IAS | INSTITUTE FOR ADVANCED STUDY

Report for the Academic Year
2015–2016

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DAN KOMODA

REPORT OF THE CHAIR

The independence and excellence of the Institute for Advanced Study rely on the power of philanthropy, and we are deeply grateful for the support we are receiving from a growing network of donors.

Carl P. Feinberg, a Friend of the Institute since 2002, endowed a Professorship of Theoretical Physics now held by Juan Maldacena in the School of Natural Sciences. The Center for Spain in America, directed by former Member and Visitor José Luis Colomer, created a John Elliott Membership in the School of Historical Studies in honor of the former Institute Professor. The Tang Research Foundation, led by former Member Xin Luo, endowed the Roger E. Covey Membership in East Asian Studies. Former Institute Trustee Jeff Bezos endowed the Bezos Membership in Astrophysics. And the late Professor Emerita Patricia Crone made a bequest that created a named Membership in the field of Near Eastern Studies.

We were thrilled to welcome new Trustees Veena Das, Krieger-Eisenhower Professor of Anthropology at Johns Hopkins University; Lorraine Daston, Director of the Max Planck Institute for the History of Science and Visiting Professor in the Committee on Social Thought at the University of Chicago; and John Overdeck, Co-Chair of Two Sigma Investments.

We are also immensely thankful for the service of Trustees Carmela Vircillo Franklin and Margaret Levi, whose terms as Academic Trustees came to an end, and Spiro Latsis, a Trustee since 2008, and Marty Leibowitz, our distinguished former Vice Chair and past President of the Corporation and Chair of the Board, who served with remarkable distinction for twenty-one years. The Board looks forward to Spiro and Marty's continuing contributions as Trustees Emeriti.

The importance of curiosity-driven basic research cannot be overstated: it is a prerequisite of innovation and the first step in societal understanding and change. The Institute invests in a vital combination of immediate impact and returns that play out over decades. I offer my heartfelt appreciation to those who join IAS in providing funding and resources for researchers who open new paths of inquiry that revolutionize human thought and lead to applications that transform our lives, influencing research, universities, programs, fields of study, and future knowledge throughout the world.
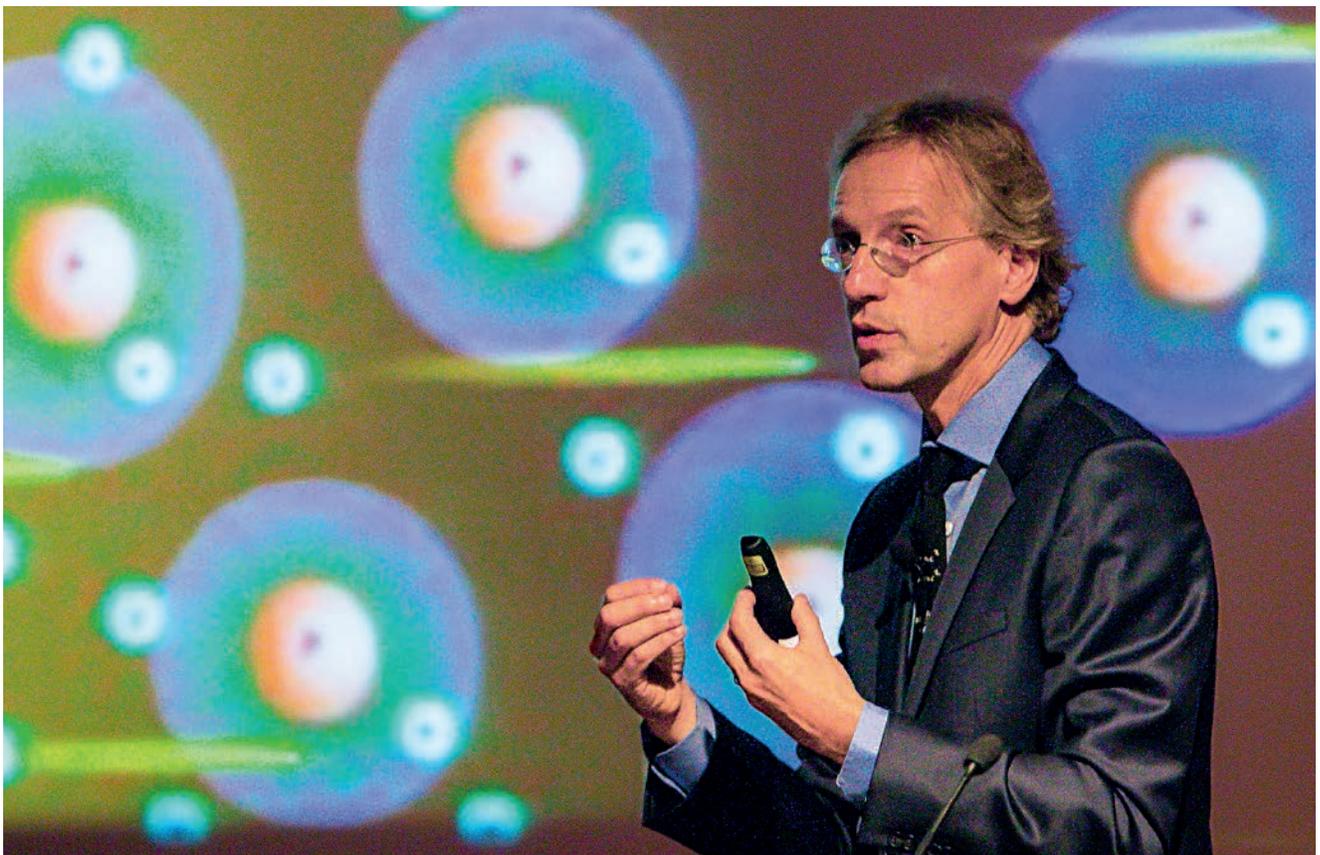
Charles Simonyi
Chair of the Board

REPORT OF THE DIRECTOR

This year was particularly auspicious for science and for the power of basic research, driven by imagination and original thought. The Institute celebrated the centennial of Einstein's general theory of relativity with a conference, General Relativity at 100, cohosted with Princeton University and supported by a grant from the Schwab Charitable Fund made possible by the generosity of IAS Trustee Eric Schmidt and Wendy Schmidt.

Incredibly, two months earlier, the Laser Interferometer Gravitational-Wave Observatory detected a key prediction of Einstein's theory: the existence of gravitational waves created when two black holes collided a billion light-years away, creating discernible ripples in spacetime. The detection, a century later, was a dramatic reminder of the timescale of basic research and its role as an engine of technological and societal progress.

Curiosity-driven basic research at the Institute continues to be recognized throughout the world and across the sciences and humanities: Professor Yve-Alain Bois was awarded the Pierre Daix Prize; IBM von Neumann Professor Jean Bourgain was awarded the Antonio Feltrinelli International Prize for Mathematics; Professor Emeritus Glen Bowersock was awarded the Prix Albert Bernard; James D. Wolfensohn Professor Didier Fassin received the Gold Medal of the Swedish Society for Anthropology and Geography; Professor Tom Spencer was awarded the Henri Poincaré Prize; and Charles Simonyi Professor Edward Witten received the Albert Einstein World Award of Science and the inaugural American Physical Society's Medal for Exceptional Achievement in Research.

We were deeply saddened by the passing of Professor Emerita Patricia Crone and Professor Emeritus Morton White in the School of Historical Studies. Patricia and Morty were foremost scholars in their fields who influenced our understanding of history and humanity. Their character, courage, and ideas are greatly missed.

Andrew W. Mellon Professor Jonathan Israel in the School of Historical Studies and Professor Peter Goddard in the School of Natural Sciences (as well as my predecessor as Director) retired as of June 30, 2016. We are deeply grateful for their original research and leadership. We also congratulate Sebastian Currier on his last year as Artist-in-Residence. Sebastian curated a stunning series of concerts and artist talks during his three-year appointment. We are very pleased that Pulitzer Prize–winning composer David Lang will succeed Sebastian and carry forward the tradition of a musical presence within the IAS community.

Like all years at the Institute, 2015–16 was one of breakthroughs and discoveries, some of them heralded in the *New York Times* and recognized with prizes, others quietly opening new lines of inquiry and deeper exploration. I am immensely grateful to our Trustees, Faculty, Members and Visitors, Friends, Staff, foundations, and other donors for supporting our Faculty and Members in their work to further knowledge and understanding.

Robbert Dijkgraaf
Director and Leon Levy Professor

Top: Charles Simonyi, Chair of the Board of Trustees, addresses Faculty and Trustees at the Board meeting in May. *Below*: Robbert Dijkgraaf, Director of the Institute and Leon Levy Professor, gives an Institute talk, "100 Years of General Relativity," available at www.ias.edu/ideas/100-years-general-relativity.

In November, the Institute celebrated the centennial of Einstein's general theory of relativity with a special two-day conference, General Relativity at 100, which examined the history and influence of relativity and its continuing impact on cutting-edge research, from cosmology and quantum gravity to black holes and mathematical relativity.

The Institute for Advanced Study

It was founding Director Abraham Flexner's belief that if the Institute "eschews the chase for the useful, the minds of its scholars will be liberated, they will be free to take advantage of surprises, and someday an unexpected discovery, apparently leading nowhere, will be found to be an indispensable link in a long and complex chain that may open new worlds in theory and practice."

FROM THE DEVELOPMENT of programmable computers and the uncovering of the deep symmetries of nature to advances in societal understanding and historical practice, long and complex chains of knowledge have developed for more than eighty-five years through research originating at the Institute for Advanced Study.

Albert Einstein was one of the first in a continuous line of distinguished Institute scientists and scholars who have produced a deeper understanding of the physical world and of humanity. Yet the Institute's remarkable history does not seem to weigh heavily on current scholars and scientists. Instead, the atmosphere focuses on the present, where every twist and hairpin bend changes our view. What do we know? What do we yet need to understand? How should we try to comprehend it?

Work at the Institute takes place across historical studies, mathematics, natural sciences, and social science. Currently, a permanent Faculty of some thirty eminent academics each year award fellowships to some two hundred visiting Members, from about one hundred universities and research institutions throughout the world. The Institute's reach has been multiplied many times over through the more than seven thousand Members who have influenced entire fields of study as well as the work and minds of colleagues and students. Thirty-three Nobel Laureates, forty-one of the fifty-six Fields Medalists, and sixteen of the seventeen Abel Prize Laureates, as well as many winners of the Wolf and MacArthur prizes, have been affiliated with the Institute.

At the Institute, everything is designed to encourage scholars to take their research to the next level. This includes creating and sustaining an environment where Members live in an academic village of apartments, originally designed by Marcel Breuer in 1957, at the edge of the Institute's eight hundred acres of campus, woodland, and farmland. Members eat in the same dining hall, share common rooms and libraries, and carry out their work in an institutional setting where human scale has been carefully maintained to encourage the sharing of ideas, mutual understanding, and friendship.

Each year a new intellectual mix is created by the Members, ranging from young postdoctoral fellows to distinguished senior professors, who typically stay a year but may stay up to five years and return for subsequent visits throughout their careers. A period spent as a Member is often a life-changing experience. Young scholars meet the contemporaries who, with them, will be leading figures in their field in the future. Senior Members have the time and freedom to initiate new lines of research. Freed from teaching and administration, Members are afforded opportunities for discussing their work with scholars and scientists from other fields. Here they are given the time to take advantage of serendipitous encounters at lunch, teatime, or at After Hours Conversations, an interdisciplinary program to encourage wide-ranging conversations in an informal environment.

Throughout the year, the Institute hosts a broad array of concerts, lectures, and programs for the Institute community and the public. In the 2015–16 academic year, the Institute celebrated the centennial of Einstein's general theory of relativity with a special two-day conference cohosted with Princeton University. The conference, General Relativity at 100, examined the history and influence of relativity and its continuing impact on cutting-edge research, from cosmology and quantum gravity to black holes and mathematical relativity. The celebration began with a special screening of *Light Falls*, a theatrical production by Brian Greene, Member (1992–93) in the School of Natural Sciences, and closed with a special performance by Joshua Bell and a screening of *Einstein's Light*, a documentary film by Nickolas Barris, Director's Visitor (2013). Videos of talks may be viewed at www.ias.edu/ideas/2015/general-relativity-at-100-conference. In addition, the Institute offers numerous and varied activities for Members, Visitors, and their families—from family science talks and children's activities to play readings, jazz evenings, tennis lessons, and trips to museums and other cultural sites.

Fundamental research at the Institute furthers our grasp of a world of diverse facts, structures, ideas, and cultures. This is due in large part to the precious freedom that Faculty and Members at the Institute experience—an independence enabled by the generosity of the Institute's founders and subsequent benefactors. We share the conviction of our founders that such unrestricted deep thinking will change this world but where and how is always a surprise.

Professor Angelos Chaniotis leads a seminar for Members and visiting scholars from nearby universities, examining inscriptions in the Institute's squeeze collection, one of the largest in the world.

School of Historical Studies

The School of Historical Studies, established in 1949 with the merging of the School of Economics and Politics and the School of Humanistic Studies, actively promotes interdisciplinary research and cross-fertilization of ideas, thereby encouraging the creation of new historical enterprises.

THE SCHOOL OF HISTORICAL STUDIES bears no resemblance to a traditional academic history department, but rather supports all learning for which historical methods are appropriate. Its Faculty and Members embrace a historical approach to research throughout the humanistic disciplines, from socioeconomic developments, political theory, and modern international relations to the history of art, science, philosophy, music, and literature. In geographical terms, the School concentrates primarily on the history of Western, Near Eastern, and Far Eastern civilizations, with emphasis on Greek and Roman civilization, the history of Europe (medieval, early modern, and modern), the Islamic world, and East Asia. Support has been extended to the history of other regions, including Central Asia, India, and Africa.

The Faculty and Members of the School do not adhere to any one point of view but practice a range of methods of inquiry and scholarly styles, both traditional and innovative. Uniquely positioned to sponsor work that crosses conventional departmental and professional boundaries, the School actively promotes interdisciplinary research and cross-fertilization of ideas, thereby encouraging the creation of new historical enterprises.

Due to an eleventh-hour discovery of new documents pertaining to Henri Matisse's 1932 *Dance* mural, Professor **Yve-Alain Bois** spent most of the fall term making necessary adjustments to *Matisse in the Barnes Foundation*, a three-volume book that he edited and that was released in January. Another consuming editorial task was that of the translation of Wladyslaw Strzeminski and Katarzyana Kobro's 1928 treatise on sculpture for the journal *October* (published in the Spring 2016 issue). In the Fall 2015 issue of the same journal, he published an essay on the problem of pseudomorphism (or look-alikes) and, for the Summer 2016 issue, he edited an anthology of texts by the French artist François Morellet, who recently

FACULTY

Yve-Alain Bois

Angelos Chaniotis

Nicola Di Cosmo
Luce Foundation Professor in East Asian Studies

Patrick J. Geary

Jonathan Haslam
George F. Kennan Professor

Jonathan Israel
Andrew W. Mellon Professor

Sabine Schmidtke

PROFESSORS EMERITI

Glen W. Bowersock

Caroline Walker Bynum

Giles Constable

Patricia Crone
(deceased July 11, 2015)

Christian Habicht

Irving Lavin

Peter Paret

Heinrich von Staden

Morton White
(deceased May 27, 2016)

passed away, and upon this occasion wrote an essay comparing his work to that of the American artist Sol LeWitt. He also prepared for publication the text of several lectures given the preceding year, one on Picasso and abstraction that he delivered at the Institut National d'Histoire de l'Art in Paris as well as in various U.S. venues, including the IAS, and the other delivered in Philadelphia at the American Philosophical Society, where he was elected a member in the spring. However, the main bulk of his scholarly activity—pursuing the long-term project of his catalogue raisonné of Ellsworth Kelly's work—will not see the light of day for at least another year. The first volume of this catalogue, which appeared in fall 2015 and received the Pierre Daix Award, led to several invitations to speak about Kelly's work (at the de Menil Foundation in Houston and at the Whitney Museum of American Art in New York)— lectures that turned into memorials, given Mr. Kelly's death over Christmas.

Bois also participated in a discussion

FACULTY & EMERITI AWARDS

Yve-Alain Bois received François Pinault's Pierre Daix Prize for *Ellsworth Kelly: Catalogue Raisonné of Paintings, Reliefs, and Sculpture, Volume One, 1940–1953* (Editions Cahiers d'Art, 2015).

Glen Bowersock received the Prix Albert Bernard from the Académie des Sciences d'outre-mer for *Le trône d'Adoulis: Les guerres de la mer Rouge à la veille de l'Islam* (Albin Michel, 2014).

Angelos Chaniotis received an Anneliese Maier Research Award from the Alexander von Humboldt Foundation and was conferred the insignia of Doctor Honoris Causa, Faculty of Philosophy and Letters by the Université de Liège.

Jonathan Israel received a 2015 PROSE award for *Revolutionary Ideas: An Intellectual History of the French Revolution from* The Rights of Man *to Robespierre* (Princeton University Press, 2014).

concerning the making of a catalogue raisonné and in a symposium on Jackson Pollock, both organized by the Edith O'Donnell Institute of Art History (The University of Texas at Dallas).

The research topics of the Members participating in the art history seminar were extremely diverse, from craft in early modern Japan (Christine Guth) to the career and production of a Dutch proto-encyclopedist artist working at the time of the iconoclasm crisis (Marisa Bass); from the concept of style in late antique visual arts (Sarah Bassett) to the rhetoric of power and the relationship between architecture and landscape in ancient Iran (Matthew Canepa); from the use and abuse of archaeology in films produced by the Stalinist regime in Russia (Michael Kunichika) to the imitation of architectural forms in medieval Islamic vessels (Margaret Graves); from the representation of a sacred mountain in China during the Qing dynasty (Wen-Shing Chou) to the relationship between art, cosmology, and astrology in late medieval Prague (Eric Ramírez-Weaver), and the rarely seen avant-garde films realized in the 1960s by Robert Beavers and Gregory Marko-poulos (Rebekah Rutkoff). Each Member presented his or her work at least once in the seminar, and despite the extraordinary diversity of their topics, common interest soon emerged, including the relationship between art and science and the concern for *materiality* in current art historical debates. Several sessions were dedicated to discussing various recent publications pertaining to these issues.

The main focus of Professor **Angelos Chaniotis**'s work remains the study of epigraphic evidence and the information it provides for Greek social, cultural, and religious history. He co-edited *Supplementum Epigraphicum Graecum LXI* (Leiden, 2015) and completed the book manuscript *From Alexander to Hadrian: The Greeks in a Cosmopolitan World*, to be published by Profile Books and Harvard University Press. He also worked on his book *Epigraphic Research at Aphrodisias, 1995–*

2014. With the support of the Anneliese Maier Research Award of the Alexander von Humboldt Foundation (Berlin), he collaborated with graduate students and postdoctoral researchers from the Universities of Munich, Heidelberg, Freiburg, and Münster in various epigraphic projects, including the study of inscriptions in Aphrodisias/Asia Minor and Yeronisos/Cyprus, the study of inscriptions as evidence for the history of emotions in the Greek world, and publication of the *Supplementum Epigraphicum Graecum*. He also supported the work of the *Inscriptiones Graecae* in Berlin. Subjects related to this research area were treated both in the Ancient Studies Seminar (October 2015–October 2016) and the fourth Epigraphic Friday (March 6, 2016).

Continuing his research on The Social and Cultural Construction of Emotions: The Greek Paradigm, a project funded by the European Research Council (2009–13), Chaniotis is currently putting together a collective volume, *Unveiling Emotions III: Display and Arousal of Emotions in the Greek World*, and preparing together with Dr. Nikolaos Kaltsas (Athens) and Professor Ioannis Mylonopoulos (Columbia University) an exhibition on this subject, which will take place in the Onassis Cultural Center in New York from March to June 2017.

Chaniotis lectured in the United States, Belgium, Germany, Greece, and Switzerland. Many of his lectures focused on his new research on the transformations of nightlife from the fourth century B.C.E. to the fourth century C.E.; he is the convener of a conference on this subject that will take place in the Fondation Hardt (Geneva) in August 2017. As a member of the Fund for Scientific Research in Belgium, he contributed to the evaluation of research in the humanities in this country. In March 2016, he received an honorary degree from the Université de Liège in recognition of his contribution to the study of antiquity and Greek religion.

In the 2015–16 academic year, **Nicola Di Cosmo,** Luce Foundation

ANDREA KANE

Member Noël Sugimura explores the history of enlightenment through eighteenth-century literature in a School of Historical Studies Lunchtime Colloquium in the spring.

Professor in East Asian Studies, collaborated on a study of climatic change in the early Middle Ages (*Nature Geoscience*, February 2016) and coauthored a study on the climatic implications (*Scientific Reports*, May 2016). These works are part of a growing involvement with historical climatology and with the use of palaeoclimatic proxies in historical investigation. A paper on the use of scientific data by historians was presented at the meetings of the American Historical Association (Atlanta, January 2016). Other papers were presented at the meetings of the American Society for Environmental History and the Association for Asian Studies (both held in Seattle, April 2016). The overall direction of his research has methodological implications regarding the integration of different classes of data in areas of history in which documentary records are especially scarce. He also joined, as a project leader, the Climate Change and History Research Initiative at Princeton University, participating in their regular activities and workshops. In April–May, he spent a month as an invited visiting professor at the École des Hautes Études en Sciences Sociales,

Paris. His lectures focused mainly on the place of China in the early modern world, in dialogue with French historians of Europe and Asia. In addition to his seminar in Paris, he lectured at the University of Chicago, Columbia University, Yale University, and the University of Hong Kong. Finally, in collaboration with Didier Fassin, James D. Wolfensohn Professor in the School of Social Science, he organized a workshop, held at the Institute in June 2016, on the theme of "non-state war economies." The participants looked at several instances, both contemporary and historical, of the emergence of war economies. This workshop did not simply place in a broader context the rise of war economies in countries such as South Sudan, Nigeria, and Syria, but aimed to combine methodologies from different disciplines and thus approach economic, political, and historical issues from an integrated as well as comparative perspective.

Within the Institute, the activities of the East Asian Studies group were varied and rich, with seventeen talks and lectures presented by Members and invited speakers. Military history has been a focus for the year, with topics

ranging from the transnational study of strategic bombing in WWII to wars of necessity or choice in Chinese history. Other topics included Buddhist art and philosophy, Chinese archaeology, modern Chinese fiction, Korean films, and Japanese literature. The seminar continues to represent a forum of exchange of ideas and lively discussion across different disciplines in which all Members participate.

Professor **Patrick Geary**'s genetic history team has successfully extracted and preliminarily sequenced ancient DNA from sixty individuals who lived in what is today Italy and Hungary in the sixth century. These sequences will make it possible to examine the social organization and migratory history of early medieval populations during the so-called migration period of European history. His entire team of geneticists, archaeologists, and historians from Europe and the United States met in January in Vienna to discuss the progress of the project. He presented preliminary results at conferences in Paris, Frankfurt, Cambridge, Tempe, and Beijing, where he spent two weeks as a Global Fellow at Peking University. At an international commemoration of

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the fourteen-hundredth anniversary of the death of the Irish monastic founder Columbanus, he lectured on memory and identity at a conference in Bobbio, Italy, the place of Columbanus's last monastic foundation. In conjunction with his Anneliese Maier Research Prize from Germany's Humboldt Foundation, in May he organized a two-day workshop for early career historians and archaeologists at the newly established Max Planck Institute for the Science of Human History in Jena on the topic of "New Methods in History and Archaeology." Also in May, the Heidelberg Centre for Transcultural Studies organized a workshop in his honor and that of Professor Sumathi Ramaswamy on the topic "Materials on the Move," which considered the transforming meanings of objects as they move through different cultural and historical contexts. He has continued to mentor the American Academy in Rome's Andrew W. Mellon Foundation–sponsored seminar "Framing Medieval Mediterranean Art," and for the twenty-first consecutive year, he chaired the M.A. defenses at the Department of Medieval Studies at the Central European University in Budapest. At the Institute, in support of Member Maria de Lurdes Rosa, he sponsored a workshop on "Noble

Houses and Their Archives in a Comparative Perspective: Portugal-Spain-France, Fourteenth–Nineteenth Centuries," which drew archivists and historians from the United States, France, Spain, and Portugal. Likewise at the Institute, in collaboration with Helmut Reimitz of Princeton University and Max Diesenberger of the Austrian Academy of Sciences, he cosponsored a workshop on "The Transformation of the Carolingian World," at which European and American scholars outlined a new international collaborative research agenda on political, social, and cultural changes in western Europe in the tenth and eleventh centuries.

Jonathan Haslam joined the School as the George F. Kennan Professor in July 2015, coming from the University of Cambridge where he is now Professor Emeritus in the History of International Relations and a Life Fellow of Corpus Christi College, Cambridge. He also remains a Fellow of the British Academy.

His comprehensive history of Soviet secret intelligence, *Near and Distant Neighbors*—a reference to civilian and military intelligence establishments—appeared with Farrar, Straus, and Giroux in New York not long after his arrival at the Institute in September

2015. The implications of this history for the present government of Russia are not hard to see in that President Vladimir Putin is a veteran of what was once KGB counter-intelligence, having served in East Germany before and during the fall of the Berlin Wall in 1989.

Opportunities arose to address the present state of Russia in lectures and seminars delivered at the Institute on the occasion of the meeting of Trustees in late September 2015 and elsewhere thereafter: in Washington, D.C., at the Woodrow Wilson International Center for Scholars (Smithsonian Institution) and at the bank of one of our most recent Trustees, Afsaneh Beschloss; and more recently in New York, at the Century Club, courtesy of Chair Emeritus of Trustees James Wolfensohn, a memorable occasion where the active involvement of such figures as Henry Kissinger greatly enlivened the debate. Haslam also delivered a lecture on the history of Soviet intelligence at the Hay-on-Wye Festival in Britain at the end of June.

The Director kindly agreed to underwrite costs for the first year of the World Disorder Lecture Series that Haslam initiated. It has up to now covered China's economic outlook, Europe's tensions with the United States, and past and present discontents in the Middle East. If further funding is forthcoming, the series will explore other such topical themes.

Work has now begun formulating proposals for a new monograph. The task is basically that of reinterpreting the history of international relations for the first half of the twentieth century, focusing on the underlying reasons for the implosion of the European states system. This resulted in the division of Germany, and therefore Europe, into American and Soviet spheres of influence from 1947 to 1989; the former

Near Eastern and Islamic Studies scholars convene at the Institute for a workshop led by Professor Sabine Schmidtke (left) and Member Maurice A. Pomerantz (right) to discuss the history, circulation, and interpretation of the *maqāma*, one of the longest traveling and widest circulating of premodern literary forms.

as protectorates, the latter effectively under military occupation.

This new enterprise results from Haslam's deep-seated unease at the continued dominance exerted by two schools of thought on our understanding of why Europe imploded: that of political scientists seeking to explain state behavior purely in terms of the impact of the states system instead of its components (societies) and that of diplomatic historians who seek answers exclusively from the analyses made and the decisions taken by the governments of the various states involved. The alternative approach requires thoroughly reconsidering the role of ideas—the *idées forces*—that drove societies forward, including the assumptions shared by those taking the decisions within government hitherto neglected.

Jonathan Israel, Andrew W. Mellon Professor, continued investigating during the last academic year the trans-Atlantic origins of democratic ideas and constitutions in the revolutionary era (1776–1848) with particular focus on the divisions within the American Revolution and the impact of American republican achievements and practices on European developments down to 1848. His book on the influence of the American Revolution on French, British, and other revolutionary democratic republican thinking recently was completed and is now with the Princeton University Press to be published in 2017 as "The Expanding Blaze: How the American Revolution Ignited the World, 1775–1848."

The sometimes furious debate in which he has been involved in recent years—with a "positive critique" accepting the concept of a "Radical Enlightenment" as fundamental to the origins of modern democracy and the revolutionary era with its roots in the early Enlightenment being attacked by a large number of historians detecting flaws in the "Radical Enlightenment argument"—has escalated further with this lively discussion being taken up in Polish, Finnish, Italian, and Spanish as well as French, Dutch, German, British, and American journals. Two

French historian Emmanuel Todd (left) gives a public lecture on Germany-U.S. relations as part of the World Disorder Lecture Series, organized by Jonathan Haslam, George F. Kennan Professor (right).

lengthy surveys of the debate by Israel are due to appear in the next few months, one in a special symposium devoted to this debate in *Journal of the History of Ideas* (September 2016), the other as the introductory piece to the forthcoming *Reassessing the Radical Enlightenment* (ed.) Steffen Ducheyne (London, Routledge, 2017). During this year, the Italian translation of his book on the role of democratic republican ideas in the French Revolution, *Revolutionary Ideas* (Princeton University Press, 2014), appeared and work is progressing on the French, German, and several other translations. He has been directly assisting to ensure the accuracy of the text and footnotes of the forthcoming French version.

The Early Modern Europe workshop at the Institute, chaired by Israel, continued down to last May as a forum of intensive debate and exchange of ideas on European History from the Renaissance down to the early nineteenth century. The participants all read and commented at length on each other's research papers, ensuring a high level of interaction throughout. Informal discussion too was often highly stimulating for all concerned. During this academic year, Israel has presented research papers, participated in conferences, and delivered keynote lectures in Rotterdam, Lisbon, Paris, Nantes, Los Angeles, and at Yale University. Several more published articles were added to

his list of publications, which is now available online. The three most important articles were: "J.G.A. Pocock and the 'Language of Enlightenment' in his Barbarism and Religion," *Journal of the History of Ideas* 77 (2016); "Northern Varieties: Contrasting the Dano-Norwegian and the Swedish-Finnish Enlightenments," in *Eighteenth-Century Periodicals as Agents of Change, Perspectives on Northern Enlightenment*, edited by Ellen Krefting, Aina Nøding, and Mona Ringvej (Leiden-Boston, 2015); "Leo Strauss and the Radical Enlightenment," in *Reading Between the Lines—Leo Strauss and the History of Early Modern Philosophy*, edited by Winfried Schröder (*New Studies in the History and Historiography of Philosophy*, vol. 3) (Berlin-Boston, 2015).

In 2014–15, Professor **Sabine Schmidtke** continued to focus on the Shii (Zaydi) tradition of Yemen and Northern Iran. She published a comprehensive article, "The Cultural Transfer of Zaydi and non-Zaydi Religious Literature from Northern Iran to Yemen, 12th through 14th Century," in *Globalization of Knowledge in the Post-Antique Mediterranean*, edited by Sonja Brentjes and Jürgen Renn (Routledge, 2016) and she continued her work on her three-volume book project (in collaboration with Hassan Ansari, currently a Member in the School of Historical Studies) *Licence to Transmit: The Spread of Muʿtazilī and*

Zaydi Thought as Documented in Ijāzas. In the field of Islamic intellectual history, she published the *Oxford Handbook of Islamic Theology (*Oxford University Press, 2016) and completed (with Khaled El-Rouayheb) the *Oxford Handbook of Islamic Philosophy,* to be published by October 2016. In addition, she completed (with Wilferd Madelung) a critical edition of two theological summae by the tenth century Buyid vizier al-Ṣāḥib b. ʿAbbād (*Al-Sāḥib Ibn ʿAbbād Promoter of Rational Theology: Two Muʿtazilī Kalām Texts from the Cairo Geniza)* (Leiden: Brill, 2016). She also finalized another issue of her journal *Intellectual History of the Islamicate World* on the topic "Histories of Books: Part I" (coedited with Maribel Fierro and Sarah Stroumsa) and is currently preparing the next issues on "Histories of Books: Part II" and "Medical Traditions" (to be published in April and September 2017, respectively). In the field of the Arabic Bible, she gave a lecture on "Arabic Translation of the Pentateuch in the Library of the Twelver Shīʿi Scholar Raḍī al-Dīn ʿAlī b. Saʿd Ibn Ṭāwūs (d. 664/1266)" (Christianity and Judaism in the Language of Islam: A Conference on the Bible in Arabic and Cognate Fields, March 29–April 1, 2016, Gustavianum, Uppsala), and she continued working on a collaborative project, a critical edition of the translation of the Bible into Arabic by Ḥārith b. Sinān. In the field of Shii studies, Schmidtke initiated a new peer-reviewed journal, *Shii Stud-ies Review,* to be published by Brill from May 2017 onwards (www.brill.com/ssr). This will be complemented by a new book series, *Shii Islam: Texts and Studies* (Leiden: Brill), also initiated and coedited by Schmidtke. On April 6, 2016, she provided an overview of the field of Shii studies in a lecture, "Shii Studies in the West: Past, Present, and Perspectives for the Future" (Columbia University Seminar on Iranian Studies, Center for Iranian Studies).

Over the course of the year, Schmidtke organized three major events at the Institute. First, a one-day work-shop with Member Maurice A. Pomer-antz, "The *Maqāma* and Its Readers: A Workshop on Arabic and Hebrew Literatures" (May 27, 2016). Secondly, in collaboration with George Kiraz (Princeton University) a two-day conference, "'Allographic Traditions' among Arabic-speaking Christians, Jews, and Samaritans: Workshop on the Writing Systems of Garshuni, Judeo-Arabic, and Samaritan-Arabic" (June 9–10, 2016). Thirdly, in collabo-ration with last year's Member Amy Singer, Schmidtke organized a one-week workshop, "The Digital Ottoman II Workshop" (June 20–24, 2016).

Schmidtke also spent much of her time at the Institute with a large and diverse group of Members studying subjects related to the Near and Middle East, though not necessarily to Islam. The group was highly international, with Members from the United Arab Emirates, Germany/Switzerland, Russia, Italy, the United States, and Iran. Over the course of the year, the Members regularly met in a bi-weekly lively seminar (in addition to a great deal of socializing), which was also frequented by Members from the Institute's School of Social Science, Princeton University graduate students and faculty, former IAS Members, as well as occasional visitors. The main subjects studied by the group and presented in the seminars related to Islamic law (Hassan Ansari), Graeco-Arabica (Carlo Scardino), early Islamic history and Shiism (Najam Haider), Islamic medicine (Nahyan Fancy), Arabic literature (Maurice A.Pomer-antz), Islamic art history (Margaret Graves), Islam in Russia (Rozaliya Garipova), Iranian press during the late nineteenth/early twentieth century (Negin Nabavi), and pre-Islamic Iranian traditions (Andrea Piras).

In 2015–16, Professor Emeritus **Glen Bowersock** completed the manuscript of a book, *The Crucible of Islam.* It is devoted to the darkest period of the most transformative time in the late antique Mediterranean world, the century between 560 and 660, just before Muhammad's birth, through the earliest Muslim conquests. He has tried to understand the Arabian milieu of Muhammad's Mecca, his struggles to find acceptance, and the impact of the Islamic conquests that followed his death. His earlier book *The Throne of Adulis,* which recently won the Prix Albert Bernard of the

Left: Member Martti Nissinen participates in the "Epigraphic Friday" workshop organized by Professor Angelos Chaniotis; *Right:* Professor Patrick Geary (center) leads scholars, including Members Thomas Biskup (left) and Eric Ramírez-Weaver (right), in a comparison of the archives and history of France, Spain, and Portugal.

Left: Jonathan Israel, Andrew W. Mellon Professor, explores the emergence of democratic ideas in European and American history during an Early Modern Workshop. *Right:* Scholars, including Intisar Rabb, director of the Islamic Legal Studies Program at Harvard Law School (pictured above), examines Arabic and Hebrew literatures during "The *Maqāma* and Its Readers," a workshop organized by Professor Sabine Schmidtke and Member Maurice Pomerantz.

Académie des Sciences d'outre-mer, had already broached this complex history through a study of Ethiopian involvement in the Arabian peninsula in the sixth century. At the Institute, Bowersock profited from discussion with Members, notably with Carlo Scardino, whose perfect mastery of both Greek and Arabic was helpful, and with Gianfranco Agosti, who was exploring late antique Greek poetry in both Christian and pagan contexts.

In October, he lectured on "Mecca, Muhammad, and Late Antique Arabia" at the University of Vienna on the invitation of former Visitor Bernhard Palme. Over the winter, his introduction to the final publication of the magnificent mosaic from Lod in Israel appeared in a volume edited by Gideon Avni. Bowersock has contributed frequently, as in the past, to the *New York Review of Books* and recently wrote about the exhibition of Hellenistic antiquities from Pergamon at the Metropolitan Museum after a visit with former Member Paul Zanker. In the *Rivista Storica Italiana,* he published a memoir of the late Emilio Gabba, an eminent Roman historian who had been an IAS Member and a close friend.

As part of his responsibilities for the Paris archive of the great French epigraphist and historian Louis Robert, Bowersock has encouraged the digitization of a precious collection of photographs from western Asia Minor that Robert and his wife took between 1932 and 1962. Some are on glass plates, and others have survived as negatives or prints. About 5,300 images of landscapes and antiquities from Turkey more than half a century ago will soon be made available not only in Paris, but, through an exceptionally generous initiative of Thibaut Boulay in Tours, to the IAS for open access here. These images will join the collection of Louis Robert's epigraphic "squeezes" that his widow presented to the Institute two decades ago.

Two areas of research occupied Professor Emeritus **Peter Paret** during the 2015–16 academic year. He continued work on the development of Carl von Clausewitz's ideas in the political and cultural context of late eighteenth- and early nineteenth-century Germany. His recent book, *Clausewitz in His Time* (New York–Oxford, 2014), will appear next year in an extended German edition, for which he has written a new introduction, enlarged two chapters on Clausewitz and the dramatist and poet Heinrich von Kleist, and compared the analyses of national defeat by Clausewitz and Marc Bloch, and added a new, seventh chapter. Colonel Reinhold Janke of the Bundeswehr and Paret share the task of translation. In December, he was invited to give a talk at the Pentagon, "On War, Then and Now," which appeared in the *Journal of Military History* 80, No. 2 (April 2016). It is hardly necessary to add that a historical analysis of Clausewitz's efforts to understand war has nothing to do with the ahistorical search for current strategic and operational success that always has driven the greater part of Clausewitz studies, and continues to do so today.

With an extended review that will appear in the *American Historical Review,* Paret has returned to a subject on which he has intermittently worked over the past fifty years: art and politics in Germany between the Wilhelmine and National Socialist eras. Beginning with the publication in 1960 of *The Berlin Secession: Modernism and Its Enemies in Imperial Germany,* his most recent work in the field involves two books on the sculptor and dramatist Ernst Barlach in 2003 and 2012, the latter written in collaboration with Helga Thieme of the German Barlach Foundation. Finally, in May he attended the annual meeting of the Advisory Committee of the Liebermann Gesellschaft at the Akademie der Künste in Berlin, and discussed additions to the working catalogue of Max Liebermann's pastels and drawings. Berghahn published the papers of the 2014 conference on historians who came to the United States from Germany, *The Second Generation,* edited by Andreas Daum, Hartmut Lehmann, and James Sheehan, which includes Paret's autobiographical essay "External Events, Inner Drives." Paret's talk at the 2015 Yale University conference on Ernst Cassirer was translated into German and will appear under the title "Bücherschicksale: Cassirer, Machiavelli, und der Lerser" in the January 2017 issue of the *Zeitschrift für Ideengeschichte* of the Deutsche Literaturarchiv.

