Applegate**, Art Historian and Appraiser

November 22
Princeton Symphony Orchestra Concert ✦ *Music for Oboe and Harp* ✦ **Mark Snyder**, oboe and English horn; **Andre Tarantiles**, harp

December 2
Public Lecture ✦ *The Acculturated Native Who Rebels: Nativists, Nationalists, and Western-Born Jihadists in Historical Perspective* ✦ **Patricia Crone**, Andrew W. Mellon Professor, School of Historical Studies

December 4–5
Edward T. Cone Concert Series Talk ✦ **William Bolcom**, Composer, and **Joan Morris**, Mezzo-soprano

Edward T. Cone Concert Series ✦ *The Music of William Bolcom* ✦ **Derek Bermel**, Artist-in-Residence, clarinet; **William Bolcom**, piano; **Kevin Deas**, bass/baritone; **Timothy Fain**, violin; **Joan Morris**, mezzo-soprano; **Joshua Roman**, cello; **Howard Watkins**, piano

December 9
Art and Its Audiences Lecture Series ✦ *Landscapes and Their Users: From Romantic to Modern in the Representation of Normandy* ✦ **Stephen Bann**, Professor Emeritus of History of Art and Senior Research Fellow, University of Bristol

January 11
Member Welcome Reception

January 15–16
Edward T. Cone Concert Series Talk ✦ **Midori**, Violinist

Edward T. Cone Concert Series ✦ *Midori and Charles Abramovic* ✦ **Midori**, violin; **Charles Abramovic**, piano

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January 27
Association of Members of the Institute for Advanced Study (AMIAS) Lecture ✦ *Mapping the Universe* ✦ **David Weinberg**, The Ohio State University; Member, School of Natural Sciences

February 12
Writers Conversation ✦ *Artistic Collaboration: A Conversation with Alex and Vincent Katz* ✦ **Alex Katz**, Painter, and **Vincent Katz**, Writer, hosted by **Derek Bermel**, Artist-in-Residence

February 17
Public Lecture ✦ *Critique of Humanitarian Reason* ✦ **Didier Fassin**, James D. Wolfensohn Professor, School of Social Science

February 19
Culture and Cuisine Talk ✦ *Art and Food and Food in Art* ✦ **Peter G. Rose**, Author and Food Historian

February 21
Princeton Symphony Orchestra Concert ✦ *Clarinet, Viola, and Piano Trio* ✦ **Benjamin Fingland**, clarinet; **Elizabeth Hostetter**, viola; **Soyeong Kim**, piano

February 27
Midwinter Party for Faculty, Members, and Staff

March 2
Art and Its Audiences Lecture Series ✦ *The Audience as Prisoner: Reflections on the Activity of the Object* ✦ **Horst Bredekamp**, Professor of Art History, Humboldt-Universität zu Berlin

March 10
Public Lecture ✦ *Celestial Mechanics and a Geometry Based on Area* ✦ **Helmut Hofer**, Professor, School of Mathematics

March 19–20
Edward T. Cone Concert Series ✦ *Radically Unfinished: Works for Solo and Duo Piano* ✦ **Vijay Iyer**, piano, and **Craig Taborn**, piano

March 20
Edward T. Cone Concert Series Talk ✦ **Nate Chinen**, Freelance Writer, *New York Times*, *Village Voice*, and *Jazz Times*

April 1
Art and Its Audiences Lecture Series ✦ *All That Glitters: Image and Ornament in Early Islam* ✦ **Finbarr Barry Flood**, William R. Kenan Jr. Professor of the Humanities, Institute of Fine Arts and College of Arts and Sciences, New York University

April 7
Friends Forum ✦ *New Physics and the Large Hadron Collider* ✦ **Nima Arkani-Hamed**, Professor, School of Natural Sciences

April 21
Leon Levy Lecture ✦ *Mass Higher Education and the Dropout Problem* ✦ **Paul Attewell**, The Graduate Center, The City University of New York; Member, School of Social Science

April 25
Princeton Symphony Orchestra Concert ✦ *Music from Italy* ✦ **Kiri Murakami**, violin; **Seth Baer**, bassoon; **Karen Fraust Baer**, piano

April 28
Friends Forum ✦ *Bethlehem: American Utopia, American Tragedy* ✦ **Seth Moglen**, Lehigh University; Member, School of Social Science

May 6
Public Lecture ✦ *Return to Space* ✦ **Charles Simonyi**, President and Chief Executive Officer, Intentional Software Corporation, and Chairman of the Board of Trustees, Institute for Advanced Study

May 7
Public Lecture ✦ *Experiments on Animals in Ancient Greece and Rome: Private and Public Science* ✦ **Heinrich von Staden**, Professor, School of Historical Studies

May 14
Friends Forum ✦ *Blackout: Lighting on the Home Front* ✦ **Sandy Isenstadt**, University of Delaware; Member, School of Historical Studies

June 15
Staff Picnic

PHOTO CREDITS, FROM TOP: ANDREA KANE, KATE ABLUTZ, CLIFF MOORE, KATE ABLUTZ, ANDREA KANE

After Hours Conversations

After Hours Conversations, a program conceived and organized by Professors Caroline Bynum of the School of Historical Studies and Piet Hut of the Program in Interdisciplinary Studies, was launched in February 2008 to encourage inter-School conversations in an informal and relaxed environment. In 2009–10, the program continued with talks held in Harry's Bar every Monday and Thursday in October and November and again in February and March. After a ten-minute presentation of a theme or problem of broad significance, there were twenty minutes of lively group discussion, often followed by continuing conversation as people lingered over drinks. In the fall term, Professors Nicola Di Cosmo of the School of Historical Studies and Piet Hut chaired the sessions; in the spring term, Bynum and Hut chaired. Attendance varied from twenty to seventy. There were presentations by Members, Visitors, and Faculty, both active and emeriti, from all four Schools of the Institute and from the Program in Interdisciplinary Studies, as well as by Director's Visitors and Staff from the administration. Topics ranged from mathematics in ancient Mesopotamia to writing the biography of George Kennan; solar systems unlike our own; neuroscience and the legal system; the status of women in early modern Europe; strategies for fundraising at IAS; new perspectives on Borromean rings; and why jihad went global with Al-Qaeda.

A webpage (www.ids.ias.edu/after-hours-conversations) provides information on dates, speakers, and topics. The program will continue in 2010–11.

ANDREA KANE

Professor Matias Zaldarriaga of the School of Natural Sciences discussed the origin of our universe during After Hours Conversations.

ANDREA KANE

Special Programs range from interdisciplinary studies and musical endeavors to building science capacity in the developing world.

Special Programs

Program in Interdisciplinary Studies

Professor **Piet Hut**'s activities included both his astrophysics research and his responsibilities as the head of the Program in Interdisciplinary Studies. The latter program had nineteen visitors, with durations of their visits ranging from days to months, in fields including physics, astrophysics, bioinformatics, medicine, psychology, cognitive science, computer science, philosophy, education, media, political science, comparative law, art history, and journalism in virtual worlds.

During the year, Hut, together with Professors Caroline Bynum and Nicola Di Cosmo from the School of Historical Studies, organized a series of After Hours Conversations, which were held at the Institute in Harry's Bar, two times a week for a period of two months during each semester. Each get-together had a more formal part lasting thirty minutes, starting with a ten-minute talk by a speaker and followed by a twenty-minute period of questions. In addition, many participants continued informal conversations afterward. These activities were widely seen as an effective way to lower the threshold for inter-School communication at the Institute, and received special praise in the Decadal Review that was published recently: "An innovative example of fostering cross-disciplinary interaction is the After Hours Conversations program, developed by Professors Caroline Bynum and Piet Hut within the last couple of years, which has been an enormous success."

Hut's main research focus this year continued to be his exploration of virtual worlds, especially Second Life, currently the largest non-game three-dimensional online virtual world, with a continued presence in-world of well over fifty thousand residents at any given time. As a sign of the "coming of age" of virtual world activities, he received a National Science Foundation grant for his work on the Meta Institute for Computational Astrophysics (MICA; www.mica-vw.org), a virtual organization that he had established two years earlier, in the category of Human Centered Computing (the research proposal was titled "Exploring the Use of Immersive Virtual Reality Technologies for Scientific Research, Communication, and Outreach").

In addition to organizing colloquia and workshops in Second Life, MICA has also started to explore an open-source virtual world, modeled upon Second Life, called OpenSim. The great advantage of OpenSim is that it allows the user to perform actual simulations, by tinkering with the physics engine, the software module that governs gravity and other physical effects. In this way, Hut and coworkers have been able to perform N-body simulations, the results of which were discussed in a workshop, "Using Virtual Worlds for Interactive Simulations of Star Cluster Evolution," in Tokyo in September 2009.

Another institute that was cofounded by Hut, Kira (www.kira.org), and brought into Second Life in the fall of 2008, continued its more broadly interdisciplinary activities. Kira was founded thirteen years ago by faculty members from Stanford University, Princeton University, the Institute, and elsewhere as a forum to discuss the nature of scientific knowledge and to compare that with other ways of knowing, from philosophy and art to various contemplative traditions. Its main activities in Second Life are a series of weekly workshops on a wide range of topics.

ANDREA KANE

Professor Piet Hut continued his exploration of virtual worlds and the nature of scientific knowledge.

Artist-in-Residence Program

The 2009–10 academic year marked the inaugural season of "The Harmonic Series," led by composer and clarinetist **Derek Bermel**, serving in his first year as Institute Artist-in-Residence. "The Harmonic Series" was developed to explore the wide variety of aesthetic perspectives in art music, especially of the twentieth and twenty-first centuries, through chamber music concerts and talks.

The 2009–10 Edward T. Cone Concert Series began with performances by Bermel on the clarinet and Christopher Taylor on piano. Their program traced the history of works for clarinet and piano, taking the audience on a journey beginning with Brahms and moving through the twentieth and twenty-first centuries with Milhaud and the American composers Leonard Bernstein, Paul Moravec, Sebastian Currier, and Bermel, who was represented by three works—*SchiZm*, *Thracian Sketches*, and *Turning*. The second concert weekend of the season highlighted the music of William Bolcom, with Bolcom and his wife, mezzo-soprano Joan Morris, as special guests. The first half of the concerts offered Bolcom's classical compositions performed by violinist Timothy Fain, cellist Joshua Roman, pianist Howard Watkins, and Bermel on clarinet. The second half featured mezzo-soprano Carla Jablonski, baritone Kevin Deas, and Morris performing Bolcom's cabaret songs. The spring concerts began with performances by noted violinist Midori, accompanied by pianist Charles Abramovic, performing an all-contemporary concert of works by Huw Watkins, Krzysztof Penderecki, Toshio Hosokawa, James MacMillan, and John Adams. The season concluded with concerts featuring the world premiere duo-recital by jazz pianists Vijay Iyer and Craig Taborn in "Radically Unfinished: Works for Solo and Duo Piano."

