# IAS INSTITUTE FOR ADVANCED STUDY

INSTITUTE FOR ADVANCED STUDY EINSTEIN DRIVE PRINCETON, NEW JERSEY 08540 (609) 734-8000 www.ias.edu

Faculty and Members 2016–2017 It is fundamental in our purpose, and our express desire, that in the appointments to the staff and faculty as well as in the admission of workers and students, no account shall be taken, directly or indirectly, of race, religion, or sex. We feel strongly that the spirit characteristic of America at its noblest, above all the pursuit of higher learning, cannot admit of any conditions as to personnel other than those designed to promote the objects for which this institution is established, and particularly with no regard whatever to accidents of race, creed, or sex.

—Louis Bamberger and Caroline Bamberger Fuld, in a letter dated June 4, 1930, to the Institute's first Board of Trustees

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# Introduction

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 in numerous and astounding ways through research originating at the Institute for Advanced Study for more than eighty-five years.

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 out of fifty-six Fields Medalists, and sixteen out of seventeen Abel Prize Laureates, as well as many winners of the Wolf and MacArthur prizes, have been affiliated with the Institute.

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 and relaxed environment.

Albert Einstein, Kurt Gödel, Hetty Goldman, George F. Kennan, Erwin Panofsky, John von Neumann, and Hermann Weyl were among the first in a long line of distinguished Institute scientists and scholars to produce 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? Located in Princeton, New Jersey, the Institute is a private, independent academic institution. Unlike universities, it has neither tuition nor intellectual property income, and its independence and excellence have been almost fully reliant on philanthropy. Founded in 1930 by brother-and-sister philanthropists Louis Bamberger and Caroline Bamberger Fuld, the Institute was established through the vision of founding Director Abraham Flexner. It was 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.

Flexner's vision has been maintained by his successors Frank Aydelotte (1939), J. Robert Oppenheimer (1947), Carl Kaysen (1966), Harry Woolf (1976), Marvin L. Goldberger (1987), Phillip A. Griffiths (1991), and Peter Goddard (2004). In July 2012, Robbert Dijkgraaf became the Institute's ninth Director.

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.



#### **Robbert Dijkgraaf**

#### Director and Leon Levy Professor

Robbert Dijkgraaf is a mathematical physicist who has made significant contributions to string theory and the advancement of science education. His research focuses on the interface between mathematics and particle physics. In addition to finding surprising and deep connections between matrix models, topological string theory, and supersymmetric quantum field theory, Dijkgraaf has developed precise formulas for the counting of bound states that explain the entropy of certain black holes. Past President (2008–12) of the Royal Netherlands Academy of Arts and Sciences and Co-Chair (since 2009) of the InterAcademy Council, Dijkgraaf is a distinguished public policy adviser and passionate advocate for science and the arts.

# School of Historical Studies

Administrative Officer: Marian Gallagher Zelazny

THE SCHOOL OF HISTORICAL STUDIES was established in 1949 with the merging of the School of Economics and Politics and the School of Humanistic Studies. It bears no resemblance to a traditional academic history department, but rather supports all learning for which historical methods are appropriate. The School embraces 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. The School has also supported scholars whose work focuses on other regions, including Central Asia, India, Africa, and the Americas.

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. It thereby encourages the creation of new historical enterprises.

# FACULTY



# Yve-Alain Bois Professor · Art History

A specialist in twentieth-century European and American art, Yve-Alain Bois is recognized as an expert on a wide range of artists, from Henri Matisse and Pablo Picasso to Piet Mondrian, Barnett Newman, and Ellsworth Kelly. The curator of a number of influential exhibitions, he is currently working on several long-term projects, foremost among them the catalogue raisonné of Ellsworth Kelly's paintings and sculptures, the second volume (out of five) of which he plans to finish this year.



# Angelos Chaniotis

#### Professor · Ancient History and Classics

Angelos Chaniotis is engaged in wide-ranging research in the social, cultural, religious, legal, and economic history of the Hellenistic world and the Roman East. The author of many books and articles and senior editor of the *Supplementum Epigraphicum Graecum*, he has worked on war, religion, communicative aspects of rituals, and strategies of persuasion in the ancient world. His current research focuses on emotions, memory, and identity. He is interested in previously unexplored aspects of the ancient world in a dialogue with other disciplines.



#### Nicola Di Cosmo

Luce Foundation Professor in East Asian Studies · East Asian Studies

Nicola Di Cosmo's research focuses on the relations between China and Inner Asia from prehistory to the early modern period. He is interested in the history and archaeology of China's northern frontiers, cultural contacts between China and Central Asia, and the military, political, and social history of Chinese dynasties of Inner Asian origin. His most recent works explore the use of proxy data from climatology and other palaeosciences in the study of the history of China and Central Asia, with special reference to early Eurasian nomads, the Mongol empire, and the Qing dynasty.

# FACULTY



#### Patrick J. Geary

Professor · Medieval History

Patrick Geary's work extends over a vast range of topics in medieval history, both chronologically and conceptually from religiosity and social memory to language, ethnicity, social structure, and political organization. Many of his essays and books remain standard literature in the field and have been translated in multiple languages. He has directed the St. Gall Plan Project, an Internet-based initiative funded by the Andrew W. Mellon Foundation that provides tools for the study of Carolingian monasticism. Currently, Geary is leading a major project that studies the migration of European societies north and south of the Alps through the analysis of ancient DNA in Longobard cemeteries in Hungary and in Italy.



#### **Jonathan Haslam**

#### George F. Kennan Professor · International Relations

Jonathan Haslam is a leading scholar on the history of thought in international relations and the Soviet Union whose work builds a bridge between historical studies and the understanding of contemporary phenomena through critical examinations of the role of ideology. His studies of Soviet foreign policy are expansive in their quality and range, demonstrating his keen originality of thought, supported by insightful and comprehensive archival research.



#### Sabine Schmidtke

#### Professor · Islamic Intellectual History

Sabine Schmidtke is a scholar of Islamic intellectual history whose research has transformed perspectives about the interrelations and connections among different strands of intellectual inquiry, across time, place, religions, and philosophical schools. Schmidtke is currently working on the history of Islamic thought in the postclassical period (thirteenth to nineteenth century) with a focus on reconstructing the textual heritage and the intellectual import of the Islamic intellectual world, from Iran and Central Asia to Turkey and Spain. She is also engaged in a comprehensive study of the Muslim reception of the Bible, a topic on which she has published extensively.