2015–16 MEMBERS AND VISITORS

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

Wendi Adamek
Chinese Buddhism ✦ University of Calgary
*The Starr Foundation East Asian Studies
Endowment Fund Member*

Gianfranco Agosti
Greek Epigrams in Late Antiquity ✦ Università
degli Studi di Roma, La Sapienza ✦ *s*
Funding provided by the Patrons' Endowment Fund

Hassan Farhang Ansari
Intellectual and Legal Studies ✦ Institute for
Advanced Study
Elizabeth and J. Richardson Dilworth Fellow

Jeffrey Barash
History of Political Thought ✦ Université de
Picardie Jules Verne, Amiens
Friends of the Institute for Advanced Study Member

Marisa Bass
Renaissance Art ✦ Washington University in St.
Louis
Funding provided by the Herodotus Fund

Sarah Bassett
Late Roman and Byzantine Art ✦ Indiana
University
*Funding provided by The Andrew W. Mellon
Foundation*

Joshua Billings
Classics ✦ Princeton University ✦ *s*

Thomas Biskup
Political History, History of Science ✦ University of
Hull
Gerda Henkel Stiftung Member

Mark Evan Bonds
Aesthetics and Philosophy of Music ✦ University of
North Carolina at Chapel Hill
Edward T. Cone Member in Music Studies

Courtney Booker
Carolingian History, History of Drama ✦ The
University of British Columbia
Funding provided by the Fund for Historical Studies

Stephen Burnett
Early Modern Jewish History ✦ University of
Nebraska–Lincoln
Elizabeth and J. Richardson Dilworth Fellow

Daniela Caglioti
Modern European History ✦ Università degli Studi
di Napoli Federico II ✦ *f*
Elizabeth and J. Richardson Dilworth Fellow

Matthew Canepa
Ancient Iranian Art and Archaeology ✦ University of
Minnesota ✦ *s*

Janet Chen
History of Modern China ✦ Princeton University
*Frederick Burkhardt Fellowship funded by the
American Council of Learned Societies*

Wen-Shing Chou
Buddhist Art and Architecture ✦ Hunter College,
The City University of New York
*The Andrew W. Mellon Foundation Fellowships for
Assistant Professors*

Albrecht Diem
Medieval Monastic Studies ✦ Syracuse University

Carolyn Eichner
Women/Gender in Modern Europe and Empire ✦
University of Wisconsin–Milwaukee

Nahyan Fancy
Premodern Islamic Science and Medicine ✦ DePauw
University ✦ *f*
Ralph E. and Doris M. Hansmann Member

Rozaliya Garipova
Islamic History ✦ University of Pennsylvania ✦ *f*
Funding provided by the Fund for Historical Studies

Eric Goldberg
Early Medieval Europe, Late Antiquity ✦
Massachusetts Institute of Technology
George William Cottrell, Jr., Member

Bryna Goodman
Modern Chinese History ✦ University of Oregon ✦ *s*
*The Starr Foundation East Asian Studies
Endowment Fund Member*

Margaret Graves
History of Islamic Art ✦ Indiana University,
Bloomington
Funding provided by the Herodotus Fund

Christine Guth
Material Culture and Design History ✦ Royal
College of Art ✦ *f*
*Funding provided by The Andrew W. Mellon
Foundation*

Najam Haider
Islamic Studies ✦ Barnard College of Columbia
University ✦ *s*
Edwin C. and Elizabeth A. Whitehead Fellow

Julia Hairston
Early Modern Italian Literature ✦ University of
California, Rome ✦ *s*
*Felix Gilbert Member; additional funding provided by
the Hans Kohn Membership Fund*

Matthew Hopper
African History ✦ California Polytechnic State
University, San Luis Obispo ✦ *f*
William D. Loughlin Member

Paulin Ismard
Ancient Greek History ✦ Université Paris 1
Panthéon-Sorbonne
The Gladys Krieble Delmas Foundation Member

Willem Jongman
Roman History, Economic History ✦ University of
Groningen ✦ *f*
*Funding provided by The Andrew W. Mellon
Foundation*

ALL PHOTOS ANDREA KANE

Left: Professor Emeritus Heinrich von Staden (left) and Member Marisa Bass (right) participate in a Historical Studies Lunchtime Colloquium. *Right*: Visitor
Karina Urbach (left), pictured here with Thomas Biskup, Gerda Henkel Stiftung Member, worked on a project that focuses on the impact that former Nazis had
on German society after 1945.

Hodong Kim
History of the Mongol Empire ✦ Seoul National University
Funding provided by the Fund for Historical Studies

Michael Kulikowski
Late Antiquity/Early Middle Ages ✦ The Pennsylvania State University
Funding provided by the Fund for Historical Studies

Michael Kunichika
Russian and Soviet Culture ✦ New York University
Willis F. Doney Member; additional funding provided by the Herodotus Fund

Rhodri Lewis
Literary and Intellectual History ✦ University of Oxford
Willis F. Doney Member

Eugenio Menegon
Late Imperial China ✦ Boston University ✦ f
Agnes Gund and Daniel Shapiro Member

Jason Moralee
Late Antiquity ✦ University of Massachusetts, Amherst
The Gladys Krieble Delmas Foundation Member

Negin Nabavi
Modern Iranian History ✦ Montclair State University ✦ s
Elizabeth and J. Richardson Dilworth Fellow

Martti Nissinen
Assyriology, Biblical Studies ✦ University of Helsinki ✦ s

Giuseppe Pezzini
Latin Literature ✦ University of Oxford ✦ s
Funding provided by the Fund for Historical Studies

Andrea Piras
Iranian Studies ✦ Università Degli Studi Di Bologna ✦ s
Funding provided by the Fund for Historical Studies

Maurice Pomerantz
Arabic Literature/Cultural History ✦ New York University Abu Dhabi
The Andrew W. Mellon Foundation Fellowships for Assistant Professors

Eric Ramírez-Weaver
Medieval Art History ✦ University of Virginia
The Andrew W. Mellon Foundation Fellowships for Assistant Professors

Camille Robcis
Intellectual History ✦ Cornell University ✦ s
AMIAS Member

Felipe Rojas
Classical Archaeology ✦ Brown University
The Andrew W. Mellon Foundation Fellowships for Assistant Professors

Maria de Lurdes Rosa
Medieval/Early Modern European History ✦ Universidade Nova de Lisboa ✦ f
Funding provided by the Herodotus Fund

Els Rose
Medieval Latin, Medieval Liturgy ✦ Utrecht University ✦ f
Funding provided by the Herodotus Fund

Rebekah Rutkoff
Cinema Studies ✦ Institute for Advanced Study
Funding provided by the Fund for Historical Studies

Emmanuelle Saada
Law and Colonialism ✦ Columbia University ✦ f
Hans Kohn Member

Carlo Scardino
Graeco-Arabica ✦ Heinrich-Heine-Universität Düsseldorf
Martin L. and Sarah F. Leibowitz Member

Daniel Smail
History and Anthropology of Medieval Southern Europe ✦ Harvard University ✦ s
Friends of the Institute for Advanced Study Member

Paul Smith
Chinese History ✦ Haverford College ✦ f
Funding provided by the Herodotus Fund

Mingwei Song
Modern Chinese Literature ✦ Wellesley College ✦ s
Elizabeth and J. Richardson Dilworth Fellow

Deborah Steiner
Classics/Ancient Greek Literature ✦ Columbia University ✦ f
Funding provided by the Hetty Goldman Membership Fund

Noël Sugimura
History of Enlightenment Cultures ✦ Georgetown University
Funding provided by the Herodotus Fund

Kenneth Swope
Chinese Military and Social History ✦ University of Southern Mississippi ✦ f
Funding provided by the Patrons' Endowment Fund

Meredith Terretta
African History, Law and Transnational Activism ✦ University of Ottawa
Louise and John Steffens Founders' Circle Member

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

John Tresch
History of Science and Technology ✦ University of Pennsylvania ✦ f
Friends of the Institute for Advanced Study Member

Karina Urbach
Modern International Relations and Jewish Family History ✦ University of London ✦ v

William Van Andringa
Roman Archaeology and Religion in Late Antiquity ✦ Université Lille 3 ✦ s
Funding provided by the Florence Gould Foundation Fund

Marga Vicedo
History of Science ✦ University of Toronto
Willis F. Doney Member

James Webb, Jr.
Historical Epidemiology ✦ Colby College ✦ f
Willis F. Doney Member

Left: Professor Yve-Alain Bois completed his three-volume work on Matisse. *Right:* Historians, anthropologists, economists, and political scientists convene to participate in a two-day workshop organized by Nicola Di Cosmo (left), Luce Foundation Professor in East Asian Studies, and Didier Fassin (right), James D. Wolfensohn Professor in the School of Social Science, to explore the relationships between warfare and economy.
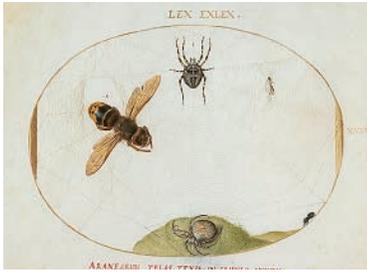
MARISA BASS ON ART AND SCIENCE IN THE EARLY MODERN NETHERLANDS

"Art" and "science" meant something very different in the Renaissance than they do within the strict disciplinary divides of today's academy. Beginning in the sixteenth century, inquiry into the workings of the natural world engaged the visual and literary arts (*artes*) as a means to pursue knowledge (*scientia*) of everything from the stars to anatomy to newly discovered species. My research at IAS this year explores a stunning example of this phenomenon from the sixteenth century: a four-volume series of manuscripts known as the *Four Elements*, which encompasses an encyclopedia of animals and plants from across the globe. Among them is one especially remarkable volume: the first illustrated book in European history exclusively devoted to the subject of insects. Read more at www.ias.edu/ideas/2016/bass-insect-artifice.

NICOLA DI COSMO ON THE MONGOL ARMY'S RETREAT FROM CENTRAL EUROPE

Why did the victorious Mongol army suddenly retreat from Central Europe in 1242? Using data analysis of tree rings and historical documents, a study by Professor Nicola Di Cosmo suggests that Europe could have been rescued by its own bad weather. Read more at www.ias.edu/di-cosmo-new-scientist.

NEGIN NABAVI ON THE BIRTH OF NEWSPAPER CULTURE IN NINETEENTH-CENTURY IRAN

In March 1882, Iran's newspaper readers encountered an unprecedented editorial appeal. This appeal to the "learned" to get involved, to "say something," and to share their learning about how to bring about progress, appeared in the Iranian state newspaper, *Ettela`*, published in Tehran. It was an attempt by the newspaper to present itself as a forum that could reflect the opinions of its intended audience, and thus to gain their trust. *Ettela`* further claimed that it was free from "all official constraints" and that it would publish any article that was sent in to the newspaper as long as "it was useful to the nation and did not defy religion and state." The evidence suggests that readers were skeptical about *Ettela`*'s appeals, yet *Ettela`* persisted and would repeat its appeal periodically. Read more at www.ias.edu/ideas/2016/nabavi-iranian-newspaper-culture.

MAURICE ALEX POMERANTZ ON THE *MAQĀMA*

The picaresque *maqāma* tales were the subject of a workshop, The *Maqāma* and Its Readers, that I organized last May with Sabine Schmidtke. Although the *maqāma* is less familiar to Western readers than the fantastic tales of the *Arabian Nights*, it was long central to Arabic and Middle Eastern literatures and is one of the longest traveling and widest circulating of premodern literary forms.

Invented in the tenth century in Central Asia, *maqāmas* are collections of rhymed prose tales that recount the exploits of tricksters who travel throughout the major cities of the Muslim world and beyond. Read more at www.ias.edu/ideas/2016/pomerantz-exploits-of-maqama.

HASSAN FARHANG ANSARI ON THE SHIITE INTERPRETATION OF THE STATUS OF WOMEN

Naturally, a major issue such as the role of "women" and "the social status of women" in society can be directly influenced by the social and political environment as well as local traditions and beliefs. The main factors in this regard are: the contribution of religious beliefs and national folklore as well as local literature and the collective conscience of a nation, including the epic history of a nation as told in prose or verse and popular stories that have had an important direct impact on behavior and traditions throughout history. Read more at www.ias.edu/ideas/2016/ansari-shiite-women.

THE BARNES FOUNDATION

YVE-ALAIN BOIS ON MATISSE'S HAND-TO-HAND COMBAT

Matisse gave two separate accounts of the moment at which he began work on the first version of *The Dance*, each of them emphasizing the immensity of the surface he had to master, "to possess," as he put it.

… Perhaps it would be important to signal that the composition of this panel came out of a hand-to-hand combat [*un corps à corps*: literally, "a body-to-body combat"] of the artist with the fifty-two square meters of surface of which the mind of the artist had to take possession, and not from the modern method of projection of a composition on a much larger surface, traced "on demand." Read more at www.ias.edu/ideas/2016/bois-matisse-barnes.

PETER PARET ON ÉMIGRÉS FROM NAZI GERMANY AS HISTORIANS

BERGHAHN BOOKS

As immigrants and historians-to-be, we shared in the collective act of leaving Germany for the United States as the Weimar Republic collapsed into the Third Reich, but each of us set out from particular circumstances, and each encountered the new differently.… A young historian arriving in this country in the thirties, even one who had already done significant work, could encounter considerable difficulties, and [Felix] Gilbert's first years in the United States were far from easy ones.…

His way of encountering the past, a way he inherited from his teachers and then refined, belongs to the scholarly and cultural history of the country in which he grew up and from which he fled, to survive and add to the intellectual energy of his new home.… Interpreting the history of one time, one country, one activity, helps us see the history of other countries, other societies, related activities, more clearly. Read more at www.ias.edu/ideas/2016/second-generation.

WORLD HEALTH ORGANIZATION
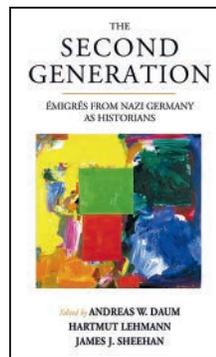
JAMES WEBB ON GLOBAL HEALTH INTERVENTIONS IN AFRICA

Historical epidemiologists are beginning to explore the documentary record of interventions in tropical Africa to prevent the transmission of infectious diseases and reduce their prevalence. Some interventions against individual diseases began in the late nineteenth- and twentieth-century era of colonialism, when Europeans founded research institutes to investigate the challenges of tropical diseases and deployed their new medical knowledge in mobile campaigns to treat sleeping sickness, tuberculosis, yaws, yellow fever, onchocerciasis, and other diseases. In the aftermath of the Second World War, the newly founded World Health Organization (WHO) provided expert advice to colonial and later independent African governments and encouraged a more global approach to disease control. Read more at www.ias.edu/ideas/2016/webb-global-health-intervention.

DAN KOMODA

JONATHAN HASLAM ON A NEW HISTORY OF SOVIET INTELLIGENCE

Mikhail Gorbachev defied every expectation at home and abroad by permitting the Berlin Wall to be breached in November 1989. He had finally allowed the imbalance of military power in Europe, which had stood provocatively and overwhelmingly to Soviet advantage since 1945, to be broken unopposed. Behind all this lay a basic truth: Moscow had effectively already given up the ideological struggle. The Russia reborn in 1992 had to confront the unexpected need to substitute at short notice raw patriotism for a long-outmoded belief in a global ideal, all in the face of falling living standards and full consciousness—not least via MTV, now beamed freely into city apartments—of what the West could offer in return for betrayal. The negative impact on intelligence assets and their recruitment was severe, given how heavily Moscow depended upon human resources once attracted by and tied to the Soviet model. Only with the emergence of their own man, former Lieutenant Colonel Vladimir Putin, as president in 2000 could the "organs" hope to regain lost ground. He rose to power as a result of the chaotic conditions prevailing in Yeltsin's Russia, the state in retreat, criminality rife, and widespread corruption associated with the liberation of the state's assets to the market. Read more at www.ias.edu/ideas/2015/haslam-putin.
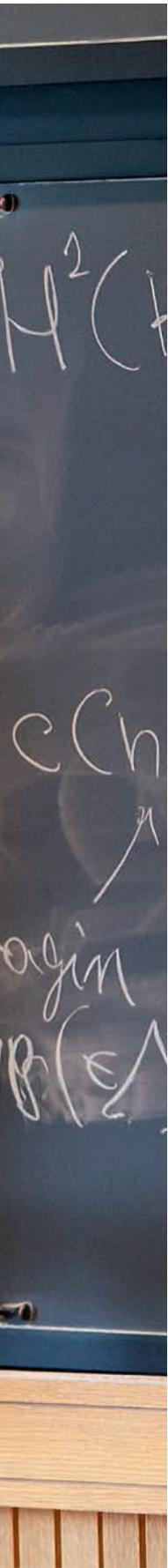
Veblen Research Instructor Ana Caraiani leads a Working Group on Algebraic Number Theory seminar organized by Richard Taylor, Robert and Luisa Fernholz Professor in the School of Mathematics.

School of Mathematics

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.

DURING THE 2015–16 ACADEMIC YEAR, the School of Mathematics conducted a special program on the classification of geometric structures on 3-manifolds. The program was led by Distinguished Visiting Professor Ian Agol of the University of California, Berkeley. Twenty Members took part in the program. Senior Members were Danny Calegari, Nathan Dunfield, John Etnyre, David Gabai, Jeremy Kahn, Vladimir Markovic, and Maryam Mirzakhani.

Background and Motivation

William Thurston proposed the classification of geometric structures on *n*-manifolds. While the spectacular geometrization theorem classified the geometric structures on 3-manifolds with compact isotropy group, i.e., locally homogeneous Riemannian metrics, there are many other interesting structures to investigate such as contact structures and foliations. The goal of the program was to investigate these geometric structures and relations between them. Other topics of interest related to geometric structures include profinite completions of 3-manifold groups, orderings of fundamental groups, mapping class groups of surfaces, gauge theory, PD(3) groups, minimal surfaces, cube complexes, and strengthened structures such as taut foliations, tight contact structures, pA flows, and quasi–geodesic foliations. Many of these structures do not even have a conjectural classification (in terms of topological restrictions and moduli), and specific examples are still being constructed.

Program Highlights

There were weekly seminars for the special program given by visitors and select Members. In addition, there were two workshops. There were about twenty visitors associated with the special program over the course of the year, not including workshop participants. Members also participated in weekly "mathematical discussions," and there was a reading seminar on gauge theory. Some results from the program included: The construction of "ubiquitous" closed quasi-fuchsian surfaces in cusped hyperbolic

3-manifolds by Members Daryl Cooper and David Futer, who made use of techniques of Mark Baker and Cooper, and Members Jeremy Kahn and Alex Wright. This answered a question posed by Agol as to whether one could cubulate cusped hyperbolic manifolds so that the cusp subgroups act elliptically.

Member Steven Frankel proved that quasi-geodesic flows may be deformed to pseudo-Anosov flows, answering a conjecture of Member Danny Calegari.

Short-term visitor Thomas Barthelme of the Pennsylvania State University, Visitor Sergio Fenley, and Frankel proved a rigidity result for hyperbolic automorphisms of 3-manifolds: these are conjugate to time-one maps of Anosov flows.

Member Joel Hass proved the existence of many hyperbolic 3-manifolds which fiber over the circle but cannot be foliated by minimal surfaces, addressing a long-standing open question of Visitor Karen Uhlenbeck.

Member Nathan Dunfield defined a class of triangulations of 3-manifolds (Δ-complexes plus some extra conditions called a laminar orientation), which imply the existence of a taut foliation. He then used this criterion to compute thousands more examples of manifolds which are not L-spaces and admit a taut foliation, bolstering a conjectured equivalence.

Member Balázs Strenner, in joint work with Dan Margalit and Oyku Yurttas, both of Georgia Institute of Technology, showed that there is a polynomial-time solution to the conjugacy problem in mapping class groups of a fixed surface.

In the spring, a reading group on gauge theory organized by Member Tye Lidman focused on understanding Peter Kronheimer and Tomasz Mrowka's preprint "Tait Colorings, and an Instanton Homology for Webs and Foams," which defined a new Floer homology invariant of certain 3-dimensional orbifolds (Kronheimer and Mrowka kicked off the 3-manifold seminar in the fall with back-to-back talks on this work). Participants included mathematicians from Princeton University, and talks were given by Lidman, Agol, Lucas Culler of Massachusetts Institute of Technology, Member and von Neumann Fellow Cagatay Kutluhan, Steven Sivek of Princeton University, and Uhlenbeck.

In general, there were many interactions between Members associated with the special program and other Members in the School, as well as academics from local universities including Princeton, Rutgers, and Temple.

Special Program Workshops
Two special program workshops were held during the first term. The first workshop, "Geometric Structures on

3-manifolds," took place from October 5–9, 2015. The goal of the October workshop was to explore the topology of hyperbolic 3-manifolds.

The second workshop, "Flows, Foliations, and Contact Structures," was held from December 7–11, 2015. This workshop encouraged interaction between mathematicians studying gauge theory, contact structures, foliations, and related topics such as symplectic topology.

Other School Activities
Senior Members Alex Eskin, Alex Kontorovich, Amir Mohammadi, Maryam Mirzakhani, Alan Reid, and Alex Wright, short-term visitors Elon Lindenstrauss and Alex Lubotzky, both of the Hebrew University of Jerusalem, and Alex Gamburd of the City University of New York participated in a small program in Teichmüller dynamics. Because this field is close to the topic of Agol's special year, the seminars in this very active area were attended by both groups of specialists. In particular, Eskin and Mirzakhani reported on their recent breakthroughs classifying invariant measures the Borel subgroup of the natural SL (2,R) action. Wright reported on his advances on classifying Veech surfaces and also on his work with Curtis McMullen and Ronen Mukamel, "Cubic Curves and Totally Geodesic Subvarieties of
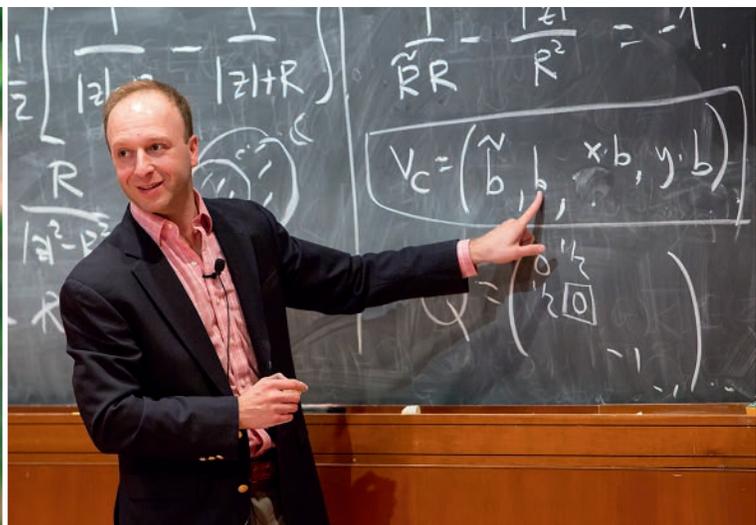
In May, a conference, "Analysis and Beyond: Celebrating Jean Bourgain's Work and Impact," was organized to bring together leading researchers working in different areas of analysis, such as former Member Larry Guth (left) and Member Alex Kontorovich (right), to discuss future research directions.

Ian Agol, Distinguished Visiting Professor in the School of Mathematics, led the special program on the classification of geometric structures on 3-manifolds. Additionally, Agol received the 2016 Breakthrough Prize in Mathematics for his contributions to low-dimensional topology and geometric group theory.

Moduli space." Mirzakhani reported on her recent work for counting points in orbits of the mapping class group (her results have since been applied by IBM von Neumann Professor **Jean Bourgain**, Professor **Peter Sarnak**, and Alex Gamburd in their work on the diophantine analysis of Markoff surfaces).

There was a one-day topology workshop at IAS in November organized by Randall Kamien of the University of Pennsylvania, Hermann Weyl Professor **Robert MacPherson**, and Konstantin Mischaikow of Rutgers, The State University of New Jersey. Speakers were Xiaming Mao, University of Michigan; Joel Moore, University of California, Berkeley; Dmitry Feichtner-Kozlov, Institut für Algebra, Geometrie, Topologie und deren Anwendungen, Universität Bremen; Facundo Mémoli, Ohio State University, and Michael Lesnick, Columbia University.

The 37th Marston Morse Memorial Lecture was given in March by Elon Lindenstrauss. He gave two talks on "Joint Equidistribution of Arithmetic Orbits, Joinings and Rigidity of Higher Rank Diagonalizable Actions" and the talk, "On Random Walks in

the Group of Euclidean Isometries."

In March, Andrei Okounkov of Columbia University delivered the 37th Herman Weyl Lectures. He gave three talks on "Weyl Groups and Their Generalizations in Enumerative Geometry."

In March, the School hosted the workshop "Thin Matrix Groups," organized by Lubotzky, and Members Reid and Kontorovich. The workshop focused on recent developments on the topic of the orbit method for thin matrix groups and strong approximation. In addition to reports on the latest developments, there were many excellent introductory lectures suitable for students and mathematicians from other areas (this topic has wide applications from number theory and group theory to topology and theoretical computer science).

In May, there was a conference, "Analysis and Beyond: Celebrating Jean Bourgain's Work and Impact," organized by Gamburd, Svetlana Jitomirskaya, Assaf Naor, Sarnak, Gigliola Staffilani, Terence Tao, and Péter Varjú. The objective of the conference was to bring together leading researchers working in different areas of analysis. In addition, they also surveyed

some of the remarkable and exciting developments and discussed future research directions.

Speakers were Professor Emeritus **Enrico Bombieri**; Emmanuel Breuillard, Université Paris-Sud 11; Haim Brezis, Rutgers, The State University of New Jersey; Ciprian Demeter, Indiana University; Alireza Salehi Golsefidy, University of California, San Diego; Larry Guth, Massachusetts Institute of Technology; Gil Kalai, The Hebrew University of Jerusalem; Carlos Kenig, The University of

FACULTY & EMERITI AWARDS

Jean Bourgain received the 2016 Antonio Feltrinelli International Prize for Mathematics by the Accademia Nazionale dei Lincei.

Phillip Griffiths received the Chern Medal by the International Mathematical Union at the International Congress of Mathematicians, in Seoul, South Korea.

Thomas Spencer received the 2015 Henri Poincaré Prize from the International Association of Mathematical Physics.
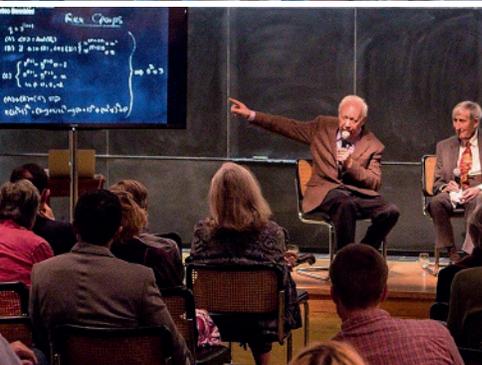
Chicago; Kontorovich; Sergei Konyagin, Lomonosov Moscow State University; Lindenstrauss; Vitali Milman, Tel Aviv University; Andrea Nahmod, University of Massachusetts, Amherst; Gilles Pisier, Texas A&M University, Wilhelm Schlag, The University of Chicago; Herbert H. Maass Professor **Avi Wigderson**; and Tamar Ziegler, The Hebrew University of Jerusalem.

The main mathematical areas covered by the conference were partial differential equations, mathematical physics and dynamical systems, analytic number theory, harmonic analysis, functional analysis and applications, sum-product phenomena, and spectral gap phenomena and applications.

The conference was widely attended with participants numbering close to two hundred. Many attendees considered it the "event of the year" in the general subject of analysis. The success of the event was due to the dynamic talks, the diversity of the material presented, and the especially interactive audience, which included a large number of young researchers.

In June, the Institute cohosted the annual Conference for African American Researchers in Mathematical Sciences (CAARMS). The group met for a day at Princeton University and then spent a day and a half at the Institute. The purpose of this annual conference is to bring together African American researchers and students in the mathematical sciences to learn about the research of their colleagues. CAARMS was founded by Professor William Massey of Princeton University, a former Member who continues to organize the conference each year. Among the many benefits of the School's involvement with this organization is to acquaint the CAARMS researchers with IAS and for

us to learn more about the research of the participants.

The joint Institute for Advanced Study/Princeton University number theory seminar continues to be one of the best attended seminars in the Princeton area. Alternating between IAS and PU, the seminar takes place at IAS every second week. In addition to new Members and postdocs reporting on their work, speakers who have made important recent breakthroughs attended from the United States and abroad. More senior local speakers also gave talks on recent developments: a good example was Bourgain's report on his proof together with Demeter and Guth of the Vinogradov mean-value conjecture.

The analysis seminar covered a broad range of topics, such as random matrix theory, classical and quantum Yang Mills theory, partial differential equations, and the geometry of nodal domains. Talks by Members included Paul Feehan on discrete critical values for Yang Mills; Robert Hough on the minimum modulus for covering systems; Juhi Jang on singular boundary conditions for a Kinetic Fokker–Planck equation; Dana Mendelson on probabilistic approach to nonlinear wave equations with rough initial conditions; and Tatyana Shcherbyna on applications of supersymmetry to the spectrum of random band matrices.

Professor Avi Wigderson leads the School's continuing Computer Science and Discrete Mathematics program, involving intensive research, often in cooperation with short-term Visitors and local scholars from academic and research institutions. There are two weekly seminars, which are archived along with participants' papers at www.math.ias.edu/csdm/15-16.

From top to bottom: David Futer (left), Elinor Lunder Founders' Circle Member, Abigail Thompson (center), Neil Chriss and Natasha Herron Chriss Founders' Circle Member, and Professor Peter Sarnak (right) at lunch in Simons Hall. Herbert H. Maass Professor Avi Wigderson attends a CSDM seminar led by Member Karim Adiprasito on problems surrounding Minkowski sums. Karen Uhlenbeck, Visitor, talks about the life and mathematics of Emmy Noether, one of the Institute's first Visitors from 1933–35. Scholars having tea in Simonyi Hall during a workshop on thin groups and super approximation. Professor Emeritus Enrico Bombieri (left) explains the mathematical beauty of the Ree Groups equation as part of a panel discussion about the Concinnitas Project, which may be viewed at https://video.ias.edu/concinnitas.

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THE GRAND HILBERT HOTEL

n   n+1

NO VACANCY BUT WE CAN MOVE SOME PEOPLE AROUND

ANA PIRES ON THE HILBERT HOTEL

In the beginning of the twentieth century, the University of Göttingen was one of the top research centers for mathematics in the world. The mathematician David Hilbert was a well-established professor there, and during the winter semester of 1924–25 he gave a series of lectures about the infinite in mathematics, physics, and astronomy. (These and other lectures by Hilbert are now published in book form by Springer-Verlag. The book is available at the IAS library in translation and in the original German.) In one of these lectures, he used an example to explain the crucial difference between finite and infinite sets: in a hotel with a finite number of rooms, if all rooms are occupied then there is no room for new guests. But in a hotel with infinitely many rooms this is not a problem: if all rooms are occupied and a new guest arrives, simply move each old guest one room over, leaving the first room vacant for the newly arrived guest. A similar argument lets us accommodate any finite number of, and even infinitely many, newly arrived guests. Read more at www.ias.edu/ideas/2016/pires-hilbert-hotel.

IAN AGOL ON VOLUMES OF HYPERBOLIC LINK COMPLEMENTS
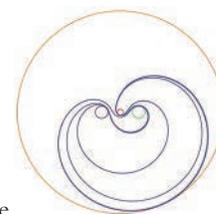
What is three-dimensional topology? Topology has its origins in the work of Henri Poincaré, who wanted to study the global structure of solutions to differential equations. Poincaré coined his theory analysis situs, but eventually it became known as the modern theory of topology.

Topology codifies the notion of continuity, meaning the identification of global properties of spaces that do not change under small (local) deformations without cutting or gluing. Two spaces are equivalent if one can be deformed to the other. Topologists are fond of saying that they cannot distinguish a doughnut from a coffee mug. They call such objects *homeomorphic*, which may be demonstrated by deforming one to the other as if they were made of clay. These objects are still intrinsically equivalent (*homeomorphic*), but cannot be deformed one to the other in three-dimensional space. We need a doughnut to sit differently in three-dimensional space.

Topologists call these doughnuts *knots*, referring to closed loops of string. How do we tell when two doughnuts (or knots) are not equivalent to each other by deformation (*isotopy*)? A knot complement is what is left when you remove a knot from space. For example, take an inner tube (surface of a doughnut), puncture it with a little hole, and turn it inside out. Read more at www.ias.edu/ideas/2016/agol-hyperbolic-link-complements.

JEAN BOURGAIN'S COAT OF ARMS

Jean Bourgain, IBM von Neumann Professor in the School of Mathematics, was bestowed the title of Baron by the Belgian government in July 2015. In association with the honor, Bourgain designed a coat of arms inscribed "In hope against hope." Bourgain explains elements of the design:

The essential part is the center where you see four mutually tangent circles that generate a so-called Apollonian circle packing (named after Apollonius of Perga, 2nd century B.C.). Such a packing is a fractal set in the plane, which one obtains if one keeps removing from the curvilinear triangles the tangent discs. In the Renaissance, these configurations were a subject of study for the French philosopher and mathematician René Descartes and later, in the twentieth century, for Frederick Soddy, who won the 1921 Nobel Prize in Chemistry. Soddy discovered the integral Apollonian packings (IACP) where the reciprocals of the radii are integers, for all circles in the packing. The theory of these IACP is today a rich mathematical research area, at the interface of hyperbolic geometry, dynamics, and number theory.

JO NELSON ON SYMPLECTIC AND CONTACT TOPOLOGY

Symplectic and contact topology is an active area of mathematics that combines ideas from dynamical systems, analysis, topology, several complex variables, and differential and algebraic geometry. Symplectic and contact structures first arose in the study of *classical mechanical systems*, allowing one to describe the time evolution of both simple and complex systems such as springs, planetary motion, and wave propagation. Understanding the evolution and distinguishing transformations of these systems led to the development of global invariants of symplectic and contact manifolds.

The equations of motion in classical mechanics are determined by the notion of a conserved quantity, *energy*. A related quantity is *action*, which is minimized by solutions to the equations of motion. For a closed system, such as the Kepler problem, whose solutions describe paths of planets orbiting the sun, the energy is the sum of the kinetic and potential energy in the system, and the action is given by the (minimized) mean value of kinetic minus potential energy. Symplectic and contact structures emerge as we investigate these systems by unpacking the information hidden in the notions of energy and action. Read more at www.ias.edu/ideas/2016/nelson-symplectic-topology.

Members Mauricio Romo (left), a researcher whose work lies at the interface between physics and mathematics, and Maxime Gabella (right), a theoretical physicist interested in string theory, in Bloomberg Hall

School of Natural Sciences

The School of Natural Sciences, established in 1966, supports research in broad areas of astrophysics, systems biology, and theoretical physics. Areas of current interest include investigating the origin and composition of the universe; conducting research at the interface of molecular biology and the physical sciences; and elementary particle physics, string theory, quantum theory, and quantum gravity.

EACH YEAR THE SCHOOL OF NATURAL SCIENCES appoints about fifty Members, the majority of them postdoctoral fellows, who are typically at the Institute for three years, some for up to five years. Collaboration is encouraged among Members who work in the School's many scientific areas—from molecular biology to mathematical physics.

From its earliest days, the Institute has been a leading center for fundamental physics, contributing substantially to many of its central themes, which now interrelate with astrophysics and biology. Areas of current interest in theoretical physics include elementary particle physics, string theory, quantum theory, and quantum gravity, and their relationship to geometry, theoretical and observational astrophysics, and cosmology.

Research in the School's astrophysics group encompasses astronomical systems from nearby planets to distant galaxies, from black holes to the dark matter and dark energy that dominate the evolution of the universe. There is a growing cross-fertilization between astrophysics and elementary particle physics, and the work of many Members and Faculty crosses the boundary between these two disciplines. Members in the astrophysics research group employ an array of tools from theoretical physics, large-scale computer simulations, and ground- and space-based observational studies to investigate the origin and composition of the universe, and to use the universe as a laboratory to study fundamental physics. At the Simons Center for Systems Biology, the tools of modern physics and mathematics are being applied to biological investigation, on varying scales, from molecular to organismic, and in some cases focusing on understanding disease processes.

The School's collaborative and pioneering approach to the sciences, which extends to the Institute's School of Mathematics, Princeton University, and the larger scientific community, continues to transform research in these fields and to open opportunities for powerful and important discoveries.

FACULTY

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Peter Goddard

Stanislas Leibler

Juan Maldacena
Carl P. Feinberg Professor

Nathan Seiberg

Scott Tremaine
Richard Black Professor

Edward Witten
Charles Simonyi Professor

Matias Zaldarriaga

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Freeman J. Dyson

Peter Goldreich

Arnold J. Levine

DAN KOMODA

Astrophysics

Probably the most remarkable discovery in physics in 2016 was the detection of gravitational waves by the Laser Interferometer Gravitational-Wave Observatory (LIGO). The signal, which lasted a few tenths of a second and was detected at facilities in Washington and Louisiana, is almost certainly due to the merger of two black holes of thirty to forty times the mass of the Sun.

The LIGO detection demonstrates that gravitational waves exist, though we already had extremely strong indirect evidence for them from the orbital decay of binary neutron stars. More importantly it shows that binary black holes exist, and that they merge often enough that over the next few years LIGO will be able to explore the complex structure of spacetime near the event horizons of merging black holes.

Binary black holes are presumably formed from binary stars: if the stars are sufficiently massive they collapse to black holes when their nuclear fuel is exhausted. However, the details of this process are not understood, and by measuring the abundance, masses, and spins of the merging black holes, LIGO will provide unique insights into the final stages of the evolution of massive stars.

Black-hole binaries merge because they steadily lose energy to gravitational waves. A binary similar to the one detected by LIGO could merge within the age of the universe if its initial separation was less than about 20 percent of the Earth–Sun distance. A challenge in forming such binaries is that the progenitor stars are larger than this at some phases of their history, suggesting that the larger star might swallow the smaller before the system formed two black holes. Richard Black Professor **Scott Tremaine**, who lectured on "Exoplanets" at the thirty-third Jerusalem Winter School in Theoretical Physics and was appointed the 2016 Halley Lecturer at the University of Oxford, and Princeton University

graduate student Kedron Silsbee have suggested an alternative mechanism in which the progenitor was a hierarchical triple system of massive stars. The inner binary orbit was initially too large for gravitational radiation to be effective, but tidal forces from the most distant companion shrank the orbit after the stars formed black holes. The model produces the required rate of binary black-hole mergers within the (very large) uncertainties.

The LIGO measurements show that the spins of the merging black holes are remarkably small. John N. Bahcall Fellow Doron Kushnir and Junior Visiting Professor Juna Kollmeier, along with Roni Waldman (The Hebrew University of Jerusalem) and Professor **Matias Zaldarriaga**, pointed out that the small spin is difficult to reconcile with several of the most popular formation models for the LIGO binary, such as the collapse of two stellar cores inside a massive common envelope, or models in which the black holes acquire mass from a surrounding accretion disk. A handful of additional detections with signal quality adequate to measure spins should strongly constrain the possible channels for creating black-hole binaries.

Systems Biology

The enormous diversity of phenomena in biology implies that a large diversity of topics is being tackled in biological research. In the tradition of theoretical approaches in physics, Professor **Stanislas Leibler** and Members working at the Simons Center for Systems Biology are striving to find some common mechanisms that could operate across different length and time scales and across different organizational levels of biological systems. For instance, at all scales, from molecular machines to the whole brain, living systems exhibit overwhelming complexity; but what part of this complexity is relevant to function? In other words, what is the dimension of the phenotype space in which biological functions evolve? It seems that in

some cases, the effective phenotypic space is a low-dimensional one.

For example, Michael Mitchell, former Visitor in the School, together with Leibler, has been continuing his analysis of mechanical properties of proteins based on published structural databases. This analysis, focused on the evaluation of internal strains, has indicated that deformations induced by ligand binding or thermal fluctuations localize around regulatory and active sites, and that a structured, low-dimensional path of strains is often visible between these sites. On larger scales, the behavior of microbial populations seems to be described quite well in a low-dimensional space, as demonstrated by Leibler and his collaborators at Rockefeller University. With BingKan Xue, a Long-term Member at Simons Center for Systems Biology, Leibler has been investigating from a theoretical perspective how low-dimensional internal representations of external fluctuating environments may emerge as relevant entities in the space of possible (microbial) survival strategies. Finally, with another Long-term Member, theoretical neuroscientist Yasser Roudi, Leibler is working to connect the theoretical description of collective behavior of biological systems with long-standing ideas from theoretical computer science.

Over the course of the past year, Professor Emeritus **Arnold Levine** has collaborated with former Long-term Member Benjamin Greenbaum, currently at the Icahn School of Medicine at Mount Sinai, and former Members Rémi Monasson and Simona Cocco, at the École Normale Supérieure, Paris, on a set of projects to study the role of non-coding RNA in engaging the immune system in cancers. The team used a set of methods, derived from statistical physics, to detect anomalous RNA produced in tumors due to their altered epigenetic state. These RNA share statistical properties that make them more similar to viral RNA than normal human RNA. The authors predicted that

Junior Visiting Professor Juna Kollmeier leads an IAS/Princeton University Joint Astrophysics Colloquium, "Cosmological Calorimetry: The Nature of the Intergalactic Medium and the Photon Underproduction Crisis."

these RNA are partially responsible for the immune response observed in tumors and worked with an immunologist, Nina Bhardwaj also at Mount Sinai, to validate these predictions. Levine also co-authored a review on the relationship between the tumor suppressor p53 and the regulation of repetitive element expression. Such elements make up half of our genome and can be aberrantly expressed in tumors. As the authors showed, such expression can cause the immune system to be engaged.

In collaboration with former Member Chang Chan, Levine has studied the contributions of genetics and stochasticity to variable phenotypes, including cancer risk in inherited cancer-predisposing syndromes by creating mouse models as well as mathematical modeling using epidemiological data. They have also studied the impact on gene regulation of inactivating mutations in two transactivation domains of tumor suppressor protein p53 under DNA damage stress.

After the Convergence Ideas Lab held at the Institute in February 2015, bringing together physicists and clinical oncologists to create interdisciplinary teams to address important questions in

clinical cancer research and propose novel techniques, paths, and approaches to answer these questions, four proposals were recommended to move forward. Stand Up To Cancer, Bristol-Myers Squibb, the Breast Cancer Research Foundation, the V Foundation, the Lustgarten Foundation, and the National Science Foundation will support this work. Professor Levine and the Simons Center for Systems Biology hosted a follow up meeting in April, at which the principal investigators (among whom are several former SCSB Members) gathered to review progress and share ideas. Another meeting, in late June, brought together the post-doctoral researchers who have joined the teams to give them an overview of all four of the research projects and to expose them to current research by leaders in the field.