This season reintroduced concert talks following the Friday performances and preceding the Saturday concerts. Anthony Tommasini, chief music critic of the *New York Times*, was the season's first speaker, followed by Bolcom and Morris, Midori and Abramovic, and jazz journalist Nate Chinen.

This year, Bermel introduced a new series, Writers Conversations. The first talk featured Steve Bodow, head writer of "The Daily Show with Jon Stewart," who discussed how the show has been dealing with the news and news media since the election of President Obama. The second in the series featured painter Alex Katz and his son, writer Vincent Katz, who spoke about artistic collaborations.

In addition to directing "The Harmonic Series" during the 2009–10 year, Bermel composed *Canzonas Americanas* for the Los Angeles Philharmonic; the work was premiered on May 4, 2010, in Disney Hall, conducted by Gustavo Dudamel. Bermel continued work on his music theater composition "Golden Motors" with lyricist/librettist Wendy S. Walters, and he completed a set of three études for the violinist Midori, to be premiered in October 2010 in San Francisco. In addition, Bermel was nominated for a Grammy as best soloist with orchestra for his CD *Voices* with the Boston Modern Orchestra Project, and he completed a new disc of his music with the award-winning ensemble Alarm Will Sound, which will be released in spring 2011.

BENTLEY DREZNER

Violinist Midori (center) with Artist-in-Residence Derek Bermel (right) and pianist Charles Abramovic (left)

Director's Visitors

Director's Visitors, scholars who work in a variety of fields, including areas not represented in the Schools, contribute much to the vitality of the Institute. They are invited to the Institute for varying periods of time, depending on the nature of their work.

During his 2009 visit, **Graham Farmelo** researched his next project about Winston Churchill and nuclear weapons, which concerns the United Kingdom leader's thinking about policy and his relationship with the associated scientists (British and American). He took full advantage of the library facilities at the Institute and the archives in Washington, D.C.

Expecting to come to the Institute to begin work on a new stage counterpart to Schoenberg's 1909 monodrama, *Erwartung*, composer **Tarik O'Regan** got waylaid by a BBC commission. With the Princeton power failure in full flow, he started going to bed early for the first time since the age of eleven—a very odd experience—and thus began thinking about matters soporific. The result, a twenty-minute work called *The Night's Untruth*, was premiered and broadcast on March 25 by the BBC Singers in London. It explores the use of sleep as metaphor by dint of excerpts from poems written in the seventeenth to twentieth centuries. Death, love, fear, ecstasy, isolation, dreaming, and rest are all textual "variations" on the "theme" of sleep and can be found in the chosen texts. The title is taken from a line in a poem by Samuel Daniel (1562–1619) and speaks to the composition's focus on sleep as a parallel, possibly dystopian, existence to the one experienced in our waking hours.

Tom Phillips rescued a lot of magazines from the library trash and recycled them [all part of the service] to make a collage storyboard for the opera *Heart of Darkness*, which as well as fulfilling a promotional function pointed the way to new work . . . but that is the wondering blunder of art: that work only points in one direction, more work; which is preferable to the only other word on that road-sign, death.

Siobhan Roberts, a freelance science journalist and author from Toronto, continued work on her second book, a biography of the Princeton University mathematician John Horton Conway. During her research this year, she learned that Conway could be described variously as "one of the most charismatic figures in mathematics" and "an oddball among oddballs." Her first book, *King of Infinite Space: Donald Coxeter, The Man Who Saved Geometry* (Walker & Company), won the 2009 Euler Prize, awarded by the Mathematical Association of America for a book that augments the public's view of mathematics. Her book on Conway, while still in the popular science genre, is as much a meditation on memory and curiosity and thinking as it is a biography of a mathematician. To that end, during her stay, Roberts took to heart the advice offered by a bumper sticker belonging to one of the mathematicians on faculty: "Don't Believe Everything You Think."

KATE ABLUTZ

Director's Visitor Graham Farmelo gave a talk about theoretical physicist Paul Dirac, the subject of a biography that he worked on while at the Institute.

Institute for Advanced Study/Park City Mathematics Institute (PCMI)

The IAS/Park City Mathematics Institute (PCMI) is a program of professional development for the mathematics community, including research mathematicians, graduate students, undergraduate students, mathematics education researchers, undergraduate faculty, and mathematics teachers at the secondary school level. PCMI has been an outreach program of the Institute for Advanced Study since 1994.

The flagship activity of PCMI is the three-week residential Summer Session, held annually in Park City, Utah, a program that combines high-quality lectures and seminars with activities and events designed to foster all-institute interaction. This interaction serves to increase awareness of the roles of professionals in all mathematics-based occupations and creates a strong sense of community.

In addition to the Summer Session, PCMI offers year-round professional development activities to secondary school mathematics teachers through its Math Science Partnership project and many Professional Development and Outreach groups.

The Graduate Summer School lectures are typically disseminated through the Park City Mathematics Series of lecture notes, a series targeted at graduate students and researchers, published by the American Mathematical Society. Also published by the AMS is a series of lectures from PCMI's Undergraduate Summer School. The Math Forum publishes online the products created by PCMI's Secondary School Teachers Program, and the proceedings and briefs authored by PCMI's International Seminar on Mathematics Education are also available on the Math Forum website.

A more detailed Annual Report is available at http://pcmi.ias.edu.

The Summer Session

The twentieth annual Summer Session, held June 27–July 18, 2010, in Park City, Utah, attracted some 360 participants in all programs.

The following programs took place during the Summer Session:

Graduate Summer School
International Seminar on Mathematics Education (one week)
Research Program in Mathematics
Secondary School Teachers Program
Service, Teaching, and Research (STaR) Program (one week)
Undergraduate Faculty Program
Undergraduate Summer School

Except as noted, all programs met for the entire three weeks.

The mathematical topic informs the courses and seminars for the Graduate Summer School, the Research Program, the Undergraduate Summer School, and the Undergraduate Faculty Program; in 2010, the topic was "The Mathematics of Image Processing." The topic "Making Mathematical Connections" provided the focus for the International Seminar and the Secondary School Teachers Program.

Each of the programs met daily for a series of courses and seminars. The groups also met together for Cross Program Activities three or four days each week.

Opening social events were held for each program on the evening of registration day. They were designed to introduce participants to their program's leaders in a casual setting and to foster early acquaintances among the diverse population of each program.

Graduate Summer School and Research Program

The Graduate Summer School and the Research Program 2010 were organized by Tony Chan, The Hong Kong University of Science and Technology; Ronald Devore, Texas A&M University; Stanley Osher, University of California, Los Angeles; and Hongkai Zhao, University of California, Irvine. This year's theme, "The Mathematics of Image Processing," included recent developments in mathematical theory, numerical algorithms, and applications in image processing. The graduate lecture series and research seminars covered a wide range of topics, such as sparse representations, compressive sensing, image compression, de-noising, segmentation, learning, and recognition. There were many interactions among participants that are expected to lead to collaborations in the near future.

Graduate Summer School

The 2010 Graduate Summer School had nine lecture series on a variety of subjects in image processing and related topics, including sparse coding, compressive sensing, variational and partial-differential-equation-based methods, wavelet, feature learning, and optimization. Each lecture series was supplemented with a computer lab where students got hands-on experience with the lecture material.

Eighty graduate students participated in the Graduate Summer School and reported that the lectures were well balanced between introductory and advanced research material. The summer program provided participants with a comprehensive and diverse learning experience that few, if any, could obtain in their own university.

The Graduate Summer School Lecture Series featured: Richard Baraniuk, Rice University, "Compressive Sensing: Sparsity-Based Signal Acquisition and Processing"; Antonin Chambolle, École Polytechnique, "Total-Variation-Based Image Reconstruction"; Michael Elad, Technion–Israel Institute of Technology, "Sparse & Redundant Representations—From Theory to Applications in Image Processing"; Anna Gilbert, University of Michigan, "A Survey of Sparse Approximation"; Yann LeCun, New York University, "Learning Image Feature"; Zuowei Shen, National University of Singapore, "Wavelet and Wavelet Frames in Imaging Science"; Joseph M. Teran, University of California, Los Angeles, "Numerical Methods for Elasticity Problems in Biomechanics"; Ross Whitaker, University of Utah, "Statistical Models and Methods in Image Analysis."

Research Program

There were thirty-five participants in the Research Program, which consisted mainly of two one-hour research seminar talks given daily by the program participants. The speakers list was balanced between senior and junior researchers. Research talks presented state-of-the-art research and stimulated not only interesting discussions among participants but also possible future collaborations.

TODD ROYAL HICKSON

PCMI combines high-quality lectures and seminars with activities and events designed to foster all-institute interaction. This interaction serves to increase awareness of the roles of professionals in all mathematics-based occupations and creates a strong sense of community.

Clay Senior Scholars-in-Residence Program

Through the generous funding of the Clay Mathematics Institute, two Senior Scholars-in-Residence participated in the PCMI 2010 Summer Session. The Senior Scholars-in-Residence are nominated and chosen for their distinguished work in the research field. Chosen for the 2010 PCMI Summer Session were Ingrid Daubechies of Princeton University and Jean-Michel Morel of École Normale Supérieure de Cachan.

The participation of Daubechies and Morel played a crucial role in the summer program. Each of them gave a public lecture to the entire PCMI program and contributed excellent research seminars. Each Scholar also volunteered to hold a one-hour conversation with the Undergraduate Summer School program: Daubechies spoke about life as a mathematician, and Morel spoke about what to expect when doing graduate research in image processing. In addition, Daubechies made a point of interacting extensively with the Secondary School Teachers Program (SSTP): she attended the SSTP mathematics course, held a special session for the SSTP about her work, took part in the Zome building activities, and in general made herself available to SSTP participants.

Public lectures by Clay Senior Scholars were "Fine Art Meets Mathematics" by Ingrid Daubechies and "Image Editing with the Poisson Equation: How to Teach the Fourier Method to Undergraduates" by Jean-Michel Morel.