#### Glen W. Bowersock Professor Emeritus · Ancient History

Glen Bowersock is an authority on Greek, Roman, and Near Eastern history and culture as well as the classical tradition in modern literature. The author of numerous important volumes and articles, he uses his exceptional knowledge of classical texts in many languages, together with inscriptions, coins, mosaics, and archaeological remains, to illuminate the mingling of different cultures and to draw unexpected and revelatory conclusions. His research interests include the Greek East in the Roman Empire and late antiquity as well as pre-Islamic Arabia.



# Caroline Walker Bynum

#### Professor Emerita · European Medieval History

Caroline Bynum studies the social, cultural, and intellectual history of Europe from the early Middle Ages to the early modern period. Her books have explored women's religious movements, the history of the body, the role of sacrifice in religion, and the materiality of late medieval art and devotion in its social context. She is currently working on the significance of religious objects in women's monastic houses in Germany before and after the Protestant Reformation and on theoretical questions concerning the agency of objects.



#### Giles Constable

#### Professor Emeritus · Medieval History

The medievalist Giles Constable is the author or editor of more than twenty books in the area of medieval religious and intellectual history concerning, among other subjects, the origins of monastic tithes, Peter the Venerable, the people and power of Byzantium, medieval religious and social thought, the reformation of the twelfth century, Renaissance Florence as seen through the case of Antonio Rinaldeschi, twelfth-century crusading, the history of Cluny, and the fourteenth-century crusading propagandist William of Adam. A work on the California Gold Rush appeared in 2015. He is at work on a short book on early medieval monasticism.

# FACULTY



#### **Christian Habicht**

#### Professor Emeritus · Ancient History

Christian Habicht is among the leading historians of the Hellenistic period. He is an authority on Greek epigraphy and on the history of Athens between Alexander the Great and Augustus. He has published books on the Hellenistic ruler-cults, on the Maccabees, on Cicero, and on Pausanias. He has edited hundreds of previously unpublished inscriptions from important sites in Greece and Asia Minor. To a new bilingual edition of Polybius, he contributed the introduction and explanatory notes; six volumes were published in 2010–12. An updated English edition of his doctoral dissertation, submitted in German in 1951, is scheduled to be published as "Divine Honors for Mortal Men in Greek Cities: The Early Cases" by Michigan Classical Press.



#### Jonathan Israel Professor Emeritus · Modern European History

Jonathan Israel's work is concerned with European and colonial history from the Renaissance to the eighteenth century. His recent work focuses on the impact of radical thought (especially Spinoza, Bayle, Diderot, and eighteenthcentury French materialists) on the Enlightenment and on the emergence of modern ideas of democracy, equality, toleration, freedom of the press, and individual freedom.



#### Irving Lavin

#### Professor Emeritus · Art History

Irving Lavin is one of America's most distinguished art historians. He has written extensively on the history of art from late antiquity to modern times, including numerous studies on Italian painting, sculpture, and architecture of the Renaissance and Baroque periods. His interests have focused primarily on the correlation between form and meaning in the visual arts. The first two volumes of a projected six-volume edition of his collected works have been published as *Visible Spirit: The Art of Gianlorenzo Bernini* (2007–09), while the third volume has appeared as *Bernini at St. Peters: The Pilgrimage* (2012). A gathering of his essays on modern art has appeared in Italian as *L'Arte della storia dell'arte* (2008).

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# FACULTY



#### **Peter Paret**

#### Professor Emeritus · Modern European History

Peter Paret is a cultural and intellectual historian with particular interest in the interaction of war and society since the eighteenth century, how historians integrate war with their interpretation of other historical forces, and the relationship between tradition and modernism in the art of nineteenth and twentieth-century Europe. His most recent books are *Myth and Modernity: Ernst Barlach's Drawings on the Nibelungen* (2012), written with Helga Thieme, which discusses a modern interpretation of a medieval myth as a document of German history in the 1920s and '30s, and *Clausewitz and His Time* (2014), essays in the cultural and intellectual history of thinking about war, an expanded version of which is currently being translated for publication in Germany in 2017.



#### Heinrich von Staden

#### Professor Emeritus · Classics and History of Science

Heinrich von Staden has written on a variety of topics in ancient science, medicine, philosophy, and literary theory, from the fifth century B.C. to the fifth century A.D. Drawing on a wide range of scientific, philosophical, and religious sources, he has contributed to the transformation of the history of ancient science and medicine, particularly of the Hellenistic period. His current research is on the role of animals in ancient scientific theories and practices, on genres of scientific and medical literature in antiquity, and on the "semantics of matter" in ancient science and medicine.

#### MEMBERS AND VISITORS



#### Hassan Farhang Ansari

Islamic Law and Theology · Institute for Advanced Study Elizabeth and J. Richardson Dilworth Fellow Hassan Ansari focuses on the study of Islamic theology, philosophy, law, and legal theory.

#### Alexander Bauer

Archaeology of the Black Sea  $\cdot$  Queens College, The City University of New York  $\cdot$  s

Funding provided by the Hetty Goldman Membership Fund

Alexander Bauer is currently excavating the pre-classical to Ottoman citadel of Sinop, Turkey. He is also examining how alternating cycles of integration and disintegration waxed and waned across Black Sea networks of connectivity during the Bronze Age, prior to the development of the Greek colonial system of the first millennium.

#### **Roland Betancourt**

Art History, Byzantine Studies · University of California, Irvine Elizabeth and J. Richardson Dilworth Fellow

Roland Betancourt is exploring the classical and late-antique foundations of Byzantine thought on time, as articulated through historical chronicles, theology, and philosophy; how a sense of a future was constructed in relation to present-oriented human experience; and how the theory and language of time manifested in liturgical performance and icon.

#### **Raoul Birnbaum**

Buddhist Studies  $\cdot$  University of California, Santa Cruz  $\cdot f$ Funding provided by the Patrons' Endowment Fund

Raoul Birnbaum is preparing a study of a significant cultural figure of modern China who became a Buddhist monk at mid-life. A granular study of Hongyi's life (1880–1942) opens up views of intersecting cultural spheres within China's modernity, and it considers how one individual chose to navigate his way through internal and external complexities.