Theoretical Physics

Over the past year, the work of Professor **Nima Arkani-Hamed** has taken a number of directions.

Unification and New Particles at the LHC

The apparent precise unification of gauge couplings at ultrahigh energies

near the String or Planck scales is the only quantitatively successful prediction of physics beyond the Standard Model, and works in the context of either low-energy or "split" supersymmetry. Preserving this success puts severe restrictions on possible matter and gauge sectors that might appear at collider-accessible energies. Arkani-Hamed, with collaborators, has enumerated all possible new gauge sectors that are compatible with unification, consisting of horizontal gauge groups acting on vector-like matter charged under the Standard Model. Interestingly, almost all of these theories are in the supersymmetric conformal window at high energies and confine quickly after the superpartners are decoupled. For a range of scalar masses compatible with both moderately tuned and minimally split supersymmetry, the confining dynamics happen at the multi-TeV scale, leading to a spectrum of multiple spin-0 and spin-1 resonances accessible to the LHC, with unusual quantum numbers and striking decay patterns.

N-naturalness

Partially motivated by the absence of new particles to date at the LHC,

Arkani-Hamed and collaborators proposed a qualitatively new, cosmological solution to the hierarchy problem. They introduced N copies of the Standard Model with varying values of the Higgs mass parameter. This generically yields a sector whose weak scale is parametrically removed from the cutoff by a factor of $1/N - \sqrt{1/N}$. Ensuring that reheating deposits a majority of the total energy density into this lightest sector requires a modification of the standard cosmological history, providing a powerful probe of the mechanism. Current and near-future cosmological experiments will explore much of the natural parameter space. Furthermore, supersymmetric completions, which preserve grand unification, predict superpartners with mass below 10 TeV, accessible to possible future 100 TeV colliders.

Locality and Unitarity From Singularities and Gauge Invariance
Much of Arkani-Hamed's work over

the past several years has centered on looking for more primitive principles from which the physics of spacetime and quantum mechanics can emerge. This problem becomes sharply posed in the context of formulating an understanding of scattering amplitudes where locality and unitarity are not assumed but are instead derived notions, a program that has been carried out most concretely and completely to date in the story of the "amplituhedron." With some collaborators, he has initiated an exploration of new connections between locality, unitarity, and scattering amplitudes that is orthogonal to these developments. They conjecture that the leading two-derivative tree-level amplitudes for gluons and gravitons can be derived from gauge invariance together with mild assumptions on their singularity structure; the locality and unitarity of amplitudes emerge from these requirements. Assuming locality in the form of singularities associated with cubic graphs,

they can prove this statement, showing that gauge-invariance in just $(n - 1)$ particles together with minimal power-counting uniquely fixes the amplitude. Unitarity in the form of factorization then follows from locality and gauge invariance. Arkani-Hamed and his colleagues also give evidence for the stronger conjecture, showing in non-trivial examples that gauge-invariance and power-counting alone demand a graph structure for singularities, and thus locality also emerges from the same starting point. Similar statements hold for theories of Goldstone bosons like the non-linear sigma model and Dirac-Born-Infeld, by replacing the condition of gauge invariance with an appropriate degree of vanishing in soft limits.

Canonical Forms from Positive Geometries
A central mathematical notion that has emerged in Arkani-Hamed's exploration of scattering amplitudes is that of a "positive geometry." Non-trivially

Attendees, including Marta Luksza (second from right), Janssen Fellow and Research Associate, and Victor Aleksandrov (right), Starr Foundation Member in Biology, make their way to the Governor's Conference on Effective Partnering in Cancer Research hosted by the Simons Center for Systems Biology on April 6.

associated with these geometries are certain canonical differential forms, which in the context of physics determine scattering amplitudes (and in other work in progress in other contexts, cosmological correlation functions as well). This subject is largely virgin mathematical territory, and so with his student and a mathematician collaborator, he has begun to develop it systematically. Along the way, they have found several beautiful new ways of computing a class of scattering amplitudes associated with the positive geometry of the simplest "amplituhedra," connecting the physics to analysis, geometry, and combinatorics in new ways.

Professor **Peter Goddard**, in collaboration with former Member Louise Dolan, has continued studying the scattering equations, originally introduced by David Fairlie and David Roberts in 1972. More recently, former Members Freddy Cachazo and Song He along with Ellis Yuan showed that formulae for the tree amplitudes for gauge theories and gravity in arbitrary dimensions can be expressed as sums over the solutions of these equations. In previous work, Dolan and Goddard gave similar formulae for the simplest case of massless scattering, scalar φ3 theory, and proofs of these formulae and those for pure gauge theory. They also found a polynomial form of the scattering equations for N particles as a system of $N-3$ homogeneous equations in $N-1$ variables, which, *inter alia,* gives a direct demonstration that the scattering equations typically have $(N-1)!$ solutions.

This work concerns the scattering equations appropriate to the Riemann sphere, as is appropriate for the description of tree amplitudes. These equations have a natural generalization to higher genus. Dolan and Goddard have studied the scattering equations on the torus, which are expected to be relevant to one-loop amplitudes for the massless theories described at tree level, and have obtained two equivalent forms of these equations, each of which is polynomial in N pairs of variables

Junior Visiting Professor Neal Dalal's (center) work is mainly in cosmology investigating neutrino effects on large-scale structure, cosmic voids, and gravitational lensing.

DON KOMODA

describing points on a (cubic) elliptic curve corresponding to the torus. As in the genus zero case, these formulations facilitate the algebraic solution of the torus scattering equations.

Work has also continued on using methods of algebraic geometry to study the projective variety defined by the polynomial scattering equations on the sphere, showing that it necessarily is zero-dimensional for nonzero values of the Mandelstam variables.

Goddard has also continued working with former Member Matthias Gaberdiel on writing an accessible but rigorous treatment of conformal field theory, in the form of a monograph or graduate textbook. He has continued serving on the boards of institutes in Jerusalem, São Paolo, Vancouver, Geneva, and Zürich. In addition, he has been working with Edward Corrigan on a memoir about the life and work of the physicist David Olive, who died in 2012.

Juan Maldacena, Carl P. Feinberg Professor, has been studying aspects of entanglement entropy according to the gauge gravity duality. Together with Princeton University student Aitor Lewkowycz and other collaborators,

he has proposed an expression for the modular Hamiltonian associated to a subregion of a field theory that has a gravity dual. The expression is very simple: it is given by the area of the boundary of the bulk region plus the bulk modular Hamiltonian. This is a simple consequence of similar formulas for the entanglement entropy.

More recently, with IAS Long-term Member Douglas Stanford, he has been studying a simple quantum mechanical model proposed by condensed matter physicists. This model has several features in common with near extremal black holes. Extremal black holes are black holes that have a very small Hawking temperature for a given horizon area. Such black holes develop a scaling symmetry for low-energy excitations. The model is solvable when the number of fermions is large. It displays an interesting time reparametrization symmetry that is both explicitly and spontaneously broken. This pattern of symmetries is also present for nearly extremal black holes. This explains features of black hole thermodynamics, as well as the effects of gravitational backreaction on infalling matter,

including the effects that can be interpreted as dual to chaotic dynamics in the microscopic theory. All of these features are completely governed by the symmetries and would be the same if the dual theory had a low string scale.

Professor **Nathan Seiberg** continued his explorations of quantum field theory—a framework combining quantum theory with Einstein's special theory of relativity. Quantum field theory is important in many branches of physics, including particle physics, string theory, condensed matter physics, and cosmology, and it leads to many insights in mathematics. There is no doubt that we are still very far from a clear and complete understanding of it.

An important class of field theories are scale invariant. In these cases, the outcome of an experiment does not depend on the overall size of the system. These special field theories occur in certain phase transitions of matter, they are crucial in the formulation of string theory, and they play an important role in other applications of quantum field theory. It is often the case that such theories depend on parameters, and it is of interest to explore that dependence. In collaboration with Jaume Gomis, Po-Shen Hsin, Zohar Komargodski, Adam Schwimmer, and Stefan Theisen, Seiberg explored the space of these parameters and in particular the metric on that space. Using the power of supersymmetry, they gave a new conceptual proof that in some cases

FACULTY & EMERITI AWARDS

Nathan Seiberg received the 2016 Dirac Medal from the International Centre for Theoretical Physics.

Edward Witten received the American Physical Society's Medal for Exceptional Achievement in Research and the 2016 Albert Einstein World Award of Science from the World Cultural Council.

that metric can be deduced from computing the partition function of the system when it is placed on a sphere. Their discussion clarified a number of confusing and subtle issues in these computations and led to many new results in two and four spacetime dimensions.

Another application of quantum field theory is to condensed matter physics. Here quantum field theory can describe the long distance behavior of matter in various phases. Seiberg and Edward Witten, Charles Simonyi Professor, explored a phase of matter known as a topological insulator. Often the bulk of such materials is insulating (it does not conduct electricity), but electric current can flow along their surface. It had previously been argued that under certain deformations the surfaces of these materials can become insulating, but they still exhibit peculiar phenomena. Seiberg and Witten found models where such phenomena take place in a transparent and simple way. This enabled them to understand reliably how the surface becomes insulating and how to properly characterize its nontrivial behavior. Along the way, they found and applied new consistency conditions in condensed matter physics.

Seiberg and Witten then followed up on this work with two condensed matter physicists, Todadri Senthil and Chong Wang. Together they found many examples of theories exhibiting a phenomenon known as duality. These are theories that appear to be different, but in fact they have the same physical consequences. There are many examples of such dual theories in particle physics, string theory, and condensed matter physics. Seiberg, Senthil, Wang, and Witten consolidated many such examples into one coherent picture and gave more evidence to its consistency. This gave a new perspective to many claims in the literature and generalized them in various directions. This also led to a new understanding of the dynamics of some puzzling systems in two spatial

dimensions. This analysis resolved how some symmetries, including time reversal symmetry, is realized in these systems. It also had applications to the theory of topological insulators and the problem of electrons in a strong magnetic field.

In the 2015–16 academic year, Charles Simonyi Professor **Edward Witten** focused in part on the study of topological phases of matter. This refers to materials that actually exist in the laboratory—many of them discovered recently—that have unusual properties that reflect a subtle interplay of topology and quantum mechanics. For Witten, this subject has a special fascination because methods of quantum field theory—originally developed for particle physics—are frequently important in describing these systems. Very often, things that are known because of their role in quantum field theory or string theory—and in some cases ideas that he or his colleagues at the Institute developed—turn out to be useful in understanding topological states of matter. Conversely, in some cases, physicists who are primarily motivated by these systems have had novel insights about relativistic field theory.

Witten wrote an elementary introduction to this subject that he hopes will be helpful for students. (This was based on lectures that he gave the previous summer during the 2015 IAS Prospects in Theoretical Physics program.) He also wrote several research articles in this general area. With Professor Nathan Seiberg, Witten analyzed the possible properties of the surface of an important type of material known as a topological insulator. They went on, with condensed matter physicists Chong Wang and Todadri Senthil, to a new perspective on the "dualities" or quantum equivalences between seemingly different states of matter. In separate work, he described the mathematics of topological insulators (and their close cousins, topological superconductors) more precisely than had been done before. This required a better understanding
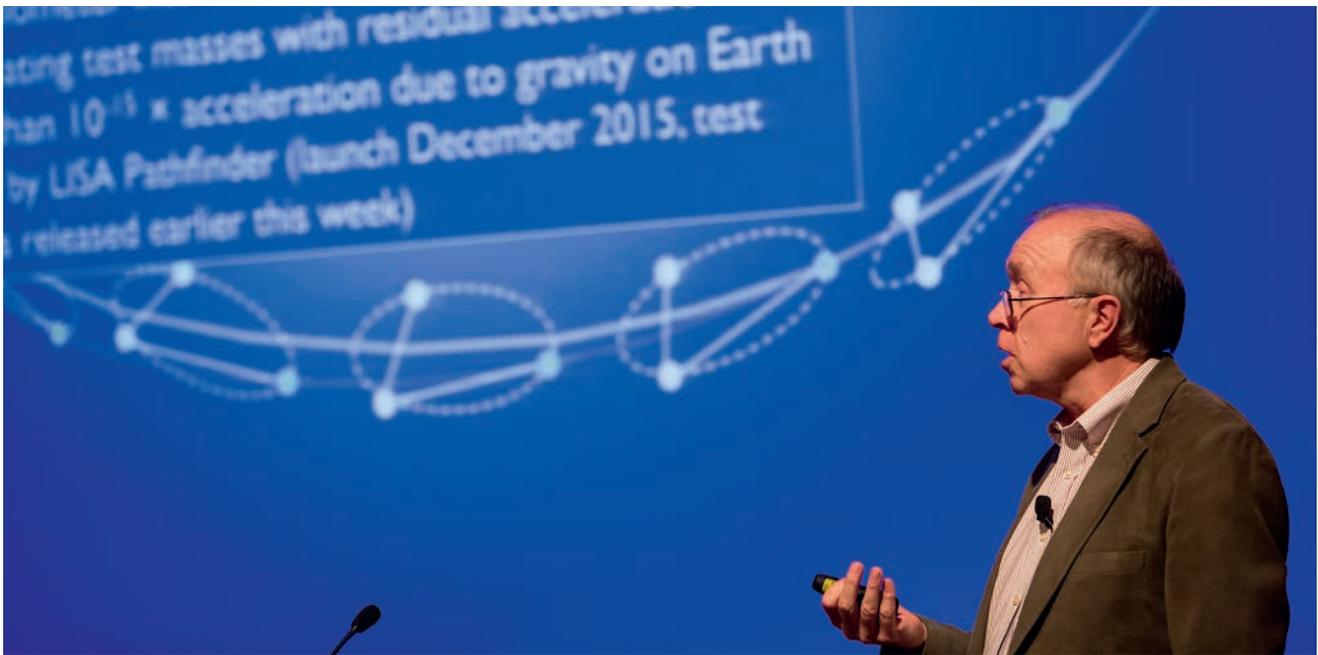
On February 11, 2016, physicists at the Laser Interferometer Gravitational-Wave Observatory announced the detection of gravitational waves, a key prediction of Albert Einstein's general theory of relativity. Richard Black Professor Scott Tremaine (above) participates in a public lecture and panel on the landmark discovery, along with Professor Matias Zaldarriaga, John N. Bahcall Fellow Doron Kushnir, and Junior Visiting Professor and Deborah Lunder and Alan Ezekowitz Founders' Circle Member Nadia Zakamska.

of a rather old quantum field theory insight known as the "parity anomaly," and he showed that a more complete understanding of this anomaly also led to a more complete understanding of some questions in string theory.

A second interest for Witten over the past year involved astronomical dark matter. The existence of dark matter in galaxies and clusters of galaxies is well-established, but its nature is completely unknown. The simplest theory of "cold" dark matter is satisfactory for many purposes, but there are hints that it does not give a satisfactory description of smaller "dwarf" galaxies or of the central portions of larger galaxies such as the Milky Way. In 2015–16, with Richard Black Professor Scott Tremaine and colleagues Jerry Ostriker and Lam Hui at Princeton and Columbia, Witten re-examined the idea that dark matter is quantum mechanically "fuzzy" in a way that could resolve some of the puzzles. This idea was originally proposed in 1999 by IAS Members Rennan Barkana, Andrei Gruzinov, and Wayne Hu. He has always found their

proposal fascinating because of the way that it potentially links up with particle physics ideas about very light particles known as "axions." It will be fascinating if the astronomical evidence converges on this possibility in the coming years.

Professor Emeritus **Stephen Adler** has continued to work on a model for electroweak and strong force unification that he proposed several years ago. The model, based on the gauge group SU(8), has equal numbers of bosonic and fermionic degrees of freedom, but has no supersymmetries when the gauge coupling is nonzero. The model cancels anomalies, and has the interesting feature that it is calculable, not just renormalizable. Work has focused on symmetry breaking in the model through the Colman-Weinberg mechanism, in which radiative corrections induce a symmetry breaking potential for the third rank antisymmetric tensor scalar field of the model. Contrary to original expectations, the model breaks the original symmetry not to SU(3) X SU(5), but rather to SU(3) X Sp(4).

Adler has made several conjectures

linking the model to composite quarks and leptons constructed from the fundamental fields of the model which play the role of preons. Because quarks and leptons have different preonic content in the model, the proton is stable against decay to the positron plus meson modes that have been searched for but not observed. Adler plans to continue his studies of the SU(8) model, focusing on anomaly-matching conditions and criteria for binding preons into composites.

Adler also wrote up his ideas on a frame-dependent origin of the so-called "dark energy" or cosmological constant component of the standard model of cosmology, as an essay submitted to the 2016 Gravity Research Foundation Essay Competition, in which it won the First Award. Further work on this is planned, focusing on the implications of Adler's proposal for gravitational radiation traversing cosmological distances. Additionally, Adler wrote papers on collinearity constraints for three-point scattering amplitudes, and on proposed tests for quaternionic (hypercomplex) quantum theories.

2015–16 MEMBERS AND VISITORS

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IBM Einstein Fellow

Left: Doron Kushnir (left), John N. Bahcall Fellow, worked on problems in high-energy astrophysics, including transitions in type 1a supernovae and non-thermal processes in galaxy clusters. *Right:* Jennifer Lin, Schmidt Fellow, explores bulk energy conditions from relative entropy, as well as bulk reconstruction, in a high-energy theory seminar held in December.

ALL PHOTOS DAN KOMODA

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Circle Member*

Left: Visiting Professor Hirosi Ooguri worked on problems in quantum field theory, quantum gravity, and string theory. *Right:* Professor Matias Zaldarriaga focused on understanding clues about the earliest moments of our universe encoded in the cosmic microwave background, the faint glow of radiation generated by the Big Bang, and in the distribution of matter in the late universe.

ALL PHOTOS ANDREA KANE

AMY RAMSEY
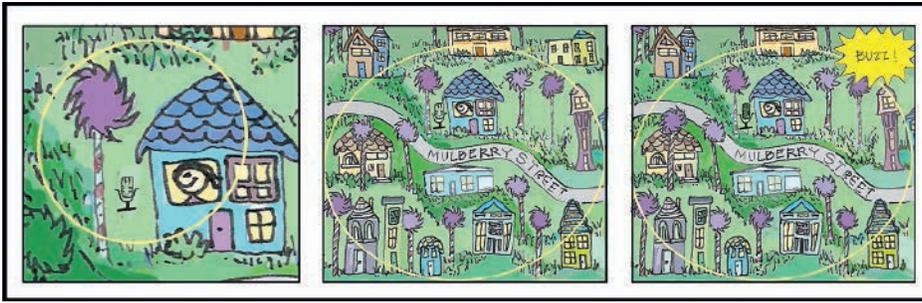
Doron Kushnir on the Astrophysics Behind LIGO's Detection

On September 14, 2015, the two detectors of the Laser Interferometer Gravitational Wave Observatory (LIGO) observed a gravitational-wave signal from the merger of a pair of black holes. While this impressive technological triumph was celebrated around the world, the astrophysical source that emitted the gravitational radiation reminded us to remain humble while making predictions in terra incognita.

Like any antenna, the LIGO detectors were tuned to a particular frequency and to reach some sensitivity. The frequency enables LIGO to detect only mergers involving a pair of massive objects, each of which is much smaller than one thousand kilometers. We only know of two classes of such objects: neutron stars (NSs) and black holes (BHs). The mass of an NS is roughly the mass of our Sun (one solar mass) and its radius is roughly ten kilometers (somewhat larger than Mount Everest). It is so dense that the velocity required to escape from its surface is not much smaller than the speed of light. The masses of BHs, on the other hand, vary significantly; while some of them have masses of millions or billions of solar masses with radii much larger than relevant for LIGO, some of them are smaller, with masses of roughly ten solar masses and radii of tens of kilometers, which satisfy LIGO's frequency requirements. The velocity required to escape from a BH surface is exactly the speed of light, as the name suggests.

To estimate the required sensitivity of the detectors, we must know how many pairs of each type (NS+NS, NS+BH, or BH+BH) exist in the universe and how long it would take for them to merge. This provides the rate of such mergers throughout the universe. The rarer such systems are, the larger the volume the detectors have to monitor, which in turn determines their sensitivity. Read more at www.ias.edu/ideas/2016/kushnir-ligo.

Juna Kollmeier on Cosmic Calorimetry

The next time you are enjoying the sun's warm rays, think of the tremendous voyage those photons have taken to get to you. Traveling, by definition, at the speed of light they left their point of origin about eight minutes previously in a furious haul to the Earth. Our detectors are the eyes and skin, which are sensitive to visible photons and infrared photons. Our bodies absorb photons at higher and lower energies, but the effects are only noticed after time and most often, unfortunately, for the damage they have done to our biologic makeup. In these sun-filled moments, it is important to remember that the overwhelming majority of the sun's photons will travel undisturbed for the entire future history of the universe, never meeting a planet, a person, a cell, or even another particle.

The story couldn't be more different for photons coming from the distant universe, which face the barrier of intergalactic hydrogen. Hydrogen is the most abundant atom in the universe, and it's also the simplest and most well understood. A photon with energy above 13.6 electronvolts (or 1 Rydberg, named after the Swedish physicist Johannes Rydberg) can tear the sole electron away from a hydrogen atom, and thus completely ionize it. Young massive stars, supernovae and other explosions, and accreting black holes are prodigious producers of these ionizing photons. Photons with less energy or a lot more energy simply
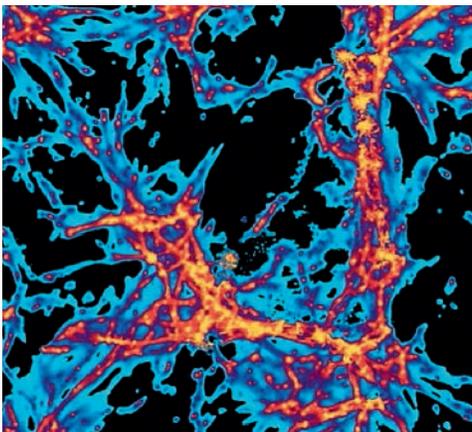
don't wreak such hydrogenic havoc. Below this energy, some photons have the specific energy required to excite the neutral hydrogen atom, jostling its sole electron to higher energy levels as opposed to removing it completely. The electrons are excited to a higher level and eventually decay down, cascading back to the ground state. Those special photons with energies at exactly 3/4 Rydberg produce "Lyman-alpha" excitation—the transition between the ground state and the first excited energy level (and named for the discoverer Theodore Lyman). These wavelengths are beyond our vision but for very distant sources where the expansion of the universe has redshifted them to visible wavelengths. It is precisely this interplay between the hydrogen in the universe and these photons that astronomers can use to figure out the nature of photon producers over cosmic time, as well as the fundamental parameters of our universe, such as its matter content. Read more at www.ias.edu/ideas/2016/kollmeier-cosmic-calorimetry.

## Freeman Dyson on Unfashionable Pursuits and Detecting Gravitational Waves

The Institute sometimes spends money on risky ventures, giving sustained support to people who work on unfashionable and dubious projects. One example of a risky venture was Einstein, who worked here for twenty years on unified field theories that never fulfilled his hopes. Another example was Joseph Weber, who worked on the design of gravitational-wave detectors that failed even more disastrously to fulfill his hopes.

Now we are celebrating the discovery of a real gravitational wave signal emitted from a collision of two massive black holes. The discovery paradoxically proves both Einstein and Weber to have been both right and wrong. Einstein was right when he predicted the existence of gravitational waves, wrong when he published a paper claiming to prove that black holes could not exist. Weber was right when he invented and constructed the first detectors of gravitational waves, wrong when he claimed that his detectors had detected real gravitational signals.

That is the way science works. Great scientists start new fields of science by making leaps in the dark. Nature decides which of the leaps is right and which is wrong. Very often, as in this case, the scientists who made the leaps are dead before Nature pronounces her verdict. The Institute can be proud that we supported both these great scientists with their risky ventures, more than half a century before Nature proved them right and wrong. Read more at www.ias.edu/ideas/2016/dyson-gravitational-waves.
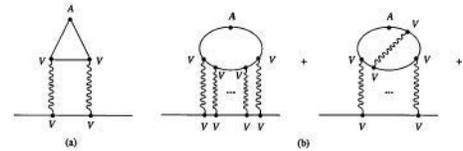
Stephen Adler on Anomalies and Counting Quark Degrees of Freedom

The article by Wally Greenberg in the spring 2015 *Institute Letter* mentions the anomalous axial current triangle diagram and describes its connection with counting quark degrees of freedom. This derives from a calculation I did when a Long-term Member at the Institute in 1968, so I thought it would be useful to describe in detail the work done by me and by Bill Bardeen at the Institute on axial-vector or chiral anomalies. At first, this work was considered to be quantum field theory esoterica, but it has turned out to have wide and continuing implications.

But first, what is an axial-vector? A vector is a directed arrow. If you hold your right hand up to a mirror with the thumb pointing towards the mirror, you will see as the image a left hand with the thumb pointing towards you. This reversal of direction is characteristic of a vector under inversion of the coordinate axes (in this case, inversion of the axis perpendicular to the mirror). But another behavior is possible: a directed arrow that remains the same under inversion of the coordinate axes. Such a quantity is called an axial-vector or pseudovector. Read more at www.ias.edu/ideas/2015/adler-anomalies.

Timothy Brandt on the Mystery of the Gamma Rays from the Galactic Center

Five years ago, NASA's Fermi Gamma-ray Space Telescope saw more gamma rays than expected from the area around the center of our galaxy. Many scientists suggest that the extra gamma rays could be from the annihilation of dark matter particles. This exotic interpretation, however, requires ruling out all other possible sources of the gamma rays. While working at IAS as Members in the School of Natural Sciences, Bence Kocsis and I have discovered an ideal candidate source.

Rapidly spinning neutron stars, called millisecond pulsars, emit gamma rays just like those seen by Fermi. They are known to be created in globular clusters, the dense stellar islands in the galactic halo beloved by astrophotographers. While the region around the galactic center has few globular clusters today, recent research suggests that it once had many. Nearly all of these clusters would have migrated inwards and dissolved, releasing their millisecond pulsars into space. The extra Fermi gamma rays may be the first direct evidence of our galaxy's once-abundant globular cluster population.

Globular clusters are extraordinary environments. A star in the core of a globular cluster core could have hundreds of thousands of neighbors within a couple of light years; the Sun's nearest neighbor is four light years away. The stars deflect one another gravitationally, driving some closer together and ejecting others out of the cluster entirely. Given enough time, the stars of a globular cluster will evaporate into space like molecules from a droplet of water. Read more at www.ias.edu/ideas/2015/brandt-gamma-rays.
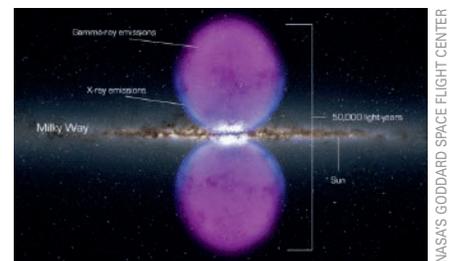
Didier Fassin, James D. Wolfensohn Professor, leads a workshop of international and interdisciplinary scholars as part of the Summer Program in Social Science, which aims to enrich and expand the realm of the social sciences through the confrontation of different intellectual traditions and perspectives.

School of Social Science

The School of Social Science, founded in 1973, is devoted to a multidisciplinary, comparative, and international approach to the analysis of societies and social change and the examination of historical and contemporary problems. Every year, the School designates an annual theme, although some Members are selected to pursue research in other areas.

HOW DO PEOPLE ESTABLISH DELIMITATIONS between and within societies, thus defining countries, nations, ethnic groups, social classes, et cetera? Such was the main question addressed in the 2015–16 theme seminar "Borders and Boundaries." Borders, as territorial and political limits within which states or chiefdoms exercise their sovereignty, and boundaries, as immaterial and symbolic limits that define the relationship between identity and difference, have long been treated as distinct scientific objects and analyzed in separate academic fields. Some scholars studied the relations between nation-states, while others analyzed the tensions between racial or religious groups. Some worked on immigration, whereas others focused on discrimination. Yet, as recent history shows, borders and boundaries are closely linked. The so-called refugee crisis in Europe is not only a demographic question as is often assumed; it has also to do with the way in which asylum seekers are regarded and rejected as undesirable others.

Indeed, if globalization has hardened rather than abolished borders, it has also produced new realities and anxieties concerning social boundaries. The migrants of yesterday have often become the second-class citizens of today. Rethinking the two domains together is thus of high relevance for the understanding of contemporary issues. Whether one considers the interactions between undocumented immigrants and Latino politics in the United States, the conflicts between neighboring countries involving oppressed minorities in Asia, the political repression of ethnic groups in Africa, or the transnational circulation of mafia and terrorist networks, the reconfiguration of borders and boundaries in both war and peace raises anew the old problems of state formation, nation-building, and social differentiation, which need to be explored in light of their genealogies and histories, colonial pasts and imperial legacies.

FACULTY

Didier Fassin
James D. Wolfensohn Professor

PROFESSORS EMERITI

Joan Wallach Scott
Michael Walzer

ANDREA KANE

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Members Chaim Gans (left) and Abdoulaye Gueye (right) attend a Borders and Boundaries seminar, the central theme for this academic year, which brought together scholars from all disciplines to investigate external limits and internal delimitations in relation to immigration, nationality, citizenship, and race.

How to analyze the continuities and discontinuities in the making of borders and boundaries? How to apprehend today's insecurities concerning immigration and identities in relation to economic and cultural tensions? How to interpret the consolidation of racial, ethnic, religious differences in a context of transnational circulation of goods and people? How are class and gender inequalities recomposed in the changing patterns of the nation-state? How do public policies, political parties, social movements, and non-governmental organizations address these issues? Around such questions, twenty-five scholars from six continents, working in twenty countries, and belonging to

FACULTY & EMERITI AWARDS

Didier Fassin received the 2016 Gold Medal of the Swedish Society for Anthropology and Geography.

Joan Wallach Scott received an honorary doctorate from Concordia University.

most disciplines of the social sciences, presented their research, both empirical and theoretical, and discussed classical as well as more recent works by anthropologist Fredrik Barth, sociologist Andreas Wimmer, philosopher Étienne Balibar, political scientist James Scott, and religious studies scholar Talal Asad, among others. As the year went on, differences between as well as convergences across fields were progressively identified; individual research was often redefined as a result of the interactions among Members; a collective project eventually emerged, which will be developed during later meetings. In parallel with the seminar, a film series on the theme was proposed to the Institute community, each being followed by a public discussion.

In addition to leading this program, **Didier Fassin**, James D. Wolfensohn Professor, continued his research on political and moral issues. He delivered the Tanner Lectures at the University of California, Berkeley, titled "The Will to Punish," bringing together a genealogical and ethnographic approach to punishment in various times and societies to answer the fundamental

questions: What is punishment? Why do we punish? Who gets punished? (an expanded version will be published by Oxford University Press). He was also invited to give the Adorno Lectures at the Goethe-Universität Frankfurt, for which he emphasized the contrast between the valuation of life as a supreme good and the unequal treatment of concrete lives in the contemporary world under the title: "Life: A Critical Anthropology" (to be published by Suhrkamp Verlag).

In parallel, following the publication of his diptych on the repressive state (*Enforcing Order*, on urban policing, and *Prison Worlds*, on the carceral condition, both at Polity), Fassin devoted substantial activity to engaging various publics around the corresponding issues in France: institutions such as the National School for the Judiciary, the National School for Corrections, and the Ministries of Justice and the Interior, as well as non-governmental organizations and general audiences, notably at the Avignon Festival. This led him to a broader reflection on the critical function of the social sciences in contemporary societies, the subject of the keynote lectures that opened the

sixth Conference on Ethnography and Qualitative Research in Bergamo and the fourteenth Biennial Conference of the European Association of Social Anthropologists in Milan, as well as the topic of Fassin's acceptance speech at the Royal Swedish Academy of Sciences where he was awarded the Gold Medal for Anthropology and Geography. To pursue this exploration at a global level, he gathered scholars working in various parts of the world in preparation of two collective volumes: one on the contribution of ethnography to the understanding of policing, forthcoming at Chicago University Press; the other on questions posed by the public presence of social scientists in diverse contexts, forthcoming at Duke University Press.

Finally, the Summer Program in Social Science for early career scholars from Latin America, the Middle East, and Africa was successfully carried on for a second meeting at the École des Hautes Études en Sciences Sociales, Paris, after a first session at the Insti-

tute in September 2015. A collective project, which tries to highlight the benefits and challenges for the social sciences of doing research across fields and countries, is in progress and should lead to an edited volume.

Professor Emerita **Joan Wallach Scott** finished a book that looks at the changing ways in which the notion of secularism has been used as a political weapon, from the anti-clerical campaigns of the nineteenth century to the current attacks on Islam. She is particularly interested in the ways in which gender figures in this discourse. Contrary to current claims that gender equality and secularism are synonymous, Scott finds that gender inequality was a foundational aspect for the representation of modern Western nation-states. When women won the vote, references to the so-called natural difference between the sexes were crucial for ideas of social organization and their implementation. Even the current emphasis, in the "clash of civilizations" polemic, on sexual emanci-

pation as a measure of the equality of women and men in the West, needs to be criticized for it covers over many enduring inequalities between the sexes—economic, social, and political. The book is a synthesis of several decades of scholarship by anthropologists, historians, and political theorists whose work is influenced by feminism, post-colonialism, post-structuralism, and psychoanalysis. It will be published next year by Princeton University Press (title still to be determined). This work and Scott's book, *The Politics of the Veil* (on controversies about Muslim women's dress in France), have made her an important commentator on continuing debates about Muslim immigrants in France and elsewhere in Western Europe.

In addition to her work on secularism, Scott writes about the philosophy and practice of history. She has been interested particularly in the intersections of psychoanalysis and history, asking how notions of the unconscious can be used to better understand the

Member Linda Bosniak, whose project explored the effects of unauthorized migration on the insular ethical orders of liberal states, leads a Social Science Lunch Seminar titled "Unapologetic: Wrongs, Rights, and Irregular Immigrants."

Left: Didier Fassin, James D. Wolfensohn Professor, and Nicola Di Cosmo, Luce Foundation Professor in East Asian Studies in the School of Historical Studies, hold a two-day workshop, "Non-State War Economies," to explore the economic dimensions of warfare. *Right:* Participants, including Carolyn Nordstrom (left) and Jonathan Benthall (right), examine the complex relationships between warfare and the economy from an interdisciplinary perspective.

actions of groups and individuals in the unfolding of what become historical events. Her keynote address to a conference of Swedish historians and philosophers of history in October 2015 was called "Psychoanalysis and the Indeterminacy of History." Her keynote to the Conference of Swiss Historians in June 2106 was titled "History and Power."

Scott lectured on the topics of secularism and history at a number of universities. She held the Chaire Suzanne Tassier-Charlier at the Université Libre de Bruxelles in March 2016. She gave the Kantorowicz lecture at Goethe-Universität Frankfurt, as well as talks at the Helsinki Collegium and Concordia University, Montreal, where she was the recipient of an honorary degree. Scott has a long-term position as an affiliated scholar in the History Department at the Graduate Center, The City University of New York.

Scott's professional activity led her to participate in a series of successful protests about changes in the research functions of the New York Public Library. She was recently appointed to the Advisory Council of the Research Libraries of the NYPL.

She continues to serve on the Committee on Academic Freedom and Tenure of the American Association of University Professors. In that role she was one of the authors of a long report on "The History, Uses and Abuses of Title IX," available at www.aaup.org/file/TitleIX_final.pdf. She is now working with a team on the question of the impact of national security concerns on academic freedom, particularly of scientific researchers.

Since the publication of *The Paradox of Liberation: Secular Revolutions and Religious Counter-revolutions* in 2015, Professor Emeritus **Michael Walzer** has continued to think about, talk with colleagues about, and lecture on the unexpected revival of religious faith and zealotry and its effects on political life. Religious zeal makes for war and terror, so this new interest connects with his old and ongoing engagement with questions about morality and the use of force. He finished this past year a long essay (forthcoming in *Daedalus*) on the use of drones by the U.S. government.

Conversations with Hugh Gusterson, a Member in 2014–15, who recently published a fine book on drones, were a big help in this project.

He has also been writing about, and may produce a book about, issues in American foreign policy—once again having to do chiefly with the use of force abroad: humanitarian intervention, regime change, etc. He will also write about our contribution to global justice and injustice and our engagement and non-engagement with the United Nations and the International Criminal Court. This work obviously overlaps with the School's theme for 2015–16: Borders and Boundaries. He joined in the work of the small seminar devoted to that theme and greatly enjoyed the discussions there— especially on immigration and the rights of refugees and migrant workers.

Walzer also traveled a lot in 2015– 16, lecturing at Georgetown, Brandeis, Duke, and Tel Aviv universities, and at the Cardinal Stefan Wyszynski University in Warsaw, at Boston College, the University of Wisconsin in Madison, and the U.S. Military Academy at West Point.

2015–16 MEMBERS AND VISITORS

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

Ari Adut
Sociology ✦ The University of Texas at Austin

Angel Aedo
Anthropology ✦ Pontificia Universidad Católica de Chile

Tugba Basaran
Political Science ✦ University of Kent ✦ *v*

Linda Bosniak
Law, Legal Theory ✦ Rutgers, The State University of New Jersey

Serguey Braguinsky
Economics, Development, Industry Behavior ✦ Carnegie Mellon University
Roger W. Ferguson, Jr., and Annette L. Nazareth Member

David Ciepley
Political Theory and Intellectual History ✦ The University of Denver
Frederick Burkhardt Fellowship funded by the American Council of Learned Societies

Brian Connolly
History ✦ University of South Florida

Anne-Claire Defossez
Sociology and Political Science ✦ Institute for Advanced Study ✦ *v*

Paulina Faba
Anthropology ✦ Universidad Alberto Hurtado ✦ *v*

Ilana Feldman
Anthropology and History ✦ George Washington University
Friends of the Institute for Advanced Study Member

Chaim Gans
Political Theory ✦ Tel Aviv University

Alice Goffman
Sociology ✦ University of Wisconsin–Madison

Carol C. Gould
Political Philosophy ✦ The Graduate Center, The City University of New York

Abdoulaye Gueye
Race Studies ✦ University of Ottawa

Tod G. Hamilton
Immigration, Health, and Race ✦ Princeton University
Deutsche Bank Member

Enze Han
Political Science ✦ University of London
Friends Founders' Circle Member

Firoozeh Kashani-Sabet
History ✦ University of Pennsylvania

Nannerl O. Keohane
Political Theory ✦ Princeton University ✦ *v, f*

Monica Kim
History ✦ New York University
AMIAS Member

Beth Lew-Williams
History ✦ Princeton University ✦ *v*

Duncan McCargo
Politics ✦ University of Leeds ✦ *v*

Maurizio Meloni
Sociology ✦ University of Sheffield ✦ *v, f*

Francesca Merlan
Anthropology ✦ The Australian National University
Wolfensohn Family Foundation Member

Basile Ndjio
Anthropology ✦ University of Douala

Paul Nugent
Political Science, History ✦ The University of Edinburgh

Rhacel Salazar Parreñas
Sociology ✦ University of Southern California
Deutsche Bank Member

Sylvain Perdigon
Anthropology ✦ American University of Beirut
Funding provided by the Florence Gould Foundation Fund

Ellen Stroud
History ✦ Bryn Mawr College ✦ *v, s*

Kristin Surak
Political Sociology ✦ University of London
Richard B. Fisher Member

Miriam Ticktin
Anthropology, Medicine, Theories of Feminism ✦ The New School for Social Research

Jennifer A. Widner
Politics, International Affairs ✦ Princeton University ✦ *v*

Left: AMIAS Member Monica Kim (left) worked on a trans-Pacific history of decolonization; Member Alice Goffman (right) investigated the formation of human bonds and human identity. *Right:* Ilana Feldman, Friends of the Institute for Advanced Study Member, worked to provide a comprehensive account of the Palestinian experience of living with humanitarian assistance across time and space.

BRIAN CONNOLLY ON THE BOURGEOIS FAMILY

Why do we still prohibit incest? Despite our sense that the incest taboo is universal, beyond question, it is in fact neither consistent nor universal. The prohibition of incest has existed across cultures and epochs, but it has varied in significant ways to perform specific political, social, and moral work at specific moments. And we should be willing to ask: what cultural work does our incest taboo perform?

To answer that question, we need to turn to the nineteenth-century United States, when the meaning of incest had to do with complicated concerns about the middle-class family. Now a cornerstone of U.S. political life, the middle-class family—in its modern form as a cultural center of feeling, class, and consumption—had not existed in previous eras. And this new bourgeois experience of family, in its sentimentality and its encouragement of effusive affection, was both valued as a source of national morality and feared as a dangerous nest of eroticism.