Secondary School Teachers Program

Fifty-two middle school and high school teachers spent three weeks learning mathematics, reflecting on what it means to teach mathematics, and working together to create a product to share with their colleagues both at PCMI and more broadly through the PCMI website.

Of the teacher participants, sixteen had returned for a second or third year of participation in the SSTP; four were teachers from the Noyce supplement to the PD^3 project; the other participants represented PCMI's Professional Development and Outreach groups from California, Minnesota, New Jersey, Utah, Washington, and Mathematics for America in New York. The remaining teachers came as individuals from a variety of geographic locations such as Arkansas, Florida, Maryland, Ohio, and Turkey. The range of teaching experience among the SSTP participants ran from one year of teaching to seasoned veterans.

As in the past nine years, the mathematics session, "Developing Mathematics: Over and Over," used materials created by a team led by Al Cuoco and Bowen Kerins from the Educational Development Center (EDC) and the PROMYS for Teachers program at Boston University. Participants explored how iterative processes can be used to investigate Fibonacci numbers, image processing, the calculation of square roots, and more, giving them a useful toolkit of techniques that can be applied to many different areas. Instructors for the course were Darryl Yong from Harvey Mudd College and Bowen Kerins, a former teacher and mathematics educator.

In the daily "Reflecting on Practice" session, participants considered how to manage productive discussions in their classrooms that contribute to student learning. The time for the course was increased by fifteen minutes in response to the concerns raised by the 2009 participant evaluations. The staff of six teachers designed and led the sessions under the guidance and supervision of the SSTP leadership team (Gail Burrill, Carol Hattan, and James King). Videos of classrooms from the United States and other countries, transcripts, research findings, articles, state assessment results, and instructional materials were used to prompt an analysis of what constitutes "math talk" and how to create classrooms where the level of discussion and interactivity was at the highest level.

For two hours each afternoon, participants took part in one of six working groups on data analysis, functions, geometry, discrete mathematics, and lesson study, and a group that took part in the introductory mathematics course of PCMI's Undergraduate Summer School ("An Introduction to Mathematical Image Processing," taught by Luminita Vese of the University of California, Los Angeles). In the latter working group, participants not only learned about the 2010 PCMI research topic but adapted it to the secondary classroom with several activities. The other working groups explored technology, developed lessons and classroom activities,

and created drafts of potential articles on interesting and useful mathematics that will be tested in classrooms when appropriate, reviewed during the coming year, revised as necessary, and posted on the PCMI website.

Undergraduate Summer School

The 2010 Undergraduate Summer School (USS) at PCMI was, as customary, organized around a pair of courses taught each day with daily problem sessions; one course was primarily aimed at introductory-level students (and a group of motivated high school teachers), and the other was intended for students at a more advanced undergraduate level of mathematics. The introductory course, "An Introduction to Mathematical Image Processing," was taught by Luminita Vese of the University of California, Los Angeles, and the advanced course, "An Introduction to Compressed Sensing," was taught by Jared Tanner of the University of Edinburgh.

Both courses were accessible to the students and received generally positive reviews. Attendance was high throughout the three-week session, filling the room to capacity (about forty to fifty students). In addition, because of the topic, the daily problem sessions (conducted by Jeff Blanchard of Grinnell College and Todd Wittman of the University of California, Los Angeles) included crucial programming components. These problem sessions were remarkably popular with the students.

Vese's introductory course covered techniques for image filtering using first- and second-order partial derivatives, the gradient, and Laplacian, and their discrete approximations by finite differences, average filters, convolution operators, the Fourier transform, and low-pass and high-pass filters. It was presented at a level that was easy for students to understand and implement in the lab.

In keeping with PCMI's focus on cross-program participation, a group of secondary school mathematics teachers led by James King of the University of Washington created a working group on "Image Processing" and attended two weeks of Vese's lectures. This group created a handful of exercises centered around simple image processing transformation that could be taught to secondary school students.

Tanner's advanced course discussed Fourier series and wavelets before delving into selected topics in compressed sensing. It was remarkable to see that many of his lectures were also independently covered in the Graduate Summer School. Usually the gap between the advanced undergraduate course and graduate courses is immense. This year the gap was not as noticeable, probably due to the newness of the field of image processing.

Undergraduate Faculty Program

For faculty members whose main focus is teaching undergraduate students, the Undergraduate Faculty Program (UFP) at PCMI offers the opportunity to renew excitement about mathematics, talk with peers about new teaching approaches, address some challenging research questions, and interact with the broader mathematical community. The UFP is unique in that it bridges the educational and research objectives of PCMI.

This year's UFP instructor/coordinator was Kevin Vixie, who was assisted by Tom Asaki, both of Washington State University. The UFP had three components this year:

1. Metrics and Regularization in Image Processing: This set of fifteen lectures by Vixie introduced the topic of image metrics and regularization and their role in image processing.

2. Data Challenges and Algorithms: Asaki grouped the participants in teams and had them explore concrete image processing problems using MATLAB. The participants learned how to implement the algorithms described in the primary lecture series. The problems were set as challenges, with some good-natured competition between the individual teams.

3. Lectures on Geometric Measure Theory: Asaki presented a set of six advanced lectures discussing geometric measure theory and its relation to image processing. The lectures attracted graduate students and members of the research program in addition to many of the UFP participants.

The UFP was unusually popular this year, attracting twenty-two participants. The group was enthusiastic about working on the data challenges in a team setting; many participants felt that acquiring a familiarity with

image processing would help them with their own research and/or could be incorporated into courses at their home institutions.

Service, Teaching, and Research (STaR) for Early Career Mathematics Educators Project

New this year to PCMI was the STaR workshop for recent doctoral graduates in mathematics education. This one-week program was organized by Robert Reys and Barbara Reys of the University of Missouri and supported with funding from the National Science Foundation.

The goals of the project are to bring together a cadre of future leaders of mathematics education in order to establish a support structure for advancing the scholarship of recent doctoral graduates in mathematics education; expand the networking of recent graduates and advanced graduate students; showcase research priorities for the field; and facilitate the establishment and development of research groups involving young mathematics education scholars from different institutions.

The forty-four STaR fellows of 2010 have appointments in forty-two different institutions throughout the United States. Twenty-four fellows have appointments in mathematics departments and twenty in colleges or departments of education. Outstanding scholars were recruited to lead or facilitate sessions. Jere Confrey of North Carolina State University, James Hiebert of the University of Delaware, and Denise Mewborn of the University of Georgia made keynote presentations and worked with the STaR fellows in follow-up breakout sessions. John (Spud) Bradley of the National Science Foundation also attended the Institute for several days and interacted with attendees.

Community and Cross Program Activity

Efforts toward building a strong and dynamic community among all PCMI participants included the use this year of the Ning social networking site, which was successful at encouraging communication among all participants in a variety of ways. The online community was used extensively for the posting of discussions, activities, schedule notices, and lecture notes.

Community is also built at PCMI through a variety of Cross Program Activities—a mix of formal presentations and informal recreational activities. Formal activities were Clay Senior Scholars-in-Residence lectures by Jean-Michel Morel and Ingrid Daubechies; a presentation by Tony DeRose of Pixar Animation Studios; a presentation by Nick Jackiw of Key Curriculum Press; two sessions of "Pizza and Problem Solving," organized by Andrew Bernoff of Harvey Mudd College; opening socials for each program on the opening day of PCMI; and opening and closing dinners.

Informal activities included designing and building the customary entry for the annual Park City Fourth of July parade (a hypercube to represent this year's parade theme "From Silver to Snow"). Some sixty people participated in the parade activities; a hike organized by PCMI Director Richard Hain, with twenty-five participants from among the programs; a PCMI World Cup soccer match; and an annual ice cream social organized and hosted by SSTP participants.

Participants are encouraged to organize sports and recreational outings. After the first week, there were participant-led sports activities held nearly every night and on the weekends, as well as weekend trips open to anyone who wished to participate.

Publication Series

Published by the American Mathematical Society, the Park City Mathematics Series comprises nearly all of the lectures ever given in PCMI's Graduate Summer School. Also published are six volumes in the Park City Mathematics Institute Subseries, a subsection of the AMS Student Mathematics Series. These volumes are aimed at undergraduate students and are published independently of the Park City Mathematics Series. The SSTP disseminates its teacher-created materials and other resources via a special website created by the Math Forum at Drexel University. A full list of PCMI's publications is included in the more detailed Annual Report available at http://pcmi.ias.edu.

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The National Security Agency
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Appreciation is also extended for the in-kind contributions of the Department of Mathematics at the University of Utah.

PCMI Oversight Board

PCMI Steering Committee 2010

PCMI Diversity Subcommittee

Science Initiative Group (SIG)

Over the past year, the Science Initiative Group has continued to support capacity building in science research and education in Africa through RISE, the Regional Initiative in Science and Education. Funded by Carnegie Corporation of New York, RISE trains Ph.D.- and M.S.-level scientists and engineers in sub-Saharan Africa in university-based networks in disciplines selected in part for their relevance to Africa's development. The RISE networks are:

AMSEN: African Materials Science and Engineering Network (Botswana, Kenya, Namibia, Nigeria, South Africa)

RISE-AFNNET: African Natural Products Network (Kenya, Tanzania, Uganda)

SABINA: Southern African Biochemistry and Informatics for Natural Products Network (Malawi, Namibia, South Africa, Tanzania)

SSAWRN: Sub-Saharan Africa Water Resources Network (Botswana, Mozambique, South Africa, Uganda)

WIO-RISE: Western Indian Ocean Regional Initiative (Mozambique, South Africa, Tanzania)

By the end of June 2010, sixty-eight students were enrolled in degree programs through RISE, about two-thirds of them working toward doctorates and the others earning masters degrees. After completing their studies under the supervision of teams of advisers from universities in their networks, most RISE graduates will commence or resume research and teaching appointments at universities in their home countries. Others will divide their time between academia and industry.

ALAN ANDERSON

Joseph Erume (right) makes his way to a community spring in a Ugandan village, accompanied by the community "chairman" (second from left) and fellow RISE researchers Justin Ekou and Irene Naigaga. Erume is studying the water quality of the spring, a source of waterborne diseases; Ekou studies the molecular biology of amoebic parasites; and Naigaga's research focuses on water quality in Lake Victoria.