#### **Antoine Borrut**

Early Islamic History and Historiography · University of Maryland, College Park Patricia Crone Member

Antoine Borrut's book project aims to address the construction of historical knowledge during the first centuries of Islam (seventh to tenth centuries C.E.) and to shed light on the much-neglected genre of astrological histories.



#### **Malcolm Bull**

Art History, Eighteenth-Century Studies  $\cdot$  University of Oxford  $\cdot f$ Funding provided by the Patrons' Endowment Fund

Malcolm Bull works in art history and, more broadly, the history of ideas. He is currently interested in painting in Italy in the eighteenth century, and in changing attitudes to justice and mercy during the same period.

#### Alejandro Cañeque



Colonial Latin America, Spanish Empire · University of Maryland, College Park Hans Kohn Member

Alejandro Cañeque's project explores the propagation of stories and images of martyrdom around the Spanish Empire from the late-sixteenth to the mid-eighteenth century. It identifies four frontiers of martyrdom: England (frontier of heresy), North Africa (frontier of infidelity), Japan (frontier of civilized paganism), and northern Mexico and the eastern and southern regions of Peru (frontier of savage paganism).



#### **Edward Champlin**

#### Ancient History, Roman Cultural History · Princeton University

Edward Champlin is working on a book about Tiberius on Capri. It explores the relationship between reclusive study and supreme power, and between the intellectual passions of the second Roman emperor gastronomy, health, sex, astrology, magic, literature, and, above all, mythology—and the larger cultural concerns of his day.



#### **Andrew Chittick**

Early Medieval China · Eckerd College Roger E. Covey Member in East Asian Studies

Andrew Chittick is reinterpreting the history of the southern Chinese Jiankang Empire (second to sixth century C.E.) through the lenses of ethnicity, frontier studies, and political culture. His work places the rise of this empire in the larger context of Asian maritime trade, Buddhist politics and diplomacy, and comparative world empires.



#### **Hwisang Cho**

#### Korean History · Xavier University

The Andrew W. Mellon Foundation Fellowships for Assistant Professors

Hwisang Cho's research focuses on the ways written culture interacts with philosophical, social, and political changes. His current project will demonstrate how new modes of reading and writing developed in Korean letter writing triggered a flourishing of Neo-Confucian moral thought, the creation of new kinds of sociocultural power, and the rise of elite politics in the Choson dynasty (1392–1910).





*Early Medieval History* · The Catholic University of America · *s Funding provided by the Herodotus Fund* 

Jennifer Davis's current book project investigates why the Franks invented the capitularies, a new genre of law in the post-Roman period, and how the use of these laws became a barometer for social and political change in the Frankish kingdoms. Based on the approximately 250 surviving manuscripts of capitularies, it will present an innovative vision of the use of law.

# Muriel Debie

### Syriac Studies, Late Antiquity · École Pratique des Hautes Études, Paris Funding provided by the Florence Gould Foundation Fund

Muriel Debie is working on a book that aims to deconstruct the prevalent monolithic view of the seventh century. It will show how the apocalyptic currents that pervaded the three monotheisms are a major interpretative key of the period. It will also advocate for a better appreciation of the various Christian affiliations' understanding of history.

#### Jacco Dieleman

Egyptology, Papyrology, Religious Studies  $\cdot$  University of California, Los Angeles  $\cdot f$ 

Funding provided by the Herodotus Fund

Jacco Dieleman is studying how Egyptian scribal culture responded to the political, economic, cultural, and linguistic challenges posed by the imposition of Hellenistic and Roman rule (fourth century B.C.E. to fourth century C.E.).

#### **Thomas Dodman**

#### Eighteenth-Century Cultural History · Boston College The Andrew W. Mellon Foundation Fellowships for Assistant Professors

Thomas Dodman is writing a microhistory of a young soldier and his adoptive family in the age of the French Revolution (1790s–1820s). His study draws on a unique collection of letters and diaries to explore the diffusion of Enlightenment ideas, the impact of war, and a family's emotional life through an era of unprecedented social and political transformation.



#### Emine Fetvaci

# Islamic Art, Ottoman Art · Boston University

Funding provided by the Hetty Goldman Membership Fund

Emine Fetvaci is writing a book on an early seventeenth-century Ottoman album of paintings, drawings, and calligraphies. Her study considers aesthetics and album-making in seventeenth-century Istanbul and examines relationships between court life and popular culture, as well as Ottoman art and the art of Iran and Western Europe.

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#### **Ildar Garipzanov**

Early Medieval History · University of Oslo · f

Ildar Garipzanov is working on the cultural history of graphic signs representing and communicating secular and divine authorities, social status, and identity in the late antique Mediterranean and early medieval Europe. At IAS, he will research the use of monograms and christograms in the Carolingian world.

#### Nina Glibetic Byzantine Studie

# Byzantine Studies · The Hebrew University of Jerusalem Funding provided by the Herodotus Fund

Nina Glibetic studies the history of Christian ritual culture with an eye to the Eastern Mediterranean world. This year, she is investigating Byzantine and medieval Slavic ritual practices connected to childbirth in multiple source-types, including liturgical manuscripts and objects of visual and material culture.

# **Robert Goulding**

#### History of Early Modern Optics · University of Notre Dame William D. Loughlin Member

Thomas Harriot (1560–1621) was one of the great English polymaths and scientists of his time, and probably the greatest English mathematician before Newton. Robert Goulding's research focuses on several hundred of his manuscript writings that have to do with optics, and seeks to put his optical work into the context of his other interests and the larger intellectual world that he inhabited.



# Military History, Machiavelli · Birkbeck, University of London · s Felix Gilbert Member

Andrea Guidi's research is a comparative exploration of two experiments for a Florentine Renaissance militia, which were established in order to defend the last popular governments that interrupted the Medici rule in Florence: the one created by Niccolò Machiavelli (1506–12) and the Ordinanza del Contado (1527–30).



# Francesco Guizzi

# Ancient History, Greek Epigraphy $\cdot$ Università degli Studi di Roma, La Sapienza $\cdot$ s

Francesco Guizzi's project addresses the issue of the relationship between central power, provincial administration, and civic communities in dealing with water supply in an area of Asia Minor (modern Turkey), the Lycus's Valley, under the Roman Empire (first to third century B.C.E.).