That sentiment and effusion are still with us now. This is because the modern subject—the individual whose political relevance both the right and the left, though in different ways, extol—is fundamentally conditioned by the bourgeois family. The bourgeois family cannot be a site of intimacy without the hovering threat of incest; thus, the modern individual, too, is never free from the threat of incest. Read more at www.ias.edu/ideas/2016/connolly-incest.

DIDIER FASSIN ON THE MORAL WORLD OF INSTITUTIONS

Moral economies represent the production, circulation, and appropriation of values and affects regarding a given social issue. Consequently, they characterize for a particular historical moment and a specific social world the manner in which this issue is constituted through judgments and sentiments that gradually come to define a sort of common sense and collective understanding of the problem. Thus, one can speak of the moral economy of asylum to characterize the transformations of values and affects around the question of refugees: positively valued and emotionally charged in the 1970s and 1980s, when persecutions by Latin American and Southeast Asian dictatorships turned them respectively into heroes or victims, the figure of the asylum seeker was gradually modified to make way in the 1990s for the image of the "fake refugee," stirring mistrust whether he or she came from the Democratic Republic of Congo or Chechnya, Bangladesh or Haiti. Obviously, it is less the objective reality of the persecutions that has evolved than the subjective approach that one has of it. In the same way, the moral economy of punishment involves the appropriateness and fairness of the sentence, which change over time: the rehabilitative paradigm of the sanction, which was dominant until the 1970s, has been replaced by a retributive one, but this punitive turn has disproportionately affected disadvantaged minorities by focusing repression on certain types of offenses, such as drug use, while overlooking others, such as financial crime. As can be seen, moral economies do not characterize a specific group or activity––we do not speak of the moral economies of judges or of justice––but of a social fact—here, asylum or punishment. Read more at www.ias.edu/ideas/2016/fassin-heart-of-the-state.

JILL LOCKE ON THE DEATH OF SHAME

This is is a book about a phenomenon I call *The Lament That Shame Is Dead*. *The Lament* is a nostalgic story of an imagined past that represents a longing for a mythical place and time when shame secured and regulated social life. It operates as a narrative of civilizational decline that expresses a fear of untethered, autochthonous, self-fashioning and self-authenticating subjects who wreak havoc on the social order and status quo. These subjects are named and disciplined as "shameless" threats who operate with an unfettered and unregulated desire to fulfill their own needs above and beyond any concern for others. They are positioned as lacking reflection, judgement, and regard for others, and characterized as natural forces—rushing rivers and raging seas that need civilization's dikes, levees, and canals to harness their nonreflective and uncivilized urges and passions. Read more at www.ias.edu/ideas/locke-democracy-and-death-shame.

JOAN WALLACH SCOTT ON THE VEIL AND FRENCH REPUBLICANISM

The official French preoccupation with the veil exceeds that of most other countries in Western Europe. In the Anglo-American world, even post–9/11, the veil is not seen as the flag of an insurrection; nor is the suppression of ethnic, racial, and religious differences a requirement for inclusion in the nation. A line from the American poet Walt Whitman captures something of the way diversity is celebrated here: "I am large, I contain multitudes," he wrote. This is not to say that there aren't terrible and enduring problems of discrimination based on differences (of race especially) in the U.S., just to note that differences are here recognized as part of the national heritage. They are tracked in the census, documented in official data collections, understood to be the source of our cultural richness. Hyphenated designations (African-American, Italian-American, Jewish-American, Muslim-American) signal acceptance of the fact that political and cultural identities can co-exist without damaging the essential unity of the nation. . . . It is vast inequalities of wealth and not communal affiliations that are dividing the electorate and our politicians in the U.S. right now.

For these reasons, the French obsession with the veil seems to many of us to have taken the form of what Emmanuel Terray diagnosed in 2004 as "political hysteria." The furious rhetoric, dire warnings, and punitive laws directed at articles of women's clothing (hijab, voile intégrale, abaya) seem excessive, if not unreasonable. The warning in 1989 from Alain Finkielkraut, Elisabeth Badinter, and others that failure to ban the hijab in schools would become "the Munich" of the Republic led some of us to wonder how these supposedly serious intellectuals could so overstate their case. In recent days, Laurence Rossignol's comment likening wearing the veil to submitting oneself to slavery elicited a similar response—did she have any idea of the history to which she was referring? Read more at www.ias.edu/ideas/2016/scott-veil-in-france.

DUNCAN MCCARGO ON MILITARY COUPS

The number of military coups and coup attempts since 1950 currently stands at around 530, an astonishing number. We tend to have a very specific notion of a military coup: a military coup is something that rarely takes place; is characteristic of particular kinds of countries—perhaps Latin American states; and belongs mainly to a limited historical period, the heyday of the coup era, during the late 1960s and early 1970s. We think of it as a form of regime change belonging to the post-independence period, when lots of new nations were having trouble consolidating their political institutions and finding ways to manage power transitions.

Most of our basic assumptions about coups do not stand up to close scrutiny. During their heyday, coups were as common a way of changing regime as any other method: power changed hands as frequently as through elections, and much more frequently than through popular uprisings or revolutions. . . . While the overall number of coups has declined in recent decades, since 2010 there have been about twenty-nine coups or coup attempts, around four or five a year . . . rather more than we might expect. Read more at www.ias.edu/ideas/2016/mccargo-coups.

ILANA FELDMAN ON PALESTINIAN REFUGEES

In 1948, approximately 750,000 Palestinians were displaced from their homes, going both to neighboring countries such as Jordan, Syria, and Lebanon, and to the parts of Mandate Palestine that became the West Bank and the Gaza Strip. These refugees have never been allowed to return to their homes, and today there are five million Palestinian refugees registered with the United Nations Relief and Works Agency for Palestine Refugees (UNRWA), the body charged with providing assistance to Palestinians across the Middle East, 1.5 million of whom live in one of the fifty-eight official UNRWA camps.

Humanitarian assistance to refugees was first provided by UN-commissioned "volunteer agencies": the American Friends Service Committee, the International Committee of the Red Cross, and the League of Red Cross Societies. As the longevity of the crisis became apparent, the UN established UNRWA as the agency responsible for providing assistance to Palestinians in the five primary fields of displacement. This assistance has changed significantly over the years as the emergency of flight ebbed into the chronic need of long-term displacement. Read more at www.ias.edu/ideas/2016/feldman-refugee-humanitarian.

The internationally acclaimed ensemble Music from Copland House performs with composer and clarinetist Derek Bermel (right), Artist-in-Residence (2009–13), at the Institute in March as part of the Edward T. Cone Concert Series led by current Artist-in-Residence Sebastian Currier.

Special Programs and Outreach

The Institute for Advanced Study is committed to the idea that science and learning transcend all geographic boundaries and scholastic disciplines, and that scholars and scientists are members of one commonwealth of the mind. It engages with the greater Princeton community through public lectures, concerts, and events, and extends its influence beyond academia through innovative programs designed to inspire and educate.

BEYOND THE WORK THAT TAKES PLACE in the four Schools, the Institute's scope is broadened and enhanced by its special programs, which contribute much to the vitality of the Institute.

The Program in Interdisciplinary Studies, directed by Professor Piet Hut, explores ways of viewing the world that span a range of disciplines from computational astrophysics, geology, and paleontology to artificial intelligence, cognitive psychology, and philosophy.

The Director's Visitor program enables the Director to invite scholars from a variety of fields, including areas not represented within the four Schools, to participate in the range of intellectual and social activities at the Institute. Beginning with Director J. Robert Oppenheimer (1947–66) and formalized by Director Harry Woolf (1976–87), the program has included nearly eighty scholars invited as Director's Visitors, including philosopher Paul Benacerraf, biochemist Paul Berg, political theorist Isaiah Berlin, former U.S. Ambassador William H. Luers, and writer Sylvia Nasar.

Throughout each academic year, the Institute offers lectures and special events that are open to the public, as well as the Edward T. Cone Concert Series and talks organized by the Institute's Artist-in-Residence. The Artist-in-Residence Program was established in 1994 to create a musical presence within the Institute community, and to have in residence a person whose work could be experienced and appreciated by scholars from all disciplines. Artists-in-Residence have included Robert Taub, Jon Magnussen, Paul Moravec, Derek Bermel, and, as of 2013, Sebastian Currier.

The Institute also engages in outreach beyond its local community. Since 1994, the IAS/Park City Mathematics Institute has integrated mathematics educators, researchers, and students through innovative programs. The Program for Women and Mathematics, sponsored jointly with Princeton University, provides substantive mathematics content as well as practical encouragement for women to pursue careers in the field of mathematics.

The School of Natural Sciences sponsors Prospects in Theoretical Physics, a two-week residential summer program held at the Institute for exceptionally promising graduate students and postdoctoral scholars. In 1999, the Institute created the Science Initiative Group, an international team of scientific leaders and supporters dedicated to fostering science in developing countries.

SPECIAL PROGRAMS

Program in Interdisciplinary Studies

Director's Visitors

Artist-in-Residence Program

OUTREACH

IAS/Park City Mathematics Institute

Program for Women and Mathematics

Prospects in Theoretical Physics

Science Initiative Group

DAN KOMODA

SPECIAL PROGRAMS

PROGRAM IN INTERDISCIPLINARY STUDIES

Visitors in the Program in Interdisciplinary Studies, led by Professor Piet Hut, explore diverse areas of scholarship.

Professor **Piet Hut**, head of the Institute's Program in Interdisciplinary Studies, is currently interested in the origin of cognition, or more precisely the spontaneous emergence of autonomous agents in complex systems. A wider interest is the general question about the relationship between a reductionistic analysis and a study of the nature of emergent properties in complex systems. And an over-arching interest is the notion of metacognition, or "knowledge of knowledge," in the form of multidisciplinary investigations of the circularity of cognition, from reflection in computer science to reflexivity in social science. In pursuit of these questions, Hut inter-acted with Visitors in his Program covering a range of areas—from astrophysics, astrobiology, geophysics, physics of complex systems, mathematics, statistics, geochemistry, biochemistry, bioinformatics, geomicrobiology, computer science, neuroscience, and artificial life to linguistics, pragmatics, sociology, political science, cognitive science, literature, art history, psychology, and philosophy.

At the Institute, Hut continued to lead the After Hours Conversations series, together with colleagues Didier Fassin from the School of Social Science, Patrick Geary from the School of Historical Studies, and Helmut Hofer from the School of Mathematics. These conversations were held in Harry's Bar twice a week for a period of two months during each term, and they were widely seen as an effective way to encourage inter-School communication.

Hut continued his association with ELSI, the Earth-Life Science Institute at the Tokyo Institute for Technology, as a foreign Principle Investigator and Councilor. Launched at the end of 2012, ELSI is focused on the study of the origins and evolution of life on Earth, as well as possibly on other planets, within the context of geology and astrophysics. In July 2015, Hut and collaborators at ELSI won a substantial grant, for which he was the Principle Investigator, from the John Templeton Foundation for the establishment of EON, the ELSI Origins Network. This network strengthens the connections between broadly interdisciplinary collaborations in the field of origins of life in particular, and of origins of life-like processes in general, in natural as well as social sciences.

In August 2015, Hut organized a three-week summer school in Kobe, Japan, titled "Towards an Integrative Approach to the Study of Awareness." The school's eighteen part-time teachers and twenty full-time students were drawn from a large range of disciplines, including neuroscience, cognitive science, artificial intelligence, artificial life, robotics, logic, high-performance computing, psychology, and philosophy, in particular phenomenology.

Hut continued his involvement with the B612 Foundation, dedicated to trying to protect the Earth from asteroid impacts. As a cofounder, he served for more than ten years as a Member of the Board, and he currently holds the position of Strategic Advisor.

DONATO GIOVANNELLI ON EARTH'S LAST FRONTIER

It should come as no surprise that our planet was nick-named "the pale blue dot" in the wake of the 1990s iconic photograph taken by *Voyager*. Approximately 68 percent of Earth's surface is covered with water—with an average depth of 3,800 meters, most of Earth's oceans are well within the realm of the deep sea and represent 95 percent of the global biosphere. Although the deep sea is the largest and least explored habitat on Earth, our knowledge of the biodiversity and functioning of the deep-sea ecosystem is incomplete at best. Read more at www.ias.edu/ideas/2016/giovannelli-last-frontier.

2015–16 VISITORS
f First Term ✦ *s* Second Term

Catherine Chung
Writing ✦ Adelphi University ✦ *s*

Henderson (Jim) Cleaves
Chemistry ✦ Carnegie Institution of Washington

Douglas Duckworth
Philosophy ✦ Temple University

Donato Giovannelli
Biology ✦ Rutgers, The State University of New Jersey

Reiner Grundmann
Sociology ✦ University of Nottingham ✦ *s*

Hyun Ok Park
East Asian Studies ✦ York University ✦ *f*

Michael Th. Rassias
Mathematical Analysis, Analytic Number Theory ✦ Universität Zürich

Edwin L. Turner
Astrophysics ✦ Princeton University

ARTIST-IN-RESIDENCE PROGRAM

Composer **Sebastian Currier**, the Institute's Artist-in-Residence, curated the 2015–16 Edward T. Cone Concert Series, which featured performances by American Brass Quintet; Rolf Schulte, James Winn, and Lucy Shelton; New Millennium Ensemble; and Music from Copland House and works such as Currier's *Cadence, Fugue, Fade*, György Kurtag's *Kafka Fragments*, Laura Schwendinger's *High Wire Act*, and former Artist-in-Residence Derek Bermel's *Death with Interruptions*.

Additionally, Currier organized the Artists Present Series, which included talks with writers Catherine Chung, Visitor in the Program in Interdisciplinary Studies, Zia Haider Rahman, and Tracy K. Smith, as well as musicians from the Signum Quartet.

During the 2015–16 academic year, two new works by Currier were premiered. The Boston Symphony performed *Divisions*, a work they co-commissioned, first in Boston at Symphony Hall, and then in New York at Carnegie Hall. The Cincinnati Symphony gave the world premier of *Flex*, a concerto for orchestra.

ANDREA KANE

ANDREA KANE

Top left: Tracy K. Smith reads from her memoir, *Ordinary Light*, as part of the Artists Present Series. *Bottom left:* Visitor Catherine Chung speaks on *The Tenth Muse*, a novel she worked on at IAS. *Right:* Sebastian Currier attends a farewell reception in his honor, marking his final year as the Institute's Artist-in-Residence.

DIRECTOR'S VISITORS

DAN KOMODA

The Institute and *Nautilus* magazine presented a special edition of the Categorically Not! conversation series, organized by Director's Visitor K.C. Cole, in the spring. Its theme, On the Edge, explored real and imagined boundaries, limits, and horizons through the lenses of physics, medicine, photography, and anthropology. For videos of the event's talks, visit www.ias.edu/ideas/2016/cole-categorically-not.

Journalist **K.C. Cole**, Professor at the University of Southern California, organized a special edition of the conversation series Categorically Not! at IAS. The theme of the event, as well as her research, was real and imagined boundaries, limits, and horizons within and between disciplines. Her work at IAS represented a sequel of sorts to her recent book, a biography of her mentor, the late Frank Oppenheimer.

Carmela Vircillo Franklin, Institute Trustee and Professor of Classics at Columbia University, engaged in reconstructing the lost *Liber Pontificalis [Book of the Popes]* of the twelfth century for a critical edition to be published in the *Monumenta Germaniae Historica*.

Theoretical physicist **Marc Henneaux**, Professor at the Université Libre de Bruxelles and Director of the International Solvay Institutes, pursued research on duality for higher-spin gauge fields and continued writing, in collaboration with Volodia Belinski, a book describing the BKL chaotic behavior of the gravitational field near a generic space-like singularity.

OUTREACH

PARK CITY MATHEMATICS INSTITUTE

Participants of PCMI gather in Park City, Utah, to explore "The Mathematics of Data." Those in attendance pursued individual courses of study while engaging in meaningful interactions with peers and those from different parts of the mathematical community.

The IAS/Park City Mathematics Institute (PCMI) is an intensive three-week summer outreach program, held annually in Park City, Utah, which includes several parallel programs and activities for different groups across the entire mathematical community. Established in 1991 by a grant from the National Science Foundation, PCMI has been an Institute program since 1994, and it is currently funded by major grants from the National Science Foundation, the National Security Agency, and Math for America, as well as grants from other private foundations and individuals. Rafe Mazzeo of Stanford University is the current Director of PCMI.

The component programs of PCMI include a workshop for mathematics researchers, nine mini-courses for graduate students, two lecture series for undergraduate students, a program for faculty from predominantly undergraduate institutions, a workshop for mentors of undergraduate students from underrepresented groups, a teacher leadership program for K–12 teachers, an international seminar on mathematics education, and a short course for high school students. Together these programs have over 325 participants. PCMI is a very successful effort toward vertical integration, with participants from different groups interacting with each other both scientifically and socially.

Each year, a different research theme is chosen, and a set of organizers who are specialists on the topic shape the program. The theme for 2016, "The Mathematics of Data," was organized by John Duchi (Stanford University), Anna Gilbert (University of Michigan), and Michael Mahoney (University of California, Berkeley). One of the major goals of the program was to bring together a diverse set of participants from mathematics, statistics, and computer science in both universities and industry, all of whom are contributing to various mathematical aspects of this field, to interact and learn from one another. PCMI 2016 also included a special program on the cutting-edge topic of differential privacy, which was funded by the Alfred P. Sloan Foundation. The participants in the Undergraduate Summer School attended lectures on "Data Analysis with Wavelets and Other Mathematical Tools" and "Visualizing and Learning the Structure in Data." The Undergraduate Faculty Program participants focused on writing a document to serve as a guide for best practices in creating a data science program in an undergraduate institution. The Workshop for Mentors focused on designing programs and identifying resources to support participation by undergraduates from underrepresented groups in mathematical research.

The Teacher Leadership Program hosted sixty-two teachers from across the country who came together to learn new mathematics, reflect on best pedagogical practices, and create new materials for their own and other classrooms. During the summer session, the participating teachers planned academic year activities to extend the impact of this program, including a series of weekend workshops to be held in Philadelphia; Greenville, South Carolina; Oakland; Los Angeles; and the Boston area during the 2016–17 school year.

The International Seminar, "Mathematics Education Around the World: Bridging Policy and Practice," brought together participants from Argentina, Bolivia, Guatemala, Honduras, Paraguay, and the United States to engage in a dialogue on the role of data analysis and quantitative literacy in the preparation of mathematics teachers and the development of secondary mathematics curricula. Three senior scholars were appointed for PCMI 2016, and they interacted with participants in all of the PCMI programs: Leon Bottou (Facebook AI Research); Peter Bühlmann (Eidgenössische Technische Hochschule Zürich); and former IAS Visitor (2001–02) Charles Epstein (University of Pennsylvania).

The research theme for PCMI 2017 will be "Random Matrices," organized by Alexei Borodin (Massachusetts Institute of Technology), Ivan Corwin (Columbia University), and Alice Guionnet (École Normale Supérieure de Lyon). To learn more about the IAS/Park City Mathematics Institute, including information about the application process, visit http://pcmi.ias.edu.

PROGRAM FOR WOMEN AND MATHEMATICS

The twenty-third annual Program for Women and Mathematics, "Curves, Loops, and Words in Geometry," was held at the Institute for Advanced Study from May 9–20, 2016. Program activities were sponsored by the Institute and Princeton University and generously supported by the National Science Foundation.

Program Manager Christine Taylor of Princeton University, Sun-Yung Alice Chang of Princeton University, and Dusa McDuff of Barnard College, all former Members in the School of Mathematics, organized the 2016 Program for Women in Mathematics, which included lectures and research seminars, panels, and colloquia. Beginner lectures were given on "Computer-Driven Questions and Theorems in Geometry," by Moira Chas of Stony Brook

Priyam Patel of Purdue University leads a research seminar on building hyperbolic metrics for closed curves.

University, and on "Closed Geodesics on Surfaces," by Nancy Hingston of the College of New Jersey and former Member in the School of Mathematics. Advanced lectures included "Counting and Growth" by Moon Duchin of Tufts University and "Structures on the Free Loop Space" by Nathalie Wahl of the University of Copenhagen.

In addition to lectures and research seminars, participants engaged in evening Women-in-Science seminars and panel discussions on topics including mathematical career options in and out of academia, mathematical professional development, work–life balance, and the personal and professional identities of a mathematician. Sandi Peterson, Institute Trustee, and Kathy Wengel, both of Johnson & Johnson, presented a special lecture sharing their life experiences in the modern corporate world; subsequently Johnson & Johnson Corporation has created up to ten summer internships in Data Science and Supply Chain Management for Women and Mathematics alumnae, beginning in the summer of 2017.

The twenty-third Program for Women and Mathematics focused on curves, loops, and words in geometry with lectures exploring a range of topics, including computer-driven questions and theorems in geometry; closed geodesics on surfaces; counting and growth; and structures on the free loop space. Participants also engaged in local outreach events, including a 5k community run and mathematical projects for students at Littlebrook Elementary School.

PROSPECTS IN THEORETICAL PHYSICS

Prospects in Theoretical Physics (PiTP) is an intensive two-week summer program designed for graduate students and post-doctoral scholars considering careers in theoretical physics. First held by the School of Natural Sciences in the summer of 2002, the PiTP program is designed to provide lectures and informal sessions on the latest advances and open questions in areas of theoretical physics.

The Institute's fifteenth annual PiTP summer program, "Computational Plasma Astrophysics," held July 18–29, 2016, on the Institute campus, was organized by Scott Tremaine, Richard Black Professor in the School of Natural Sciences, along with Anatoly Spitkovsky and Jim Stone of Princeton University and former Member Peter Teuben of the University of Maryland, and cosponsored by IAS, the Max–Planck–Princeton Center for Fusion and Astro Plasma Physics, and the Black Hole Accretion Theory and Computation Network (the Horizon collaboration). The lectures covered algorithms for numerical magnetohydrodynamics, kinetic simulations, radiation MHD, and MHD in dynamic spacetimes; applications to accretion disks, jets, star formation, and other systems; and topics such as visualization, software engineering, and emerging architectures for high-performance computing. The full PiTP 2016 program and videos of talks may be viewed at www.ias.edu/ideas/2016/pitp.

The Institute's fifteenth annual Program in Theoretical Physics, organized by Richard Black Professor Scott Tremaine, explored computational plasma astrophysics through a series of lectures on topics including algorithms for numerical magnetohydrodynamics, kinetic simulations, radiation MHD, and MHD in dynamic spacetimes; applications to accretion disks, jets, star formation, and other systems; and topics such as visualization, software engineering, and emerging architectures for high-performance computing. Videos of talks may be viewed at www.ias.edu/ideas/2016/pitp.

SCIENCE INITIATIVE GROUP

The Science Initiative Group (SIG), an IAS outreach program since 1999, fosters scientific research in developing countries. Since 2008, SIG has focused on the Regional Initiative in Science and Education (RISE), which supports African scientists pursuing advanced degrees through university-based networks on their home continent.

When RISE was established, a goal was to incubate the initiative at the IAS and ultimately transfer it to a secretariat in Africa—just as SIG's earlier project, the Millennium Science Initiative, was adopted by its host countries, Chile, Brazil, and Uganda. That transition is poised to happen; an African partner organization is preparing to assume responsibility for a new phase of RISE in 2017.

RISE participants explore fields of study across the sciences, with a range of focus that includes geohydrology, natural product technology, mechanical engineering, physics, chemisty, and more. Scientists and engineers conduct university-based, regional research in pursuit of advanced academic degrees.

Celebration

RISE held the capstone meeting of its eight years under SIG management in April in Nairobi. Nearly half of the 180 RISE doctoral and master's degree recipients and students, joined by academic leaders, gathered to share experiences, learn from one another, and imagine their futures as the architects of Africa's development.

The event opened with the premiere of a short film about RISE (bit.ly/rise_film). Featuring many of the scholars present, the film set the tone for the four-day gathering, which was a celebration and showcase; a networking opportunity where inter-university partnerships were reinforced and research collaborations established; and a forum to plan the next phase of RISE as a fully Africa-owned initiative.

Scholar Recognition

A highlight of the meeting was the announcement of the recipients, selected in a competition among RISE Ph.D. graduates, of $25,000 seed grants to develop research groups in African institutions. The five winners will form groups in bioinformatics at the University of Malawi; materials science at the Federal University of Technology, Akure, Nigeria; groundwater and surface water interactions at Rhodes University, South Africa; natural products at Makerere University, Uganda; and computation and modeling at the University of Dodoma, Tanzania.

Also announced were the winners of the inaugural AMMSI-Phillip Griffiths Prize, awarded to African mathematicians who have made outstanding contributions to mathematics or its applications. The awards, including a $6,000 cash prize, were made possible by a donation from Phillip Griffiths, Professor Emeritus in the School of Mathematics, to RISE affiliate network AMMSI (African Mathematics Millennium Science Initiative) upon receipt of the Chern Medal in 2014. The awards were conferred at a ceremony at the Institute.

For more information, visit https://sig.ias.edu.

RECORD OF EVENTS

School of Historical Studies

September 22
Medieval Seminar ✦ *First Term Introductions* ✦ **Patrick J. Geary**, Professor, School of Historical Studies

September 24
Historical Studies Public Event ✦ *Reading from "Wall-Flower"* ✦ **Rita Kuczynski**, German Novelist and Author

September 29
Medieval Seminar ✦ *Heito of Reichenau—"Visio Wettini"* ✦ **Albrecht Diem**, Syracuse University; Member, School of Historical Studies

October 1
Historical Studies Lunchtime Colloquia ✦ *First Term Introductions* ✦ **Jonathan Israel**, Andrew W. Mellon Professor, School of Historical Studies

October 5
East Asian Studies Seminar ✦ *The Court of Qubilai Qa'an: A Perso-Mongol Perspective* ✦ **Hodong Kim**, Seoul National University; Member, School of Historical Studies

October 6
Medieval Seminar ✦ *With Practice, Skill, and Cunning: Hunting, Culture, and Identity in the Frankish World, 315–987* ✦ **Eric Goldberg**, Massachusetts Institute of Technology; Member, School of Historical Studies

October 8
Historical Studies Lunchtime Colloquia ✦ *Whose Emotions? The Perception of Music as Autobiography* ✦ **Mark Evan Bonds**, The University of North Carolina at Chapel Hill; Member, School of Historical Studies

October 13
Medieval Seminar ✦ *Mary's Mountain: The Transformations of the Capitol in the Middle Ages, 500–1143* ✦ **Jason Moralee**, University of Massachusetts; Member, School of Historical Studies

October 15
Historical Studies Lunchtime Colloquia ✦ *Liberated Africans in the Indian Ocean World* ✦ **Matthew Hopper**, California Polytechnic State University, San Luis Obispo; Member, School of Historical Studies

October 19
East Asian Studies Seminar ✦ *On the Transnational Destruction of Cities: What Japan and the United States Learned from the Bombing of Britain and Germany in World War II* ✦ **Sheldon Garon**, Princeton University

October 21
Early Modern Europe Seminar ✦ *Appetite, Moral Order, and the Nature of Things: Hamlet and Hunting* ✦ **Rhodri Lewis**, University of Oxford; Member, School of Historical Studies

Islamicist Seminar ✦ *The Transmission of an Idea, the Genealogy of Its Sentence: The "World of Image" ('ālam al-mithāl) from the Twelfth Century up until Today* ✦ **Eric (L.W.C.) van Lit**, Yale University

October 22
Historical Studies Lunchtime Colloquia ✦ *Ancient Rome: The First Modern Economy* ✦ **Willem Jongman**, University of Groningen; Member, School of Historical Studies

October 26
East Asian Studies Seminar ✦ *Atatürk through Chinese Eyes* ✦ **Giray Fidan**, Princeton University

October 27
Ancient Studies Seminar ✦ *When Darkness Falls in the Roman Empire: Historical Aspects of the Night in the Imperial Period* ✦ **Angelos Chaniotis**, Professor, School of Historical Studies

Medieval Seminar ✦ *Reconstructing Noble Family Archives, Remaking Family Histories (Medieval and Early Modern Portugal): Recovered Voices, Newfound Questions* ✦ **Maria de Lurdes Rosa**, Universidade Nova de Lisboa; Member, School of Historical Studies

October 28
Islamicist Seminar ✦ *Studying the Transmission and Development of Ibn al-Nafīs's Physiology in the Mamluk-Era Commentaries on the Qānūn and the Mūjiz* ✦ **Nahyan Fancy**, DePauw University; Member, School of Historical Studies

October 29
Historical Studies Lunchtime Colloquia ✦ *In Ibn al-Nafīs's Shadow: Arabic Medical Commentaries during the Mamluk Period, 1260–1516* ✦ **Nahyan Fancy**, Depauw University; Member, School of Historical Studies

November 2
East Asian Studies Seminar ✦ *Thinking about Wars of Necessity and Wars of Choice: The Song Wars with the Tangut Xi Xia, ca. 1038–85* ✦ **Paul Smith**, Haverford College; Member, School of Historical Studies

November 3
Medieval Seminar ✦ *Tracing the Lineaments of a Lost Book* ✦ **Courtney Booker**, The University of British Columbia; Member, School of Historical Studies

November 5
Historical Studies Lunchtime Colloquia ✦ *For a Thousand Li There Were No Cooking Fires: Framing Devastation in the Ming-Qing Transition* ✦ **Kenneth Swope**, University of Southern Mississippi; Member, School of Historical Studies

November 10
Ancient Studies Seminar ✦ *Connoisseurs, Amateurs, Poseurs, and Other People Interested in Ancient Realia in Roman Anatolia* ✦ **Felipe Rojas**, Brown University; Member, School of Historical Studies

Medieval Seminar ✦ *Signs of Power: Astrology, Cosmology, and Philosophy in Late Medieval Prague* ✦ **Eric Ramírez-Weaver**, University of Virginia; Member, School of Historical Studies

November 12
Historical Studies Lunchtime Colloquia ✦ *Transformations of the Image in the Age of the Mass Media* ✦ **Jeffrey Barash**, Université de Picardie Jules Verne, Amiens; Member, School of Historical Studies

November 16
East Asian Studies Seminar ✦ *A Shang Village and What It Suggests about the Shang Economy* ✦ **Rod Campbell**, Institute for the Study of the Ancient World, New York University

November 17
Ancient Studies Seminar ✦ *"Templum caelesti iudicio saepe damnatum": The Exemplarity of the Capitolium's Cycle of Destructions in Late Antiquity* ✦ **Jason Moralee**, University of Massachusetts; Member, School of Historical Studies

Law and Colonialism Sub-group ✦ "*In the Colonies, Black Lives Don't Count": Official Anticommunism, Extraparliamentary Legislation, and Judicial Irregularity in Interwar Overseas France* ✦ **Meredith Terretta**, University of Ottawa; Member, School of Historical Studies

Medieval Seminar ✦ *Inscribed in the Book of Life: Transformation and Transmission of Citizenship in Merovingian Liturgical Sources* ✦ **Els Rose**, Utrecht University; Member, School of Historical Studies

November 18
Early Modern Europe Seminar ✦ *Insect Artifice: The Metamorphosis of Nature during the Dutch Revolt* ✦ **Marisa Bass**, Washington University in St. Louis; Member, School of Historical Studies

Islamicist Seminar ✦ *Shar'ification and Russification: How did Muslims Divide Their Inheritance in Imperial Russia?* ✦ **Rozaliya Garipova**, University of Pennsylvania; Member, School of Historical Studies

November 19

Historical Studies Lunchtime Colloquia ✦ *From Athens to Rome and from Alexandria to Baghdad: A Comparison between Two Cultural Transfers* ✦ **Carlo Scardino**, Heinrich-Heine-Universität Düsseldorf; Member, School of Historical Studies

November 24

Noble Houses and Their Archives Workshop ✦ *Opening Remarks* ✦ **Patrick J. Geary**, Professor, School of Historical Studies, and **Maria de Lurdes Rosa**, Universidade Nova de Lisboa; Member, School of Historical Studies ✦ *Archives and History: Implications of a Conceptual Divide* ✦ **Francis X. Blouin**, University of Michigan ✦ *Archives in the Historiography of Institutional Culture: Sites, Evidence, and the Need for Comparison* ✦ **Randolph C. Head**, University of California, Riverside ✦ *Historians, Archives, Sources: Old Questions, New Answers?* ✦ **Joseph Morsel**, Université Paris 1 Panthéon-Sorbonne ✦ *Noble Houses and Their Archives, Portugal, Fifteenth to Nineteenth Centuries: New Data, New Questions* ✦ **Maria de Lurdes Rosa**, Universidade Nova de Lisboa; Member, School of Historical Studies ✦ *Noble Households, the City, and Courtly Life in Late Medieval Portugal* ✦ **Rita Costa-Gomes**, Towson University ✦ *Social Status, Patrimony, and Order: Recent Studies on Nobel Households in Early Modern Portugal and Spain* ✦ **Pedro Cardim**, Universidade Nova de Lisboa ✦ *Uses of the Archive by Families of Portuguese Nobility, Fifteenth to Sixteenth Centuries* ✦ **Rita Sampaio da Nóvoa**, Universidade Nova de Lisboa ✦ *Questioning "National" Frontiers: Nobility Archival Practices in a Comparative Perspective (Portugal and Spain, Fifteenth to Nineteenth Centuries)* ✦ **Maria João A. e Sousa**, Universidade Nova de Lisboa ✦ *Le Programme ARCHIFAM, Enquête sur la Nature et les Fonctions des Archives de Famille en Péninsule Ibérique: Bilan et Perspectives* ✦ **Véronique Lamazou-Duplan**, Université de Pau et des Pays de l'Adour ✦ *Les Foix-Béarn-Navarre et Leurs Archives: Inventaires en Question* ✦ **Véronique Lamazou-Duplan**, Université de Pau et des Pays de l'Adour

December 1

Ancient Studies Seminar ✦ *Reconstructing the* Consularia Italica ✦ **Michael Kulikowski**, The Pennsylvania State University; Member, School of Historical Studies

Medieval Seminar ✦ *Reconstruction of the Tradition of the So-Called* Consularia Italica ✦ **Michael Kulikowski**, The Pennsylvania State University; Member, School of Historical Studies

December 2

Islamicist Seminar ✦ *Fixing the Past: Hafiz-i Abru and the "Jami` al-tawarikh"* ✦ **Stefan Kamola**, Princeton University

Law and Colonialism Sub-group ✦ *Subjects, Citizens, and Aliens in a Time of Upheaval: Naturalizing and Denaturalizing in Europe during the First World War* ✦ **Daniela L. Caglioti**, Università di Napoli Federico II; Member, School of Historical Studies

December 3

Historical Studies Lunchtime Colloquia ✦ *The Guts of the Matter: Intestinal Disease and Human History* ✦ **James Webb, Jr.**, Colby College; Member, School of Historical Studies

December 7

East Asian Studies Seminar ✦ *Amicitia Palatina: The Europeans' Networking at the Qing Court in the Long Eighteenth Century* ✦ **Eugenio Menegon**, Boston University; Member, School of Historical Studies

December 8

Medieval Seminar ✦ *General Group Discussion* ✦ **Patrick J. Geary**, Professor, School of Historical Studies

December 9

Art History Seminar ✦ *Making and Knowing in Early Modern Artistic Production* ✦ **Marisa Bass**, Washington University in St. Louis; Member, School of Historical Studies

Islamicist Seminar ✦ *Rogue Fictions: Thoughts on the Form, Circulation, and History of the Arabic Maqāma* ✦ **Maurice Pomerantz**, New York University Abu Dhabi; Member, School of Historical Studies

December 10

Historical Studies Lunchtime Colloquia ✦ *Archaeology in the Twilight of Utopia: Eisenstein and the Problem of Deep Time* ✦ **Michael Kunichika**, New York University; Member, School of Historical Studies

December 14

East Asian Studies Seminar ✦ *Mandalas of Mañjuśrī: The Creation of Manchu Imperial Monasteries During the Qianlong Reign* ✦ **Wen-shing Chou**, Hunter College, The City University of New York; Member, School of Historical Studies

December 15

Law and Colonialism Sub-group ✦ *The Crisis of Legitimacy of Muslim Marriage in Russia at the Turn of the Twentieth Century* ✦ **Rozaliya Garipova**, University of Pennsylvania; Member, School of Historical Studies

December 16

Art History Seminar ✦ *Hybridity and the Global Turn in Japanese Art History* ✦ **Christine Guth**, Royal College of Art; Member, School of Historical Studies

Early Modern Europe Seminar ✦ *The Shadow of a Reason: Edgar Allan Poe and the Forging of U.S. Science* ✦ **John Tresch**, University of Pennsylvania; Member, School of Historical Studies

December 17

Historical Studies Lunchtime Colloquia ✦ *Islamic Law and Citizenship in the Russian Empire* ✦ **Rozaliya Garipova**, University of Pennsylvania; Member, School of Historical Studies

January 11

East Asian Studies Seminar ✦ *Why Does the Nirvāṇa Sūtra Cause Controversies?* ✦ **Wendi Adamek**, University of Calgary; Member, School of Historical Studies

January 12

Medieval Seminar ✦ *Second Term Introductions* ✦ **Patrick J. Geary**, Professor, School of Historical Studies

January 13

Islamicist Seminar ✦ *Crossing Empires: Shi'i Pilgrims of the Sultan and the Shah* ✦ **Firoozeh Kashani-Sabet**, University of Pennsylvania; Member, School of Historical Studies

January 14

Historical Studies Lunchtime Colloquia ✦ *Second Term Introductions* ✦ **Jonathan Israel**, Andrew W. Mellon Professor, School of Historical Studies

January 19

Ancient Studies Seminar ✦ *"Privileged Slaves" in Classical Athens and the Legal Framework of Servile Labor* ✦ **Paulin Ismard**, University Paris 1 Panthéon-Sorbonne; Member, School of Historical Studies

Medieval Seminar ✦ *Theodore Mommsen, Louis Duchesne, and the* Liber pontificalis: *Classical Philology and Medieval Latin Texts* ✦ **Carmela Vircillo Franklin**, Columbia University; Director's Visitor

January 20

Islamicist Seminar ✦ *On the Authorship of the* K. Tathbīt dalā'il al-nubuwwa ✦ **Hassan Ansari**, Institute for Advanced Study; Member, School of Historical Studies

January 21

Historical Studies Lunchtime Colloquia ✦ *From Stone to Codex: Ancient Chronicle Traditions and Roman Imperial History* ✦ **Michael Kulikowski**, The Pennsylvania State University; Member, School of Historical Studies

January 25

East Asian Studies Seminar ✦ *Shipwrecks and Submerged Worlds: Excavation and Interpretation of New Discoveries from the South China Sea* ✦ **Hsueh-man Shen**, Institute of Fine Arts, New York University

January 27

Early Modern Europe Seminar ✦ *Trees on the Go: Botany, Germany, and the British Empire, 1750–1800* ✦ **Thomas Biskup**, University of Hull; Member, School of Historical Studies

S. T. Lee Lecture ✦ *The Transmission of Knowledge in Abbasid Iraq: Problems in the Interpretation of the "Catalogue" of Ibn al-Nadim* ✦ **Devin Stewart**, Emory University

January 28

Historical Studies Lunchtime Colloquia ✦ *Human Rights in an Age of Contestation: French Third Worldism, African Revolution, and Capital Punishment ca. 1970* ✦ **Meredith Terretta**, University of Ottawa; Member, School of Historical Studies

February 1

East Asian Studies Seminar ✦ *Encounters with the National Language from Chongqing to Taiwan, 1937–49* ✦ **Janet Chen**, Princeton University; Member, School of Historical Studies

February 2

Law and Colonialism Sub-group ✦ *"Law Is One Thing, and Virtue Is Another": Vernacular Readings of Law and Legal Process in 1920s Shanghai* ✦ **Bryna Goodman**, University of Oregon; Member, School of Historical Studies

Medieval Seminar ✦ *Recyclage et l'ontologie de l'objet dans les textes du bas Moyen Âge: l'exemple de Marseille* ✦ **Daniel Smail**, Harvard University; Member, School of Historical Studies

February 4

Historical Studies Lunchtime Colloquia ✦ *Rule and Practice in Early Medieval Monasticism* ✦ **Albrecht Diem**, Syracuse University; Member, School of Historical Studies

February 8

East Asian Studies Seminar ✦ *Finance, Sovereignty, and Freedom: Stock Exchanges in the Early Chinese Republic* ✦ **Bryna Goodman**, University of Oregon; Member, School of Historical Studies

February 9

Ancient Studies Seminar ✦ *Elpis in the Epigraphic Evidence: From Deceived Expectations to a Persuasion Strategy* ✦ **Angelos Chaniotis**, Professor, School of Historical Studies

Medieval Seminar ✦ *Reading and Teaching the Rule in the Age of Monastic Reform: A Study of the* Glosae a diuersis doctoribus collectae in regula sancti Benedicti abbatis ✦ **Matthieu H. van der Meer**, Syracuse University