While the impact of RISE is expected to grow as African universities build stronger links with one another and develop a better qualified professoriate, individual triumphs have already begun to emerge, as the following vignettes illustrate.

Sugar cane ash, a waste product of processing sugar cane, has found its way into the Ph.D. research of John Mwero, an AMSEN student from Kenya. He is seeking ways to reduce the cost of concrete, the standard building material in Nairobi, by adding agricultural waste to it. His early results showed that while large amounts of ash weaken the concrete, small amounts—about 6 to 8 percent—actually bring a slight improvement in strength.

In discussing what inspired him to study natural products chemistry, John Odda, a Ugandan researcher earning his Ph.D. through AFNNET, recalled, "Sometimes I would get sick with malaria. My

dad would walk over to some bush and come back with roots and leaves and cook them all up. He would give me something to drink and I would get well. I remember thinking, 'What magic is that?' I wanted to know what was in those plants, and I still want to know." Through RISE, Odda is researching the pharmacology of plants used in traditional medicine.

Nicholas Mphangwe, a RISE-supported Ph.D. candidate based at the Tea Research Foundation of Central Africa in Malawi, is learning how to identify genetic markers that will allow for more accurate and rapid selection of desirable tea strains. The scientists at the foundation have been raising and studying some three hundred tea cultivars, seeking to improve quality by traditional methods of hand selection. Using equipment and techniques available at the University of Pretoria, part of the SABINA network, Mphangwe will help refine this process through the use of genetic markers for qualities such as flavor, resistance to insects and diseases, and tolerance of low temperature and drought.

Irene Naigaga brought her background in veterinary medicine to her Ph.D. research project in the SSAWRN network, where she is developing an inexpensive but accurate technique to monitor water quality in Lake Victoria. She found that she can assess water quality by studying lesions in the tissue of Nile perch (tilapia), a fish that accumulates pollutants from the lake over its lifespan.

WIO-RISE Ph.D. student Grace Mutia discovered that fishermen in Zanzibar, where her research is based, crush certain seaweeds and place them in hand-woven traps as bait for parrotfish, a common local food. She believes that if she can isolate and produce the fish-attracting chemical, she can improve the lot of the fishermen and reduce the heavy demand on seaweed.

Details and other student stories can be found at www.ias.edu/rise.

ALAN ANDERSON

Grace Mutia (left), a WIO-RISE Ph.D. student, believes that she can improve the lot of fishermen in Zanzibar by isolating and producing the chemical in seaweed that attracts parrotfish, a common local food.

Acknowledgments

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Centennial Council

(through June 30, 2010)

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The Karoly Simonyi Memorial Endowment Fund
The Sivian Fund
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Wolf Foundation Prize Endowment
The James D. Wolfensohn Fund

[1] *Annual gifts from July 1, 2009–June 30, 2010*

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through May 8, 2010

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(in order of service)

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(2009-2010 Faculty and Faculty Emeriti are in bold)

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** From July 1, 2010*

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Karen Cuozzo
Assistant to the Director

Robert Ruggiero
Special Assistant to the Director for the Decadal Review

John Masten
Associate Director for Finance and Administration

Anthony Bordieri, Jr.
Manager of Facilities

Ashvin Chhabra
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Manager of Administrative Services

Roberta Gernhardt
Manager of Human Resources

Mary Mazza
Comptroller

Michel Reymond
Chef/Manager, Dining Hall

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Associate Director for Development and Public Affairs

Kamala Brush
Senior Development Officer

Christine Ferrara
Senior Public Affairs Officer

Pamela Hughes
Senior Development Officer

Catherine Newcombe
Senior Development Officer

Kelly Devine Thomas
Senior Publications Officer

Library Administration

Momota Ganguli
Librarian, Mathematics and Natural Sciences

Marcia Tucker
Librarian, Historical Studies and Social Science (also Coordinator of Information Access for Computing, Telecommunications, and Networking Administration)

Christine Di Bella
Archivist

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School of Mathematics

Donne Petito
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School of Social Science

Michelle Sage
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School of Natural Sciences

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The Simons Center for Systems Biology
School of Natural Sciences

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Manager
Databases and Integration

Institute for Advanced Study—
Louis Bamberger and Mrs. Felix Fuld Foundation

Financial Statements
June 30, 2010 and 2009

(With Independent Auditors' Report Thereon)

Independent Auditors' Report

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

We have audited the accompanying statements of financial position of Institute for Advanced Study–Louis Bamberger and Mrs. Felix Fuld Foundation (the Institute) as of June 30, 2010 and 2009, and the related statements of activities and cash flows for the years then ended. These financial statements are the responsibility of the Institute's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits 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 consideration of internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Institute's internal control over financial reporting. Accordingly, we express no such opinion. An audit also includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Institute for Advanced Study–Louis Bamberger and Mrs. Felix Fuld Foundation as of June 30, 2010 and 2009, and the changes in its net assets and its cash flows for the years then ended in conformity with U.S. generally accepted accounting principles.

KPMG LLP

November 11, 2010

STATEMENTS OF FINANCIAL POSITION
JUNE 30, 2010 AND 2009

Assets		2010	2009
Cash and cash equivalents	$	6,952,589	312,162
Accounts receivable		585,413	1,328,265
Government grants and contracts receivable		4,371,757	2,107,272
Prepaid and other assets		635,260	498,011
Contributions receivable—net		1,974,608	3,047,310
Unamortized debt issuance costs—net		573,080	632,006
Funds held by trustee		7,187,358	8,587,408
Beneficial interest in remainder trust		2,786,283	2,654,256
Land, buildings and improvements, equipment and rare book collection—net		60,191,610	60,693,542
Investments		571,200,943	530,320,152
Total assets	$	656,458,901	610,180,384
Liabilities and Net Assets			
Liabilities:			
Accounts payable and accrued expenses	$	7,455,400	7,560,855
Deferred revenue		15,474,995	9,403,447
Liabilities under split-interest agreements		2,234,409	2,247,809
Accrued benefit obligation		14,582,000	10,469,000
Asset retirement obligation		940,283	908,878
Bond swap liability		4,629,600	3,514,367
Note payable		492,767	557,724
Long-term debt		57,475,994	60,064,009
Total liabilities		103,285,448	94,726,089
Net assets:			
Unrestricted		346,689,111	322,590,494
Temporarily restricted		125,676,785	114,834,907
Permanently restricted		80,807,557	78,028,894
Total net assets		553,173,453	515,454,295
Total liabilities and net assets	$	656,458,901	610,180,384

See accompanying notes to financial statements.

STATEMENT OF ACTIVITIES
YEAR ENDED JUNE 30, 2010

	Unrestricted	Temporarily restricted	Permanently restricted	Total
Operating revenues, gains and other support:				
Private contributions and grants	$ —	18,180,059	—	18,180,059
Government grants	—	7,905,853	—	7,905,853
Endowment spending policy	11,264,751	13,158,949	—	24,423,700
Auxiliary activity	4,865,176	—	—	4,865,176
Net assets released from restrictions—satisfaction of program restrictions	39,244,861	(39,244,861)	—	—
Total operating revenues, gains and other support	55,374,788	—	—	55,374,788
Expenses:				
School of Mathematics	10,141,826	—	—	10,141,826
School of Natural Sciences	12,032,292	—	—	12,032,292
School of Historical Studies	7,220,001	—	—	7,220,001
School of Social Science	4,627,413	—	—	4,627,413
Libraries and other academic	7,410,944	—	—	7,410,944
Administration and general	12,456,320	—	—	12,456,320
Auxiliary activity	5,871,469	—	—	5,871,469
Total expenses	59,760,265	—	—	59,760,265
Change in net assets from operations, including depreciation	(4,385,477)	—	—	(4,385,477)
Other revenues, gains and other support:				
Private contributions and grants	289,253	732,749	2,778,663	3,800,665
Endowment change after applying spending policy	28,960,507	10,109,129	—	39,069,636
Change in fair value of bond swap liability	(1,115,233)	—	—	(1,115,233)
Gain on sale of plant assets	349,567	—	—	349,567
Change in net assets	24,098,617	10,841,878	2,778,663	37,719,158
Net assets—beginning of year	322,590,494	114,834,907	78,028,894	515,454,295
Net assets—end of year	$ 346,689,111	125,676,785	80,807,557	553,173,453

See accompanying notes to financial statements.

STATEMENT OF ACTIVITIES
YEAR ENDED JUNE 30, 2009

	Unrestricted	Temporarily restricted	Permanently restricted	Total
Operating revenues, gains and other support:				
Private contributions and grants	$ —	6,645,957	—	6,645,957
Government grants	—	6,893,184	—	6,893,184
Endowment spending policy	25,874,809	10,218,991	—	36,093,800
Auxiliary activity	4,815,473	—	—	4,815,473
Net assets released from restrictions—satisfaction of program restrictions	23,758,132	(23,758,132)	—	—
Total operating revenues, gains and other support	54,448,414	—	—	54,448,414
Expenses:				
School of Mathematics	9,312,306	—	—	9,312,306
School of Natural Sciences	10,563,018	—	—	10,563,018
School of Historical Studies	6,770,010	—	—	6,770,010
School of Social Science	3,651,834	—	—	3,651,834
Libraries and other academic	7,067,704	—	—	7,067,704
Administration and general	11,754,699	—	—	11,754,699
Auxiliary activity	5,720,414	—	—	5,720,414
Total expenses	54,839,985	—	—	54,839,985
Change in net assets from operations, including depreciation	(391,571)	—	—	(391,571)
Other revenues, gains and other support:				
Private contributions and grants	275,006	330,418	6,873,549	7,478,973
Endowment change after applying spending policy	(99,677,754)	(51,122,695)	—	(150,800,449)
Change in fair value of bond swap liability	(1,639,794)	—	—	(1,639,794)
Gain on sale of plant assets	278,072	—	—	278,072
Gain on bond swap transaction	430,131	—	—	430,131
Change in net assets	(100,725,910)	(50,792,277)	6,873,549	(144,644,638)
Net assets—beginning of year	423,316,404	165,627,184	71,155,345	660,098,933
Net assets—end of year	$ 322,590,494	114,834,907	78,028,894	515,454,295

See accompanying notes to financial statements.