Early Medieval Archaeology  $\cdot$  University of Cambridge  $\cdot f$ Funding provided by the Hetty Goldman Membership Fund Susanne Hakenbeck's research focuses on the social transformations that occurred in frontier zones following the collapse of the Roman Empire. At IAS, she will work on an archaeological history of the Danube in late antiquity. Her project will explore the role of Europe's greatest river in the formation of new societies in central Europe, following the decline of the Roman Empire in the West.

#### **Jane Hathaway**

#### Ottoman History $\cdot$ The Ohio State University $\cdot f$ The Gladys Krieble Delmas Foundation Member

Jane Hathaway is completing a book on the Chief Eunuch of the Ottoman imperial harem from the origins of the office in the late sixteenth century through the beginnings of westernizing reform in the late eighteenth century, with an epilogue following the story to the end of the Ottoman Empire.

#### **Elisabeth Kaske**

# Late Imperial China · Carnegie Mellon University The Starr Foundation East Asian Studies Endowment Fund Member Elisabeth Kaske's book project explores how the late Qing government

used the legal sale of rank and office to balance powers among the central government, provincial leaders, and local elites. It will challenge commonly held views in Chinese historiography that the influence of local elites increased at the expense of local government, and that the power of the provincial leaders grew to the detriment of the central government.

#### **Christos Kremmydas**

### Classics, Attic Oratory · Royal Holloway, University of London · s Elizabeth and J. Richardson Dilworth Fellow

Christos Kremmydas's main research interests are in ancient Greek oratory and rhetoric, law, and historiography. At IAS, he plans to work on a book that sheds light on strategies of rhetorical deception in Attic forensic oratory and explores the possibility of detecting verbal deception using ancient and modern diagnostic tools.



#### Yu-chih Lai

#### Chinese Art History and Visual Culture · Academia Sinica Zurich Financial Services Member

Yu-chih Lai's book project will examine how the unprecedented production of various kinds of images at the High Qing court of the eighteenth century represented a form of imperial governance featuring a distinctive "Manchu Way," a term coined by New Qing historians, yet also was shaped by contemporary forms of globalization.











#### **Klaus Larres**

History of International Relations · The University of North Carolina at Chapel Hill

Friends of the Institute for Advanced Study Member

At IAS, Klaus Larres is focusing on the contemporary policies of the United States and Germany toward China and Russia in a transatlantic context. Berlin and Washington have very different ideas about how to manage the rise of a globally ambitious China and deal with Putin's Russia. At times, this has led to a great deal of friction in transatlantic relations.

#### **Christian Lentz**

History of Modern Southeast Asia  $\cdot$  The University of North Carolina at Chapel Hill  $\cdot$  s

The Andrew W. Mellon Foundation Fellowships for Assistant Professors

Christian Lentz is interested in Southeast Asia's politics, societies, and environments. He is exploring the making of Vietnamese territory through contests over agrarian land and labor resources. His next project compares postcolonial Vietnam and Indonesia by examining divergent Cold War trajectories and convergent experiences with mass violence.

#### **Rebecca Maloy**

#### Medieval Music · University of Colorado Edward T. Cone Member in Music Studies

Rebecca Maloy is examining how the music of the Old Hispanic or Mozarabic rite was shaped by the intellectual culture that produced it. Her project considers how the chant served as a form of biblical commentary, how the melodies respond to textual syntax and meaning, and how the chant relates to that of other Western liturgies.

#### Federico Marcon

### History of Early Modern Japan · Princeton University Friends Founders' Circle Member

Federico Marcon is working on a book about the socio-intellectual history of money in early modern Japan. This project aims to make money "talk" about the ways in which it structured social relations between the seventeenth and nineteenth centuries, to recover how money was understood by various social agents, and to examine how the logic of fungibility translated into other forms of thought and knowledge.

#### **Rudolph Matthee**

#### Early Modern Iran · University of Delaware · s Agnes Gund and Daniel Shapiro Member

A specialist of early modern Iran, Rudi Matthee aims to study the historical formation of an Iranian sense of self. His book project will connect the Safavid period with the Qajar era across the "missing" eighteenth century, and probe the ways in which Iranians—both persophone elites and the subaltern who rarely speaks—since Safavid times have engaged with the world around them.



#### **Fabien Montcher**

Intellectual and Political History · Saint Louis University John Elliott Member

Fabien Montcher is exploring how scholarship contributed to the foundations of modern state politics between the late Renaissance and the Enlightenment. As a social historian of ideas, he seeks to understand how Iberian communities of knowledge, from both the Spanish and the Portuguese Empires, fostered political communication among different state information systems.

#### **Giuliano Mori**

#### Early Modern Intellectual History · Institute for Advanced Study Willis F. Doney Member

Giuliano Mori is investigating the role played by the tradition of ancient theology in the seventeenth-century Jesuit environment as a means to formulate new historiographical paradigms aimed at incorporating idolatrous peoples into the Catholic church. He is also interested in how this changed the seventeenth-century notion of error and falsehood.



#### **Ohad Nachtomy**

History of Philosophy and Science · Bar-Ilan University · s

Ohad Nachtomy's main objectives for the coming year are to complete a book manuscript on infinity, unity, and life in Leibniz's philosophy, to edit a collective volume on infinity in early modern philosophy, and to compose an introduction to philosophy through literary texts.





#### **Patrick O'Banion**

Religious Life in Early Modern Spain · Lindenwood University · s Felix Gilbert Member

Patrick O'Banion's project explores the relationship between Christianity and Islam in early modern Spain. Baptized Muslims, or Moriscos, underwent a coerced conversion to Christianity early in the sixteenth century and a forced expulsion a century later, leading historians to depict Moriscos as homogenous, disempowered, and passive. This project explores the Castilian town of Deza, an example that suggests that Moriscos were variegated and active.

#### **Klaus Oschema**

#### Late Medieval Culture and Society · Universität Heidelberg Gerda Henkel Stiftung Member

Klaus Oschema works on astrologers as "experts" in late medieval Europe. He analyzes the mechanisms and strategies, including the aspect of performance, which allowed astrologers to position themselves as experts and to occupy a central role in a variety of contexts of political and social decision-making.