February 10

Islamicist Seminar ✦ *Problems in the Translation of Greek Agricultural Terms into Arabic* ✦ **Carlo Scardino**, Heinrich-Heine-Universität Düsseldorf; Member, School of Historical Studies

February 11

Historical Studies Lunchtime Colloquia ✦ *When the Lightning Struck Pompeii: Reconstructing Local Religious Knowledge from Archaeological Debris* ✦ **William van Andringa**, Université Lille 3; Member, School of Historical Studies

February 16

East Asian Studies Seminar ✦ *The View from the Boundary: Provinces and Court in Post-Rebellion Tang China* ✦ **Tineke D'Haeseleer**, Princeton Society of Fellows

Law and Colonialism Sub-group ✦ *Using the Figure of "The Jew": French Feminist Politics in Global Empires and the Metropole* ✦ **Carolyn Eichner**, University of Wisconsin–Milwaukee; Member, School of Historical Studies

February 17

Art History Seminar ✦ *Shaping the Spatial Cosmologies of the Iranian Expanse* ✦ **Matthew Canepa**, University of Minnesota; Member, School of Historical Studies

Early Modern Europe Seminar ✦ *Luther's Jews* ✦ **Stephen Burnett**, University of Nebraska-Lincoln; Member, School of Historical Studies

February 18

Historical Studies Lunchtime Colloquia ✦ *Insect Artifice: The Origins of Entomology in the Early Modern Netherlands* ✦ **Marisa Bass**, Washington University in St. Louis; Member, School of Historical Studies

February 22

East Asian Studies Seminar ✦ *Posthuman Maos: The Invisible Real and the Hidden Dimensions of Chinese Science Fiction* ✦ **Mingwei Song**, Wellesley College; Member, School of Historical Studies

February 24

Art History Seminar ✦ *Nature and the Enemies of Art in the Early Modern Netherlands* ✦ **Marisa Bass**, Washington University in St. Louis; Member, School of Historical Studies

February 25

Historical Studies Lunchtime Colloquia ✦ *Arameans in Assyria in the Ninth to Seventh Centuries B.C.E.* ✦ **Martti Nissinen**, University of Helsinki; Member, School of Historical Studies

February 29

East Asian Studies Seminar ✦ *The Rabbis of Hanlin: Jesuits and the Question of Religion in China, or Another Look at the Birth of World History* ✦ **Zvi Ben-Dor Benite**, New York University

March 1

Ancient Studies Seminar ✦ *The Importance of Graeco-Arabic Studies for Classics: The Example of the Arabic Translations of Ancient Agricultural Writers* ✦ **Carlo Scardino**, Heinrich-Heine-Universität; Member, School of Historical Studies

Medieval Seminar ✦ *Danger and Death* ✦ **Eric Goldberg**, Massachusetts Institute of Technology; Member, School of Historical Studies

March 2

Islamicist Seminar ✦ *With Blessings and Metaphors: The Medieval Islamic Art of the Object* ✦ **Margaret Graves**, Indiana University; Member, School of Historical Studies

March 3

Workshop on Squeezes of Ancient Greek Inscriptions in the Collection of the Institute for Advanced Study ✦ **Angelos Chaniotis**, Professor, School of Historical Studies ✦ **Gianfranco Agosti**, Universitá degli Studi di Roma, La Sapienza; Member, School of Historical Studies ✦ **Joshua Billings**, Princeton University; Member, School of Historical Studies ✦ **Paulin Ismard**, University Paris 1 Panthéon-Sorbonne; Member, School of Historical Studies ✦ **Michael Kulikowski**, The Pennsylvania State University; Member, School of Historical Studies ✦ **Martti Nissinen**, University of Helsinki; Member, School of Historical Studies ✦ **Giuseppe Pezzini**, University of Oxford; Member, School of Historical Studies ✦ **Felipe Rojas**, Brown University; Member, School of Historical Studies ✦ **William Van Andringa**, Universitè Lille 3; Member, School of Historical Studies

Historical Studies Lunchtime Colloquia ✦ *The Documentary Archaeology of Late Medieval Europe* ✦ **Daniel Smail**, Harvard University; Member, School of Historical Studies

March 4

Epigraphic Friday ✦ *An Assyrian Prayer to Nabû* ✦ **Martti Nissinen**, University of Helsinki; Member, School of Historical Studies ✦ *Kallias the Egyptian: The Athenian Insurrection and Its Broader Political Context* ✦ **Nino Luraghi**, Princeton University ✦ *Writing Fiction Like Inscriptions* ✦ **Jason Moralee**, University of Massachusetts; Member, School of Historical Studies ✦ *An Altar for a New Hero* ✦ **Christopher Jones**, Yale University ✦ *After the War: Remembering the Civic Career of a Veteran from Patara* ✦ **Andrew Lepke**, Universität Münster ✦ *New Inscriptions from Aphrodisias* ✦ **Angelos Chaniotis**, Professor,

School of Historical Studies ✦ *New Inscriptions from Gadara/Umm Qais* ✦ **Florian Forster**, Ludwig-Maximilians–Universität München ✦ *Urban Prefects and Bronze Tesserae* ✦ **Michael Kulikowski**, The Pennsylvania State University; Member, School of Historical Studies ✦ *Two New Verse Inscriptions from Syria and Egypt* ✦ **Gianfranco Agosti**, Universitá degli Studi di Roma, La Sapienza; Member, School of Historical Studies ✦ *A New Bilingual Inscription of Augustan Date, in Nabataean and Sabaic, from Sirwah in Yemen* ✦ **Glen W. Bowersock**, Professor Emeritus, School of Historical Studies

March 7
East Asian Studies Seminar ✦ *Orphaned, Interned, Captured: The (In)visibilities of Film Archiving in Asia* ✦ **Steven Chung**, Princeton University

March 8
Medieval Seminar ✦ *Permeable Membranes: Astronomy and Appropriation in the Leiden* Aratea ✦ **Eric Ramírez-Weaver**, University of Virginia; Member, School of Historical Studies

March 9
Islamicist Public Lecture ✦ *Constructing Lineages: Jews, Muslims, and Nasab in the Middle Ages* ✦ **Arnold Franklin**, Queens College, The City University of New York

March 15
Ancient Studies Seminar ✦ *Was There a Greek Enlightenment?* ✦ **Joshua Billings**, Princeton University; Member, School of Historical Studies

Medieval Seminar ✦ *Forgetting, Remembering, and Stealing the First French Text* ✦ **Courtney Booker**, The University of British Columbia; Member, School of Historical Studies

March 16
Art History Seminar ✦ *Signs of Import and Influence in the Astrological Compendia Made for Wenceslas IV* ✦ **Eric Ramírez-Weaver**, University of Virginia; Member, School of Historical Studies

Early Modern Europe Seminar ✦ *Cambridge Companion to the Dutch Golden Age: Radical Thought* ✦ **Jonathan Israel**, Andrew W. Mellon Professor, School of Historical Studies

March 17
Historical Studies Lunchtime Colloquia ✦ *Nobel Laureate Niko Tinbergen's Work on Autism: A New Stratigraphic View of Human Nature* ✦ **Marga Vicedo**, University of Toronto; Member, School of Historical Studies

March 21
East Asian Studies Seminar ✦ *Poetics of Nature, Fetish for Consumption: On the Medicinal Uses of Human Milk in Imperial China* ✦ **He Bian**, Princeton University

March 22
Medieval Seminar ✦ *The Thorny Laurel: Tullia d'Aragona, Woman of Letters* ✦ **Julia Hairston**, University of California, Rome; Member, School of Historical Studies

March 23
Islamicist Seminar ✦ *The Year of Mawânîd: Tax Collection, Local Patricians, and Central Administration under the Early Abbasids* ✦ **Hossein Kamali**, Barnard College, Columbia University

March 24
Historical Studies Lunchtime Colloquia ✦ *The "Satanic" Sublime and Milton's English Enlightenment Readers* ✦ **Noël Sugimura**, Georgetown University; Member, School of Historical Studies

March 25
Squeeze Collection Workshop for Columbia University Graduate Students ✦ *Squeezes of Ancient Greek Inscriptions in the Collection of the Institute for Advanced Study* ✦ **Angelos Chaniotis**, Professor, School of Historical Studies

March 28
Art History Seminar ✦ *Cinematic Incubation: Markopoulos and the Temenos* ✦ **Rebekah Rutkoff**, Institute for Advanced Study; Member, School of Historical Studies

East Asian Studies Seminar ✦ *Visions of No-Sense: Zen Kōans and the Arts of Fifteenth Century Japan* ✦ **Thomas W. Hare**, Princeton University

March 29
Ancient Studies Seminar ✦ *Pagan Gods Changing in Roman Gaul (Third to Fourth Centuries A.D.): Archaeological Facts and Religious Changes in Late Antiquity* ✦ **William Van Andringa**, Universitè Lille 3; Member, School of Historical Studies

Medieval Seminar ✦ *Regula cuiusdam ad virgines, a Seventh-Century Rule for Nuns* ✦ **Albrecht Diem**, Syracuse University; Member, School of Historical Studies

March 30
Art History Seminar ✦ *Style and Meaning in Late Antique Art* ✦ **Sarah Bassett**, Indiana University; Member, School of Historical Studies

March 31
Historical Studies Lunchtime Colloquia ✦ *Language of Imperialism, Language of Liberation: Telling Stories in the Kanak-French Colonial Encounter* ✦ **Carolyn Eichner**, University of Wisconsin–Milwaukee; Member, School of Historical Studies

April 5
Ancient Studies Seminar ✦ *Paideia and Society in Late Antiquity: The Case of Verse Inscriptions* ✦ **Gianfranco Agosti**, Universitá degli Studi di Roma, La Sapienza; Member, School of Historical Studies

Medieval Seminar ✦ *The Documentary Archaeology of Late Medieval Europe* ✦ **Daniel Smail**, Harvard University; Member, School of Historical Studies

April 13
Squeeze Collection Workshop for Students from Rutgers, The State University of New Jersey ✦ *Squeezes of Ancient Greek Inscriptions in the Collection of the Institute for Advanced Study* ✦ **Angelos Chaniotis**, Professor, School of Historical Studies ✦ **Stephen Tracy**, The American School of Classical Studies at Athens

Early Modern Europe Seminar ✦ *The Thorny Laurel: Tullia d'Aragona, Woman of Letters* ✦ **Julia Hairston**, University of California, Rome; School of Historical Studies

Islamicist Seminar ✦ *Creating Publics: Newspapers and Newspaper Culture in Qajar Iran* ✦ **Negin Nabavi**, Montclair State University; Member, School of Historical Studies

April 27
Law and Colonialism Sub-group ✦ *Where Did the Ākhūnds Go? Islamic Legal Experts and the Breakdown of the Traditional Islamic Legal Order in the Russian Empire* ✦ **Rozaliya Garipova**, University of Pennsylvania; Member, School of Historical Studies

May 10
Exploratory Meeting: The Transformation of the Carolingian World ✦ *Welcome and presentations of some impressions from the first meeting in Vienna, and some ideas and perspectives* ✦ **Patrick J. Geary**, Professor, School of Historical Studies ✦ **Helmut Reimitz**, Princeton University, **Conrad Leyser**, University of Oxford, **Hans Hummer**, Wayne State University and **Timothy Newfield**, Princeton University ✦ *Presentations of some impressions from the first meeting in Vienna, and some ideas and perspectives* ✦ **Eric Goldberg**, Massachusetts Institute of Technology, **Jennifer Davis**, The Catholic University of America, **Warren Brown**, California Institute of Technology, **Max Diesenberger**, Austrian Academy of Sciences ✦ Breakout groups ✦ *Christianity and the Church* ✦ **Conrad Leyser**, University of Oxford ✦ *Politics and Political Culture* ✦ **Eric Goldberg**, Massachusetts Institute of Technology ✦ *Legal Order and Normative Pluralism* ✦ **Jennifer Davis**, The Catholic University of America, and **Warren Brown**, California Institute of Technology ✦ *Economy and Environment* ✦ **Timothy Newfield**, Princeton University ✦ *Social Dynamics and Politics of Identity* ✦ **Hans Hummer**, Wayne State University ✦ *Culture and Communication* ✦

Patrick Geary, Professor, School of Historical Studies ✦ **Helmut Reimitz**, Princeton University

Exploratory Meeting: The Transformation of the Carolingian World ✦ Breakout groups (continued) ✦ *Christianity and the Church* ✦ **Conrad Leyser**, University of Oxford ✦ *Politics and Political Culture* ✦ **Eric Goldberg**, Massachusetts Institute of Technology ✦ *Legal Order and Normative Pluralism* ✦ **Jennifer Davis**, The Catholic University of America, and **Warren Brown**, California Institute of Technology ✦ *Economy and Environment* ✦ **Timothy Newfield**, Princeton University ✦ *Social Dynamics and Politics of Identity* ✦ **Hans Hummer**, Wayne State University ✦ *Culture and Communication* ✦ **Patrick J. Geary**, Professor, School of Historical Studies ✦ **Helmut Reimitz**, Princeton University ✦ *Reports and Discussion* ✦ moderators: **Patrick J. Geary**, Professor, School of Historical Studies, and **Helmut Reimitz**, Princeton University

Law and Colonialism Sub-group ✦ *Bodies of Law in Algerian Colonization* ✦ **Judith Surkis**, Rutgers, The State University of New Jersey

May 27
The Maqāma and Its Readers: A Workshop on Arabic and Hebrew Literatures ✦ *Opening Remarks and Welcome* ✦ **Sabine Schmidtke**, Professor, School of Historical Studies, and **Maurice Pomerantz**, New York University Abu Dhabi; Member, School of Historical Studies ✦ *Two Picaresque Tales and a Yellow Cow: Black Humor and Qurānic References in Hamadhānī's* al-Maqama al-Mawṣiliyya ✦ **Bilal Orfali**, American University of Beirut ✦ *Hamadhānī's Maqāmāt and Its Readers: The Examples of Ibn Nāqiyā and al-Ḥarīrī* ✦ **Maurice Pomerantz**, New York University Abu Dhabi; Member, School of Historical Studies ✦ *The Ethical Dimension of al-Ḥarīrī's Maqāmāt: The View from Al-Panjdīhī's Commentary* ✦ **Matthew Keegan**, New York University ✦ *The Anti-Shiism of al-Hamadhānī and the Maqāmāt* ✦ **Devin Stewart**, Emory University ✦ *Response to the Anti-Shiism of al-Hamadhānī and the Maqāmāt* ✦ **Hassan Ansari**, Institute for Advanced Study; Member, School of Historical Studies ✦ *Judah al-Ḥarīzī as a Bilingual Author* ✦ **Jonathan Decter**, Brandeis University ✦ *Religious Themes in the Tahkemoni by Judah al-Ḥarīzī* ✦ **Raymond P. Scheindlin**, Jewish Theological Seminary ✦ *Monks in Love, Greedy Priests, and Muslim Tricksters: On the Image of the Other in Post-Andalusī Hebrew Maqāmāt* ✦ **Orit Bashkin**, The University of Chicago ✦ *Closing Remarks* ✦ **Sabine Schmidtke**, Professor, School of Historical Studies, and **Maurice Pomerantz**, New York University Abu Dhabi; Member, School of Historical Studies

Non-State War Economies International Workshop ✦ *Framing War Economies* ✦ **Nicola Di Cosmo**, Luce Foundation Professor in East Asian Studies, School of Historical Studies ✦ *War Economies: A General Framework* ✦ **Didier Fassin**, James D. Wolfensohn Professor, School of Social Science ✦ *Material Motives? Resource Wars, Raw Materials, and War Economies* ✦ **Philippe Le Billion**, The University of British Columbia ✦ *Beyond the Shadows: Digital Non-State Actors in Cyberspace* ✦ **Carolyn Nordstrom**, University of Notre Dame ✦ *Warlordism in Historical Perspective* ✦ **Clémence Pinaud**, Indiana University ✦ *The War Economy of Asian Nomadic Empires in Ancient and Medieval Times* ✦ **Nicola Di Cosmo**, Luce Foundation Professor in East Asian Studies, School of Historical Studies ✦ *Warlords and Renaissance Italy* ✦ **William Caferro**, Vanderbilt University ✦ *Warlords and the Economy in Early Twentieth Century China* ✦ **Edward McCord**, The George Washington University ✦ *Non-State Actors and State Building* ✦ **Bernard Haykel**, Princeton University ✦ *Taxation and Governance by Armed Groups* ✦ **Zachariah Mampilly**, Vassar College ✦ *Somalia: The Challenges of Security in a Collapsed State* ✦ **William Reno**, Northwestern University ✦ *Social Implications of the War Economy in South Sudan in the Second (1983–2005) and Third (2013–) Civil Wars* ✦ **Clémence Pinaud**, Indiana University ✦ *A Repercussion from the Reagan Doctrine: The Spooking of Islamic Charity* ✦ **Jonathan Benthall**, University College London

June 4
Non-State War Economies International Workshop ✦ *Profits and Losses in War and Post-War* ✦ **Didier Fassin**, James D. Wolfensohn Professor, School of Social Science ✦ *An Illiberal Interpretation of War: Wartime Political Economy and "Development" in Colombia, Mozambique, and Myanmar* ✦ **Christopher Cramer**, University of London ✦ *Reconstruction's Deconstruction: The Promise and Profits of a Remade "Post-War" Afghanistan* ✦ **Catherine Lutz**, Brown University ✦ *The Effects of Conflict on Migration and the Returns to Migration in Colombia* ✦ **Ana María Ibáñez Londoño**, Universidad de los Andes

June 9
"Allographic Traditions" among Arabic-Speaking Christians, Jews, and Samaritans: Workshop on the Writing Systems of Garshuni, Judeo-Arabic, and Samaritan-Arabic ✦ *Opening Statement* ✦ **Sabine Schmidtke**, Professor, School of Historical Studies ✦ *Turks with a "wāw"* ✦ **E. Efe**, Rutgers, The State University of New Jersey ✦ *The Phenomenon of "Code Switching" in the Written Discourse of Judaeo-Arabic Texts* ✦ **Meira Pollack**, Tel Aviv University ✦ *Samaritan Traditions* ✦ **Eve Krakowski**, Princeton University ✦ *Allographic Writing in the Samaritan Manuscript Culture between Arabic and Hebrew* ✦ **Stefan Schorch**, Martin-Luther-Universität Halle-Wittenberg ✦ *Arabic and Syriac in the Samaritan Version of*

Saadya Gaon's Translation of the Pentateuch ✦ **Tamar Zewi**, University of Haifa ✦ *Syro-Turkic Garshuni Traditions* ✦ **Hassan Ansari**, Institute for Advanced Study; Member, School of Historical Studies ✦ *Poems in Turkic and Persian Garshuni from the Mongol Time* ✦ **Anton Pritula**, The State Hermitage Museum ✦ *Remarks on Some Turkic Garshuni Texts Preserved in an Eighteenth Century Chaldean Prayer Book* ✦ **Jonas Karlsson**, Uppsala University ✦ *Judeo-Arabic Traditions* ✦ **Tamar Zewi**, University of Haifa ✦ *Jewish Identity and Hebrew Script: the Case of Judaeo-Arabic* ✦ **Esther-Miriam Wagner**, University of Cambridge ✦ *Judeo-Arabic as a Legal Language: The View from the Cairo Geniza* ✦ **Eve Krakowski**, Princeton University

June 10
"Allographic Traditions" among Arabic-Speaking Christians, Jews, and Samaritans: Workshop on the Writing Systems of Garshuni, Judeo-Arabic, and Samaritan-Arabic ✦ *Syriac Garshuni Traditions* ✦ **Andrea Piras**, Università di Bologna ✦ *Syriac Garshuni: Patterns of Distribution in Different Branches of Syriac Christianity* ✦ **Grigory Kessel**, Philipps-Universität Marburg ✦ *From Garshuni to "Garshunography": Garshuni Systems in the Early Modern and Modern World* ✦ **George A. Kiraz**, Princeton University ✦ *Syro-Arabic Garshuni Traditions* ✦ **Grigory Kessel**, Philipps-Universität Marburg ✦ *The Use of Garshuni by the Melkites from a Cultural-Historical Perspective* ✦ **Johannes Pahlitzsch**, Johannes Gutenberg-Universität Mainz ✦ *Why and When to Write in Garshuni: Observations Based on Some Mainstream and Peripheral Cases* ✦ **Hidemi Takahashi**, The University of Tokyo ✦ *Spain* ✦ **George Kiraz**, Princeton University ✦ *Linguistic and Cultural Uses behind Aljamiado Texts* ✦ **Nuria Martínez de Castilla Muñoz**, Universidad Complutense Madrid ✦ *Spanish Islam in Arabic Script: Language, Identity, and Community Boundaries in the Literature of Religious Polemics of the Muslims of Late Medieval Christian Iberia* ✦ **Mònica Colominas Aparicio**, University of Amsterdam, *Arabic and Coptic* ✦ **Johannes Pahlitzsch**, Johannes Gutenberg-Universität Mainz ✦ *The "Violet Fragment": Revisiting a Strange Case of Arabic in Greek Letters* ✦ **Ronny Vollandt**, Ludwig-Maximilians-Universität München ✦ *Allographic Experiments at the Cradle and at the Grave of Coptic Written Culture* ✦ **Sebastian Richter**, Freie Universität Berlin

June 20
Digital Ottoman Platform II Workshop ✦ *Welcome and Opening Remarks* ✦ **Robbert Dijkgraaf**, Director and Leon Levy Professor, Institute for Advanced Study, and **Sabine Schmidtke**, Professor, School of Historical Studies ✦ *What We've Done, What We're Doing, Where We're Going* ✦ moderator: **Sabine Schmidtke**, Professor, School Of Historical Studies ✦ *Capsule Report on DOP 1* ✦ **Amy Elizabeth Singer**, Tel Aviv University ✦ *Individual Projects Review* ✦ **Chris Gratien**, The Harvard Academy for International Area

Studies ✦ *Report on the State of the Gazetteer* ✦ **Mark Połczyński**, Marquette University, **Michał Połczyński**, Georgetown University, and **Nir Shafir**, University of California, Los Angeles ✦ *Multiple Languages, Scripts, and Orthographies in Historical Gazetteers* ✦ **Lex Berman**, Harvard University ✦ *A Schema for the Ottoman Historical Gazetteer* ✦ **Will Hanley**, Florida State University ✦ *If It Isn't Somewhere, It Doesn't Exist—The Challenge of Building a Historical GIS for the Russian Empire* ✦ **Kelly O'Neill**, Harvard University ✦ *Technical Tricks for Gathering and Reconciling Data* ✦ **Jeremy Guillette**, Harvard University ✦ *Reinventing the Wheel? A general discussion of existing gazetteers* ✦ led by **Nir Shafir**, University of California

June 21
Digital Ottoman Platform II Workshop ✦ *Place, Space, Visualization, and Putting It Together* ✦ moderator: **Michał Połczyński**, Georgetown University ✦ *Historical Geography of Ottoman Egypt* ✦ **Nicolas Michel**, Institut Français d'Archéologie Orientale ✦ *Visualizing an Agro-Economic Regime in Ottoman Greece and Albania with GIS* ✦ **Emily Neumeier**, University of Pennsylvania ✦ *Database for Ottoman Inscriptions: Exploring Digital Possibilities* ✦ **Hakan Karateke**, The University of Chicago ✦ *Workshop Session: Introduction to Linked Data* ✦ led by **Will Hanley**, Florida State University, and **Mark Połczyński**, Marquette University ✦ *Mapping Late Ottoman Population Data in Istanbul and for the Empire* ✦ **Erdem Kabadayı**, Koç University, Istanbul ✦ *Summary discussion of the day and looking ahead* ✦ led by **Mark Połczyński**, Marquette University

June 22
Digital Ottoman Platform II Workshop ✦ *Gazetteer Madness* ✦ moderator: **Chris Gratien**, The Harvard Academy for International Area Studies ✦ *The Pleiades Project* ✦ **Tom Elliot**, Institute for the Study of the Ancient World, New York University ✦ *Spatial History Projects in Crete, Cyprus, and Beyond* ✦ **Antonis Hadjikyriacou**, Institute for Mediterranean Studies, Foundation for Research and Technology–Hellas (FORTH) ✦ *Economic and "Large-N" Analysis of Islamic Legal Practice in the Ottoman Empire: A View of the Craft's Kitchen* ✦ **Boğaç Ergene**, The University of Vermont ✦ *Breakout GAZ #1: Creating an OTTOMAN Gazetteer* ✦ moderator: **Michał Połczyński**, Georgetown University ✦ *Breakout WEB #1: Planning for a Web Platform—Appearance, Content, Interface, Workflow to Design* ✦ moderator: **Chris Gratien**, The Harvard Academy for International Area Studies ✦ *Breakout ORG #1: Drafting a Five-Year Timeline—Tasks, Priorities, Leadership, Funds* ✦ moderator: **Amy Elizabeth Singer**, Tel Aviv University ✦ *Reports from breakouts and summary discussion* ✦ led by **Chris Gratien**, The Harvard Academy for International Area Studies

June 23
Digital Ottoman Platform II Workshop ✦ *NUTS and BOLTS* ✦ moderator: **Nina Ergin**, Koç University, Istanbul ✦ *Istanbul's Early Modern Urban Topography and Mapping Its Narratives* ✦ **Serkan Şavk**, İzmir University of Economics ✦ *The Emma B. Andrews Diary Project—Recreating a Nile Journey in the Digital Age* ✦ **Sarah Ketchley**, University of Washington ✦ *Introduction to Git and GitHub* ✦ **Jeremy Guillette**, Harvard University ✦ *Breakout GAZ & WEB #2: Use Cases* ✦ moderator: **Lex Berman**, Harvard University ✦ *Breakout ORG #2: Leadership and Partnership in a Collective: Workflows and Responsibility* ✦ moderator: **Sabine Schmidtke**, Professor, School of Historical Studies ✦ *Breakout GAZ #3: Ontologies: Confidence and Integrating Pre-existing Data (Defining Confidence in Sources and Assertions), Stability, Reliability, Documentation, Quality* ✦ moderator: **Tom Elliot**, Institute for the Study of the Ancient World, New York University ✦ *Breakout WEB #3: Planning a Web Platform—Appearance, Content, Interface, Workflow to Design* ✦ moderator: **Michał Połczyński**, Georgetown University ✦ *Breakout ORG #3: The DOP as an Editor/Publisher* ✦ moderator: **Nina Ergin**, Koç University, Istanbul ✦ *Reports from breakouts and summary discussion* ✦ led by **Nina Ergin**, Koç University, Istanbul

June 24
Digital Ottoman Platform II Workshop ✦ *Engagement and Sustainability* ✦ moderator: **Amy Elizabeth Singer**, Tel Aviv University ✦ *Breakout GAZ #4: Putting Things to the Test!* ✦ **Mark Połczyński** ✦ *Breakout WEB #4: How Will DOP Look to the User? What Will It Offer?* ✦ **Michał Połczyński** ✦ *Breakout ORG #4: Identifying Grants, Defining Funding Needs, Timetable for Applications* ✦ moderators: **Sabine Schmidtke**, Professor, School of Historical Studies, and **Amy Elizabeth Singer**, Tel Aviv University ✦ *General concluding discussion* ✦ led by **Amy Elizabeth Singer**, Tel Aviv University

School of Mathematics

September 17
Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Spectral Summation Formulae and Their Applications* ✦ **Valentin Blomer**, Georg-August-Universität Göttingen; von Neumann Fellow, School of Mathematics

September 18
Princeton/IAS Symplectic Geometry Seminar ✦ *Fixed-Point Expressions for the Fukaya Endomorphism Algebra of RP^{2m} and Higher Genus Open Invariants* ✦ **Amitai Zernik**, The Hebrew University of Jerusalem

Computer Science/Discrete Mathematics Seminar I ✦ *Explicit Two-Source Extractors and Resilient Functions I* ✦ **Eshan Chattopadhyay**, The University of Texas at Austin

Short Talks by Postdoctoral Members ✦ *Univalent Foundations and the Equivalence Principle* ✦ **Benedikt Ahrens**, Member, School of Mathematics ✦ *On Torsion in the Cohomology of Shimura Varieties* ✦ **Ana Caraiani**, Princeton University; Veblen Research Instructor, School of Mathematics ✦ *Flows, Planes, and Circles* ✦ **Steven Frankel**, Member, School of Mathematics ✦ *Recent Developments of the Mixed Andre-Oort Conjecture* ✦ **Ziyang Gao**, Member, School of Mathematics

September 22
Computer Science/Discrete Mathematics Seminar II ✦ *Explicit Two-Source Extractors and Resilient Functions II* ✦ **Eshan Chattopadhyay**, The University of Texas at Austin

Short Talks by Postdoctoral Members ✦ *Completion Theorems in Equivariant Homotopy Theory* ✦ **Saul Glasman**, Member, School of Mathematics ✦ *Higher-Order Fourier Analysis and Applications* ✦ **Pooya Hatami**, Member, School of Mathematics ✦ *Heegaard Floer Homology and the Knot Concordance Group* ✦ **Jennifer Hom**, Member, School of Mathematics ✦ *Recent Progress on Random Walk in Groups* ✦ **Robert Daniel Hough**, Member, School of Mathematics ✦ *Hodge Theory for Combinatorial Geometries* ✦ **June Huh**, Princeton University; Veblen Fellow, School of Mathematics

September 24
Working Group on Algebraic Number Theory

Short Talks by Postdoctoral Members ✦ *Word-Induced Measures on Groups* ✦ **Doron Puder**, Member, School of Mathematics ✦ *Lower Bounds for de-Morgan Formulae* ✦ **Avishay Tal**, Member, School of Mathematics ✦ *Exponential Separation of Communication and External Information* ✦ **Gillat Kol**, Member, School of Mathematics ✦ *Toward a New Formalization of Real Numbers* ✦ **Catherine Lelay**, Member, School of Mathematics ✦ *Invariants of 4-Manifolds* ✦ **Tye Lidman**, Member, School of Mathematics ✦ *Dynamics on Moduli Spaces and Exceptional Families of Algebraic Curves* ✦ **Alexander Murray Wright**, Member, School of Mathematics

Joint IAS/Princeton University Number Theory Seminar ✦ *On the Averaged Colmez Conjecture* ✦ **Xinyi Yuan**, Institute for Advanced Study, Berkeley

September 28
Computer Science/Discrete Mathematics Seminar I ✦ *Ramsey Numbers of Degenerate Graphs* ✦ **Choongbum Lee**, Massachusetts Institute of Technology

Short Talks by Postdoctoral Members ✦ *On Cuspidality of Global Arthur Packets of Quasi-Split Classical Groups* ✦ **Baiying Liu**, Member, School of Mathematics ✦ *Type Theory and Formalization of Mathematics* ✦ **Anders**

Mörtberg, Member, School of Mathematics ✦ *An Integral Lift of Contact Homology* ✦ **Joanna Nelson**, Member, School of Mathematics

September 29
Short Talks by Postdoctoral Members ✦ *Diophantine Approximation and Diophantine Definitions* ✦ **Héctor Pastén Vásquez**, Member, School of Mathematics ✦ *p-adic Modular Forms* ✦ **Christian Johansson**, Member, School of Mathematics ✦ *Rational Points on Varieties and the Brauer-Manin Obstruction* ✦ **Damaris Schindler**, Member, School of Mathematics ✦ *Random Band Matrices: Delocalization and Universality* ✦ **Tatyana Shcherbyna**, Member, School of Mathematics ✦ *Metrics on Diffeomorphism Groups in Symplectic and Contact Geometry* ✦ **Egor Shelukhin**, Member, School of Mathematics

September 30
Short Talks by Postdoctoral Members ✦ *Pseudo-Anosov Stretch Factors* ✦ **Balazs Strenner**, Member, School of Mathematics ✦ *Quantum Weak Mixing and Effective Strong Multiplicity One Theorem* ✦ **Junehyuk Jung**, Member, School of Mathematics ✦ *Quantization in Modular Setting and Its Applications* ✦ **Roman Travkin**, Member, School of Mathematics ✦ *On Smooth Actions by Higher Rank Lattices* ✦ **Zhiren Wang**, Member, School of Mathematics ✦ *Uniform Spectral Gap and Selberg Type Theorems on Infinite Area Surfaces* ✦ **Dale Winter**, Member, School of Mathematics

October 1
Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Motivic Cohomology Actions and the Geometry of Eigenvarieties* ✦ **David Hansen**, Columbia University

October 2
Princeton/IAS/Columbia Symplectic Geometry Seminar ✦ *Lagrangian Cobordism: What We Know and What Is It Good For* ✦ **Octav Cornea**, Université de Montréal ✦ *Non-Trivial Hamiltonian Fibrations via K-Theory Quantization* ✦ **Egor Shelukhin**, Member, School of Mathematics

October 5
Workshop on Geometric Structures on 3-Manifolds

Computer Science/Discrete Mathematics Seminar I ✦ *Is Optimization Computationally Equivalent to Online Learning?* ✦ **Elad Hazan**, Princeton University

October 6
Workshop on Geometric Structures on 3-Manifolds

Computer Science/Discrete Mathematics Seminar II ✦ *Invariants of Random Knots* ✦ **Chaim Even Zohar**, The Hebrew University of Jerusalem

October 7
Workshop on Geometric Structures on 3-Manifolds

October 8
Workshop on Geometric Structures on 3-Manifolds

Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Algebraic Solutions of Differential Equations over the Projective Line Minus Three Points* ✦ **Yunqing Tang**, Harvard University

October 9
Workshop on Geometric Structures on 3-Manifolds

Princeton/IAS Symplectic Geometry Seminar ✦ *Real Gromov-Witten Theory in All Genera* ✦ **Penka Georgieva**, Institut de Mathématiques de Jussieu, Université Pierre et Marie Curie

October 12
Computer Science/Discrete Mathematics Seminar I ✦ *Factors of Polynomials of Low Individual Degree* ✦ **Rafael Oliveira**, Princeton University

Members' Seminar ✦ *3-Manifold Groups* ✦ **Ian Agol**, University of California, Berkeley; Distinguished Visiting Professor, School of Mathematics

October 13
Workshop on Fundamental Groups and Periods

Computer Science/Discrete Mathematics Seminar II ✦ *Non-constructive Combinatorics* ✦ **Noga Alon**, Tel Aviv University; Visiting Professor, School of Mathematics

Geometric Structures on 3-Manifolds ✦ *The Four-Color Theorem and an Instanton Invariant for Spatial Graphs I* ✦ **Peter Kronheimer**, Harvard University ✦ *The Four-Color Theorem and an Instanton Invariant for Spatial Graphs II* ✦ **Tomasz Mrowka**, Massachusetts Institute of Technology

October 15
Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Adjoint Selmer Groups for Polarized Automorphic Galois Representations* ✦ **Patrick Allen**, University of Illinois at Urbana–Champaign

October 16
Princeton/IAS Symplectic Geometry Seminar ✦ *3D Mirror Symmetry and Symplectic Duality* ✦ **Tudor Dimofte**, Perimeter Institute for Theoretical Physics

Mathematical Conversations ✦ *Finite Simple Groups* ✦ **Robert Guralnick**, University of Southern California; Visitor, School of Mathematics

October 19
Members' Seminar ✦ *Subgroups of Random Groups* ✦ **Danny Calegari**, The University of Chicago; Member, School of Mathematics

October 20
Geometric Structures on 3-Manifolds ✦ *Geometric Techniques in Knot Theory* ✦ **Jessica S. Purcell**, Brigham Young University; von Neumann Fellow, School of Mathematics ✦ *Non-orientable Knot Genus and the Jones Polynomial* ✦ **Efstratia Kalfagianni**, Michigan State University

October 22
Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Unlikely Intersections for Two-Parameter Families of Polynomials* ✦ **Tom Tucker**, University of Rochester

October 23
Princeton/IAS Symplectic Geometry Seminar ✦ *Dehn Twists Exact Sequences through Lagrangian Cobordism* ✦ **Weiwei Wu**, Université de Montréal

October 26
Computer Science/Discrete Mathematics Seminar I ✦ *Random Words, Longest Increasing Subsequences, and Quantum PCA* ✦ **John Wright**, Carnegie Mellon University

Members' Seminar ✦ *Quantum Ergodicity for the Uninitiated* ✦ **Zeev Rudnick**, Tel Aviv University; Member, School of Mathematics

October 27
Computer Science/Discrete Mathematics Seminar II ✦ *Algorithmic Proof of the Lovasz Local Lemma via Resampling Oracles* ✦ **Jan Vondrák**, IBM Almaden Research Center; Member, School of Mathematics

Geometric Structures on 3-Manifolds ✦ *CAT(0) Cube Complexes and Virtually Special Groups* ✦ **Daniel Groves**, University of Illinois at Chicago ✦ *A New Cubulation Theorem for Hyperbolic Groups* ✦ **Daniel Groves**, University of Illinois at Chicago

October 28
Mathematical Conversations ✦ *Volumes of Hyperbolic Link Complements* ✦ **Ian Agol**, University of California, Berkeley; Distinguished Visiting Professor, School of Mathematics

October 29

Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *From Local Class Field Theory to the Curve and Vice Versa* ✦ **Laurent Fargues**, Institut de Mathématiques de Jussieu

October 30

Princeton/IAS/Columbia Symplectic Geometry Seminar ✦ *Floer Homology for Translated Points* ✦ **Margherita Sandon**, Université de Strasbourg ✦ *Functors and Relations from Fukaya Categories of LG Models* ✦ **Sheel Ganatra**, Stanford University

November 2

Finite Simple Groups: Thirty Years of the Atlas and Beyond, Celebrating the Atlases and Honoring John Conway

Computer Science/Discrete Mathematics Seminar I ✦ *Two-Source Dispersers for Polylogarithmic Entropy and Improved Ramsey Graphs I* ✦ **Gil Cohen**, California Institute of Technology

Members' Seminar ✦ *Optimal Knots* ✦ **Abigail Thompson**, University of California, Davis; Member, School of Mathematics

November 3

Finite Simple Groups: Thirty Years of the Atlas and Beyond, Celebrating the Atlases and Honoring John Conway

Computer Science/Discrete Mathematics Seminar II ✦ *Two-Source Dispersers for Polylogarithmic Entropy and Improved Ramsey Graphs II* ✦ **Gil Cohen**, California Institute of Technology

Geometric Structures on 3-Manifolds ✦ *Random Walks on Groups with Hyperbolic Properties* ✦ **Joseph Maher**, City University of New York ✦ *Random Walks on Weakly Hyperbolic Groups* ✦ **Joseph Maher**, City University of New York

November 4

Finite Simple Groups: Thirty Years of the Atlas and Beyond, Celebrating the Atlases and Honoring John Conway

November 5

Finite Simple Groups: Thirty Years of the Atlas and Beyond, Celebrating the Atlases and Honoring John Conway

November 6

Princeton/IAS Symplectic Geometry Seminar ✦ *Negative and Positive Results in the Intersection between Systolic and Symplectic Geometry* ✦ **Umberto Hryniewicz**, Universidade Federal do Rio de Janeiro

November 7

Workshop on Topology: Identifying Order in Complex Systems ✦ *Critical Mechanical Structures: Topology and Entropy* ✦ **Xiaoming Mao**, University of Michigan ✦ *Topological Effects in Metals: From Chiral and Gyrotropic Magnetic Effects to Quenched Majoranas* ✦ **Joel Moore**, University of California, Berkeley ✦ *Topological and Combinatorial Methods in Theoretical Distributed Computing* ✦ **Dmitry Feichtner-Kozlov**, Institut für Algebra, Geometrie, Topologie und deren Anwendungen (ALTA), Universität Bremen ✦ *Hierarchical Clustering on Asymmetric Networks* ✦ **Facundo Mémoli**, The Ohio State University ✦ *Interactive Visualization of 2-D Persistence Modules* ✦ **Michael Lesnick**, Columbia University

November 9

Computer Science/Discrete Mathematics Seminar I ✦ *Cutting Plane Method: A Faster Algorithm for Many (Combinatorial) Optimization Problems* ✦ **Yin Tat Lee**, Massachusetts Institute of Technology

Members' Seminar ✦ *Hard Lefschetz Theorem and Hodge-Riemann Relations for Combinatorial Geometries* ✦ **June Huh**, Princeton University; Veblen Fellow, School of Mathematics

Minerva Lectures at Princeton University ✦ *I: Geometry and Dynamics on Hyperbolic Surfaces* ✦ **Maryam Mirzakhani**, Stanford University; Member, School of Mathematics

November 10

Computer Science/Discrete Mathematics Seminar II ✦ *Exponential Separation of Communication and External Information* ✦ **Gillat Kol**, Member, School of Mathematics

Joint IAS/Princeton University Number Theory Seminar ✦ *On the Moy-Prasad Filtration and Supercuspidal Representations* ✦ **Jessica Fintzen**, Harvard University

November 11

Minerva Lectures at Princeton University ✦ *II: Dynamics on Moduli Spaces of Hyperbolic Surfaces* ✦ **Maryam Mirzakhani**, Stanford University; Member, School of Mathematics