STATEMENTS OF CASH FLOWS
YEARS ENDED JUNE 30, 2010 AND 2009

	2010	2009
Cash flows from operating activities:		
Change in net assets	$ 37,719,158	(144,644,638)
Adjustments to reconcile change in net assets to net cash used in operating activities:		
Depreciation	4,060,637	3,752,797
Contributions restricted for endowment and plant	(4,478,275)	(7,503,021)
Net realized and unrealized (gains) losses	(64,911,928)	113,984,366
Change in fair value of bond swap liability	1,115,233	1,639,794
Gain on sale of plant assets	(349,567)	(278,072)
Amortization of debt issuance costs	58,926	63,477
Amortization of bond discount	26,985	30,153
Changes in assets/liabilities:		
Accounts receivable and government grants and contracts receivable	(1,521,633)	249,587
Prepaid and other assets	(137,249)	185,438
Contributions receivable	1,072,702	511,634
Beneficial interest in remainder trust	(132,027)	696,740
Accounts payable and accrued expenses	(105,455)	511,460
Deferred revenue	6,071,548	2,698,774
Accrued benefit obligation	4,113,000	1,379,744
Asset retirement obligation	31,405	34,440
Net cash used in operating activities	(17,366,540)	(26,687,327)
Cash flows from investing activities:		
Proceeds from sale of plant assets	1,822,338	1,075,930
Purchase of plant assets	(5,031,476)	(4,779,137)
Proceeds from sale of investments	567,497,630	929,042,835
Purchase of investments	(543,466,493)	(906,445,760)
Net cash provided by investing activities	20,821,999	18,893,868
Cash flows from financing activities:		
Contributions restricted for endowment and plant	4,478,275	7,503,021
Decrease in liabilities under split-interest agreements	(13,400)	(139,949)
Repayment of long-term debt	(2,615,000)	(2,425,000)
Repayments of note payable	(64,957)	(63,678)
Decrease in funds held by trustee	1,400,050	2,276,982
Net cash provided by financing activities	3,184,968	7,151,376
Net increase (decrease) in cash and cash equivalents	6,640,427	(642,083)
Cash and cash equivalents—beginning of year	312,162	954,245
Cash and cash equivalents—end of year	$ 6,952,589	312,162
Supplemental data:		
Interest paid	$ 1,829,881	2,041,407

See accompanying notes to financial statements.

1) Organization and Summary of Significant Accounting Policies

Organization

The Institute for Advanced Study–Louis Bamberger and Mrs. Felix Fuld Foundation (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."

Summary of Significant Accounting Policies

Basis of Presentation

The accompanying financial statements, which are presented on the accrual basis of accounting, have been prepared to focus on the Institute as a whole and to present net assets and revenues, expenses, gains, and losses based on the existence or absence of donor-imposed restrictions. Accordingly, net assets and changes therein are classified as follows:

- Permanently restricted net assets—net assets subject to donor-imposed stipulations that they be maintained permanently by the Institute. Generally, the donors of these assets permit the Institute to use all or part of the income earned on related investments for general or specific purposes.
- Temporarily restricted net assets—net assets subject to donor-imposed stipulations that will be met by actions of the Institute and/or by the passage of time.
- Unrestricted net assets—net assets not subject to donor-imposed stipulations. Unrestricted net assets may be designated for specific purposes by action of the board of trustees.

Revenues are reported as increases in unrestricted net assets unless use of the related asset is limited by donor-imposed restrictions. Expenses are reported as decreases in unrestricted net assets. Expiration of donor-imposed stipulations that simultaneously increase unrestricted net assets and decrease temporarily restricted net assets are reported as net assets released from restrictions.

Contributions and investment returns with donor-imposed restrictions are reported as temporarily restricted revenues and are reclassified to unrestricted net assets when an expense is incurred that satisfies the donor-imposed restriction.

Contributions of long-lived assets are reported as unrestricted revenue. Contributions restricted for the acquisition of grounds, buildings, and equipment are reported as temporarily restricted revenues. These contributions are reclassified to unrestricted net assets upon acquisition of the assets.

(a) Contributions

Contributions, including unconditional promises to give, are recognized as revenues in the period received. Conditional promises to give are not recognized until they become unconditional, that is when the conditions on which they depend are substantially met. Contributions of assets other than cash are recorded at their estimated fair value. Pledges of contributions to be received after one year are discounted at a risk-adjusted discount rate. The discount rates range from 0.32% to 1.11%. Amortization of discount is recorded as additional contribution revenue in accordance with donor-imposed restrictions, if any, on the contributions.

(b) Cash and cash equivalents

Cash and cash equivalents consist of cash on hand, and all highly liquid investments with an original maturity of three months or less, except for those managed as a component of the Institute's investment portfolio.

(c) Investments

All investments, including short-term investments, investments in marketable securities, limited partnerships and hedge and offshore funds, are reported in the financial statements at fair value or net asset value as a practical expedient, based upon values provided by external investment managers, general partners or quoted market value. The Institute reviews and evaluates the values provided by external investment managers and general partners and agrees with the valuation methods and assumptions used in determining the fair value of funds. These estimated fair values may differ significantly from the values that would have been used had a ready market for these securities existed.

The statements of activities recognize unrealized gains and losses on investments as increases and decreases, respectively, in unrestricted net assets unless their use is temporarily or permanently restricted by explicit donor stipulation. Purchase and sale transactions are recorded on a settlement-date basis. Gains and losses on the sale of investment securities are calculated using the specific identification method.

The Institute regularly offers first mortgages on primary residences to full-time faculty and senior administrative employees who have met certain requirements stipulated by the board of trustees.

(d) Fair Value Hierarchy

Fair value is defined as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date. Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) Topic 820, *Fair Value Measurements* establishes a fair value hierarchy, which requires an entity to maximize the use of observable inputs and minimize the use of unobservable inputs when measuring fair value. The standard describes three levels of inputs that may be used to measure fair value:

- Level 1: Quoted prices in active markets for identical assets or liabilities.
- Level 2: Observable inputs other than Level 1 prices such as quoted prices for similar assets or liabilities; quoted prices in markets that are not active; or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities.
- Level 3: Unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the asset or liabilities.

Fair value estimates are made at a specific point in time, based on available market information and judgments about the financial asset, including estimates of timing, amount of expected future cash flows and the credit standing of the issuer. In some cases, the fair value estimates cannot be substantiated by comparison to independent markets. In addition, the disclosed fair value may not be realized in the immediate settlement of the financial asset. In addition, the disclosed fair values do not reflect any premium or discount that could result from offering for sale at one time an entire holding of a particular financial asset. Potential taxes and other expenses that would be incurred in an actual sale or settlement are not reflected in amounts disclosed.

(e) 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).

(f) Deferred Revenue

Conditional amounts are recorded initially as deferred restricted revenue, and are reported as revenues when expended in accordance with the terms of the condition.

(g) Split Interest Agreements

The Institute is the beneficiary of various unitrusts, pooled income funds and a gift annuity fund. The Institute's interest in these split interest agreements is reported as a contribution in the year received and is calculated as the difference between the fair value of the assets contributed to the Institute, and the estimated liability to the beneficiary. This liability is computed using actuarially determined rates and is adjusted annually. The assets held by the Institute under these arrangements are recorded at fair value as determined by quoted market price and are included as a component of investments. Changes in the life expectancy of the donor or annuitant, amortization of the discount and other changes in the estimates of future payments are reported as endowment change after applying spending policy in the accompanying statements of activities.

(h) Unamortized Debt Issuance Costs

Debt issuance costs represent costs incurred in connection with debt financing. Amortization of these costs is provided on the effective interest method extending over the remaining term of the applicable indebtedness. Debt issuance costs at June 30, 2010 and 2009 were net of accumulated amortization of $756,673 and $697,747, respectively.

(i) Other Revenues, Gains and Other Support

A portion of long-term investment income and gains and losses is allocated to operating revenue each year in accordance with the Institute's spending policy for investments held for endowment and similar purposes, as more fully discussed in note 4. All other investment income earned and gains and losses on investments held for long-term purposes and nonrecurring revenue and expenses are considered other revenues, gains and other support in the statements of activities.

(j) Asset Retirement Obligation

The Institute recognizes the fair value of a liability for legal obligations associated with asset retirements in the period in which the obligation is incurred, if a reasonable estimate of the fair value of the obligation can be made. When the liability is initially recorded, the Institute capitalizes the cost of the asset retirement obligation by increasing the carrying amount of the related long-lived asset. The liability is accreted to its present value each period, and the capitalized cost associated with the retirement obligation is depreciated over the useful life of the related asset. Upon settlement of the obligation, any difference between the cost to settle the asset retirement obligation and the liability recorded is recognized as a gain or loss in the statements of activities.

(k) Fund Raising Expenses

Fund raising expenses incurred by the Institute amounted to $1,302,728 and $1,456,427 for the years ended June 30, 2010 and 2009, respectively. This amount is included in administration and general expenses in the accompanying statements of activities.

(l) Functional Allocation of Expenses

The costs of providing program services and support services of the Institute have been summarized on a functional basis in the statements of activities. Accordingly, certain operating costs have been allocated among the functional categories.

(m) Tax Status

The Institute is exempt from federal income taxes pursuant to Section 501(c)(3) of the Internal Revenue Code (the Code) and is listed in the Internal Revenue Service Publication 78. The Institute has been classified as a public charity under Section 509(a) of the Code.

(n) Use of Estimates

The preparation of financial statements in conformity with U.S. generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements. Estimates also affect the reported amounts of revenues and expenses during the reported period. Actual results could differ from those estimates.

(o) Subsequent Events

The Institute evaluated events subsequent to June 30, 2010 and through November 11, 2010, the date on which the financial statements were issued. The Institute determined there were no subsequent events to disclose.

(p) Reclassifications

Certain reclassifications have been made to the prior year balances to conform to the current year presentation.

(q) Recently Adopted Accounting Standards

In 2009, the Institute adopted the measurement provisions Accounting Standards Update (ASU) No. 2009-12, *Fair Value Measurements and Disclosures—Investments in Certain Entities That Calculate Net Asset Value per Share (or its Equivalent)*, with respect to investments within its scope (principally hedge funds and private equity—collectively alternative investments). This guidance amends ASC No. 820-10 and allows for the estimation of the fair value of investments in investment companies for which the investment does not have a readily determinable fair value using net asset value per share or its equivalent. In addition, classification of these investments within the fair value hierarchy is based on the Institute's ability to timely redeem its interest rather than on valuation inputs. In 2010, the Institute also adopted the disclosure provisions of ASU No. 2009-12.