#### MEMBERS AND VISITORS



#### **Anastasios (Tom) Papademetriou**

Ottoman History · Stockton University · s Edwin C. and Elizabeth A. Whitehead Fellow

Tom Papademetriou works on the history of non-Muslims in Ottoman society. His current project examines the Patriarchate of Constantinople's transformation from a weak ecclesiastical institution at the end of the sixteenth century to a powerful religious and civil authority representing the Greek community by the end of the eighteenth century.





# Fabian ReiterAncient History, PapyrologyUniversität Trierf

Fabian Reiter's project aims at the first edition of about 450 Greek ostraca, inscribed potsherds, from the Egyptian village of Tebtynis, which were excavated in the years 1997–2003. Their study is particularly rewarding since in most cases their exact finding spots are known and are often helpful for interpretation.

#### Frank Rexroth

#### Medieval Intellectual History · Georg-August-Universität Göttingen Elinor Lunder Founders' Circle Member

Frank Rexroth's studies aim at a new interpretation of the emergence of a self-referential academic field between the beginning of the twelfth and the mid-thirteenth century. Schools as social groups provide an analytical starting point for his current project, which will ask how the reconfiguration of groups of masters and students made the emergence of a new scholarly *episteme* possible.



#### History of International Relations $\cdot$ The University of Hong Kong $\cdot f$ Funding provided by the Fund for Historical Studies

Priscilla Roberts plans to produce a volume of case studies focusing on the role and influence of foreign policy think tanks in the conduct of international affairs from the 1920s to the 1980s. It will consider how such organizations have functioned, not just singly but as elite transnational intellectual networks.



#### **Nicolaas Rupke**

#### History of Biology · Washington and Lee University Funding provided by The Andrew W. Mellon Foundation

Nicolaas Rupke is studying the history of the non-Darwinian tradition in evolutionary biology, which ranges from early nineteenth-century naturalism and the Humboldtian conception of cosmic complexification to recent notions of self-organization, evo-devo, and convergence. His project will apply a "geography of knowledge" approach, situating conflicting views in their national and sociopolitical spaces.





#### **Daniel J. Sherman**

Art History, Modern French Cultural History  $\cdot$  The University of North Carolina at Chapel Hill  $\cdot\,f$ 

Funding provided by the Hetty Goldman Membership Fund

Daniel Sherman's project probes the intertwined histories of archaeology and French culture in the early twentieth century. It focuses on two controversies over excavations at Carthage in the French Protectorate of Tunisia and over the authenticity of a supposed Neolithic site discovered in central France.

#### **Nancy Sinkoff**

### Jewish History · Rutgers, The State University of New Jersey Elizabeth and J. Richardson Dilworth Fellow

Nancy Sinkoff studies modern East European Jewish history in the European heartland and its diasporic settlements, with a focus on Jewish politics. At IAS, she plans to complete her biography of Lucy S. Dawidowicz (1915–90), a Polish-Jewish immigrant daughter who was central to the postwar construction of Holocaust consciousness and neoconservatism.

#### **Columba Stewart**

### Early Medieval History · St. John's University George William Cottrell, Jr. Member

Columba Stewart is writing an overview of the first millennium of Christian asceticism and monasticism both East and West. The intended audience extends from the educated general reader to students and scholars of late antiquity and the Middle Ages.





#### Antonio Stramaglia

Classical Philology  $\cdot$  Università degli Studi di Cassino e del Lazio Meridionale  $\cdot f$ 

Infosys Member

Antonio Stramaglia is preparing a comprehensive critical edition—the first ever on a systematic scale—of the remains of the lost works of Apuleius of Madauros: a large amount of multifarious material, both in Greek and in Latin, from a leading personality of the Antonine age.

#### Cameron B. Strang

### History of Science in North America · University of Nevada, Reno Martin L. and Sarah F. Leibowitz Member

Cameron Strang's research focuses on the history of science in early America, especially how diverse men and women produced knowledge amidst intercultural encounters. He is currently researching and writing a book on eastern Native Americans who explored the trans-Mississippi West during the eighteenth and nineteenth centuries.



#### Despina Stratigakos

German and Norwegian Architecture · University at Buffalo, The State University of New York Louise and John Steffens Founders' Circle Member

Despina Stratigakos explores the intersections of architecture and power. Her current project investigates the vast construction schemes undertaken in Norway following Germany's invasion in 1940, and what they reveal about the National Socialist vision of colonial territories in the postwar world Adolf Hitler imagined.

#### Daniela Summa

# Greek Epigraphy · Berlin-Brandenburgische Akademie der Wissenschaften · $\nu, f$

Daniela Summa researches Greek epigraphy as a historical and literary source, focusing on the editing of documents, as well as the history of classical scholarship. She plans to conduct research on the correspondence between Louis Robert and Günther Klaffenbach (1929–72), two of the most significant ancient historians and epigraphists of the twentieth century.

#### **Mark Tauger**

#### Soviet Agriculture · West Virginia University Funding provided by The Andrew W. Mellon Foundation

Mark Tauger's study examines famines and agricultural sciences in Russia and the USSR. It surveys the history of famines and famine relief from early Russian history to the twentieth century, the responses of Russian and Soviet agricultural specialists to famine, and the emergence of a Soviet Green Revolution in the 1950s.



#### *Early Islam, Islamic Literature* · Università degli Studi di Napoli L'Orientale *AMLAS Member*

Roberto Tottoli's research aims to analyze the history of the editing and printing of the Qur'an. His project will deal with the known European editions, ranging from the Paganini Venice edition of the beginning of the sixteenth century to the edition by G. Flügel in the nineteenth. It will also consider the history of the Muslim editions of the Qur'an.



# Karina Urbach

# Modern International Relations, Jewish Family History $\cdot$ University of London $\cdot$ v

Karina Urbach works on the role of elites in the international relations of Europe in the first half of the twentieth century. Her new project focuses on the impact that former Nazis had on German society after 1945.









#### **Matthew Waters**

Achaemenid Persia, Ancient Near East · University of Wisconsin–Eau Claire · s Willis F. Doney Member

Matthew Waters's project seeks to contextualize the varied Greek and biblical evidence for Cyrus the Great with the burgeoning data available from cuneiform sources for Babylonian social and institutional history. This will be done in conjunction with an examination of Achaemenid royal ideology that places it in the longue durée of Elamite, Babylonian, and Assyrian antecedents.