Mathematical Conversations ✦ *Effective Hyperbolic Geometry* ✦ **David Futer**, Temple University; Member, School of Mathematics

November 12

Working Group on Algebraic Number Theory

Geometric Structures on 3-Manifolds ✦ *Pseudo-Anosov Constructions and Penner's Conjecture* ✦ **Balazs Strenner**, Member, School of Mathematics ✦ *Algebraic Degrees and Galois Conjugates of Pseudo-Anosov Stretch Factors* ✦ **Balazs Strenner**, Member, School of Mathematics

Joint IAS/Princeton University Number Theory Seminar ✦ *Hasse Principle for Kummer Varieties* ✦ **Alexei Skorobogatov**, Imperial College London; Member, School of Mathematics

November 13

Princeton/IAS Symplectic Geometry Seminar ✦ *Legendrian Fronts in Contact Topology* ✦ **Roger Casals**, Massachusetts Institute of Technology

Minerva Lectures at Princeton University ✦ *III: Counting Mapping Class Group Orbits on Hyperbolic Surfaces* ✦ **Maryam Mirzakhani**, Stanford University; Member, School of Mathematics

November 16

Computer Science/Discrete Mathematics Seminar I ✦ *How Quaternion Algebras over Number Fields Are Useful for Creating Compiler for a Quantum Computer?* ✦ **Vadym Kliuchnikov**, Microsoft Research, Redmond, Washington

Members' Seminar ✦ *The SL(2, R) Action on Moduli Space* ✦ **Alex Eskin**, The University of Chicago; Member, School of Mathematics

November 17

Computer Science/Discrete Mathematics Seminar II ✦ *Cohomology for Computer Science* ✦ **Alex Lubotzky**, The Hebrew University of Jerusalem

Geometric Structures on 3-Manifolds ✦ *The Complex Geometry of Teichmüller Spaces and Bounded Symmetric Domains I* ✦ **Stergios Antonakoudis**, University of Cambridge ✦ *The Complex Geometry of Teichmüller Spaces and Bounded Symmetric Domains II* ✦ **Stergios Antonakoudis**, University of Cambridge

November 18

Mathematical Conversations ✦ *An Introduction to Chromatic Homotopy Theory* ✦ **Saul Glasman**, Member, School of Mathematics

November 19

Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Geometric Deformations of Orthogonal and Symplectic Galois Representations* ✦ **Jeremy Booher**, Stanford University

November 20

Princeton/IAS Symplectic Geometry Seminar ✦ *Low-Area Floer Theory and Non-displaceability* ✦ **Dmitry Tonkonog**, University of Cambridge

November 23

Computer Science/Discrete Mathematics Seminar I ✦ *Advances on Ramsey Numbers* ✦ **Jacob Fox**, Stanford University

Members' Seminar ✦ *Fun with Finite Covers of 3-Manifolds: Connections between Topology, Geometry, and Arithmetic* ✦ **Nathan Dunfield**, University of Illinois at Urbana–Champaign; Member, School of Mathematics

November 24

Computer Science/Discrete Mathematics Seminar II ✦ *General Systems of Linear Forms: Equidistribution and True Complexity* ✦ **Pooya Hatami**, Member, School of Mathematics

Geometric Structures on 3-Manifolds ✦ *Hausdorff Dimension of Kleinian Group Uniformization of Riemann Surface and Conformal Rigidity* ✦ **Yong Hou**, Princeton University; Visitor, School of Mathematics

November 25

Joint IAS/Princeton University Number Theory Seminar ✦ *Several Non-archimedean Variables, Isolated Periodic Points, and Zhang's Conjecture* ✦ **Alon Levy**, KTH Royal Institute of Technology, Stockholm

November 30

Computer Science/Discrete Mathematics Seminar I ✦ *Lower Bounds on the Size of Semidefinite Programming Relaxations* ✦ **David Steurer**, Cornell University

Members' Seminar ✦ *Billiards in Quadrilaterals, Hurwitz Spaces, and Real Multiplication of Hecke Type* ✦ **Alexander Wright**, Member, School of Mathematics

December 1

Computer Science/Discrete Mathematics Seminar II ✦ *Rigidity of Random Toeplitz Matrices with an Application to Depth Three Circuits* ✦ **Avishay Tal**, Member, School of Mathematics

Geometric Structures on 3-Manifolds ✦ *Volume and Homology for Hyperbolic 3-Orbifolds, and the Enumeration of Arithmetic Groups I* ✦ **Peter Shalen**, University of Illinois at Chicago ✦ *Volume and Homology for Hyperbolic 3-Orbifolds, and the Enumeration of Arithmetic Groups II* ✦ **Peter Shalen**, University of Illinois at Chicago

December 2

Princeton University Mathematics Department Colloquium ✦ *Veering Triangulations and Pseudo-Anosov Flows* ✦ **Ian Agol**, University of California, Berkeley; Distinguished Visiting Professor, School of Mathematics

Mathematical Conversations ✦ *Limitations for Hilbert's Tenth Problem over the Rationals* ✦ **Héctor Pastén Vásquez**, Member, School of Mathematics

December 3

Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Generating Series of Arithmetic Divisors in Unitary Shimura Varieties* ✦ **Tonghai Yang**, University of Wisconsin–Madison

December 4

Princeton/IAS Symplectic Geometry Seminar ✦ *Point-Like Bounding Chains in Open Gromov-Witten Theory* ✦ **Sara Tukachinsky**, The Hebrew University of Jerusalem

Joint IAS/Princeton University Number Theory Seminar ✦ *Arithmetic of Double Torus Quotients and the Distribution of Periodic Torus Orbits* ✦ **Ilya Khayutin**, The Hebrew University of Jerusalem

December 7

Workshop on Flows, Foliations, and Contact Structures

Computer Science/Discrete Mathematics Seminar I ✦ *Bias vs. Low Rank of Polynomials with Applications to List Decoding and Effective Algebraic Geometry* ✦ **Abhishek Bhowmick**, The University of Texas at Austin

December 8

Workshop on Flows, Foliations, and Contact Structures

Computer Science/Discrete Mathematics Seminar II ✦ *Ramanujan Coverings of Graphs* ✦ **Doron Puder**, Member, School of Mathematics

December 9

Workshop on Flows, Foliations, and Contact Structures

December 10

Workshop on Flows, Foliations, and Contact Structures

Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *The First Order Theory of Meromorphic Functions* ✦ **Héctor Pastén Vásquez**, Member, School of Mathematics

December 11

Workshop on Flows, Foliations, and Contact Structures

December 14

Computer Science/Discrete Mathematics Seminar I ✦ *Toward the KRW Conjecture: Cubic Lower Bounds via Communication Complexity* ✦ **Or Meir**, University of Haifa

Members' Seminar ✦ *Locally Symmetric Spaces and Torsion Classes* ✦ **Ana Caraiani**, Princeton University; Veblen Research Instructor, School of Mathematics

Geometric Structures on 3-Manifolds ✦ *Quasi-Fuchsian Surfaces in Finite-Volume Hyperbolic 3-Manifolds* ✦ **Daryl Cooper**, University of California, Santa Barbara; Member, School of Mathematics

December 17

Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Modularity and Potential Modularity Theorems in the Function Field Setting* ✦ **Michael Harris**, Columbia University

Joint IAS/Princeton University Number Theory Seminar ✦ *Decoupling in Harmonic Analysis and the Vinogradov Mean Value Theorem* ✦ **Jean Bourgain**, IBM von Neumann Professor; School of Mathematics

December 18

Princeton/IAS Symplectic Geometry Seminar ✦ *Absolute vs. Relative Gromov-Witten Invariants* ✦ **Mohammad Tehrani**, Stony Brook University, The State University of New York

January 12

Computer Science/Discrete Mathematics Seminar II ✦ *Anti-concentration: Results and Applications* ✦ **Hoi Nguyen**, The Ohio State University; von Neumann Fellow, School of Mathematics

January 13

Mathematical Conversations ✦ *Combinatorics to Geometry to Arithmetic of Circle Packings* ✦ **Alex Kontorovich**, Rutgers, The State University of New Jersey; Member, School of Mathematics

January 19

Computer Science/Discrete Mathematics Seminar II ✦ *Proof Complexity Lower Bounds from Algebraic Circuit Complexity* ✦ **Michael Forbes**, Visitor, School of Mathematics

Geometric Structures on 3-Manifolds ✦ *Low-Dimensional Dynamics and Hyperbolic 3-Manifolds* ✦ **André de Carvalho**, Universidade de São Paulo

January 20

Mathematical Conversations ✦ *Heegaard Splittings and the Stabilization Problem for 3-Manifolds* ✦ **Abigail Thompson**, University of California, Davis; Member, School of Mathematics

January 21

Princeton/IAS Symplectic Geometry Seminar ✦ *From Symplectic Geometry to Combinatorics and Back* ✦ **Dan Cristofaro-Gardiner**, Harvard University

January 25

Short Talks by Postdoctoral Members ✦ *Topics between Combinatorics, Geometry, and Algebra* ✦ **Karim Alexander Adiprasito**, Member,

School of Mathematics ✦ *Affine Springer Fibers and Representation Theory* ✦ **Cheng-Chiang Tsai**, Member, School of Mathematics

January 26
Geometric Structures on 3-Manifolds ✦ *Geometry of Complex Surface Singularities and 3-Manifolds* ✦ **Walter D. Neumann**, Columbia University; Member, School of Mathematics

February 1
Computer Science/Discrete Mathematics Seminar I ✦ *Constant-Round Interactive-Proofs for Delegating Computations* ✦ **Ron Rothblum**, Massachusetts Institute of Technology

Members' Seminar ✦ *The Space of Surface Shapes and Some Applications to Biology* ✦ **Joel Hass**, University of California, Davis; Member, School of Mathematics

February 2
Computer Science/Discrete Mathematics Seminar II ✦ *Constant-Round Interactive-Proofs for Delegating Computations (continued)* ✦ **Ron Rothblum**, Massachusetts Institute of Technology

Geometric Structures on 3-Manifolds ✦ *Profinite Rigidity and Flexibility for Compact 3-Manifold Groups* ✦ **Alan Reid**, The University of Texas at Austin; Member, School of Mathematics

February 4
Princeton/IAS Symplectic Geometry Seminar ✦ *Floer Theory Revisited* ✦ **Mohammed Abouzaid**, Columbia University

Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Cycles on the Moduli of Shtukas and Taylor Coefficients of L-Functions* ✦ **Wei Zhang**, Columbia University

February 5
Mathematical Conversations ✦ *Computer Algebra Systems, Formal Proofs, and Interactive Theorem Proving* ✦ **Anders Mörtberg**, Member, School of Mathematics

February 8
Computer Science/Discrete Mathematics Seminar I ✦ *Bipartite Perfect Matching Is in Quasi-NC* ✦ **Stephen Fenner**, University of South Carolina

Members' Seminar ✦ *The Singularity of Symbolic Matrices* ✦ **Avi Wigderson**, Herbert H. Maass Professor, School of Mathematics

Special Analysis/Number Theory Seminar ✦ *Variance of Sums of Arithmetic Functions over Primes in Short Intervals* ✦ **Jon Keating**, University of Bristol

February 9
Computer Science/Discrete Mathematics Seminar II ✦ *The Singularity of Symbolic Matrices* ✦ **Avi Wigderson**, Herbert H. Maass Professor, School of Mathematics

Geometric Structures on 3-Manifolds ✦ *Obstructions to Minimal Fibrations of Hyperbolic 3-Manifolds* ✦ **Joel Hass**, University of California, Davis; Member, School of Mathematics

February 10
Mathematical Conversations ✦ *Hyperbolicity in Dynamics* ✦ **Steven Frankel**, Member, School of Mathematics

February 11
Augmentations and Legendrians at the IAS ✦ *Restrictions on the Fundamental Group of Some Lagrangian Cobordisms* ✦ **Baptiste Chantraine**, Université de Nantes

Augmentations and Legendrians at the IAS ✦ *Toward a Contact Fukaya Category* ✦ **Lenny Ng**, Duke University ✦ *Satellite Operations and Legendrian Knot Theory* ✦ **John Etnyre**, Georgia Institute of Technology; Member, School of Mathematics

Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Statistics of Abelian Varieties over Finite Fields* ✦ **Michael Lipnowski**, Duke University

February 12
Augmentations and Legendrians at the IAS ✦ *A Frontal View on Lefschetz Fibrations I* ✦ **Emmy Murphy**, Massachusetts Institute of Technology ✦ *A Frontal View on Lefschetz Fibrations II* ✦ **Roger Casals**, Massachusetts Institute of Technology ✦ *A Quantitative Look at Lagrangian Cobordisms* ✦ **Lisa Traynor**, Bryn Mawr College; Member, School of Mathematics

February 15
Geometric Structures on 3-Manifolds ✦ *Minimal Surfaces in 3-Manifold Topology* ✦ **Dan Ketover**, Imperial College London

February 16
Computer Science/Discrete Mathematics Seminar II ✦ *The Singularity of Symbolic Matrices* ✦ **Avi Wigderson**, Herbert H. Maass Professor, School of Mathematics

February 17
Mathematical Conversations ✦ *Quantum Chaos and Eigenvalue Statistics* ✦ **Zeev Rudnick**, Tel Aviv University; Member, School of Mathematics

February 18
Princeton/IAS Symplectic Geometry Seminar ✦ *Spectral Invariants for Contactomorphisms of Prequantization Bundles and Applications* ✦ **Frol Zapolsky**, University of Haifa

Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Vanishing Cycles and Bilinear Forms* ✦ **Will Sawin**, Princeton University

February 22
Computer Science/Discrete Mathematics Seminar I ✦ *The Deterministic Communication Complexity of Approximate Fixed Point* ✦ **Omri Weinstein**, New York University

Members' Seminar ✦ *Mock and Quantum Modular Forms* ✦ **Amanda Folsom**, Amherst College; von Neumann Fellow, School of Mathematics

February 23
Computer Science/Discrete Mathematics Seminar II ✦ *Minkowski Sums, Mixed Faces, and Combinatorial Isoperimetry* ✦ **Karim Alexander Adiprasito**, Member, School of Mathematics

Geometric Structures on 3-Manifolds ✦ *Free Group Cayley Graph and Measure Decompositions* ✦ **Yong Hou**, Princeton University; Visitor, School of Mathematics

Analysis Seminar ✦ *Stochastic Quantization Equations* ✦ **Hao Shen**, Columbia University

February 24
Analysis Seminar ✦ *Global Existence and Convergence of Solutions to Gradient Systems and Applications to Yang-Mills Flow* ✦ **Paul Feehan**, Rutgers, The State University of New Jersey; Member, School of Mathematics

February 25
Princeton/IAS Symplectic Geometry Seminar ✦ *Positive Loops—On a Question by Eliashberg-Polterovich and a Contact Systolic Inequality* ✦ **Peter Albers**, Universität Münster

Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Euler Systems for Rankin-Selberg Convolutions and Generalisations* ✦ **Sarah Zerbes**, University College London

February 29
Computer Science/Discrete Mathematics Seminar I ✦ *Graph Isomorphism in Quasipolynomial Time I* ✦ **László Babai**, The University of Chicago

Members' Seminar ✦ *Word Measures on Unitary Groups* ✦ **Doron Puder**, Member, School of Mathematics

March 1
Computer Science/Discrete Mathematics Seminar II ✦ *Graph Isomorphism in Quasipolynomial Time II* ✦ **László Babai**, The University of Chicago

Geometric Structures on 3-Manifolds ✦ *Morse Index and Multiplicity of Min-Max Minimal Hypersurfaces* ✦ **Fernando Codá Marques**, Princeton University

March 2

Analysis Seminar ✦ *Supersymmetric Approach to Random Band Matrices* ✦ **Tatyana Shcherbyna**, Member, School of Mathematics

Mathematical Conversations ✦ *Totally Geodesic Surfaces in Hyperbolic 3-Manifolds* ✦ **Alan Reid**, The University of Texas at Austin; Member, School of Mathematics

March 3

Princeton/IAS Symplectic Geometry Seminar ✦ *Subflexible Symplectic Manifolds* ✦ **Kyler Siegel**, Stanford University

Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Density of Polynomials with Squarefree Discriminant* ✦ **Jerry Wang**, Princeton University

March 4

Joint IAS/Princeton University Number Theory Seminar ✦ *The Asymptotic Behavior of Sup Norms of Maass Forms* ✦ **Simon Marshall**, University of Wisconsin–Madison

March 7

Computer Science/Discrete Mathematics Seminar I ✦ *Almost Optimal Sum of Squares Lower Bound for Planted Clique* ✦ **Pravesh Kothari**, The University of Texas at Austin

March 8

Computer Science/Discrete Mathematics Seminar II ✦ *Fast Learning Requires Good Memory: A Time-Space Lower Bound for Parity Learning* ✦ **Ran Raz**, Weizmann Institute of Science; Visiting Professor, School of Mathematics

Analysis Seminar ✦ *The Hidden Landscape of Localization of Eigenfunctions* ✦ **Svitlana Mayboroda**, University of Minnesota

Geometric Structures on 3-Manifolds ✦ *Proper Affine Actions of Right-Angled Coxeter Groups* ✦ **Jeffrey Danciger**, The University of Texas at Austin

March 9

Mathematical Conversations ✦ *Where a Surface Is Determined by Its Boundary: The World of Lagrangian Fillings of Legendrian Knots* ✦ **Lisa Traynor**, Bryn Mawr College; Member, School of Mathematics

March 10

Princeton/IAS Symplectic Geometry Seminar ✦ *Homological Mirror Symmetry for Singularities of Type T_{pqr}* ✦ **Ailsa Keating**, Columbia University

Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Iwasawa Theory for the Symmetric Square of a Modular Form* ✦ **David Loeffler**, University of Warwick

March 14

Computer Science/Discrete Mathematics Seminar I ✦ *Lower Bounds for Homogeneous Depth-5 Arithmetic Circuits over Finite Fields* ✦ **Mrinal Kumar**, Rutgers, The State University of New Jersey

March 15

Computer Science/Discrete Mathematics Seminar II ✦ *Proof Complexity—An Introduction* ✦ **Avi Wigderson**, Herbert H. Maass Professor, School of Mathematics

Analysis Seminar ✦ *Topology of the Set of Singularities of Viscosity Solutions of the Hamilton-Jacobi Equation* ✦ **Albert Fathi**, École Normale Supérieure de Lyon

Hermann Weyl Lectures ✦ *Weyl Groups, and Their Generalizations, in Enumerative Geometry I* ✦ **Andrei Okounkov**, Columbia University

March 16

Analysis Seminar ✦ *Local Eigenvalue Statistics for Random Regular Graphs* ✦ **Roland Bauerschmidt**, Harvard University

Hermann Weyl Lectures ✦ *Weyl Groups, and Their Generalizations, in Enumerative Geometry II* ✦ **Andrei Okounkov**, Columbia University

Mathematical Conversations ✦ *p-adic Numbers in Cryptography and Data Compression* ✦ **Mark Goresky**, Member, School of Mathematics

March 17

Hermann Weyl Lectures ✦ *Weyl Groups, and Their Generalizations, in Enumerative Geometry III* ✦ **Andrei Okounkov**, Columbia University

March 18

Geometric Structures on 3-Manifolds ✦ *Counting Closed Orbits of Anosov Flows in Free Homotopy Classes* ✦ **Sergio Fenley**, Florida State University; Visitor, School of Mathematics

March 21

Computer Science/Discrete Mathematics Seminar I ✦ *Polynomial-Time Tensor Decompositions via Sum-of-Squares* ✦ **Tengyu Ma**, Princeton University

Members' Seminar ✦ *An Introduction to the abc Conjecture* ✦ **Héctor Pastén Vásquez**, Member, School of Mathematics

Symplectic Geometry Seminar ✦ *Stable Homotopy Theory and Floer Theory* ✦ **Thomas Kragh**, Uppsala University

March 22

Computer Science/Discrete Mathematics Seminar II ✦ *The Resolution Proof System* ✦ **Avi Wigderson**, Herbert H. Maass Professor, School of Mathematics

Geometric Structures on 3-Manifolds ✦ *Slowly Converging Pseudo-Anosovs* ✦ **Mark Bell**, University of Illinois at Urbana–Champaign

March 23

Analysis Seminar ✦ *Universality for Random Matrices Beyond Mean Field Models* ✦ **Paul Bourgade**, New York University

March 24

Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Low-Lying, Fundamental, Reciprocal Geodesics* ✦ **Alex Kontorovich**, Rutgers, The State University of New Jersey; Member, School of Mathematics

March 25

Mathematical Conversations ✦ *Conversations on Schubert's "Wandererfantasie"* ✦ **Valentin Blomer**, Georg-August-Universität Göttingen; von Neumann Fellow, School of Mathematics

March 28

Workshop on Thin Groups and Super Approximation

Computer Science/Discrete Mathematics Seminar I ✦ *A Local Central Limit Theorem for Triangles in a Random Graph* ✦ **Swastik Kopparty**, Rutgers, The State University of New Jersey

March 29

Workshop on Thin Groups and Super Approximation

March 30

Workshop on Thin Groups and Super Approximation

Mathematical Conversations ✦ *What Is the Fukaya Category?* ✦ **Octav Cornea**, Université de Montréal; Member, School of Mathematics

March 31

Workshop on Thin Groups and Super Approximation

Working Group on Algebraic Number Theory

Princeton/IAS Symplectic Geometry Seminar ✦ *Cellular Homology, Augmentations, and Generating Families for Legendrian Surfaces* ✦ **Michael Sullivan**, University of Massachusetts

Joint IAS/Princeton University Number Theory Seminar ✦ *Lambda-adic Waldspurger Packets* ✦ **Vinayak Vatsal**, The University of British Columbia

April 1

Workshop on Thin Groups and Super Approximation

Princeton/IAS/Columbia Symplectic Geometry Seminar ✦ *Log Canonical Threshold and Floer Homology of the Monodromy* ✦ **Mark McLean**, Stony Brook University, The State University of New York ✦ *Infinitely Many Monotone Lagrangian Tori in Del Pezzo Surfaces* ✦ **Renato Vianna**, University of Cambridge

April 4

Computer Science/Discrete Mathematics Seminar I ✦ *An Average-Case Depth Hierarchy Theorem for Boolean Circuits I* ✦ **Li-Yang Tan**, Toyota Technological Institute at Chicago
Members' Seminar ✦ *Knot Surgery and Heegaard Floer Homology* ✦ **Jennifer Hom**, Member, School of Mathematics

Geometric Structures on 3-Manifolds ✦ *The Solution to the Sphere Packing Problem in 24 Dimensions via Modular Forms* ✦ **Stephen Miller**, Rutgers, The State University of New Jersey

April 5

Computer Science/Discrete Mathematics Seminar II ✦ *An Average-Case Depth Hierarchy Theorem for Boolean Circuits II* ✦ **Li-Yang Tan**, Toyota Technological Institute at Chicago

Geometric Structures on 3-Manifolds ✦ *Collapsing Hyperbolic Structures: From Rigidity to Flexibility and Back* ✦ **Steve Kerckhoff**, Stanford University

April 6

Analysis Seminar ✦ *Quantum Yang-Mills Theory in Two Dimensions: Exact vs. Perturbative* ✦ **Timothy Nguyen**, Michigan State University

Mathematical Conversations ✦ *Entrance Path Category of a Stratified Space* ✦ **Amit Patel**, Member, School of Mathematics

April 7

Princeton/IAS Symplectic Geometry Seminar ✦ *Stein Fillings of Cotangent Bundles of Surfaces* ✦ **Jeremy van Horn Morris**, University of Arkansas ✦ *Classification Results for Two-Dimensional Lagrangian Tori* ✦ **Georgios Dimitroglou-Rizell**, University of Cambridge ✦ *Filtering the Heegaard-Floer Contact Invariant* ✦ **Gordana Matic**, University of Georgia

Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Potential Automorphy of $\hat{G}$-Local Systems* ✦ **Jack Thorne**, University of Cambridge

April 9

Workshop on Topology: Identifying Order in Complex Systems ✦ *Volumes of the Basins of Attraction for Mechanically Stable Disk Packings* ✦ **Corey O'Hern**, Yale University ✦ *Towards a Homological Description of Nonlinear Dynamics* ✦ **Konstantin Mischaikow**, Rutgers, The State University of New Jersey ✦ *Metrics on the Space of Shapes, and Applications to Biology* ✦ **Joel Hass**, University of California, Davis; Member, School of Mathematics ✦ *A Topological Predictor of Protein Compressibility* ✦ **Vidit Nanda**, University of Pennsylvania

April 11

Members' Seminar ✦ *Applications of Thin Orbits* ✦ **Alex Kontorovich**, Rutgers, The State University of New Jersey; Member, School of Mathematics

April 12

Geometric Structures on 3-Manifolds ✦ *Veering Dehn Surgery* ✦ **Saul Schleimer**, University of Warwick

April 14

Working Group on Algebraic Number Theory

Geometric Structures on 3-Manifolds ✦ *A Graph Coloring Problem and Its Algebraic and Topological Consequences* ✦ **Daniel Wise**, McGill University and Technion–Israel Institute of Technology

Joint IAS/Princeton University Number Theory Seminar ✦ *Optimal Strong Approximation for Quadratic Forms* ✦ **Naser Talebizadeh Sardari**

April 15

Princeton/IAS Symplectic Geometry Seminar ✦ *Symplectic Embeddings and Infinite Staircases* ✦ **Ana Rita Pires**, Fordham University

April 19

Computer Science/Discrete Mathematics Seminar II ✦ *A Characterization of Functions with Vanishing Averages over Products of Disjoint Sets* ✦ **Pooya Hatami**, Member, School of Mathematics

Analysis Seminar ✦ *Spectral Gaps via Additive Combinatorics* ✦ **Semyon Dyatlov**, Massachusetts Institute of Technology ✦ *On the Number of Nodal Domains of Toral Eigenfunctions* ✦ **Igor Wigman**, King's College London

April 20

Geometric Structures on 3-Manifolds ✦ *Meridional Essential Surfaces of Unbounded Euler Characteristics in Knot Complements* ✦ **João Nogueira**, Universidade de Coimbra

April 21

Princeton/IAS Symplectic Geometry Seminar ✦ *A Heegaard Floer Analog of Algebraic Torsion* ✦ **Cagatay Kutluhan**, University at Buffalo, The State University of New York; von Neumann Fellow, School of Mathematics

Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Standard Conjecture of Künneth Type with Torsion Coefficients* ✦ **Junecue Suh**, University of California, Santa Cruz

April 25

Analysis Seminar ✦ *Exponential Convergence to the Maxwell Distribution of Solutions of Spatially Inhomogenous Boltzmann Equations* ✦ **Gang Zhou**, California Institute of Technology

April 26

Computer Science/Discrete Mathematics Seminar II ✦ *Reed-Muller Codes for Random Erasures and Errors* ✦ **Amir Shpilka**, Tel Aviv University

April 27

Analysis Seminar ✦ *Random Data Cauchy Theory for Some Nonlinear Wave Equations* ✦ **Dana Mendelson**, Member, School of Mathematics ✦ *On the Kinetic Fokker-Planck Equation in Bounded Domains* ✦ **Juhi Jang**, University of Southern California; von Neumann Fellow, School of Mathematics

April 28

Princeton/IAS Symplectic Geometry Seminar ✦ *Small Symplectic and Exotic 4-Manifolds via Positive Factorizations* ✦ **R. İnanç Baykur**, University of Massachusetts

Working Group on Algebraic Number Theory

Joint IAS/Princeton University Number Theory Seminar ✦ *Variation of Canonical Height, Illustrated* ✦ **Laura de Marco**, Northwestern University

May 3

Computer Science/Discrete Mathematics Seminar II ✦ *Fourier Tails for Boolean Functions and Their Applications* ✦ **Avishay Tal**, Member, School of Mathematics

Geometric Structures on 3-Manifolds ✦ *NonLERFness of Groups of Certain Mixed 3-Manifolds and Arithmetic Hyperbolic n-Manifolds* ✦ **Hongbin Sun**, University of California, Berkeley

May 4

Analysis Seminar ✦ *The Minimum Modulus Problem for Covering Systems* ✦ **Robert Daniel Hough**, Member, School of Mathematics

May 5

Joint IAS/Princeton University Number Theory Seminar ✦ *Rational Curves on Elliptic Surfaces* ✦ **Douglas Ulmer**, Georgia Institute of Technology

May 6

Celebrating Emmy Noether ✦ *Symmetry and Conservation Laws: Noether's Contribution to Physics* ✦ **Karen Uhlenbeck**, The

University of Texas at Austin;Visitor, School of Mathematics ✦ *Emmy Noether: Breathtaking Mathematics* ✦ **Georgia Benkart**, University of Wisconsin–Madison

May 10
2016 Women and Mathematics

Joint IAS/Princeton University Number Theory Seminar ✦ *On the Hilbert Property and the Fundamental Group of Algebraic Varieties* ✦ **Umberto Zannier**, Scuola Normale Superiore di Pisa

May 11–13
2016 Women and Mathematics

May 16
2016 Women and Mathematics ✦ *Visit to Princeton University*

May 17–20
2016 Women and Mathematics

May 19
Joint IAS/Princeton University Number Theory Seminar ✦ *On p-Torsion in Class Groups of Number Fields* ✦ **Lillian Pierce**, Duke University

May 21–24
Analysis and Beyond: Celebrating Jean Bourgain's Work and Its Impact ✦ Organizers and Lecturers: **Peter Sarnak**, Professor, School of Mathematics; **Sergei Konyagin**, Moscow State University; **Alireza Salehi Golsefidy**, University of California, San Diego; **Alex Gamburd**, University of California, Santa Cruz; **Alex Kontorovich**, Institute for Advanced Study; **Tamar Ziegler**, The Hebrew University of Jerusalem; **Enrico Bombieri**, Professor Emeritus, School of Mathematics; **Terence Tao**, University of California, Los Angeles; **Larry Guth**, Massachusetts Institute of Technology; **Ciprian Demeter**, Indiana University; **Assaf Naor**, Princeton University; **Haim Brezis**, Rutgers, The State University of New Jersey; **Vitali Milman**, Tel Aviv University; **Gilles Pisier**, Texas A&M University; **Peter Sarnak**, Professor, School of Mathematics; **Gil Kalai**, The Hebrew University of Jerusalem; **Avi Wigderson**, Herbert H. Maass Professor, School of Mathematics; **Svetlana Jitomirskaya**, University of California, Irvine; **Wilhelm Schlag**, University of Chicago; **Gigliola Staffilani**, Massachusetts Institute of Technology; **Andrea Nahmod**, University of Massachusetts; **Carlos Kenig**, University of Chicago; **Péter Varjú**, University of Cambridge; **Elon Lindenstrauss**, The Hebrew University of Jerusalem; **Emmanuel Breuillard**, Université of Paris–Sud 11

May 26
Joint IAS/Princeton University Number Theory Seminar ✦ *Divisibility of Coefficients of Modular Forms* ✦ **Joel Bellaiche**, Brandeis University

June 17–18
Conference for African American Researchers in the Mathematical Sciences

School of Natural Sciences

ASTROPHYSICS ACTIVITIES

July 6
Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ *Fast, Accurate Predictions of Galaxy Auto and Cross Power Spectra with Cosmic Emulators* ✦ **Juliana Kwan**, University of Pennsylvania

September 15
Institute for Advanced Study/Princeton University Joint Astrophysics Colloquium ✦ *The Gravity of Kepler Systems* ✦ **Eric Agol**, University of Washington

September 17
Astrophysics Informal Seminar ✦ *Superfluid Dark Matter* ✦ **Lasha Berezhiani**, Princeton University

September 22
Institute for Advanced Study/Princeton University Joint Astrophysics Colloquium ✦ *Order Out of Chaos: Formation of Galaxies in a Hierarchical Universe* ✦ **Andrey Kravtsov**, The University of Chicago

September 28
Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ *Oscillations in the CMB Bispectrum—Theory and Data Analysis* ✦ **Moritz Münchmeyer**, Institut d'Astrophysique de Paris

September 29
Institute for Advanced Study/Princeton University Joint Astrophysics Colloquium ✦ *New Insights into Stellar Interiors from Asteroseismology* ✦ **Lars Bildsten**, Kavli Institute for Theoretical Physics, University of California, Santa Barbara

October 1
Astrophysics Informal Seminar ✦ *Young Pulsars and the Galactic Center GeV Gamma-Ray Excess* ✦ **Ryan O'Leary**, University of Colorado

October 6
Institute for Advanced Study/Princeton University Joint Astrophysics Colloquium ✦ *MINERVA-Red: An Intensive Survey for Planets Orbiting the Nearest Low-Mass Stars to the Sun* ✦ **Cullen Blake**, University of Pennsylvania

October 8
Astrophysics Informal Seminar ✦ *Tuning the Clock: Making Sense of Stellar Rotation Observed with Kepler* ✦ **Jennifer L. van Saders**, Carnegie Observatories, Carnegie Institution for Science

October 12
Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ *Helium Reionization Simulations: Seeing the Forest for the Trees* ✦ **Paul La Plante**, Carnegie Mellon University

October 13
Institute for Advanced Study/Princeton University Joint Astrophysics Colloquium ✦ *The Macrophysics and Microphysics of Cosmic Rays* ✦ **Ellen Zweibel**, University of Wisconsin–Madison

October 15
Astrophysics Informal Seminar ✦ *New Tests of Not-So-Dark Matter* ✦ **Yacine Ali-Haïmoud**, Johns Hopkins University

October 20
Institute for Advanced Study/Princeton University Joint Astrophysics Colloquium ✦ *Lonely Galaxies: The Baryon Content of Isolated Dwarf Galaxies* ✦ **Marla Geha**, Yale University

October 22
Astrophysics Informal Seminar ✦ *Probing the Primordial Universe with Large-Scale Structure* ✦ **Valentin Assassi**, Institute for Advanced Study; Member, School of Natural Sciences

October 26
Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ *Modelling the Large Scale Structure with and without Massive Neutrinos* ✦ **Elena Massara**, Scuola Internazionale Superiore di Studi Avanzati

October 27
Institute for Advanced Study/Princeton University Joint Astrophysics Colloquium ✦ *The Surprisingly Dynamic Last Years in the Lives of Massive Stars* ✦ **Eliot Quataert**, University of California, Berkeley

October 29
Astrophysics Informal Seminar ✦ *Looking for Dark Matter in the Neutrino Sector: A Tale of Weak Interactions in the Strong Coupling Epoch* ✦ **Tejaswi Venumadhav Nerella**, Institute for Advanced Study; Member, School of Natural Sciences

November 2
Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ *Cosmology Constraints from Weak Lensing Non-Gaussian Statistics* ✦ **Jia Liu**, Columbia University

November 3
Institute for Advanced Study/Princeton University Joint Astrophysics Colloquium ✦ *Nu Physics in the CMB* ✦ **Daniel Green**, Canadian Institute for Theoretical Astrophysics

November 5
Astrophysics Informal Seminar ✦ *Mapping the Circumgalactic Medium: The Origin and Structure of the Hidden Reservoir of Gas Around Galaxies* ✦ **Rongmon Bordoloi**, Massachusetts Institute of Technology

November 10
Institute for Advanced Study/Princeton University Joint Astrophysics Colloquium ✦ *Climate Dynamics of Condensible-Rich Exoplanet Atmospheres* ✦ **Ray Pierrehumbert**, University of Oxford

November 12
Astrophysics Informal Seminar ✦ *Surprises in Relativistic Simulations of Compact Object Binaries Involving Neutron Stars* ✦ **Vasileios Paschalidis**, Princeton University

November 16
Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ *On Improving the Models of Cosmic Reionization* ✦ **Alexander Kaurov**, The University of Chicago

November 17
Institute for Advanced Study/Princeton University Joint Astrophysics Colloquium ✦ *The Social Life of Spacecraft: How Socio-Technical Organization Matters in Scientific Work* ✦ **Janet Vertesi**, Princeton University

November 19
Astrophysics Informal Seminar ✦ *Why are Quasars Not Just Scaled-Up Black Hole X-Ray Binaries?* ✦ **Shane Davis**, University of Virginia

November 24
Institute for Advanced Study/Princeton University Joint Astrophysics Colloquium ✦ *Stellar Forensics with Explosions: Supernovae, Gamma-Ray Bursts, and Their Environments* ✦ **Maryam Modjaz**, New York University

November 30
Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ *A Direct Measurement of Tomographic Lensing Power Spectra from CFHTLenS* ✦ **Fabian Köhlinger**, Universiteit Leiden

December 1
Institute for Advanced Study/Princeton University Joint Astrophysics Colloquium ✦ *Forming Massive Galaxies* ✦ **Pieter van Dokkum**, Yale University

December 3
Astrophysics Informal Seminar ✦ *The Unhealthy Lives of Companions to Millisecond Pulsars* ✦ **E. Sterl Phinney**, California Institute of Technology

December 8
Institute for Advanced Study/Princeton University Joint Astrophysics Colloquium ✦ *Cosmological Calorimetry: The Nature of the Intergalactic Medium and the Photon Underproduction Crisis* ✦ **Juna Kollmeier**, Carnegie Observatories, Carnegie Instititution of Science; Junior Visiting Professor, School of Natural Sciences

December 10
Astrophysics Informal Seminar ✦ *Interaction of Exoplanet Upper Atmospheres with Stellar Radiation and Winds* ✦ **Phil Arras**, University of Virginia

December 14
Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ *The Sunyaev-Zel'dovich Effect Associated with Quasar Feedback* ✦ **Devin Crichton**, Johns Hopkins University ✦ *Hemispherical Asymmetry and its Cosmological Implications* ✦ **Suvodip Mukherjee**, Inter–University Centre for Astronomy and Astrophysics

December 15
Institute for Advanced Study/Princeton University Joint Astrophysics Colloquium ✦ *Crash, Boom, Bang: Giant Impacts and the Formation of Planets at Home and Abroad* ✦ **Hilke Schlichting**, Massachusetts Institute of Technology

January 14
Astrophysics Informal Seminar ✦ *Sweating the Small Stuff: Simulating Dwarf Galaxies, Ultra-Faint Dwarf Galaxies, and Their Own Tiny Satellites* ✦ **Coral Wheeler**, University of California, Irvine

January 19
Astrophysics Informal Seminar ✦ *The Long-Term Evolution of Hierarchical Systems* ✦ **Adrian Hamers**, Universiteit Leiden

January 25
Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ *CHIME: The Canadian Hydrogen Intensity Mapping Experiment* ✦ **Kendrick Smith**, Perimeter Institute for Theoretical Physics

February 4
Astrophysics Informal Seminar ✦ *Observational Tests of SN Ia Explosion Models in a Paradigm Shift* ✦ **Subo Dong**, Kavli Institute for Astronomy and Astrophysics at Peking University

February 8
Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ *Evidence for the kSZ Effect with ACTPol and BOSS: Probing Baryon Physics in Galaxy Groups and Clusters* ✦ **Emmanuel Schaan**, Princeton University

February 11
Astrophysics Informal Seminar ✦ *Dark Hydrogen with Hyperfine Interactions* ✦ **Kimberly Boddy**, University of Hawai'i at Mānoa

February 18
Astrophysics Informal Seminar ✦ *Stellar Dynamics around a Massive Black Hole* ✦ **Ben Bar-Or**, Institute for Advanced Study; Member, School of Natural Sciences

February 25
Astrophysics Informal Seminar ✦ *Circumgalactic Cosmology* ✦ **Masataka Fukugita**, The University of Tokyo

February 29
Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ *Large-Scale Structure Constraints with Controlled Theoretical Uncertainties* ✦ **Marko Simonović**, Institute for Advanced Study; Member, School of Natural Sciences

March 3
Astrophysics Informal Seminar ✦ *Fire and Ice: The Role of Energetic Processes in the Cold Chemistry of Protoplanetary Disks* ✦ **Ilse Cleeves**, Harvard–Smithsonian Center for Astrophysics

March 14
Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ *CMB-S4 Discussion* ✦ **Erminia Calabrese** and **Nicholas Battaglia**, Princeton University, and **Vera Gluscevic**, Institute for Advanced Study; Member, School of Natural Sciences

March 17
Astrophysics Informal Seminar ✦ *Warm Circumstellar Debris Disks: Diagnosing the Unseen Perturber* ✦ **Erika Nesvold**, Carnegie Institution for Science

March 24
Astrophysics Informal Seminar ✦ *Probing the Inner Accretion Flow of Supermassive Black Holes with X-Ray Reverberation Mapping* ✦ **Erin Kara**, University of Maryland

March 28
Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ *Mapping Merging Clusters with Weak Lensing* ✦ **Elinor Medezinski**, Princeton University

March 31

Astrophysics Informal Seminar ✦ *Evidence for Excess Dark Matter at the Galactic Plane* ✦ **Nir Shaviv**, The Hebrew University of Jerusalem