Effective June 30, 2010, the Institute adopted ASC Section 815-10-50, *Disclosures about Derivative Instruments and Hedging Activities* (ASC 815-10-50), which requires additional disclosures for derivative instruments, including but not limited to, objectives and strategies of the derivative instruments and the related hedging activities, risk exposure, and the level of derivative activity entered into by an organization. The adoption of ASC 815-10-50 had no impact on the Institute's financial statements.

Effective June 30, 2010, the Institute adopted FASB Statement No. 168, *The FASB Accounting Standards Codification™ and the Hierarchy of Generally Accepted Accounting Principles—a replacement of SFAS No. 162, The Hierarchy of Generally Accepted Accounting Principles* (Statement 168), and ASU 2009-01, *Topic 105—Generally Accepted Accounting Principles—amendments based on—Statement of Financial Accounting Standards No. 168—The FASB Accounting Standards Codification™ and the Hierarchy of Generally Accepted Accounting Principles* (ASU 2009-01). Statement 168 establishes *The FASB Accounting Standards Codification™* (Codification) as the source of authoritative accounting principles recognized by the FASB to be applied by nongovernmental entities in the preparation of financial statements in conformity with U.S. GAAP. The adoption of Statement 168 had no impact on the Institute's financial statements.

2) Contributions Receivable

Unconditional promises to give at June 30, 2010 and 2009 were as follows:

		2010	2009
Unconditional promises to give:			
Less than one year	$	1,123,166	1,198,166
One to five years		866,668	1,955,001
		1,989,834	3,153,167
Discount on promises to give		(15,226)	(105,857)
Total	$	1,974,608	3,047,310

(3) Investments, Funds Held by Trustee, and Beneficial Interest in Remainder Trust

(a) Overall Investment Objective

The overall investment objective of the Institute is to invest its assets in a prudent manner that will achieve a long-term rate of return sufficient to fund a portion of its annual operating activities and capital preservation. The Institute diversifies its investments among various managers and investment opportunities. Major investment decisions are authorized by the Board's Finance Committee, which oversees the Institute's investment program in accordance with established guidelines.

(b) Allocation of Investment Strategies

In addition to traditional stocks and fixed-income securities, the Institute may also hold shares or units in traditional institutional funds as well as in alternative investment funds involving hedged strategies, private equity and real asset strategies. Hedged strategies involve funds whose managers have the authority to invest in various asset classes at their discretion, including the ability to invest long and short. Funds with hedged strategies generally hold securities or other financial instruments for which a ready market exists and may include stocks, bonds, put or call options, swaps, currency hedges and other instruments, and are valued accordingly. Private equity funds employ buyout and venture capital strategies and focus on investments in turn-around situations. Real asset funds generally hold interests in public real estate investment trusts (REITS) or commercial real estate through sole-member entities. Private equity and real asset strategies therefore often require the estimation of fair values by the fund managers in the absence of readily determinable market values. Because of the inherent uncertainties of valuation, these estimated fair values may differ significantly from values that would have been used had a ready market existed, and the differences could be material. Such valuations are determined by fund managers and generally consider variables such as operating results, comparable earnings multiples, projected cash flows, recent sales prices, and other pertinent information, and may reflect discounts for the illiquid nature of certain investments held. Moreover, the fair values of the Institute's interests in shares or units of these funds, because of liquidity and capital commitment terms that vary depending on the specific fund or partnership agreement, may differ from the fair value of the funds' underlying net assets.

(c) Basis of Reporting

Investments are reported at estimated fair value. If an investment is held directly by the Institute and an active market with quoted prices exists, the market price of an identical security is used as reported fair value. Reported fair values of cash and cash equivalents invested in shares of mutual funds registered with an exchange are based on share prices

reported by the funds as of the last business day of the fiscal year. The Institute's interests in alternative investment funds are generally reported at the net asset value (NAV) reported by the fund managers, which is used a practical expedient to estimate the fair value of the Institute's interest therein, unless it is probable that all or a portion of the investment will be sold for an amount different from NAV. As of June 30, 2010 and 2009, the Institute had no plans or intentions to sell investments at amounts different from NAV.

The following tables summarize the Institute's investments and other assets by major category in the fair value hierarchy as of June 30, 2010 and 2009, as well as related strategy, liquidity and funding commitments:

	June 30, 2010			
	Level 1	Level 2	Level 3	Total
Investments:				
Long-term investment strategies:				
Fixed income:				
U.S. Treasuries	$ 39,913,689	—	—	39,913,689
Total	39,913,689	—	—	39,913,689
Hedge funds—onshore (1):				
Emerging markets	—	—	5,620,295	5,620,295
Equities—long bias	—	—	6,802,442	6,802,442
Multiple strategies	—	—	46,920,737	46,920,737
Total	—	—	59,343,474	59,343,474
Hedge funds—offshore (1):				
Commercial mortgage backed	—	—	16,727,631	16,727,631
Commodity trading advisor	—	7,197,803	—	7,197,803
Distressed/high-yield	—	—	31,950,967	31,950,967
Emerging markets	—	—	9,778,981	9,778,981
Equities—long bias	—	—	19,069,305	19,069,305
Equities—long/short	—	38,744,376	7,288,394	46,032,770
Fixed income arbitrage	—	—	25,587,287	25,587,287
Global asset allocation	—	—	23,549,745	23,549,745
Multiple strategies	—	16,185,952	175,410,347	191,596,299
Total	—	62,128,131	309,362,657	371,490,788
Limited partnerships (2, 3)	—	—	71,778,972	71,778,972
Cash and cash equivalents	15,767,896	—	—	15,767,896
Other investments:				
Funds invested separately:				
Cash and cash equivalents	—	—	222,233	222,233
Fixed income securities	—	—	3,506,803	3,506,803
Mortgages from faculty and staff	—	—	9,177,088	9,177,088
Total investments	$ 55,681,585	62,128,131	453,391,227	571,200,943
Other assets:				
Beneficial interest in remainder trust	—	—	2,786,283	2,786,283
Funds held by trustee:				
U.S. government obligations	7,187,358	—	—	7,187,358
Total other assets	$ 7,187,358	—	2,786,283	9,973,641

Notes:

(1) The Institute's hedge fund investments are restricted from redemption based on rolling lock up periods.

(2) The private equity funds have initial terms of 10 years with extensions of 1 to 3 years, and have an average remaining life of 6 years.

(3) Carrying values have been estimated by the fund's management in the absence of readily determinable fair values.

	June 30, 2009			
	Level 1	Level 2	Level 3	Total
Investments:				
Long-term investment strategies:				
Fixed income:				
U.S. Treasuries	$ 39,876,793	—	—	39,876,793
Total	39,876,793	—	—	39,876,793
Hedge funds—onshore (1):				
Emerging markets	—	—	6,201,637	6,201,637
Equities—long bias	—	—	5,913,657	5,913,657
Multiple strategies	—	—	29,186,384	29,186,384
Total	—	—	41,301,678	41,301,678
Hedge funds—offshore (1):				
Commercial mortgage backed	—	—	16,806,998	16,806,998
Commodity trading advisor	—	7,791,330	—	7,791,330
Distressed/high-yield	—	—	33,623,469	33,623,469
Emerging markets	—	—	8,723,640	8,723,640
Equities—long bias	—	—	20,133,536	20,133,536
Equities—long/short	—	42,515,447	3,127,890	45,643,337
Fixed income arbitrage	—	—	22,546,538	22,546,538
Multiple strategies	—	12,437,516	187,629,799	200,067,315
Total	—	62,744,293	292,591,870	355,336,163
Limited partnerships (2, 3)	—	—	61,657,620	61,657,620
Cash and cash equivalents	19,594,262	—	—	19,594,262
Other investments:				
Funds invested separately:				
Cash and cash equivalents	—	—	268,726	268,726
Fixed income securities	—	—	4,133,861	4,133,861
Mortgages from faculty and staff	—	—	8,151,049	8,151,049
Total investments	$ 59,471,055	62,744,293	408,104,804	530,320,152
Other assets:				
Beneficial interest in remainder trust	—	—	2,654,256	2,654,256
Funds held by trustee:				
U.S. government obligations	8,587,408	—	—	8,587,408
Total other assets	$ 8,587,408	—	2,654,256	11,241,664

Notes:

(1) The Institute's hedge fund investments are restricted from redemption based on rolling lock up periods.

(2) The private equity funds have initial terms of 10 years with extensions of 1 to 3 years, and have an average remaining life of 6 years.

(3) Carrying values have been estimated by the fund's management in the absence of readily determinable fair values.

Substantially all of the investments 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.

As of June 30, 2010, the Institute is obligated under certain limited partnership agreements to advance additional funding in the amount of $43,112,231, which is anticipated to be called over the next 10 years.

U.S. Treasuries, U.S. government obligations, and cash and cash equivalents invested in registered mutual funds are classified in Level 1 of the fair value hierarchy as defined in note 1 because their fair values are based on quoted prices for identical securities. Most investments classified in Levels 2 and 3 consist of shares or units in nonregistered investment funds as opposed to direct interests in the funds' underlying securities, some of which are marketable or not

difficult to value. Because each fund's reported NAV is used as a practical expedient to estimate the fair value of the Institute's interest therein, the level in which a fund's fair value measurement is classified is based on the Institute's ability to redeem its interest at or near the date of the statement of financial position. Accordingly, the inputs or methodology used for valuing or classifying investments for financial reporting purposes are not necessarily an indication of the risks associated with those investments or a reflection of the liquidity of or degree of difficulty in estimating the fair value of each fund's underlying assets and liabilities.