#### **Thomas Weber-Karyotakis**

Classical Archaeology, Greco-Roman Sculpture in the Middle East · The University of Jordan · s Willis F. Doney Member

Thomas Weber-Karyotakis studies classical archaeology and has led excavations in Greece, Syria, Yemen, Saudi Arabia, Libya, and Jordan. He is currently building a cultural center near the border between Syria and Jordan to help young Syrian refugees remember the history and tradition of their country, visit local archaeological sites, and learn practical skills.

#### Xin Yu

#### Medieval Chinese History · Fudan University The Starr Foundation East Asian Studies Endowment Fund Member

Xin Yu is examining historical memory, manuscript culture, visual culture, and religious ritual, including mortuary customs, apotropaic rites, divination, and sacrifice, to develop a comprehensive understanding of the different kinds of text in the production and transmission of knowledge and the practice of magic and religion along the Silk Road.



#### Helmut Zander

#### History of Religion $\cdot$ Université de Fribourg $\cdot v, f$

Helmut Zander is preparing a paper on the question of how we can understand long-term developments ("tradition") in religions, which are supposed to exist over centuries or millennia. The broader context of his research is the analysis of cultural "grammars," which are supposed to shape cultural "identities."

# School of Mathematics

# Administrative Officer: Mary Jane Hayes

THE SCHOOL OF MATHEMATICS, established in 1933, was the first School at the Institute for Advanced Study. Oswald Veblen, Albert Einstein, John von Neumann, and Hermann Weyl were the first Faculty appointments. Kurt Gödel, who joined the Faculty in 1953, was one of the School's first Members. Today, the School is an international center for research in mathematics and computer science. Members discover new mathematical results and broaden their interests through seminars and interactions with the Faculty and with each other. Several central themes in mathematics in the last seventy-five years owe their major impetus to discoveries that took place at the Institute. As an example, the creation of one of the first storedprogram computers, which von Neumann built on the Institute's campus, influenced the development of today's computers and formed the mathematical basis for computer software.

During the 2016–17 academic year, the School will have a special program on homological mirror symmetry. Paul Seidel, from the Massachusetts Institute of Technology, will be the School's Distinguished Visiting Professor. Maxim Kontsevich, from the Institut des Hautes Études Scientifiques, will be attending the program for one month during each of the fall and spring terms (from mid-October to mid-November, and for the month of February). Denis Auroux, from the University of California, Berkeley, will be attending for the spring term.

Other programs associated with the School are the Institute for Advanced Study/Park City Mathematics Institute (PCMI), an innovative program integrating mathematics research and mathematics education, and the Program for Women and Mathematics, jointly sponsored with Princeton University, which brings together research mathematicians with women undergraduate and graduate students for an intensive ten-day workshop held on campus.

# FACULTY



#### Jean Bourgain IBM von Neumann Professor

Jean Bourgain's work touches on many central topics of mathematical analysis: the geometry of Banach spaces, harmonic analysis, ergodic theory, spectral problems, and nonlinear partial differential equations from mathematical physics and combinatorial number theory. His contributions have solved longstanding problems in convexity theory and harmonic analysis such as Mahler's conjecture and the lambda-p set problem. His work has had important consequences in theoretical computer science, group expansion, spectral gaps, and the theory of exponential sums in analytic number theory. In Hamiltonian dynamics, he developed the theory of invariant Gibbs measures and quasi-periodicity for the Schrödinger equation.



#### Helmut Hofer Professor

One of the founders of the area of symplectic topology, Helmut Hofer works on symplectic geometry, dynamical systems, and partial differential equations. His fundamental contributions to the field have led to a new area of mathematics known as "Hofer geometry."



#### Robert MacPherson Hermann Weyl Professor

Robert MacPherson's work has introduced radically new approaches to the topology of singular spaces and promoted investigations across a great spectrum of mathematics. He works in several fields of geometry-topology, algebraic geometry, differential geometry, and singularity theory. He is especially interested in aspects of geometry that interact with other areas of mathematics, such as the geometry of spaces of lattices, which interacts with modular forms, and the geometry of toric varieties, which interacts with combinatorics.

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# FACULTY



# Peter Sarnak

Professor

Peter Sarnak has made major contributions to number theory and to questions in analysis motivated by number theory. His interest in mathematics is wide-ranging, and his research focuses on the theory of zeta functions and automorphic forms with applications to number theory, combinatorics, and mathematical physics.



# **Thomas Spencer**

Professor

Thomas Spencer has made major contributions to the theory of phase transitions and the study of singularities at the transition temperature. In special cases, he and his collaborators have proved universality at the transition temperature. Spencer also has worked on partial differential equations with stochastic coefficients, especially localization theory. He is presently developing a mathematical theory of supersymmetric path integrals to study the quantum dynamics of a particle in random media. His other interests include random matrices, chaotic behavior of dynamical systems, and nonequilibrium theories of turbulence.



# **Richard Taylor**

#### Robert and Luisa Fernholz Professor

A leader in the field of number theory and in particular Galois representations, automorphic forms, and Shimura variations, Richard Taylor, with his collaborators, has developed powerful new techniques for use in solving longstanding problems, including the Shimura-Taniyama conjecture, the local Langlands conjecture, and the Sato-Tate conjecture. Currently, Taylor is interested in the relationship between l-adic representations for automorphic forms—how to construct l-adic representations for automorphic forms and how to prove given l-adic representations that arise in this way.

# FACULTY



#### Vladimir Voevodsky Professor

Vladimir Voevodsky is known for his work in the homotopy theory of schemes, algebraic K-theory, and interrelations between algebraic geometry and algebraic topology. He made one of the most outstanding advances in algebraic geometry in the past few decades by developing new cohomology theories for algebraic varieties. Among the consequences of his work are the solutions of the Milnor and Bloch-Kato conjectures. Currently, he is interested in type-theoretic formalizations of mathematics and automated proof verification. He is working on new foundations of mathematics based on homotopytheoretic semantics of Martin-Lof type theories.