April 11

Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ *Peaks, Exclusion, and the BAO Scale* ✦ **Tobias Baldauf**, Institute for Advanced Study; Member, School of Natural Sciences

April 14

Astrophysics Informal Seminar ✦ *CMB Spectral Distortions within LCDM* ✦ **Jens Chluba**, The University of Manchester

April 21

Astrophysics Informal Seminar ✦ *Transiting Circumplanetary Disks* ✦ **Eric Mamajek**, University of Rochester

April 25

Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ *BH Binaries From Early Universe and LIGO* ✦ **Takamitsu Tanaka**, Stony Brook University, The State University of New York

May 12

Astrophysics Informal Seminar ✦ *Quasinormal Modes Beyond Kerr Black Holes* ✦ **Aaron Zimmerman**, Canadian Institute for Theoretical Astrophysics

May 19

Astrophysics Informal Seminar ✦ *Gravitational Lensing of Transient Events* ✦ **Liang Dai**, Institute for Advanced Study; Member, School of Natural Sciences

May 9

Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ *Cosmological Constraints from a Joint Analysis of CMB Lensing and Galaxy Density* ✦ **Cyrille Doux**, Laboratoire AstroParticule et Cosmologie, Université Paris Diderot

June 2

Astrophysics Informal Seminar ✦ *The Lyman-Alpha Forest and DLAs: Probes to Large-Scale Structure and Galaxy Formation* ✦ **Jordi Miralda-Escude**, Universitat de Barcelona

June 16

Astrophysics Special Talk ✦ *Paul Dirac: The Theorist's Theorist* ✦ **Graham Farmelo**, University of Cambridge

June 27

Princeton University/Institute for Advanced Study Early Universe/Cosmology Lunch Discussion ✦ *Dark Energy from 21cm Intensity Mapping: the BINGO Telescope* ✦ **Elisa Ferreira**, McGill University

HIGH ENERGY THEORY ACTIVITIES

September 11

High Energy Theory Seminar ✦ *6d (2,0) Theories from the Ground Up* ✦ **Clay Cordova**, Institute for Advanced Study; Long-term Member, School of Natural Sciences

September 16

Physics Group Meeting ✦ *Euclidean Wormholes* ✦ Discussion group led by **Juan Maldacena**, Carl P. Feinberg Professor, School of Natural Sciences

September 21

High Energy Theory Seminar ✦ *A Simple Model of Quantum Holography* ✦ **Alexei Y. Kitaev**, California Institute of Technology

September 23

Physics Group Meeting ✦ *Kitaev's Model and AdS2* ✦ Discussion group led by **Douglas Stanford**, Institute for Advanced Study; Long-term Member, School of Natural Sciences

September 25

High Energy Theory Seminar ✦ *Topologically Twisted Index and Casson-Walker Invariant* ✦ **Pavel Putrov**, Institute for Advanced Study; Member, School of Natural Sciences

September 30

Physics Group Meeting ✦ *Fluid Dynamics as an Effective Field Theory—Recent Progress and Open Problems* ✦ Discussion group led by **Loganayagam Ramalingam**, Institute for Advanced Study; Member, School of Natural Sciences

October 5

High Energy Theory Seminar ✦ *Soft Dilaton Theorems* ✦ **Rutger Boels**, Deutsches Elektronen-Synchrotron (DESY), Universität Hamburg

October 7

Physics Group Meeting ✦ *The Cosmological Constant and the String Landscape* ✦ General Discussion

October 9

High Energy Theory Seminar ✦ *Fermion Path Integrals and Topological Phases* ✦ **Edward Witten**, Charles Simonyi Professor, School of Natural Sciences

October 14

Physics Group Meeting ✦ *Mysteries in the Conformal Bootstrap* ✦ Discussion group led by **David Poland**, Junior Visiting Professor, School of Natural Sciences

October 19

High Energy Theory Seminar ✦ *A Cosmological Solution to the Hierarchy Problem* ✦ **David Kaplan**, Johns Hopkins University

October 21

Physics Group Meeting ✦ *The BMS Group* ✦ Discussion group led by **Aron Wall**, Institute for Advanced Study; Member, School of Natural Sciences

October 23

High Energy Theory Seminar ✦ *A Perfect Bounce* ✦ **Neil Turok**, Perimeter Institute for Theoretical Physics

October 28

Physics Group Meeting ✦ *The Second Run of the LHC* ✦ Discussion group led by **Raffaele Tito D'Agnolo**, Member, School of Natural Sciences

November 2

High Energy Theory Seminar ✦ *Gravity Dual of Relative Entropy* ✦ **Nima Lashkari**, Massachusetts Institute of Technology

November 4

Physics Group Meeting ✦ *Anomalies, Conformal Manifolds, and Spheres* ✦ Discussion group led by **Nathan Seiberg**, Professor, School of Natural Sciences

November 11

Physics Group Meeting ✦ *Aspects of BPS Particles* ✦ Discussion group led by **Clay Cordova**, Institute for Advanced Study; Long-term Member, School of Natural Sciences,

November 12

Phenomenology Seminar ✦ *Discovering or Falsifying sub-GeV Thermal Dark Matter* ✦ **Gordan Krnjaic**, Fermilab

November 16

High Energy Theory Seminar ✦ *New Area Law in General Relativity (and Beyond)* ✦ **Netta Engelhardt**, University of California, Santa Barbara

November 18

Physics Group Meeting ✦ *Supersymmetric Operator Algebras* ✦ Discussion group led by **Christopher John Beem**, Institute for Advanced Study; Member, School of Natural Sciences

November 20

High Energy Theory Seminar ✦ *Entanglement, Spacetime, and Quantum Error Correction* ✦ **Xi Dong**, Institute for Advanced Study; Member, School of Natural Sciences

November 25

Physics Group Meeting ✦ *On the Uniqueness of String Theory* ✦ Discussion group led by **Nima Arkani-Hamed**, Professor, School of Natural Sciences

November 30

High Energy Theory Seminar ✦ *Signs of Hope: A Few LHC Run I Results to Watch for Run II* ✦ **Maurizio Pierini**, CERN

December 4

High Energy Theory Seminar ✦ *Bulk Energy Conditions from Relative Entropy and Comments on Bulk Reconstruction* ✦ **Jennifer Lin**, Institute for Advanced Study; Member, School of Natural Sciences

December 9

Physics Group Meeting ✦ *Charactering CFT's with Gravitational Description* ✦ Discussion group led by **Hirosi Ooguri**, California Institute of Technology; Visiting Professor, School of Natural Sciences

December 14

High Energy Theory Seminar ✦ *Chaos in Quantum Channels* ✦ **Daniel Roberts**, Massachusetts Institute of Technology

December 15

Pheno & Vino Seminar ✦ *New Directions in Searching for the Dark Universe* ✦ **Surjeet Rajendran**, University of California, Berkeley

December 16

Physics Group Meeting ✦ *Color-Kinematics in Scattering Amplitudes* ✦ Discussion group led by **John J. Carrasco**, Stanford University; Member, School of Natural Sciences

January 13

Physics Group Meeting ✦ *Perturbative String Scattering Amplitudes with the Pure Spinor Formalism* ✦ Discussion group led by **Carlos Mafra**, Institute for Advanced Study; Member, School of Natural Sciences

January 20

Physics Group Meeting ✦ *Soft Gravitons* ✦ Discussion group led by **Ellis Ye Yuan**, Institute for Advanced Study; Member, School of Natural Sciences

January 22

High Energy Theory Seminar ✦ *Possibilities for the 750 GeV Excess* ✦ **Matthew Low**, Institute for Advanced Study; Member, School of Natural Sciences

January 27

Physics Group Meeting ✦ *The Diphoton Excess and Physics Beyond the Standard Model* ✦ Discussion group led by **Nima Arkani-Hamed**, Professor, School of Natural Sciences

February 1

High Energy Theory Seminar ✦ *Landau Singularities and Symbology* ✦ **Marcus Spradlin**, Brown University

February 3

Physics Group Meeting ✦ *The Diphoton Excess and Physics Beyond the Standard Model (continued)* ✦ Discussion group led by **Nima Arkani-Hamed**, Professor, School of Natural Sciences

February 5

High Energy Theory Seminar ✦ *Tree and One-Loop Amplitudes from Scattering Equations* ✦ **Ellis Ye Yuan**, Institute for Advanced Study; Member, School of Natural Sciences

February 10

Physics Group Meeting ✦ *Entropy Bounds* ✦ Discussion group led by **Aron Wall**, Institute for Advanced Study; Member, School of Natural Sciences

February 11

Informal Phenomenology Seminar ✦ *Colliding into the Galaxy* ✦ **Philip Harris**, CERN

February 17

Physics Group Meeting ✦ *Entanglement and Gravity* ✦ Discussion group led by **Jennifer Lin**, Institute for Advanced Study; Member, School of Natural Sciences

February 19

High Energy Theory Seminar ✦ *Multiloop Scattering Amplitudes in String and Field Theory* ✦ **Carlos Mafra**, Institute for Advanced Study; Member, School of Natural Sciences

February 24

Physics Group Meeting ✦ *Gauged Linear Sigma Models, B-branes, and Hemispheres* ✦ Discussion group led by **Mauricio Romo**, Institute for Advanced Study; Member, School of Natural Sciences

February 29

High Energy Theory Seminar ✦ *On Information Loss in AdS3/CFT2* ✦ **Jared Kaplan**, Johns Hopkins University

March 2

Physics Group Meeting ✦ *Looking for a Bulk Point* ✦ Discussion group led by **David Simmons-Duffin**, Institute for Advanced Study; Long-term Member, School of Natural Sciences

March 4

High Energy Theory Seminar ✦ *B-brane Transport on (Non-)abelian Gauged Linear sigma Models* ✦ **Mauricio Romo**, Institute for Advanced Study; Member, School of Natural Sciences

March 9

Physics Group Meeting ✦ *Integration by Parts for Feynman Integrals* ✦ Discussion group led by **David Kosower**, CEA/Saclay; Member, School of Natural Sciences

March 14

High Energy Theory Seminar ✦ *Complexity Behind the Horizon* ✦ **Leonard Susskind**, Stanford University

March 16

Physics Group Meeting ✦ *ER=EPR and Copenhagen-Everett Duality* ✦ Discussion group led by **Leonard Susskind**, Stanford University

March 18

High Energy Theory Seminar ✦ *2d (0,2) Gauge Theories and Calabi-Yau 4-Fold Singularities* ✦ **Sangmin Lee**, Seoul National University; Member, School of Natural Sciences

March 17

Physics Group Meeting ✦ *Latest Announcements from CMS* ✦ General Discussion

March 23

Physics Group Meeting ✦ *Categorification of Chern-Simons Partition Function* ✦ Discussion group led by **Pavel Putrov**, Institute for Advanced Study; Member, School of Natural Sciences

March 28

High Energy Theory Seminar ✦ *Linearity of Holographic Entanglement Entropy* ✦ **Ahmed Almheiri**, Stanford University

March 30

Physics Group Meeting ✦ *Tensor Networks and Spacetime Geometry* ✦ General Discussion

April 1

High Energy Theory Seminar ✦ *Cross-Order Relations from Maximal Unitarity* ✦ **David Kosower**, CEA/Saclay; Member, School of Natural Sciences

April 6

Physics Group Meeting ✦ *Quantum Statistics and Spacetime Topology* ✦ Discussion group led by **Juven Chun-Fan Wang**, Institute for Advanced Study; Member, School of Natural Sciences

April 11

High Energy Theory Seminar ✦ *Charge-Vortex Duality and Dirac Fermions in (2+1)d* ✦ **Chong Wang**, Harvard University

April 13

Physics Group Meeting ✦ *Replica Symmetry Breaking* ✦ Discussion group led by **Dionysios Anninos**, Institute for Advanced Study; Member, School of Natural Sciences

April 20

Physics Group Meeting ✦ *Conformal Constraints on Defects* ✦ Discussion group led by **Abhijit Gadde**, Institute for Advanced Study; Member, School of Natural Sciences

April 25

High Energy Theory Seminar ✦ *Elliptic Calabi-Yau Manifolds and the F-Theory Landscape* ✦ **Washington Taylor**, Massachusetts Institute of Technology

April 27

Physics Group Meeting ✦ *Framed BPS States and Quantum Holonomies* ✦ Discussion group led by **Maxime Gabella**, Institute for Advanced Study; Member, School of Natural Sciences

April 29

Informal HET Seminar ✦ *High-Temperature Asymptotics of the 4d Superconfomal Index* ✦ **Arash Arabi Ardehali**, University of Michigan

April 29

High Energy Theory Seminar ✦ *Efficiency=Geometry? Decoding the DNA of Prediction in Gauge, Gravity, and Effective Field Theories* ✦ **John J. Carrasco**, Stanford University; Member, School of Natural Sciences

May 4

Physics Group Meeting ✦ *On Kevin Costello's Approach to Integrable Spin Systems* ✦ Discussion group led by **Edward Witten**, Charles Simonyi Professor, School of Natural Sciences

May 11

Physics Group Meeting ✦ *Constraints on Electromagnetism from Quantum Gravity* ✦ Discussion group led by **Daniel Harlow**, Harvard University

May 13

High Energy Theory Seminar ✦ *Weinberg Soft Theorems from Weinberg Adiabatic Modes* ✦ **Marko Simonivić**, Institute for Advanced Study; Member, School of Natural Sciences

May 16

High Energy Theory Seminar ✦ *Effective Field Theory of Dissipative Fluids* ✦ **Hong Liu**, Massachusetts Institute of Technology

May 18

Physics Group Meeting ✦ *4d, N=3 Superconformal Theories* ✦ Discussion group led by **Sangmin Lee**, Seoul National University; Member, School of Natural Sciences

May 20

High Energy Theory Seminar ✦ *Scattering Amplitudes in Binary* ✦ **Nima Arkani-Hamed**, Professor, School of Natural Sciences

May 25

Physics Group Meeting ✦ *Discrete Liouville* ✦ Discussion group led by **Masahito Yamazaki**, Institute for Advanced Study; Member, School of Natural Sciences

June 1

Physics Group Meeting ✦ *String Theory Low Energy Expansion and M Theory Amplitudes* ✦ Discussion group led by **Arnab Rudra**, University of California, Davis

July 18–29

Prospects in Theoretical Physics: Computational Plasma Astrophysics

Organizers and Lecturers: **Michael Barnes**, University of Oxford; **Matthew Ericson**, *The New York Times*; **Charles Gammie**, University of Illinois at Urbana-Champaign; **Matthew Kunz**, Princeton University; **Luis Lehner**, Perimeter Institute for Theoretical Physics; **Robert Lupton**, Princeton University; **Tamara Munzner**, The University of British Columbia; **Eve Ostriker**, Princeton University; **Eliot Quataert**, University of California, Berkeley; **Anatoly Spitkovsky**, Princeton University; **Jim Stone**, Princeton University; **Alexander Tchekhovskoy**, University of California, Berkeley; **Peter Teuben**, University of Maryland; **Scott Tremaine**, Richard Black Professor, School of Natural Sciences; **Olindo Zanotti**, Università degli Studi di Trento; **John ZuHone**, Smithsonian Astrophysical Observatory; **Ellen Zweibel**, University of Wisconsin–Madison

THE SIMONS CENTER FOR SYSTEMS BIOLOGY ACTIVITIES

July 15

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ *Stochastic Thermodynamics of Interacting Motors* ✦ **Alberto Imparato**, Aarhus University

August 5

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ *Thermodynamics of Information Processing in Biology* ✦ **Pablo Sartori**, Max–Planck–Institut für Physik Komplexer Systeme

October 6

The Simons Center for Systems Biology Seminar ✦ *Survival of the Simplest or the Fastest* ✦ **Michael Lässig**, Universität zu Köln

October 7

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ *Aging in C. elegans: The Temporal Scaling of Lifespan Distributions* ✦ *Executable Knowledge* ✦ **Walter Fontana**, Harvard Medical School

October 9

Meeting with C. Denise Caldwell and Bradley Keister of NSF ✦ *Neural Interactions That Support Grid Cells* ✦ **Yasser Roudi**, Norwegian University of Science and Technology; Member, School of Natural Sciences ✦ *Predicting Influenza Evolution with Fitness Models* ✦ **Marta Luksza**, Columbia University; Research Associate, School of Natural Sciences ✦ *Applied Topology Informs Cellular Fate at a Single-Cell Level* ✦ **Pablo G. Camara**, Columbia University

October 14

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ *Population Dynamics of Reproducing Complex Systems* ✦ **Guy Bunin**, Massachusetts Institute of Technology

November 16

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ *Model of Immune Strategies* ✦ **Olivier Rivoire**, CNRS and Université Joseph Fourier (Grenoble 1)

December 2

Joshua Lederberg–John von Neumann Symposium ✦ *Multiple Timescales of Neuronal Computation* ✦ **Adrienne Fairhall**, University of Washington ✦ *Evolutionary Tradeoffs and the Geometry of Phenotype Space* ✦ **Uri Alon**, Weizmann Institute of Science ✦ *Navigating the Manifolds of the Brain* ✦ **Yasser Roudi**, Norwegian University of Science and Technology; Member, School of Natural Sciences ✦ *Tired with Phase Transitions* ✦ **Alessandro Treves**, Scuola Internazionale Superiore di Studi Avanzati, Trieste ✦ *Symmetry and Adaptation in C. elegans's Response to Touch* ✦ **Massimo Vergassola**, University of California, San Diego

December 3

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ **Mikhael Gromov**, New York University

December 9

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ *Evolution of Genomic Binding Landscapes by Global Selection* ✦ **Edo Kussell**, New York University

December 16

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ *Circuit Mechanisms for Flexible Sensory Processing in Drosophila* ✦ **Vanessa Ruta**, The Rockefeller University

January 6

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ **Sanjay Jain**, University of Delhi; Member, School of Natural Sciences

January 13

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ **Simone Pigolotti**, Universitat Politècnica de Catalunya

January 21

The Simons Center for Systems Biology Seminar ✦ *Applied Topology Reveals Developmental Progression at a Single-Cell Level* ✦ **Pablo G. Camara**, Columbia University

January 21

The Simons Center for Systems Biology Seminar ✦ *Interactive Visualization of 2-D Persistent Homology* ✦ **Michael Lesnick**, Princeton Neuroscience Institute, Princeton University

February 17

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ **Gaby Maimon**, The Rockefeller University

February 22

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ *Stochastic Gene Switches* ✦ **John Hertz**, Nordita, Stockholm

February 24

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ *Life's Engines: How Microbes Made Earth Habitable* ✦ **Paul G. Falkowski**, Rutgers, The State University of New Jersey; Visitor, School of Natural Sciences

February 24

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ *Hydrodynamics* and *Collective Behavior of Tethered Microbes* ✦ **Alex Petroff**, The Rockefeller University

March 2

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ *Belief Propagation and Dynamical Cavity Method for Kinetic Models* ✦ **Gino Del Ferraro**, KTH Royal Institute of Technology, Stockholm

March 11

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ **Harmit S. Malik**, Fred Hutchinson Cancer Research Center

New York Metropolitan Area Discussion Group in Mathematics and Oncology ✦ *The Evolution of Tumor Formation in Mice and Humans with Germline p53 Mutations* ✦ **Arnold Levine**, Professor Emeritus, School of Natural Sciences ✦ *Topological Methods for Complex Data* ✦ **Gunnar Carlsson**, Stanford University ✦ *Dimensionality Reduction in Spaces of Phylogenetic Trees* ✦ **Andrew Blumberg**, The University of Texas at Austin

March 23

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ **Gabriele Micali**, Imperial College London

April 6

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ *Construction Grammar* ✦ **Adele Goldberg**, Princeton University

April 8

Governor's Conference on Effective Partnering in Cancer Research ✦ *The Genetic Basis for Cancer Therapeutics* ✦ **William Sellers**, Novartis Institutes for Biomedical Research ✦ *Tackling the Off-Target Problem in Cancer Pharmacology* ✦ **William G. Kaelin, Jr.**, Dana–Farber Cancer Institute ✦ *Evolution of Resistance to Targeted Therapies* ✦ **Jeffrey Engelman**, Massachusetts General Hospital Cancer Center ✦ *Role of Mutations in Epigenetic Regulators in Pathogenesis of Myeloid Malignancies* ✦ **Ross L. Levine**, Memorial Sloan Kettering Cancer Center ✦ *Organoid Models of Pancreatic Cancer* ✦ **David A. Tuveson**, Cold Spring Harbor Laboratory ✦ *Circulating Tumor Cells: The "Liquid Biopsy"* ✦ **David T. Ting**, Massachusetts General Hospital Cancer Center

April 9–10

Convergence Teams Meeting ✦ *Liberating the Immunologic Response to Pancreatic Cancer* ✦ **Jeffrey Drebin**, Penn Medicine ✦ *The Genetic, Epigenetic, and Immunological Underpinnings of Cancer Evolution through Treatment* ✦ **Ross Levine**, Memorial Sloan Kettering Cancer Center ✦ *Rational Design of Anticancer Drug Combinations with Dynamic Multidimensional Input* ✦ **Levi Garraway**, Dana–Farber Cancer Institute ✦ *Ecology of the Tumor Microenvironment* ✦ **Gurinder S. Atwal**, Cold Spring Harbor Laboratory

April 13

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ *Recognizing Innovations within an Evolving Complex System: Insights from a Stochastic Model of Autocatalytic Network Evolution* ✦ **Sanjay Jain**, University of Delhi; Member, School of Natural Sciences

April 22

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ **Oliver Rando**, University of Massachusetts Medical School

April 25

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ **Walter Fontana**, Harvard Medical School

April 26

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ *A Physical Model for Transcription Factories* ✦ **Guillaume Le Treut**, Institut de Physique Théorique, Saclay

April 27

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ *Bacterial Colonies on Chitin Particles* ✦ **Otto Cordero**, Massachusetts Institute of Technology

May 11

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ *Ecology without Species* ✦ **Mikhail Tikhonov**, Harvard University

May 26

The Simons Center for Systems Biology Informal Talks on Abstract/Conceptual/ Quantitative Aspects of Biology ✦ *Neural Networks of Unusual Mathematical Structure* ✦ **John Hopfield**, Princeton University, and **Dmitry Krotov**, Institute for Advanced Study; Member, School of Natural Sciences

June 27–29

Convergence Scholars Meeting ✦ *Rationale Design of Anticancer Combinations in Breast Cancer* ✦ **José Baselga**, Memorial Sloan Kettering Cancer Center ✦ *Activating the Immune Response in Pancreatic Cancer* ✦ **Jeffrey Drebin**, Penn Medicine ✦ *Ecology of the Tumor Microenvironment in Breast Cancer* ✦ **Gurinder S. Atwal**, Cold Spring Harbor Laboratory ✦ *Genetics and Targeted Therapy of Myeloid Malignancies: A Physician Scientist's Perspective* ✦ **Ross Levine**, Memorial Sloan Kettering Cancer Center ✦ *The Microbiome: The Dark Side of Cancer Immunity* ✦ **Drew Pardoll**, Johns Hopkins School of Medicine ✦ *Mechanism-Based Biomarkers to Guide Anti-PD-1 Cancer Immunotherapy* ✦ **Suzanne Topalian**, Johns Hopkins School of Medicine ✦ *Glioblastoma Evolution and under Therapy* ✦ **Raul Rabadan**, Columbia University ✦ *Modeling Inherited Cancer Syndromes* ✦ **Chang Chan**, Rutgers Cancer Institute of New Jersey ✦ *New Technologies for Personalized Cancer Immunotherapies* ✦ **James Heath**, California Institute of Technology ✦ *Single-Cell 42-Plex Cytokine Profiling: Evaluating the Quality of T Cells in Immune Defense and the Craziness of these Cells If They Go Wild* ✦ **Rong Fan**, Yale University ✦ *Hitting HIV Where It Hurts* ✦ **Arup Chakraborty**, Massachusetts Institute of Technology ✦ *Tumor Suppressor and Tumor Maintenance Genes* ✦ **Scott Lowe**, Memorial Sloan Kettering Cancer Center ✦ *RNA Technologies to Understand Transcriptional Heterogeneity* ✦ **David T. Ting**, Massachusetts General Hospital Cancer Center, Harvard Medical School ✦ *Functional Genomics* ✦ **Robert Darnell**, The Rockefeller University ✦ *Autoimmunity and Cancer* ✦ **Melanie**

Kleinschek, Theravance Biopharma ✦ *Accelerating Biomarker and Therapeutic Discovery with Organoid Models of Pancreatic Cancer* ✦ **Dannielle Engle** and **Herve Tiriac**, Cold Spring Harbor Laboratory

School of Social Science

August 30–September 11
Summer Program in Social Science

September 24
School Welcome Party

September 28
Social Science Lunch Seminar ✦ *Selective Migration and the Health of Black Immigrants in the United States* ✦ **Tod G. Hamilton**, Princeton University; Member, School of Social Science

September 30
Borders and Boundaries Seminar ✦ Organizational Meeting

October 5
Social Science Lunch Seminar ✦ *Dynamics of Difference in Australia: First Contact to the Present* ✦ **Francesca Merlan**, The Australian National University; Member, School of Social Science

October 12
Social Science Lunch Seminar ✦ *Creating a Globally Competitive Industry—Lessons from Meiji-Era Japanese Cotton Spinning Industry* ✦ **Serguey Braguinsky**, Carnegie Mellon University; Member, School of Social Science

October 14
Borders and Boundaries Seminar ✦ *Ethnic Boundaries* ✦ **Andreas Wimmer**, Columbia University

October 19
Social Science Lunch Seminar ✦ *Why Is Treason Coming Back into Fashion, and Not Just in Thailand?* ✦ **Duncan McCargo**, University of Leeds; Visitor, School of Social Science

October 26
Social Science Lunch Seminar ✦ *Life Lived in Relief: Palestinian Refugees and the Humanitarian Experience* ✦ **Ilana Feldman**, The George Washington University; Member, School of Social Science

October 27
Occasional Conversations ✦ *The Upcoming AAA Vote on BDS*

October 28
Borders and Boundaries Seminar ✦ *The Making of Borders: Historical Perspectives*

Borders and Boundaries Film Series ✦ *Sentenced Home,* directed by Nicole Newnham and David Gabias ✦ Post-screening discussion led by **Linda Bosniak**, Rutgers, The State University of New Jersey; Member, School of Social Science

November 2
Social Science Lunch Seminar ✦ *Motivating Solidarity with Distant Others: Empathic Politics, Responsibility, and the Problem of Global Justice* ✦ **Carol C. Gould**, The Graduate Center, The City University of New York; Member, School of Social Science

November 9
Social Science Lunch Seminar ✦ *Rewriting the (African) State From the Margins: Can It Be Done?* ✦ **Paul Nugent**, The University of Edinburgh; Member, School of Social Science

November 11
Borders and Boundaries Seminar ✦ *The Contestation of Borders: Ethical, Political, and Economic Perspectives*

Borders and Boundaries Film Series ✦ *Omar*, directed by Hany Abu-Hassad ✦ Post-screening discussion led by **Ilana Feldman**, The George Washington University; Member, School of Social Science

November 16
Social Science Lunch Seminar ✦ *Sovereignty's Archive* ✦ **Brian Connolly**, University of South Florida; Member, School of Social Science

November 23
Social Science Lunch Seminar ✦ *External Shocks* ✦ **Alice Goffman**, University of Wisconsin–Madison; Member, School of Social Science

November 24
Borders and Boundaries Seminar ✦ *The Condition of the Refugee: Case-Studies from South Africa and Palestine*

November 30
Social Science Lunch Seminar ✦ *Our Corporate Civilization and Its Neoliberal Crisis* ✦ **David Ciepley**, University of Denver; Member, School of Social Science

December 7
Social Science Lunch Seminar ✦ *The Failure of the Liberal Core-Values as Justifications for Cultural Rights and Cosmopolitan Cultural Justice* ✦ **Chaim Gans**, Tel Aviv University; Member, School of Social Science

December 9
Borders and Boundaries Seminar ✦ *Global Labor Markets and Work Migrations: Sociology and Economics*

Borders and Boundaries Film Series ✦ *Welcome*, directed by Philippe Lioret ✦ Post-screening discussion led by **Anne-Claire Defossez**, Institute for Advanced Study; Visitor, School of Social Science

December 14
Social Science Lunch Seminar ✦ *Humanity Interrogated: Forging Liberal Warfare through the Interrogation Rooms of the Korean War* ✦ **Monica Kim**, New York University; Member, School of Social Science

January 25
Social Science Lunch Seminar ✦ *Palestinian Refugees and the Space of Appearance: Notes on Kinship in the Camps of Tyre, Lebanon* ✦ **Sylvain Perdigon**, American University of Beirut; Member, School of Social Science

January 27
Borders and Boundaries Seminar ✦ *The Signification of Boundaries: A Critical Approach*

Borders and Boundaries Film Series ✦ *The Class*, directed by Laurent Cantet ✦ Post-screening discussion led by **Abdoulaye Gueye**, University of Ottawa; Member, School of Social Science

February 1
Social Science Lunch Seminar ✦ *Race No Longer Lives Next Door: Blackness and the Crisis of French Politics of Identity* ✦ **Abdoulaye Gueye**, University of Ottawa; Member, School of Social Science

February 8
Social Science Lunch Seminar ✦ *Mobilizing Morality: Migrant Domestic Workers in Dubai* ✦ **Rhacel Salazar Parreñas**, University of Southern California; Member, School of Social Science

February 10
Borders and Boundaries Seminar ✦ *Racial Boundaries: A Comparative View*

Borders and Boundaries Film Series ✦ *Disgrace*, directed by Steve Jacobs ✦ Post-screening discussion led by **Paul Nugent**, The University of Edinburgh; Member, School of Social Science

February 22
Social Science Lunch Seminar ✦ *"Unapologetic": Wrongs, Rights, and Irregular Immigrants* ✦ **Linda Bosniak**, Rutgers, The State University of New Jersey; Member, School of Social Science

February 24
Borders and Boundaries Seminar ✦ *The Politics of Boundaries: 1. Citizenship*

February 29
Social Science Lunch Seminar ✦ *Rooting Life at the Edge of the Desert: Migrant Experiences and Institution Interactions in Northern Chile* ✦ **Angel Aedo**, Pontifica Universidad Católica de Chile; Member, School of Social Science

Occasional Conversations ✦ *Islam and the West*

March 2

Social Science Lunch Seminar ◆ *Varieties of State Building in the Borderland Area between China and Mainland Southeast Asia* ◆ **Enze Han**, University of London; Member, School of Social Science

March 3

Borders and Boundaries Reading Group ◆ Discussion of texts submitted by **Abdoulaye Gueye**, University of Ottawa; Member, School of Social Science, and **Beth Lew-Williams**, Princeton University; Visitor, School of Social Science

March 9

Borders and Boundaries Seminar ◆ *The Politics of Boundaries: 2. Multiculturalism*

Borders and Boundaries Film Series ◆ *The Edge of Heaven*, directed by Fatih Akın ◆ Post-screening discussion led by **Kristin Surak**, University of London; Member, School of Social Science

March 14

Social Science Lunch Seminar ◆ *The Terror, 1793–1794: A Tragedy of Distrust* ◆ **Ari Adut**, The University of Texas at Austin; Member, School of Social Science

March 21

Social Science Lunch Seminar ◆ *The Problem with Innocence* ◆ **Miriam Ticktin**, The New School for Social Research; Member, School of Social Science

March 23

Borders and Boundaries Seminar ◆ Discussion of several texts focusing on religious boundaries

April 4

Social Science Lunch Seminar ◆ *Passages through the Persian Gulf: Ethnicity, Identity, and Imperial Politics* ◆ **Firoozeh Kashani-Sabet**, University of Pennsylvania; Member, School of Social Science

April 6

Borders and Boundaries Reading Group ◆ Discussion of texts submitted by **Ilana Feldman**, The George Washington University, and **Chaim Gans**, Tel Aviv University; Members, School of Social Science

April 11

Social Science Lunch Seminar ◆ *Beyond Blood and Soil: Jus Pecuniae and the Rise of Economic Citizenship* ◆ **Kristin Surak**, University of London; Member, School of Social Science

April 18

Social Science Lunch Seminar ◆ *Nation and its Undesirable Subjects: Homosexuality, Citizenship, and the Gay-"Other" in Cameroon* ◆ **Basile Ndjio**, University of Douala; Member, School of Social Science

April 25

Social Science Lunch Seminar ◆ *Chinese Exclusion, Racial Violence, and the Problem of Scale* ◆ **Beth Lew-Williams**, Princeton University; Visitor, School of Social Science

April 27

Borders and Boundaries Reading Group ◆ Discussion of texts submitted by **Enze Han**, University of London, and **Rhacel Salazar Parreñas**, University of Southern California; Members, School of Social Science

May 25

Borders and Boundaries Seminar ◆ Conclusions and reflections

June 2–4

Non-State War Economy Seminar ◆ Organized jointly by **Didier Fassin**, James D. Wolfensohn Professor, School of Social Science, and **Nicola Di Cosmo**, Luce Foundation Professor in East Asian Studies, School of Historical Studies

Director's Office Events

September 18

Friends Fall Reception

September 21

Institute Welcome Reception

September 25

Friends Lunch with a Member ◆ *Marriage and Sovereignty in the Nineteenth-Century United States* ◆ **Brian Connolly**, University of South Florida; Member, School of Social Science

October 2

Artists Present ◆ *A Conversation with Signum Quartet* ◆ **Signum Quartet**; **Marc Uys**, Executive Director, Princeton Symphony Orchestra; and **Sebastian Currier**, Artist-in-Residence

October 4

Princeton Symphony Orchestra Concert ◆ **Signum Quartet**

October 9

AMIAS Family Barbecue

October 10

Science Talk for Families ◆ *Really Big Numbers and Infinity* ◆ **Richard Schwartz**, Chancellor's Professor of Mathematics, Brown University

October 14

Friends Talk ◆ *100 Years of General Relativity* ◆ **Robbert Dijkgraaf**, Director and Leon Levy Professor

October 16–17

Edward T. Cone Concert Series and Talk ◆ *Cadence, Fugue, Fade* ◆ **American Brass Quintet**

October 21

Exhibit and Special Event ◆ *Concinnitas* ◆ **Enrico Bombieri**, Professor Emeritus in the School of Mathematics; **Robbert Dijkgraaf**, Director and Leon Levy Professor; **Freeman Dyson**, Professor Emeritus in the School of Natural Sciences; and **Dan Rockmore**, William H. Neukom 1964 Professor of Computational Science, Director of the Neukom Institute for Computational Science, and Professor of Mathematics at Dartmouth College

October 23

Friends Lunch with a Member ◆ *The Man and His Image: Art & Propaganda at the Court of the Qianlong Emperor of China* ◆ **Eugenio Menegon**, Agnes Gund and Daniel Shapiro Member, School of Historical Studies

October 24

Memorial for Patricia Crone, Professor Emerita in the School of Historical Studies

October 30

Public Lecture ◆ *Do We Understand Putin's Russia?* ◆ **Jonathan Haslam**, George F. Kennan Professor, School of Historical Studies

November 4

Special Event and Performance ◆ *Light Falls: Space, Time, and an Obsession of Einstein* ◆ **Brian Greene**, Professor of Theoretical Physics, Columbia University; **Carl Howell**, Actor and Musician; **Angela Janas**, Actor; and **Michael Winther**, Actor

November 5–6

General Relativity at 100 Conference

November 6

Special Event and Screening ◆ *Einstein's Light* ◆ **Nickolas Barris**, Founder of Imaginary Films, and **Joshua Bell**, violin

November 13

Friends Talk ◆ *The Art of Dining: Downton Abbey* ◆ **Francine Segan**, Food Historian

November 20–21

Edward T. Cone Concert Series and Talk ◆ *Kafka Fragments* ◆ **Rolf Schulte**, violin; **Lucy Shelton**, soprano; and **James Winn**, piano

November 21

Friends Lunch with a Member ◆ *Eighteenth-Century Readings of* Paradise Lost *and the Evolution of the "Satanic Sublime"* ◆ **Noël Sugimura**, Member, School of Historical Studies

December 4

Friends Lunch with a Member ◆ *Exploring Three Dimensions* ◆ **Abigail Thompson**, Neil Chriss and Natasha Herron Chriss Founders' Circle Member, School of Mathematics

Friends Talk ✦ *The Aspirational Investor* ✦ **Ashvin Chhabra**, President, Euclidean Capital

December 6
Princeton Symphony Orchestra Concert ✦ **Momenta Quartet**

January 20
Artists Present ✦ **Catherine Chung**, Adelphi University; Visitor, Program in Interdisciplinary Studies

January 22
Friends Talk ✦ *Twilight of the Aristocracy 1918 to 1940* ✦ **Karina Urbach**, Visitor, School of Historical Studies

January 24
Princeton Symphony Orchestra Concert ✦ **Alexander Chaleff**, violin, and **Alexandra Zelman-Doring**, poet

January 27
S.T. Lee Public Lecture ✦ *The Transmission of Knowledge in Abbasid Iraq: Problems in the Interpretation of the Catalogue of Ibn al-Nadim* ✦ **Devin J. Stewart**, Associate Professor of Arabic and Islamic Studies, Emory College of Arts and Sciences

January 29
Friends Lunch with a Member ✦ *Antiquity's Angry Editorialist* ✦ **Michael Kulikowski**, Member, School of Historical Studies

February 2
World Disorder Lecture Series ✦ *And Now for the Hard Part: China's Economic Adjustment After Three Miracle Decades* ✦ **Michael Pettis**, Professor, Guanghua School of Management, Peking University

February 5–6
Edward T. Cone Concert Series and Talk ✦ *High Wire Act* ✦ **New Millennium Ensemble**

February 9
World Disorder Lecture Series ✦ *The Coming Crisis Between Germany and the United States: The Cultural Divergence of Advanced Nations* ✦ **Emmanuel Todd**, Institut National d'Etudes Démographiques

February 17
Friends Dessert with a Member ✦ *Archaeology and the Twilight of Utopia: The Prehistoric Front of the Cold War* ✦ **Michael Kunichika**, Willis F. Doney Member, School of Historical Studies

February 19
Public Lecture ✦ *The New Era of Gravitational-Wave Astronomy* ✦ **Robbert Dijkgraaf**, Director and Leon Levy Professor; **Doron Kushnir**, John N. Bahcall Fellow, School of Natural Sciences; **Scott Tremaine**, Richard Black Professor in the School of Natural Sciences; **Nadia Zakamska**, Johns Hopkins University; Junior Visiting Professor, School of Natural Sciences; **Matias Zaldarriaga**, Professor, School of Natural Sciences

February 26
Friends Lunch with a Member ✦ *How to Study Ancient Prophecy?* ✦ **Martti Nissinen**, University of Helsinki; Member, School of Historical Studies

February 28
Princeton Symphony Orchestra Concert ✦ **Alexander Chaleff**, violin, and **Alexandra Zelman-Doring**, poet

March 4–5
Edward T. Cone Concert Series and Talk ✦ *Remembrance of Things Past* ✦ **Music from Copland House**

March 11
Friends Lunch with a Member ✦ *Geometry and the Shape of Space* ✦ **David Futer**, Elinor Lunder Founders' Circle Member, School of Mathematics

March 12
Science Talk for Families ✦ *Hidden World: The Deep Sea* ✦ **Donato Giovannelli**, Rutgers, The State University of New Jersey; Visitor, Program in Interdisciplinary Studies

March 16
Artists Present ✦ **Tracy K. Smith**, Writer

March 18
Friends Talk ✦ *Extraordinary Changes in Attitudes Toward Wine and Food* ✦ **Gary Fine**, Member, School of Social Science, and **Kevin Zraly**, Wine Expert

March 20
Princeton Symphony Orchestra Concert ✦ **Marc Uys**, violin; **Bridget Kibbey**, harp; and **Mary Mackenzie**, soprano

April 13
Artists Present ✦ **Zia Haider Rahman**, Writer

April 14
Public Lecture ✦ *Categorically Not! On the Edge* ✦ **Sean B. Carroll**, Vice President for Science Education, Howard Hughes Medical Institute; **K.C. Cole**, University of Southern California; Director's Visitor; **Robbert Dijkgraaf**, Director and Leon Levy Professor; **Helen Fisher**, Biological Anthropologist, Kinsey Institute, Indiana University; and **Felice Frankel**, Research Scientist and Photographer, Massachusetts Institute of Technology

Friends Lunch with Yewande Austin ✦ *The Art of Change* ✦ **Yewande Austin**, Artist and Human Rights Activist

April 21
Talk and Luncheon for Founders', Chairman's, and Director's Circle ✦ *The Quest for Other Worlds* ✦ **Nadia Zakamska**, Johns Hopkins University; Junior Visiting Professor, School of Natural Sciences

April 29
World Disorder Lecture Series ✦ *Who Lost the Middle East?* ✦ **Richard Murphy**, Former U.S. Ambassador to Syria and Saudi Arabia

May 6
Public Lecture ✦ *Celebrating Emmy Noether* ✦ **Georgia Benkart**, Professor Emerita, University of Wisconsin-Madison; **Catherine Chung**, Adelphi University; Visitor, Program in Interdisciplinary Studies; **Ingrid Daubechies**, James B. Duke Professor of Mathematics; Professor of Electrical and Computer Engineering at Duke University; and **Karen Uhlenbeck**, University of Texas; Visitor, School of Mathematics

May 11
Public Lecture ✦ *Math in the Real World: More Than Just a Numbers Game* ✦ **Sandra Peterson**, Group Worldwide Chairman, Johnson & Johnson; Institute Trustee; and **Kathy Wengel**, Worldwide Vice President, Supply Chain, Johnson & Johnson

May 13
AMIAS Lecture ✦ *An Antidote to the Politics of Despair: Enabling Conceptions of Justice and the Democratic Necessity of Insurgency* ✦ **Deva Woodly**, Assistant Professor of Politics, The New School for Social Research

May 20
Friends Lunch with a Member ✦ *Activism in the Shadows of Universalism, Elisions, and Accents in the History of Human Rights* ✦ **Meredith Terretta**, Louise and John Steffens Founders' Circle Member, School of Historical Studies

May 25
Friends Annual Meeting and Picnic

June 10
Staff Picnic

ACKNOWLEDGMENTS

(for the year ended June 30, 2016)

Each year researchers from around the world come to the Institute for Advanced Study to interact, explore, take risks, share, build, and discover. This would not be possible but for the far-sighted vision and support of a worldwide network of philanthropists. We thank our donors for their contributions in fiscal year 2015–16 during which new commitments to endowment and the IAS Fund totaled more than $12 million.