The following tables present the Institute's activities for the years ended June 30, 2010 and 2009 for investments classified in Level 3:

2010

Level 3 roll forward	Limited partnerships	Hedge funds	Mortgages from faculty and staff	Funds invested separately: Cash and cash equivalents	Funds invested separately: Fixed income securities	Beneficial interest in remainder trust	Total
Beginning value as of July 1, 2009	$ 61,657,620	333,893,548	8,151,049	268,726	4,133,861	2,654,256	410,759,060
Acquisitions	10,547,098	40,103,388	1,518,813	—	35,000	—	52,204,299
Dispositions	(12,747,314)	(60,256,399)	(492,774)	(46,493)	(1,260,372)	—	(74,803,352)
Transfers in/out of Level 3	—	10,000,000	—	—	—	—	10,000,000
Net realized and unrealized gains	12,321,568	44,965,594	—	—	598,314	132,027	58,017,503
Fair value at June 30, 2010	$ 71,778,972	368,706,131	9,177,088	222,233	3,506,803	2,786,283	456,177,510

2009

Level 3 roll forward	Limited partnerships	Hedge funds	Mortgages from faculty and staff	Funds invested separately: Cash and cash equivalents	Funds invested separately: Fixed income securities	Beneficial interest in remainder trust	Total
Beginning value as of July 1, 2008	$ 57,571,645	462,520,219	6,566,023	4,046,496	433,697	3,350,996	534,489,076
Acquisitions	21,524,286	85,000,000	1,901,950	—	3,777,770	—	112,204,006
Dispositions	(6,862,438)	(117,143,120)	(316,924)	(3,777,770)	—	—	(128,100,252)
Net realized and unrealized losses	(10,575,873)	(96,483,551)	—	—	(77,606)	(696,740)	(107,833,770)
Fair value at June 30, 2009	$ 61,657,620	333,893,548	8,151,049	268,726	4,133,861	2,654,256	410,759,060

All gains (losses) in Level 3 were attributable to changes in net unrealized gains (losses) relating to those investments still held at June 30, 2010 and 2009, respectively.

Private equity and venture capital investments are generally made through limited partnerships. Under the terms of such agreements, the Institute may be required to provide additional funding when capital or liquidity calls are made by fund managers. These partnerships have a limited existence, and they may provide for annual extensions for the purpose of disposing portfolio positions and returning capital to investors. However, depending on market conditions, the inability to execute the fund's strategy, or other factors, a manager may extend the terms of a fund beyond its originally anticipated existence or may wind the fund down prematurely. The Institute cannot anticipate such changes because they generally arise from unforeseeable events, but should they occur they could reduce liquidity or originally anticipated investment returns. Accordingly, the timing and amount of future capital or liquidity calls in any particular future year are uncertain.

Investment liquidity as of June 30, 2010 is aggregated below based on redemption or sale period:

	Investment fair values
Investment redemption or sale period:	
Daily	$ 55,681,515
Monthly	22,737,605
Quarterly	23,204,574
Semi-annually	23,539,675
Annually	35,669,945
Subject to rolling lock ups or other restrictions	259,163,285
Illiquid	151,204,344
Total as of June 30, 2010	$ 571,200,943

(d) Funds Held by Trustee

Funds held by trustee represent the balance of the proceeds from the 2001, 2006 and 2008 New Jersey Educational Facilities Authority (NJEFA or the Authority) bonds that have not yet been expended for construction purposes or debt service payments. 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, 2010 and 2009, the fair value of such securities approximates their carrying value.

(e) Redemption Restrictions—Hedge Funds

At June 30, 2010, the Institute had hedge fund investments of approximately $430,834,000, of which approximately $127,457,000 was restricted from redemption for lock up periods. At June 30, 2009, the Institute had hedge fund investments of approximately $355,336,000, of which approximately $255,334,000 was restricted from redemption for lock up periods. Some of the investments with redemption restrictions allow early redemption for specified fees. The terms and conditions upon which an investor may redeem an investment vary, usually with the majority requiring 30 to 180 days notice after the initial lock up period.

The expirations of redemption lock up periods are summarized in the table below:

	Amount
Fiscal year:	
2011	$ 28,760,000
2012	40,755,000
2013	4,742,000
2014 and thereafter	53,200,000
Total	$ 127,457,000

(f) Redemption Restrictions—Limited Partnerships

At June 30, 2010 and 2009, the Institute had limited partnership investments of approximately $71,778,900 and $61,657,600, respectively, which were restricted from redemption for lock up periods. Some of the investments with redemption restrictions allow early redemption for specified fees. The terms and conditions upon which an investor may redeem an investment vary, usually with the majority requiring 30 to 180 days notice after the initial lock up period.

The expirations of redemption lock up periods are summarized in the table below:

	Amount
Fiscal year:	
2011	$ —
2012	—
2013	13,498,000
2014 and thereafter	58,280,900
Total	$ 71,778,900

(4) Investment Return and Endowment Spending Policy

Investment return consists of interest, dividends, and realized and unrealized gains and losses on investments. Each year, the Institute includes a portion of its endowment return in its operating budget, with the amount of such planned support determined using its spending policy. The policy of the Institute is to distribute for current spending a percentage of the fair value of pooled investments which is determined by the Board of Trustees annually. The spending rate for operating and capital purposes was 4.7% and 5.6% for 2010 and 2009, respectively.

The following tables summarize the investment return and its classification in the statements of activities for the years ended June 30, 2010 and 2009:

	2010		
	Unrestricted	Temporarily restricted	Total
Dividends and interest, net of investment expenses of $1,996,337	$ (715,443)	(703,148)	(1,418,591)
Net realized and unrealized gains	40,940,701	23,971,226	64,911,927
Total investment return	40,225,258	23,268,078	63,493,336
Endowment spending policy for use in operations	11,264,751	13,158,949	24,423,700
Endowment change after applying spending policy	$ 28,960,507	10,109,129	39,069,636

	2009		
	Unrestricted	Temporarily restricted	Total
Dividends and interest, net of investment expenses of $1,343,266	$ (370,813)	(351,470)	(722,283)
Net realized and unrealized losses	(73,432,132)	(40,552,234)	(113,984,366)
Total investment return	(73,802,945)	(40,903,704)	(114,706,649)
Endowment spending policy for use in operations	25,874,809	10,218,991	36,093,800
Endowment change after applying spending policy	$ (99,677,754)	(51,122,695)	(150,800,449)

Total investment management and advisory fees (credits) were $2,766,610 and $(1,199,314) for the years ended June 30, 2010 and 2009, respectively.

5) Endowment

The Institute's endowment consists of approximately 90 individual funds established for a variety of purposes including both donor-restricted endowment funds and funds designated by the Board of Trustees to function as endowments. Net assets associated with endowments, including funds designated by the Board of Trustees to function as endowments, are classified and reported based on the existence or absence of donor-imposed restrictions.

(a) Interpretation of Relevant Law

The Institute has interpreted the New Jersey Uniform Prudent Management of Institutional Funds Act as requiring the preservation of the purchasing power of the original gift as of the gift date of the donor-restricted endowment funds absent explicit donor stipulations to the contrary. The Institute classifies as permanently restricted net assets (a) the original value of gifts donated to the permanent endowment, (b) the original value of subsequent gifts to the permanent endowment, and (c) accumulations to the permanent endowment made in accordance with the direction of the applicable donor gift instrument at the time the accumulation is added to the fund.

Net assets associated with endowment funds are classified and reported based on the existence or absence of donor-imposed restrictions.

Endowment net assets consisted of the following at June 30, 2010 and 2009:

	2010			
	Unrestricted	Temporarily restricted	Permanently restricted	Total
Donor restricted	$ (1,368,509)	125,249,638	80,807,557	204,688,686
Board designated	346,580,860	—	—	346,580,860
	$ 345,212,351	125,249,638	80,807,557	551,269,546

	2009			
	Unrestricted	Temporarily restricted	Permanently restricted	Total
Donor restricted	$ (1,612,530)	114,789,876	78,028,894	191,206,240
Board designated	322,491,061	—	—	322,491,061
	$ 320,878,531	114,789,876	78,028,894	513,697,301

Changes in endowment net assets for the fiscal years ended June 30, 2010 and 2009 were as follows:

	Unrestricted	Temporarily restricted	Permanently restricted	Total
Net assets, July 1, 2008	$ 416,274,585	164,947,754	71,155,345	652,377,684
Dividends and interest income, net	(370,813)	(214,167)	—	(584,980)
Unrealized losses	(73,397,047)	(40,055,141)	—	(113,452,188)
Contributions	275,006	—	6,873,549	7,148,555
Appropriation for expenditure—operations	(25,874,809)	(10,218,991)	—	(36,093,800)
Unspent appropriation returned to principal	3,971,609	330,421	—	4,302,030
Net assets, June 30, 2009	$ 320,878,531	114,789,876	78,028,894	513,697,301
Dividends and interest income, net	(715,443)	(406,482)	—	(1,121,925)
Unrealized gains	40,696,680	23,536,468	—	64,233,148
Contributions	289,253	—	2,778,663	3,067,916
Transfer of gain on investments to replenish unrestricted net assets	244,021	(244,021)	—	—
Appropriation for expenditure—operations	(11,264,751)	(13,158,949)	—	(24,423,700)
Appropriation for expenditure—other	(4,915,940)	—	—	(4,915,940)
Unspent appropriation returned to principal	—	732,746	—	732,746
Net assets, June 30, 2010	$ 345,212,351	125,249,638	80,807,557	551,269,546

(b) Funds with Deficiencies

At June 30, 2010 and 2009, the fair value of 12 and 10 endowment accounts were less than the level that the donor required the Institute to retain as a fund of perpetual duration by approximately $1,369,000 and $1,613,000, respectively.

(c) Return Objectives and Risk Parameters

The Institute has adopted investment and spending policies for endowment assets that attempt to provide a predictable stream of funding to programs supported by its endowment while seeking to maintain the purchasing power of the endowment assets. Endowment assets include those assets of donor-restricted funds that the Institute must hold in perpetuity or for a donor-specified period as well as board-designated funds.

(d) Strategies Employed for Achieving Objectives

The Institute manages its investments in accordance with a total return concept and the goal of maximizing returns within acceptable levels of risk. The Institute relies on a total return strategy in which investment returns are achieved through both capital appreciation (realized and unrealized) and current yield (dividends and interest). The Institute's spending policy is designed to provide a stable level of financial support and to preserve the real value of its endowment.

(6) 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, 2010 and 2009 follows:

		2010	2009
Land	$	377,470	377,470
Land improvements		1,543,134	1,388,588
Buildings and improvements		91,713,069	90,397,927
Equipment		25,757,852	24,944,594
Construction in progress		200,508	176,288
Rare book collection		203,508	203,508
Joint ownership property		3,340,441	2,350,158
		123,135,982	119,838,533
Less accumulated depreciation		(62,944,372)	(59,144,991)
Net book value	$	60,191,610	60,693,542

The Institute has capitalized interest income of $3,238 and $19,209 and interest expense of $8,942 and $88,746 in construction in progress for the years ended June 30, 2010 and 2009, respectively.