#### **Avi Wigderson**

#### Herbert H. Maass Professor

Avi Wigderson is a widely recognized authority in the diverse and evolving field of theoretical computer science. His main research area is computational complexity theory. This field studies the power and limits of efficient computation and is motivated by such fundamental scientific problems as: Does P=NP? (Can mathematical creativity be efficiently automated?) Can every efficient process be efficiently reversed? (Is electronic commerce secure?) Can randomness enhance efficient computation? Can quantum mechanics enhance efficient computation? How do we learn, and can machines be taught to learn like us (or better)?



#### Enrico Bombieri Professor Emeritus

Enrico Bombieri, a Fields Medalist for his work on the large sieve and its application to the distribution of prime numbers, is one of the world's leading authorities on number theory and analysis. His work ranges from analytic number theory to algebra and algebraic geometry, and the partial differential equations of minimal surfaces. In the past decade, his main contributions have been in the active area of Diophantine approximation and Diophantine geometry, exploring questions on how to solve equations and inequalities in integers and rational numbers.



# Pierre Deligne

### Professor Emeritus

Pierre Deligne is known for his work in algebraic geometry and number theory. He pursues a fundamental understanding of the basic objects of arithmetical algebraic geometry—motive, L-functions, Shimura varieties —and applies the methods of algebraic geometry to trigonometrical sums, linear differential equations and their monodromy, representations of finite groups, and quantization deformation. His research includes work on Hilbert's twenty-first problem, Hodge theory, the relations between modular forms, Galois representations and L series, the theory of moduli, tannakian categories, and configurations of hyperplanes.



#### Phillip A. Griffiths Professor Emeritus

Phillip Griffiths initiated with his collaborators the theory of variation of Hodge structure, which has come to play a central role in many aspects of algebraic geometry and its uses in modern theoretical physics. In addition to algebraic geometry, he has made contributions to differential and integral geometry, geometric function theory, and the geometry of partial differential equations. A former Director of the Institute (1991–2003), Griffiths chairs the Science Initiative Group, which fosters science in the developing world through programs such as the Carnegie-IAS African Regional Initiative in Science and Education.

#### **Robert P. Langlands**

## Professor Emeritus



Robert Langlands's profound insights in number theory and representation theory include the formulation of general principles relating automorphic forms and algebraic number theory; the introduction of a general class of L-functions; the construction of a general theory of Eisenstein series; the introduction of techniques for dealing with particular cases of the Artin conjecture (which proved to be of use in the proof of Fermat's theorem); the introduction of endoscopy; and the development of techniques for relating the zeta functions of Shimura varieties to automorphic L-functions. Mathematicians have been working on his conjectures, the Langlands program, for the last three decades. He spent a good deal of time in the late eighties and nineties, and with some success, studying lattice models of statistical physics and the attendant conformal invariance. In recent years, he has been preoccupied by the geometric theory of automorphic forms. He has only now reached the stage at which he can contemplate publication.





Symplectic Topology, Mirror Symmetry  $\cdot$  Columbia University  $\cdot f$ ,  $\nu/s$ Funding provided by the Ellentuck Fund

Mohammed Abouzaid is working on two projects: using Family Floer theory to prove homological mirror symmetry for symplectic manifolds carrying Lagrangian torus fibrations, and understanding stable and unstable homotopy types associated with Floer theory.

#### Zeyuan Allen-Zhu

### Algorithms and Optimization · Institute for Advanced Study Funding provided by the National Science Foundation

Zeyuan Allen-Zhu is interested in developing the core mathematics for algorithms in the broadest sense. One of his recent projects is to formulate a new optimization framework to simultaneously produce faster algorithms across multiple subfields of computer science, for problems ranging from matching, fractional packing, and graph sparsification to SVD, neural networks, and support vector machines.

#### Nurömür Hülya Argüz

Algebraic Geometry, Mirror Symmetry · Institute for Advanced Study · f Funding provided by the National Science Foundation

In her Ph.D., Nurömür Argüz worked on an algebraic geometric and tropical approach to the Fukaya category based on log Gromov-Witten theory, following a suggestion of Mohammed Abouzaid and Bernd Siebert. At IAS, she is investigating the symplectic side more closely, notably concerning symplectic cohomology.



#### **Denis Auroux**

Symplectic Geometry, Mirror Symmetry · University of California, Berkeley · s Schmidt Fellow; supported by Eric and Wendy Schmidt

Denis Auroux is researching Lagrangian Floer homology, Fukaya categories and their applications to homological mirror symmetry, symplectic geometry, and low-dimensional topology.



#### **Matthew Ballard**

*Algebraic Geometry* · University of South Carolina Matthew Ballard is interested in questions regarding derived categories in algebraic geometry, including mirror symmetry.

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#### Huanchen Bao

Representation Theory · Institute for Advanced Study Funding provided by the National Science Foundation

Huanchen Bao is studying representation theory of Lie algebras, Lie superalgebras, quantum groups, and their connections to geometry and categorification.



# Lev Borisov

Algebraic Geometry · Rutgers, The State University of New Jersey Lev Borisov's expertise is in algebraic geometry, in particular toric varieties and mirror symmetry. At IAS, he is participating in the special program on homological mirror symmetry.



#### Nathaniel Bottman

Symplectic Geometry · Institute for Advanced Study

Nathaniel Bottman's research is in symplectic geometry, with a focus on notions of functoriality for Fukaya categories. While at IAS, he intends to continue work on a new operad controlling operations among Fukaya categories and to investigate these operations as they relate to symplectic cohomology.



#### Mark Braverman

Computer Science · Princeton University · vnf Funding provided by the National Science Foundation

Mark Braverman's research focuses on core problems in theoretical computer science and their connections to mathematics, information theory, and areas of applications. At IAS, he plans to explore connections between information theory and optimization, and between mechanism design and algorithms.



#### **Guillaume Brunerie**

Homotopy Type Theory · Institute for Advanced Study Funding provided by the National Science Foundation

Guillaume Brunerie is working on homotopy theory in the setting of univalent foundations, using higher inductive types and the univalence axiom to state and prove theorems of homotopy theory. He is also interested in other aspects of homotopy type theory, such as cubical type theory and formalization in Agda.

### MEMBERS AND VISITORS



#### **Eshan Chattopadhyay**

Theoretical Computer Science  $\cdot$  Institute for Advanced Study  $\cdot f$ Funding provided by the Simons Foundation Eshan Chattopadhyay's research interests are in computational complexity theory, pseudorandomness, and cryptography.