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Schmidt Fellowship Fund
Eric and Wendy Schmidt Membership in Biology
Shiing-Shen Chern Membership Fund
Simons Foundation
Charles Simonyi Endowment Fund
Space Telescope Science Institute Hubble Fellowship
The Starr Foundation Biology Endowment
The Starr Foundation East Asian Studies Endowment Fund
Louise and John Steffens Founders' Circle Member
The Peter Svennilson Membership
Frank and Peggy Taplin Membership

United States Department of Energy
The Oswald Veblen Fund
Edwin C. and Elizabeth A. Whitehead Fellowship
Wolfensohn Family Membership
The James D. Wolfensohn Fund
Zurich Financial Services Membership

OTHER DEDICATED ENDOWMENTS AND FUNDS

Ruth and Irving Adler Expository Lectures in Mathematics Fund
Artist-in-Residence Endowment
The Broitman Foundation Fund
Edward T. Cone Concert Series Endowment
R. Llewelyn Davies Fund
Gladys Krieble Delmas Endowment
Friends of the Institute for Advanced Study Endowment
Vartan Gregorian Innovation Fund
Professor Harish-Chandra Endowment
IAS Land Endowment
Kresge Challenge Fund
Dr. S.T. Lee Fund for Historical Studies
Leon Levy Book Fund
Anneliese Maier Research Award
Mary Marquand Endowment
Marston Morse Memorial Fund
Otto Neugebauer Fund
New Initiatives Fund
Erwin Panofsky Fund
Nancy Peretsman and Robert Scully Endowment
Public Policy Lecture Series Endowment
Henry Schaerf Memorial Fund
Mr. and Mrs. William H. Scheide Artist-in-Residence Endowment
Simons Center for Systems Biology Endowment
Simons Foundation Endowment Fund
Charles and Lisa Simonyi Endowment Fund
Karoly Simonyi Memorial Endowment Fund
The Sivian Fund
The Starr Foundation Biology Endowment
Leo Usdan Fund
Shelby White and Leon Levy Archives Endowment
Wolf Foundation Prize Endowment

ADMINISTRATION

(as of June 30, 2016)

Robbert Dijkgraaf
Director and Leon Levy Professor

Nadine Thompson
Executive Assistant to the Director

Josephine S. Faass
Director of Academic Affairs

John Masten
Associate Director for Finance and
Administration

Mark Baumgartner
Chief Investment Officer

Michael Ciccone
Chief Administrative Operations Officer

William Grip
Chief Facilities Officer

Michael Klompus
Chief Human Resources Officer

Mary Mazza
Comptroller/Chief Fiscal Officer

Michel Reymond
Chef/Director of Dining Services

Vacant
Chief Development Officer
Associate Director for Development
and Communications

Christine Ferrara
Director of Communications

Catherine Fleming
Director of Development

Pamela Hughes
Director of Individual Gifts

Molly Sullivan
Director of Individual Gifts

Kelly Devine Thomas
Editorial Director

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)

Casey Westerman
Archivist

School Administration

Mary Jane Hayes
Administrative Officer
School of Mathematics

Donne Petito
Administrative Officer
School of Social Science

Michelle Sage
Administrative Officer
School of Natural Sciences

Suzanne P. Christen
Executive Director and Administrator
The Simons Center for Systems Biology
School of Natural Sciences

Marian Gallagher Zelazny
Administrative Officer
School of Historical Studies

Programs

Beth Brainard
Program Officer
IAS/Park City Mathematics Institute

Arlen K. Hastings
Executive Director, Science Initiative Group

Rafe Mazzeo
Director
IAS/Park City Mathematics Institute

Christine Taylor
Program Officer
Women and Mathematics

Computing, Telecommunications, and Networking Administration

Jeffrey Berliner
Chief Information Officer

Brian Epstein
Computer Manager
Network and Security

Kevin Kelly
Computer Manager
School of Mathematics

Jonathan Peele
Computer Manager
Information Technology Group

James Stephens
Computer Manager
School of Natural Sciences

Edna Wigderson
Manager of Databases and Integration

PRESENT AND PAST DIRECTORS

(in order of service as of June 30, 2016)

Abraham Flexner · Frank Aydelotte

J. Robert Oppenheimer · Carl Kaysen · Harry Woolf

Marvin L. Goldberger · Phillip A. Griffiths · Peter Goddard · Robbert Dijkgraaf

PRESENT AND PAST FACULTY

(2015–2016 Faculty and Faculty Emeriti are in black)

Stephen L. Adler · James W. Alexander · Andrew E. Z. Alföldi · Danielle Allen

Nima Arkani-Hamed · Michael F. Atiyah · John N. Bahcall · Arne K. A. Beurling · Yve-Alain Bois

Enrico Bombieri · Armand Borel · Jean Bourgain · Glen W. Bowersock

Caroline Walker Bynum · Luis A. Caffarelli · Angelos Chaniotis · Harold F. Cherniss · Marshall Clagett

Giles Constable · Patricia Crone · José Cutileiro · Roger F. Dashen · Pierre Deligne

Nicola Di Cosmo · Freeman J. Dyson · Edward M. Earle · Albert Einstein · John H. Elliott

Didier Fassin · Patrick J. Geary · Clifford Geertz · Felix Gilbert · James F. Gilliam · Peter Goddard

Kurt Gödel · Hetty Goldman · Peter Goldreich · Oleg Grabar · Phillip A. Griffiths · Christian Habicht

Harish-Chandra · Jonathan Haslam · Ernst Herzfeld · Albert O. Hirschman · Helmut Hofer · Lars V. Hörmander

Piet Hut · Jonathan Israel · Ernst H. Kantorowicz · George F. Kennan · Robert P. Langlands · Irving Lavin

Tsung-Dao Lee · Stanislas Leibler · Arnold J. Levine · Elias A. Lowe · Robert MacPherson

Juan Maldacena · Avishai Margalit · Eric S. Maskin · Jack F. Matlock, Jr. · Millard Meiss

Benjamin D. Meritt · John W. Milnor · David Mitrany · Deane Montgomery · Marston Morse

J. Robert Oppenheimer · Abraham Pais · Erwin Panofsky · Peter Paret · Tullio E. Regge

Winfield W. Riefler · Dani Rodrik · Marshall N. Rosenbluth · Peter Sarnak · Sabine Schmidtke

Joan Wallach Scott · Nathan Seiberg · Atle Selberg · Kenneth M. Setton · Carl L. Siegel · Thomas Spencer

Walter W. Stewart · Bengt G. D. Strömgren · Richard Taylor · Homer A. Thompson · Scott Tremaine

Kirk Varnedoe · Oswald Veblen · Vladimir Voevodsky · John von Neumann · Heinrich von Staden

Michael Walzer · Robert B. Warren · André Weil · Hermann Weyl · Morton White · Hassler Whitney

Avi Wigderson · Frank Wilczek · Edward Witten · Ernest Llewellyn Woodward

Chen Ning Yang · Shing-Tung Yau · Matias Zaldarriaga

Institute for Advanced Study— Louis Bamberger and Mrs. Felix Fuld Foundation

Financial Statements
June 30, 2016 and 2015

(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 financial statements of Institute for Advanced Study—Louis Bamberger and Mrs. Felix Fuld Foundation (the Institute), which comprise the statements of financial position as of June 30, 2016 and 2015, and the related statements of activities and cash flows for the years then ended, and the related notes to the financial statements.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with U.S. generally accepted accounting principles; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

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 from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

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, 2016 and 2015, and the changes in its net assets and its cash flows for the years then ended, in accordance with U.S. generally accepted accounting principles.

KPMG LLP

November 3, 2016

Assets		2016	2015
Cash and cash equivalents	$	7,602,998	6,108,320
Accounts receivable and other assets		2,935,387	917,848
Grants receivable		1,838,300	1,534,494
Contributions receivable—net		19,905,402	28,506,760
Unamortized debt issuance costs—net		680,337	518,544
Funds held by bond trustee		2,426,873	2,299,649
Beneficial interest in remainder trust		2,613,469	2,629,823
Land, buildings and improvements, equipment, and rare book collection—net		90,673,753	83,092,279
Investments		772,057,363	774,023,403
Total assets	$	900,733,882	899,631,120

Liabilities and Net Assets

Liabilities:			
Accounts payable and accrued expenses	$	8,832,768	7,914,349
Deferred revenue		10,845,676	5,310,557
Liabilities under split–interest agreements		1,913,138	2,136,528
Postretirement benefit obligation		18,473,368	15,262,863
Asset retirement obligation		1,082,777	1,060,476
Bond swap liability		5,127,858	4,131,660
Note payable		74,665	147,861
Long-term debt, net of discount		73,902,321	61,237,580
Total liabilities		120,252,571	97,201,874
Net assets:			
Unrestricted		357,099,237	387,032,882
Temporarily restricted		170,493,442	182,703,391
Permanently restricted		252,888,632	232,692,973
Total net assets		780,481,311	802,429,246
Total liabilities and net assets	$	900,733,882	899,631,120

See accompanying notes to financial statements.

	Unrestricted	Temporarily restricted	Permanently restricted	Total
Operating revenues, gains, and other support:				
Private contributions and grants	$ —	10,816,178	—	10,816,178
Government grants	—	7,043,263	—	7,043,263
Endowment spending policy	20,986,932	17,867,268	—	38,854,200
Auxiliary activity	7,042,436	—	—	7,042,436
Net assets released from restrictions— satisfaction of program restrictions	35,726,709	(35,726,709)	—	—
Total operating revenues, gains, and other support	63,756,077	—	—	63,756,077
Expenses:				
School of Mathematics	11,558,556	—	—	11,558,556
School of Natural Sciences	11,870,919	—	—	11,870,919
School of Historical Studies	8,690,016	—	—	8,690,016
School of Social Science	3,309,893	—	—	3,309,893
Libraries and other academic	7,926,242	—	—	7,926,242
Administration and general	16,068,543	—	—	16,068,543
Auxiliary activity	8,312,231	—	—	8,312,231
Total expenses	67,736,400	—	—	67,736,400
Change in net assets from operations, including depreciation	(3,980,323)	—	—	(3,980,323)
Other revenues, gains, and other support:				
Private contributions and grants	62,702	10,303,476	20,195,659	30,561,837
Endowment change after applying spending policy	(25,019,294)	(22,513,425)	—	(47,532,719)
Change in fair value of bond swap liability	(996,198)	—	—	(996,198)
Loss on sale of plant assets	(532)	—	—	(532)
Change in net assets	(29,933,645)	(12,209,949)	20,195,659	(21,947,935)
Net assets—beginning of year	387,032,882	182,703,391	232,692,973	802,429,246
Net assets—end of year	$ 357,099,237	170,493,442	252,888,632	780,481,311

See accompanying notes to financial statements.

	Unrestricted	Temporarily restricted	Permanently restricted	Total
Operating revenues, gains, and other support:				
Private contributions and grants	$ —	8,331,412	—	8,331,412
Government grants	—	6,038,775	—	6,038,775
Endowment spending policy	22,457,949	16,862,951	—	39,320,900
Auxiliary activity	6,762,376	—	—	6,762,376
Net assets released from restrictions— satisfaction of program restrictions	31,233,138	(31,233,138)	—	—
Total operating revenues, gains, and other support	60,453,463	—	—	60,453,463
Expenses:				
School of Mathematics	10,561,754	—	—	10,561,754
School of Natural Sciences	10,995,815	—	—	10,995,815
School of Historical Studies	7,899,091	—	—	7,899,091
School of Social Science	4,218,369	—	—	4,218,369
Libraries and other academic	7,222,313	—	—	7,222,313
Administration and general	14,540,577	—	—	14,540,577
Auxiliary activity	7,929,359	—	—	7,929,359
Total expenses	63,367,278	—	—	63,367,278
Change in net assets from operations, including depreciation	(2,913,815)	—	—	(2,913,815)
Other revenues, gains, and other support:				
Private contributions and grants	837,108	524,196	30,277,094	31,638,398
Endowment change after applying spending policy	4,536,336	9,144,103	—	13,680,439
Change in fair value of bond swap liability	143,516	—	—	143,516
Loss on sale of plant assets	(15,420)	—	—	(15,420)
Change in net assets	2,587,725	9,668,299	30,277,094	42,533,118
Net assets—beginning of year	384,445,157	173,035,092	202,415,879	759,896,128
Net assets—end of year	$ 387,032,882	182,703,391	232,692,973	802,429,246

See accompanying notes to financial statements.

	2016	2015
Cash flows from operating activities:		
Change in net assets	$ (21,947,935)	42,533,118
Adjustments to reconcile change in net assets to net cash used in operating activities:		
Depreciation	4,849,131	4,684,153
Contributions restricted for endowment and plant	(28,645,990)	(27,324,031)
Net realized and unrealized losses/(gains)	5,742,935	(55,034,872)
Change in fair value of bond swap liability	996,198	(143,516)
Loss on sale of plant assets	532	15,420
Amortization of debt issuance costs	49,325	52,145
Amortization of bond discount	19,260	20,627
Changes in assets/liabilities:		
Accounts receivable, grants receivable, and other assets	(2,321,345)	1,115,329
Contributions receivable	8,601,358	(3,226,839)
Beneficial interest in remainder trust	16,354	(70,546)
Accounts payable and accrued expenses	918,419	67,732
Deferred revenue	5,535,119	1,564,652
Postretirement benefit obligation	3,210,505	175,902
Asset retirement obligation	22,301	25,219)
Net cash used in operating activities	(22,953,833)	(35,545,507)
Cash flows from investing activities:		
Proceeds from sale of plant assets	—	1,916,909
Purchase of plant assets	(12,431,137)	(7,434,326)
Proceeds from sale of investments	224,230,743	308,624,724
Purchase of investments	(228,007,638)	(289,329,967)
Net cash (used in) provided by investing activities	(16,208,032)	13,777,340
Cash flows from financing activities:		
Contributions restricted for endowment and plant	28,645,990	27,324,031
Decrease in liabilities under split-interest agreements	(223,390)	(211,060)
Debt issuance costs on long-term debt	(211,118)	—
Proceeds from issuance of long-term debt	15,220,481	—
Principal payments on long-term debt	(2,575,000)	(2,440,000)
Principal payments on note payable	(73,196)	(71,753)
Decrease in funds held by bond trustee	(127,224)	(12,685)
Net cash provided by financing activities	40,656,543	24,588,533
Net increase in cash and cash equivalents	1,494,678	2,820,366
Cash and cash equivalents—beginning of year	6,108,320	3,287,954
Cash and cash equivalents—end of year	$ 7,602,998	6,108,320
Supplemental data:		
Interest paid	$ 2,209,025	1,954,592

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 members visiting the Institute from other research institutions and universities throughout the world.

The Founders' original letter to the first Trustees described the objectives of the Institute as follows: "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.

(a) Contributions and Grants

Contributions and grants, including unconditional promises to give, are recognized initially at fair value 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 0.28% to 2.07%. Amortization of discount is recorded as additional contribution revenue in accordance with donor-imposed restrictions, if any, on the contributions. The inputs to the fair value estimate are considered Level 3 in the fair value hierarchy.

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.

(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*

Investments in marketable securities are reported in the financial statements at fair value based on published market quotations. Investments in limited partnerships and hedge funds are reported in the financial statements at estimated fair value using net asset value (NAV) or its equivalent as a practical expedient, based upon values provided by external investment managers or general partners, unless it is probable that all or a portion of the investment will be sold for an amount different from NAV. 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. As of June 30, 2016 and 2015, the Institute had no plans or intentions to sell investments at amounts different from NAV.

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 or law. 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 Measurements*

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. The fair value hierarchy requires an entity to maximize the use of observable inputs and minimize the use of unobservable inputs when measuring fair value. A financial instrument's level within the fair value hierarchy is based on the lowest level of any input that is significant to the fair value measurement. The three levels of inputs used to measure fair value are as follows:

•   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 and does 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.

Net Asset Value (NAV) is used as a practical expedient for certain commingled funds, privately held investments, and securities held in partnership format for which a readily determinable fair value is not available, unless the Institute believes such NAV calculation is not measured in accordance with fair value. These values may differ significantly from values that would have been used had a readily available market existed for such investments, and that difference could be material to the change in net assets of the Institute.

In May 2015, the FASB issued Accounting Standards Update No. 2015-07 (Update No. 2015-07), *Disclosures for Investments in Certain Entities That Calculate Net Asset Value per Share (or Its Equivalent)*. The guidance removes the requirement to make certain disclosures and categorize within the fair value hierarchy all investments for which fair value is measured using the NAV per share practical expedient. The Institute elected to early adopt the provisions of Update No. 201507 and applied the provisions of the update retrospectively to 2015.

Additionally, the Institute adopted Accounting Standards Update No. 2015-10 (Update No. 2015-10), *Technical Corrections and Improvements*. The accounting standards update contains amendments that affect a wide variety of topics in the accounting standards codification. One of these amendments includes a clarification that an equity security has a readily determinable fair value if it meets certain conditions. An equity security includes an investment in a mutual fund or an investment in a structure similar to a mutual fund. The fair value of an equity security is considered to be readily determinable if the fair value per share is determined and published, and is the basis for current transactions. The Institute does not have any investments that were impacted by this accounting standard.

(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*
Amounts received on conditional grants are recorded initially as deferred 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 to reflect changes in the life expectancy of the donor or annuitant, amortization of the discount, and other changes in the estimates of future payments. The assets held by the Institute under these arrangements are recorded at fair value as determined by quoted market prices and are included as a component of investments.

(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, 2016 and 2015 were net of accumulated amortization of $1,067,484 and $1,018,159, 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, change in fair value of bond swap liability, and nonrecurring revenue and expenses are considered other revenues, gains and other support in the statements of activities. Private contributions and grants budgeted for operations are included in operating revenues, gains, and other support. All other private contributions and grants are considered other revenues, gains, and other support.

(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 $1,974,810 and $1,919,089 for the years ended June 30, 2016 and 2015, 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.

There are certain transactions that could be deemed unrelated business income and would result in a tax liability. Management reviews transactions to estimate potential tax liabilities using a threshold of more likely than not. It is management's estimation that there are no material tax liabilities that need to be recorded.

(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.

(2) Contributions Receivable

Unconditional promises to give at June 30, 2016 and 2015 were as follows:

		2016	2015
Unconditional promises to give:			
Less than one year	$	8,116,086	9,879,564
One to five years		12,611,800	20,162,838
		20,727,886	30,042,402
Discount on promises to give		(822,484)	(1,535,642)
Total	$	19,905,402	28,506,760

At June 30, 2016 and 2015, 92% and 88% of gross contributions receivable and 34% and 63% of contributions revenue are from four donors, respectively.

During fiscal 2011, the Institute received two conditional pledges totaling $100 million to enhance the Institute's endowment fund. The pledges are conditioned on the Institute raising an additional $100 million in cash or pledges from third-party donors in the period January 1, 2011 through June 30, 2015, which have been met. The conditional pledge payments began in June 2011 and will continue through June 30, 2022. As of June 30, 2016 and 2015, the Institute has recorded revenue totaling approximately $90.4 million and $72.5 million, respectively, relating to these conditional pledges.

(3) Investments, Funds Held by Bond 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. 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. Major investment decisions are authorized by the Board's Investment 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.

The following tables summarize the Institute's investments and other assets at fair value by major category in the fair value hierarchy as of June 30, 2016 and 2015, as well as related strategy, liquidity, and funding commitments:

		June 30, 2016			
	Total	Level 1	Level 2	Level 3	Investments at NAV
Investments:					
Long-term investment strategies:					
Hedge funds—onshore:					
Emerging markets	$ 1,504,761	—	—	—	1,504,761
Equities—long/short	5,579,633	—	—	—	5,579,633
Multiple strategies	62,415,272	—	—	—	62,415,272
Total	69,499,666	—	—	—	69,499,666
Hedge funds—offshore:					
Structured credit	11,990,576	—	—	—	11,990,576
Distressed/high-yield	5,021,666	—	—	—	5,021,666
Emerging markets	39,227	—	—	—	39,227
Equities—long bias	14,627,017	—	—	—	14,627,017
Equities—long/short	84,284,222	—	—	—	84,284,222
Event driven strategies	20,541,876	—	—	—	20,541,876
Multiple strategies	209,508,982	—	—	—	209,508,982
Quantitative/CTA	55,898,287	—	—	—	55,898,287
Quantitative equity long short	10,675,606	—	—	—	10,675,606
Insurance	21,716,573	—	—	—	21,716,573
Bio tech/health care	11,836,093	—	—	—	11,836,093
Discretionary macro	13,334,616	—	—	—	13,334,616
Energy trading	15,000,000	—	—	—	15,000,000
Total	474,474,741	—	—	—	474,474,741
Limited partnerships	157,237,113	—	—	—	157,237,113
Cash and cash equivalents	60,158,644	60,158,644	—	—	—
Other investments:					
Assets held under split-interest agreements:					
Cash and cash equivalents	69,755	69,755	—	—	—
Fixed income securities	3,729,096	—	—	3,729,096	—
Mortgages from faculty and staff	6,888,348	—	—	6,888,348	—
Total investments	$ 772,057,363	60,228,399	—	10,617,444	701,211,520
Other assets:					
Beneficial interest in remainder trust	$ 2,613,469	—	—	2,613,469	—
Funds held by bond trustee:					
U.S. government obligations	2,426,873	—	2,426,873	—	—
Total other assets	$ 5,040,342	—	2,426,873	2,613,469	—

		Total	Level 1	Level 2	Level 3	Investments at NAV
				June 30, 2015		
Investments:						
Long–term investment strategies:						
Hedge funds—onshore:						
Emerging markets	$	1,508,662	—	—	—	1,508,662
Equities—long bias		8,485,482	—	—	—	8,485,482
Equities—long/short		5,721,238	—	—	—	5,721,238
Multiple strategies		59,487,770	—	—	—	59,487,770
Total		75,203,152	—	—	—	75,203,152
Hedge funds—offshore:						
Structured credit	$	12,756,659	—	—	—	12,756,659
Distressed/high-yield		8,280,232	—	—	—	8,280,232
Emerging markets		40,160	—	—	—	40,160
Equities—long bias		17,337,942	—	—	—	17,337,942
Equities—long/short		86,553,482	—	—	—	86,553,482
Event driven strategies		10,530,247	—	—	—	10,530,247
Fixed income arbitrage		9,693,180	—	—	—	9,693,180
Multiple strategies		251,669,656	—	—	—	251,669,656
Quantitative/CTA		28,628,451	—	—	—	28,628,451
Quantitative equity long short		11,972,947	—	—	—	11,972,947
Insurance		10,195,080	—	—	—	10,195,080
Bio tech/health care		11,506,856	—	—	—	11,506,856
Total		459,164,892	—	—	—	459,164,892
Limited partnerships		160,693,468	—	—	—	160,693,468
Cash and cash equivalents		68,141,954	68,141,954	—	—	—
Other investments:						
Assets held under split-interest agreements:						
Cash and cash equivalents		43,011	43,011	—	—	—
Fixed income securities		4,033,210	—	—	4,033,210	—
Mortgages from faculty and staff		6,743,716	—	—	6,743,716	—
Total investments	$	774,023,403	68,184,965	—	10,776,926	695,061,512
Other assets:						
Beneficial interest in remainder trust	$	2,629,823	—	—	2,629,823	—
Funds held by bond trustee:						
U.S. government obligations		2,299,649	—	2,299,649	—	—
Total other assets	$	4,929,472	—	2,299,649	2,629,823	—

The following tables present the Institute's activities for the years ended June 30, 2016 and 2015 for investments classified in Level 3:

| | | 2016 | | |
| | | Assets held under split-interest agreement | | |
Level 3 roll forward	Mortgages from faculty and staff	Fixed income securities	Beneficial interest in remainder trust	Total
Fair value at June 30, 2015	$ 6,743,716	4,033,210	2,629,823	13,406,749
Acquisitions	1,045,818	8,068	—	1,053,886
Dispositions	(901,186)	(279,083)	—	(1,180,269)
Transfers in/out of Level 3	—	—	—	—
Net realized and unrealized gains	—	(33,099)	(16,354)	(49,453)
Fair value at June 30, 2016	$ 6,888,348	3,729,096	2,613,469	13,230,913

| | | 2015 | | |
| | | Assets held under split-interest agreement | | |
Level 3 roll forward	Mortgages from faculty and staff	Fixed income securities	Beneficial interest in remainder trust	Total
Fair value at June 30, 2014	$ 8,629,342	4,355,799	2,559,277	15,544,418
Acquisitions	800,000	—	—	800,000
Dispositions	(2,685,626)	(307,167)	—	(2,992,793)
Transfers in/out of Level 3	—	—	—	—
Net realized and unrealized gains	—	(15,422)	70,546	55,124
Fair value at June 30, 2015	$ 6,743,716	4,033,210	2,629,823	13,406,749

The Institute's accounting policy is to recognize transfers between levels of the fair value hierarchy on the date of the event or change in circumstances that caused the transfer. There were no transfers between investments classified as Level 1 and Level 2 for the years ended June 30, 2016 or 2015. There were no transfers in or out of investments classified as Level 3 for the years ended June 30, 2016 or 2015.

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 origi-nally anticipated investment returns. Accordingly, the timing and amount of future capital or liquidity calls in any particular future year are uncertain. As of June 30, 2016, the Institute is obligated under certain limited partnership agreements to advance additional funding in the amount of $100,348,509, which is anticipated to be called over the next 10 years.

Investment liquidity as of June 30, 2016 is aggregated below based on redemption or sale period:

	Investment fair values
Investment redemption or sale period:	
Daily	$ 60,158,644
Monthly	114,766,050
Quarterly	123,708,370
Semi-annually	43,682,996
Annually	96,468,951
Subject to rolling lock–ups or other restrictions	148,582,883
Illiquid	184,689,469
Total as of June 30, 2016	$ 772,057,363

(c) *Funds Held by Bond Trustee*

Funds held by bond trustee represent the balance of the proceeds from the 2006 and 2008 New Jersey Educational Facilities Authority (NJEFA or the Authority) bonds, the 2012 taxable bonds and the 2015 taxable 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.

(d) *Redemption Restrictions—Hedge Funds*

At June 30, 2016, the Institute had hedge fund investments of approximately $543,992,400, of which approximately $43,631,900 was restricted from redemption for lockup periods. At June 30, 2015, the Institute had hedge fund investments of approximately $534,368,000, of which approximately $66,374,600 was restricted from redemption for lockup 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 lockup period.

The expirations of redemption lockup periods are summarized in the table below:

	Amount
Fiscal year:	
2017	$ 17,994,200
2018	8,872,600
2019 and thereafter	16,765,100
Total	$ 43,631,900

(e) *Redemption Restrictions—Limited Partnerships*

At June 30, 2016 and 2015, the Institute had limited partnership investments of approximately $157,237,100 and $160,693,500, respectively, which were restricted from redemption for lockup 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 lockup period.

The expirations of redemption lockup periods are summarized in the table below:

	Amount
Fiscal year:	
2017	$ 12,283,700
2018	37,712,800
2019	6,067,400
2020	3,878,600
2021	26,161,700
2022 and thereafter	71,132,900
Total	$ 157,237,100

(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 6.11% and 6.8% for 2016 and 2015, respectively.

The following tables summarize the investment return and its classification in the statements of activities for the years ended June 30, 2016 and 2015:

	2016		
	Unrestricted	Temporarily restricted	Total
Dividends and interest, net of investment expenses	$ (1,271,514)	(1,664,070)	(2,935,584)
Net realized and unrealized losses	(2,760,848)	(2,982,087)	(5,742,935)
Total investment return	(4,032,362)	(4,646,157)	(8,678,519)
Endowment spending policy for use in operations	20,986,932	17,867,268	38,854,200
Endowment change after applying spending policy	$ (25,019,294)	(22,513,425)	(47,532,719)

	2015		
	Unrestricted	Temporarily restricted	Total
Dividends and interest, net of investment expenses	$ (982,458)	(1,051,075)	(2,033,533)
Net realized and unrealized gains	27,976,743	27,058,129	55,034,872
Total investment return	26,994,285	26,007,054	53,001,339
Endowment spending policy for use in operations	22,457,949	16,862,951	39,320,900
Endowment change after applying spending policy	$ 4,536,336	9,144,103	13,680,439

Total investment management and advisory fees were $3,185,474 and $2,390,633 for the years ended June 30, 2016 and 2015, respectively.

(5) Endowment

The Institute's endowment consists of approximately 100 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-enacted version of the Uniform Prudent Management of Institutional Funds Act (UPMIFA) as allowing the Institute to appropriate for expenditure or accumulate so much of a donor-restricted endowment fund as the Institute determines is prudent for the uses, benefits, purposes, and duration for which the endowment fund is established, subject to the intent of the donor as expressed in the gift instrument. Unless stated otherwise in the gift instrument, the assets in a donor-restricted endowment fund are donor-restricted assets until appropriated for expenditure by the Board of Trustees of the Institute. As a result of applicable accounting guidance, 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. The remaining portion of the donor-restricted endowment fund that is not classified as permanently restricted net assets is classified as temporarily restricted net assets until those amounts are appropriated for expenditure in a manner consistent with the standard of prudence prescribed by UPMIFA.

From time to time, the fair value of assets associated with individual donor-restricted endowments may fall below the original corpus the fund included in permanently restricted net assets due to unfavorable market fluctuations subsequent to the investment of the gift. Deficiencies of this nature, which are reported in unrestricted net assets, totaled approximately $2,212,000 and $1,895,000, at June 30, 2016 and 2015, respectively. Subsequent gains that restore the fair value of the assets of the donor-restricted endowment fund are classified as an increase in unrestricted net assets.

Endowment net assets consisted of the following at June 30, 2016 and 2015:

| | 2016 | | | |
	Unrestricted	Temporarily restricted	Permanently restricted	Total
Donor restricted	$ (2,212,010)	159,961,990	252,888,632	410,638,612
Board designated	343,959,621	—	—	343,959,621
	$ 341,747,611	159,961,990	252,888,632	754,598,233

| | 2015 | | | |
	Unrestricted	Temporarily restricted	Permanently restricted	Total
Donor restricted	$ (1,895,141)	182,062,449	232,692,973	412,860,281
Board designated	373,545,516	—	—	373,545,516
	$ 371,650,375	182,062,449	232,692,973	786,405,797

Changes in endowment net assets for the fiscal years ended June 30, 2016 and 2015 were as follows:

	Unrestricted	Temporarily restricted	Permanently restricted	Total
Net assets, June 30, 2014	$ 366,347,161	172,496,180	202,415,879	741,259,220
Dividends and interest income, net	(982,458)	(989,771)	—	(1,972,229)
Realized and unrealized gains	27,976,743	26,994,796	—	54,971,539
Contributions	880,715	424,196	30,277,094	31,582,005
Appropriation for expenditure— operations	(22,458,009)	(16,862,952)	—	(39,320,961)
Appropriation for expenditure— capital and other	(113,777)	—	—	(113,777)
Net assets, June 30, 2015	$ 371,650,375	182,062,449	232,692,973	786,405,797
Dividends and interest income, net	(1,271,514)	(1,665,225)	—	(2,936,739)
Realized and unrealized losses	(2,760,848)	(2,891,611)	—	(5,652,459)
Contributions	115,750	303,476	20,195,659	20,614,885
Appropriation for expenditure— operations	(20,986,932)	(17,867,268)	—	(38,854,200)
Appropriation for expenditure— capital and other	(4,999,220)	—	—	(4,999,220)
Additions to temporarily restricted funds	—	20,169	—	20,169
Net assets, June 30, 2016	$ 341,747,611	159,961,990	252,888,632	754,598,233

(b) *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.

(c) *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.

A summary of plant assets at June 30, 2016 and 2015 is as follows:

	2016	2015
Land	$ 377,470	377,470
Land improvements	2,503,680	2,360,368
Buildings and improvements	136,904,499	126,342,840
Equipment	34,575,593	33,552,683
Rare book collection	203,508	203,508
Joint ownership property	5,176,376	4,487,887
	179,741,126	167,324,756
Accumulated depreciation	(89,067,373)	(84,232,477)
Net book value	$ 90,673,753	83,092,279

(7) Long-Term Debt

A summary of long-term debt at June 30, 2016 and 2015 is as follows:

	2016	2015
2006 Series B—NJEFA	$ 23,400,000	24,500,000
2006 Series C—NJEFA	16,000,000	16,500,000
2008 Series C—NJEFA	3,335,000	3,910,000
2012 Taxable	16,130,000	16,530,000
2015 Taxable	15,300,000	—
Less unamortized bond discount	(262,679)	(202,420)
Total long-term debt	$ 73,902,321	61,237,580

Interest expense on long-term debt for the years ended June 30, 2016 and 2015 was $2,150,287 and $1,916,444, respectively.

(a) 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.

(b) 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.

(c) 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.

(d) 2012 Taxable
In December 2012, the Institute received proceeds of $17,320,000 Taxable Bonds, 2012 Series of the Institute for Advanced Study Issue, which were issued at a discount of approximately $92,000. The 2012 Taxable Bonds were used to finance the advance refunding of outstanding 2001 Series A Bonds, to fund renovations to the Members Housing facility and the costs of renovation and equipping certain educational facilities of the Institute, and to pay certain costs incidental to the sale and issuance of the 2012 Taxable Bonds.

(e) 2015 Taxable
In November 2015, the Institute received proceeds of $15,300,000 Taxable Bonds, 2015 Series of the Institute for Advanced Study Issue, which were issued at a discount of approximately $80,000. The 2015 Taxable Bonds were used to fund capital projects at the Institute and for other corporate purposes of the Institute, and to pay certain costs incidental to the sale and issuance of the 2015 Taxable Bonds.

(f) Interest Rates
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.

The 2008 Series C Bonds bear interest at rates ranging from 3% to 5% per annum, 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 2012 Taxable bonds bear interest at rates ranging from 0.388% to 3.892% per annum, payable semi-annually, are subject to redemption at various prices and require principal payments and sinking fund installments through December 1, 2042. The obligation to make the interest payments on a periodic basis, in the amounts sufficient to cover principal and interest due on the bonds, is a general obligation to the Institute.

The 2015 Taxable bonds bear interest at rates ranging from 0.906% to 4.394% per annum, payable semi-annually, are subject to redemption at various prices and require principal payments and sinking fund installments through December 1, 2045. The obligation to make the interest payments on a periodic basis, in the amounts sufficient to cover principal and interest due on the bonds, is a general obligation to the Institute.

(g) *Bond Swap Agreement*

On December 22, 2008, the Institute entered into a swap agreement with Wells Fargo Bank covering $28,800,000 of outstanding 2006 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 notional value of the 2006 Series B Bond is $24,500,000. 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 Institute entered into this swap agreement with the intention of lowering its effective interest rate. At June 30, 2016 and 2015, the fair value of the interest rate swap was $(5,127,858) and $(4,131,660), respectively. The unrealized (loss)/gain recognized during the years ended June 30, 2016 and 2015 in the amount of $(996,198) and $143,516, respectively, is reported in the statements of activities in change in fair value of bond swap liability. The swap agreement utilizes Level 2 inputs to measure fair value. The fair value of the interest rate swap was determined using pricing models developed based on the LIBOR swap rate and other market data. Under the swap agreement, the Institute may be required to post collateral to the counterparty if certain triggering events (rates and dollar thresholds) are met. As of June 30, 2016 and 2015, there was no requirement to post collateral imposed by the swap counterparty.

The bonds are repayable as follows at June 30, 2016:

	Amount
Year ending June 30:	
2017	$ 2,915,000
2018	3,160,000
2019	3,600,000
2020	3,740,000
2021	3,780,000
2022 through 2046	56,970,000
Total	$ 74,165,000

The 2006 Series B, 2006 Series C, and 2008 Series C bonds are secured by a pledge of revenues pursuant to the respective Loan Agreements.

(h) *Lines of Credit*

As of June 30, 2016 and 2015, the Institute had unsecured loan agreements representing a line of credit. As of June 30, 2016, the agreement provides for borrowings up to $20,000,000, and is available through April 2019. As of June 30, 2015, there were two agreements that provided for borrowings up to $20,000,000 and $30,000,000, and were available through April 2016. The $30,000,000 line of credit was not renewed. Interest payments are due on demand and interest accrues at the LIBOR rate plus 90 basis points, which was 2.16% as of June 30, 2016. There were no borrowings in fiscal year 2016 or 2015 against the lines of credit. No interest expense was incurred for the years ended June 30, 2016 and 2015.

(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, 2016 and 2015 totaled approximately $2,220,500 and $2,251,400, 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 of the plan at June 30, 2016 and 2015. There are no plan assets at June 30, 2016 and 2015.

	2016	2015
Postretirement benefit obligation:		
Retirees	$ 5,748,176	5,273,118
Fully eligible active plan participants	3,013,153	1,644,181
Other active plan participants	9,712,039	8,345,564
Postretirement benefit obligation	$ 18,473,368	15,262,863
Change in benefit obligation:		
Benefit obligation at beginning of year	$ 15,262,863	15,086,961
Service cost	731,336	774,586
Interest cost	671,036	647,226
Benefits paid	(371,378)	(356,662)
Actuarial loss (gain)	2,179,511	(889,248)
Benefit obligation at end of year	$ 18,473,368	15,262,863
Components of net periodic benefit cost:		
Service cost	$ 731,336	774,586
Interest cost	671,036	647,226
Amortization of net loss (gain)	2,179,511	(889,248)
Net periodic postretirement benefit cost	$ 3,581,883	532,564

	2016	2015
Benefit obligation weighted average assumptions at June 30, 2016 and 2015:		
Discount rate	3.61%	4.46%
Periodic benefit cost weighted average assumptions for the years ended June 30, 2016 and 2015:		
Discount rate	4.46%	4.35%

The healthcare trend rate is assumed to be 6.0% in fiscal 2016 and 7.5% in fiscal 2015, trending up to an ultimate rate of 5% in 2026 and thereafter.

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:

| | 2016 | | 2015 | |
	Increase	Decrease	Increase	Decrease
Effect on total service and interest cost	$ 458,444	(304,768)	478,350	(316,756)
Effect on the postretirement benefit obligation	4,633,598	(3,319,381)	3,862,157	(2,649,492)

Projected payments for each of the next five fiscal years and thereafter through 2026 are as follows:

	Amount
Year ending June 30:	
2017	$ 468,000
2018	480,000
2019	487,000
2020	501,000
2021	513,000
2022 through 2026	3,081,000

The Institute funds claims as they are incurred. The Institute does not expect to contribute any amounts in fiscal 2016 or 2015, except as needed to provide for benefit payments.

(9) Temporarily and Permanently Restricted Assets

Restricted net assets are available for the following purposes at June 30, 2016 and 2015:

	2016	2015
Temporarily restricted net assets are restricted to:		
School of Mathematics	$ 29,821,537	34,269,453
School of Natural Sciences	15,514,305	19,045,637
School of Historical Studies	36,682,351	41,068,809
School of Social Science	56,720,143	61,224,425
Libraries and other academic	5,624,983	6,612,801
Administration and general	26,130,123	20,482,266
	$ 170,493,442	182,703,391
Permanently restricted net assets are restricted to:		
Investments to be held in perpetuity, the income from which is expendable to support academic services	$ 252,888,632	232,692,973

(10) Subsequent Events

The Institute evaluated events subsequent to June 30, 2016 through November 3, 2016, the date on which the financial statements were issued and determined there were no subsequent events required to be disclosed.

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