(7) Long-Term Debt

A summary of long-term debt at June 30, 2010 and 2009 follows:

		2010	2009
2001 Series A—NJEFA	$	2,480,000	2,735,000
2006 Series B—NJEFA		28,600,000	28,800,000
2006 Series C—NJEFA		18,800,000	19,200,000
2008 Series C—NJEFA		7,815,000	9,575,000
Less unamortized bond discount		(219,006)	(245,991)
Total long-term debt	$	57,475,994	60,064,009

Interest expense on long-term debt for the years ended June 30, 2010 and 2009 was $1,768,112 and $1,962,927, respectively.

(a) 2001 Series A

In May 2001, the Institute received proceeds of the Authority offering of $11,000,000 Revenue Bonds, 2001 Series A of the Institute for Advanced Study Issue. Proceeds were used for the construction of Bloomberg Hall and additional capital projects. These bonds were partially refunded through the 2006 Series B Revenue bonds detailed below.

(b) 2006 Series B

In July 2006, the Institute received proceeds of the Authority offering of $29,600,000 Revenue Bonds, 2006 Series B of the Institute for Advanced Study Issue. The 2006 Series B Bonds were issued to finance the advance refunding of the outstanding 1997 Series G Bonds, the partial advance refunding of the 2001 Series A Bonds, and to pay a portion of certain costs incidental to the sale and issuance of the 2006 Series B Bonds.

(c) 2006 Series C

In March 2007, the Institute received proceeds of the Authority offering of $20,000,000 Revenue Bonds, 2006 Series C of the Institute for Advanced Study Issue. Proceeds are being used to finance the costs of construction, renovating and equipping certain educational facilities of the Institute, to fund capitalized interest on the 2006 Series C Bonds during the renovation and construction and to pay certain costs incidental to the sale and issuance of the 2006 Series C Bonds.

(d) 2008 Series C

In March 2008, the Institute received proceeds of the Authority offering of $11,255,000 Revenue Bonds, 2008 Series C of the Institute for Advanced Study Issue. The 2008 Series C Bonds were issued to finance the advance refunding of outstanding 1997 Series F Bonds, the advance refunding of outstanding 1997 Series G, and to pay a portion of certain costs incidental to the sale and issuance of the 2008 Series C Bonds.

(e) Interest Rates

The 2001 Series A and 2008 Series C Bonds bear interest at rates ranging from 3% to 5%, payable semi-annually, are subject to redemption at various prices and require principal payments and sinking fund installments through July 1, 2021. The obligation to pay the Authority on a periodic basis, in the amounts sufficient to cover principal and interest due on the bonds, is a general obligation of the Institute.

The 2006 Series B and C Bonds bear interest at variable rates. The bonds were issued in the Weekly Mode with weekly rates determined by Lehman Brothers Inc, as Remarketing Agent and paid monthly. The maximum interest rate on the 2006 Bonds shall be twelve percent (12%) per annum. The 2006 bonds are subject to redemption at various prices and require principal payments and sinking fund installments through July 1, 2036. 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. On September 18, 2008, the Institute entered into a contract with JPMorgan Chase Bank to take over as Remarketing Agent, replacing Lehman Brothers Inc.

(f) Bond Swap Agreement

On April 18, 2006, the Institute entered into a swap agreement with Lehman Brothers Commercial Bank covering $29,600,000 of outstanding 2006 Series B Bonds that required the Institute to pay a fixed rate of 3.7702% to Lehman Brothers Commercial Bank in exchange for Lehman Brothers Commercial Bank agreeing to pay the Institute a variable rate equal to 67% of the USD-LIBOR-BBA rate with a term of three months, payable monthly, on an identical notional amount. The effective date of the swap was July 19, 2006 and the termination date of the swap agreement coincides with the maturity of the bonds, which is July 1, 2031. In September 2008, the filing of a petition in bankruptcy by Lehman Brothers Holdings Inc. constituted an "Event of Default," giving the Institute the right to terminate the swap and designate an Early Termination Date on notice to Lehman Brothers Commercial Bank.

On December 22, 2008, the Institute entered into a new swap agreement with Wells Fargo Bank covering $28,800,000 of outstanding Series B Bonds that required the Institute to pay a fixed rate of 3.7702% to Wells Fargo Bank in exchange for Wells Fargo Bank agreeing to pay the Institute a variable rate equal to 67% of the USD-LIBOR-BBA rate with a term of three months, payable monthly, on an identical notional amount. The effective date of the swap was December 22, 2008 and the termination date of the swap agreement coincides with the maturity of the bonds, which is July 1, 2031.

The accounting for this transaction has been made in accordance with ASC 958-815, *Not-for-Profit Entities—Derivatives and Hedging*. The Institute entered into this swap agreement with the intention of lowering its effective interest rate. At June 30, 2010 and 2009, the fair value of the derivative was ($4,629,600) and ($3,514,367), respectively. The swap agreement utilizes level 2 inputs to measure fair market value under ASC 820. The unrealized loss recognized during the year ended June 30, 2010 and 2009 in the amount of $1,115,233 and $1,639,794, respectively, is reported in the statements of activities in change in fair value of bond swap liability.

The bonds are repayable as follows at June 30, 2010:

	Amount
Year ending June 30:	
2011	$ 2,725,000
2012	2,055,000
2013	2,290,000
2014	2,320,000
2015	2,360,000
2016 through 2036	45,945,000
Total	$ 57,695,000

The 2001 Series A, 2006 Series B, 2006 Series C and 2008 Series C bonds are secured by a pledge of revenues pursuant to the respective Loan Agreements.

(g) Line of Credit

As of June 30, 2010 and 2009, the Institute had an unsecured loan agreement representing a line of credit. The agreement provides for borrowings up to $20,000,000 and is available through January 2011. As of June 30, 2010 and 2009, there were no amounts outstanding against the line of credit. It is the Institute's intention to extend this credit facility. Interest payments are due on demand and interest accrues at the LIBOR rate plus 100 basis points, which was 2.19% and 2.68% as of June 30, 2010 and 2009, respectively. No interest expense was recorded for the years ended June 30, 2010 and 2009.

(8) Pension Plans and Other Postretirement 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 participant's compensation in accordance with the formula set forth in the plan documents on a nondiscriminatory basis. Contributions for the years ended June 30, 2010 and 2009 totaled approximately $2,066,000 and $1,936,000, respectively.

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 following table provides a reconciliation of the change in benefit obligation and the funded status of the plan at June 30, 2010 and 2009:

		2010	2009
Postretirement benefit obligation:			
Retirees	$	5,853,000	4,885,000
Fully eligible active plan participants		1,746,000	876,000
Other active plan participants		6,983,000	4,708,000
Postretirement benefit obligation	$	14,582,000	10,469,000
Change in benefit obligation:			
Benefit obligation at beginning of year	$	10,469,000	9,089,256
Service cost		450,000	277,454
Interest cost		633,000	568,507
Benefits paid		(375,946)	(490,699)
Actuarial loss		3,405,946	1,024,482
Benefit obligation at end of year (funded status)	$	14,582,000	10,469,000
Components of net periodic benefit cost:			
Service cost	$	450,000	277,454
Interest cost		633,000	568,507
Amortization of transition obligation		3,405,946	1,024,482
Net periodic postretirement benefit cost	$	4,488,946	1,870,443

	2010	2009
Benefit obligation weighted average assumptions at June 30, 2010 and 2009:		
Discount rate	5.40%	6.19%
Periodic benefit cost weighted average assumptions for the years ended June 30, 2010 and 2009:		
Discount rate	6.19%	6.50%

At June 30, 2010 and 2009, the trend rate used for health care costs was 5.0% and 5.0%, respectively.

The effects of a 1% increase or decrease in trend rates on total service and interest cost and the postretirement benefit obligation are as follows:

	2010		2009	
	Increase	Decrease	Increase	Decrease
Effect on total service and interest cost	$ 222,000	(175,000)	141,039	(111,961)
Effect on the postretirement benefit obligation	2,514,000	(2,011,000)	1,622,000	(1,313,000)

Projected payments for each of the next five fiscal years and thereafter are as follows:

	Amount
Year ending June 30:	
2011	$ 522,000
2012	569,000
2013	600,000
2014	644,000
2015	675,000
2016 through 2017	4,027,000

The Institute expects to contribute approximately $1,464,000 in the next fiscal year.

(9) Temporarily and Permanently Restricted Assets

Restricted net assets are available for the following purposes at June 30, 2010 and 2009:

		2010	2009
Temporarily restricted net assets are restricted to:			
School of Mathematics	$	29,019,998	26,671,464
School of Natural Sciences		6,412,172	6,061,912
School of Historical Studies		31,210,429	28,297,437
School of Social Science		50,295,421	46,543,273
Libraries and other academic		3,805,200	2,859,241
Administration and general		4,933,565	4,401,580
	$	125,676,785	114,834,907
Permanently restricted net assets are restricted to:			
Investments to be held in perpetuity, the income from which is expendable to support academic services	$	80,807,557	78,028,894

(10) Disclosures About Fair Value of Financial Instruments

The Institute is required to disclose the estimated fair value of financial instruments, both assets and liabilities recognized and not recognized in the statement of financial position, for which it is practicable to estimate fair value.

The estimated fair value amounts in the following disclosure have been determined by the Institute using available market information and appropriate valuation methodologies. The estimates are not necessarily indicative of the amounts the Institute could realize in a current market exchange, and the use of different market assumptions or methodologies could have a material effect on the estimated fair value amounts at June 30, 2010 and 2009.

		2010	2009
Assets:			
Cash	$	6,952,589	312,162
Government grants and contracts receivable		4,371,757	2,107,272
Funds held by trustee		7,187,358	8,587,408
Beneficial interest in remainder trust		2,786,283	2,654,256
Investments		571,200,943	530,320,152
Liabilities:			
Note payable		492,767	557,724
Long-term debt		58,323,828	61,002,987
Bond swap liability		4,629,600	3,514,367

The fair value estimates presented are based on information available to the Institute as of June 30, 2010 and 2009, 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.

(11) Contingencies

The Institute has an investment in the Ariel Fund Limited (the Fund). During fiscal year 2009, the fund became subject to the oversight of a Receiver appointed by the Attorney General of New York for the principal purposes of marshalling and preserving the assets of the Fund, for ultimate distribution of the proceeds to the respective investors of the Fund. There is also a potential for litigation to recover amounts from investors who have received distributions from the Fund. Management does not expect this to have a significant impact on the Institute's financial statements.

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