#### William Yun Chen

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Number Theory, Arithmetic Geometry, Galois Theory · Institute for Advanced Study Funding provided by the National Science Foundation

William Yun Chen studies moduli spaces of elliptic curves equipped with non-abelian level structures, which are often quotients of the upper half plane by noncongruence subgroups of SL(2,Z). At IAS, he plans to further develop this theory and its applications to the arithmetic of noncongruence modular forms and the inverse Galois problem.



#### Man Wai Cheung

*Algebra* · Institute for Advanced Study *Funding provided by the National Science Foundation* Man Wai Cheung is working in mirror symmetry. More specifically, she

is interested in connecting mirror symmetry, cluster algebra, and quiver representation by using scattering diagram and theta function.



#### **Otis Chodosh**

Geometric Analysis · Institute for Advanced Study and Princeton University · vri

Otis Chodosh is interested in minimal surfaces, the isoperimetric problem, and geometric flows. He plans to continue to investigate the large-scale behavior of area in settings related to general relativity and low-dimensional topology.



#### **Thomas Church**

Topology, Representation Theory · Stanford University Friends of the Institute for Advanced Study Member

Thomas Church is interested in asymptotic representation theory, including representation stability, and its applications in topology, number theory, and combinatorics. At IAS, he plans to focus on additive combinatorics and its connections with matrix multiplication algorithms, and on topological and derived aspects of function field Langlands.

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# Mirela Ciperiani

Number Theory · The University of Texas at Austin · vnf Funding provided by the National Science Foundation and the Minerva Research Foundation Membership Fund

Mirela Ciperiani's research concerns points on genus one curves. This has led her to study local and global questions about elliptic curves and the Iwasawa theory of elliptic curves.



# Percy A. Deift

Integrable Systems, Random Matrix Theory · Courant Institute of Mathematical Sciences, New York University · f Neil Chriss and Natasha Herron Chriss Founders' Circle Member

Percy Deift is currently working on numerical algorithms applied to random data. The fluctuations in computation times for each algorithm have universality properties, sometimes described by random matrix theory. The work is part numerical/experimental and part analytical.

# **Bohan Fang**



Mathematical Physics, Gromov-Witten Theory, Mirror Symmetry · Peking University · s

Funding provided by the Oswald Veblen Fund

Bohan Fang's research is on the mathematical aspects of mirror symmetry. Currently, he is interested in mirror symmetry where the A-model involves disk or higher genus open invariants in the toric Calabi-Yau setting. It should contain both the enumerative (open Gromov-Witten invariants) and homological (categories) ingredients.



# Sheel Ganatra

Symplectic Geometry  $\cdot$  Institute for Advanced Study  $\cdot f$ Funding provided by the National Science Foundation

Much of Sheel Ganatra's recent work concerns structural aspects of Fukaya categories and Floer theory, using methods of homological algebra and non-commutative geometry, with applications to (and inspirations from) mirror symmetry and string topology.



#### **Mark Goresky**

Geometry, Automorphic Forms  $\cdot$  Institute for Advanced Study  $\cdot v$ Mark Goresky is studying the moduli space of abelian varieties with real structures and its finite field analogues. т



#### **Daniel R. Grayson**

Univalent Foundations  $\cdot$  University of Illinois at Urbana-Champaign  $\cdot$  v, s Friends of the Institute for Advanced Study Member

Daniel Grayson plans to work on computer formalization of some of the proofs of modern mathematics, using Vladimir Voevodsky's univalent foundations, a new foundation for mathematics based on homotopy type theory, where the notion of "set" is no longer the most fundamental.



#### Pooya Hatami

Theoretical Computer Science, Pseudorandomness  $\cdot$  Institute for Advanced Study  $\cdot v$ 

Pooya Hatami is interested in theoretical computer science and combinatorics, in particular the study of randomness, computational pseudorandomness, and mathematical structure.

#### Xuhua He

Algebraic Groups, Representation Theory, Arithmetic Geometry · University of Maryland · vnf

Funding provided by The Bell Companies Fellowship Fund and the National Science Foundation

Xuhua He's research area is algebraic groups, representation theory, and arithmetic geometry. He is particularly interested in questions related to (finite and affine) Weyl groups and flag varieties, and their applications to arithmetic geometry and representation theory.



# Algebraic Geometry, Combinatorics $\cdot$ Institute for Advanced Study and Princeton University $\cdot vf$

Funding provided by the Clay Mathematics Institute and the National Science Foundation June Huh applies algebraic geometry and singularity theory to problems in combinatorics and other areas. His recent interests include singularities of projective hypersurfaces, positivity of Chern classes of Schubert varieties, and connections between realizability problems in algebraic geometry and combinatorial geometry.



#### Ian Jauslin

Mathematical Physics · Institute for Advanced Study Funding provided by the Giorgio and Elena Petronio Fellowship Fund II Ian Jauslin's research focuses on the mathematical aspects of statistical mechanics and solid state physics. In particular, he is interested in phase transitions in classical and quantum many-particle systems, and in rigorous implementations of the renormalization group.

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#### Hao Jia

Partial Differential Equations · Institute for Advanced Study Funding provided by the National Science Foundation

Hao Jia's current research interest is the study of partial differential equations from mathematical physics, such as Navier-Stokes equations and wave equations. He is particularly interested in the regularity property and long time behavior of solutions.



#### Ilya Kachkovskiy

Analysis, Spectral Theory · Institute for Advanced Study Funding provided by the National Science Foundation

Ilya Kachkovskiy is interested in spectral theory of quasiperiodic and periodic Schrödinger operators, mainly in Anderson localization and absolutely continuous spectrum. His other research interests include abstract operator theory and operator algebras, particularly almost commuting operators and matrices.



#### Ludmil Katzarkov

Algebraic Geometry, Homological Mirror Symmetry · Universität Wien · s Friends of the Institute for Advanced Study Member

Ludmil Katzarkov plans to work on two projects: developing categorical Kähler geometry and a connection with stability conditions, and developing a theory of categorical linear systems.



#### **Ailsa Keating**

Symplectic Geometry  $\cdot$  Institute for Advanced Study  $\cdot v/f$ , s Funding provided by the National Science Foundation

Ailsa Keating studies problems in symplectic topology and mirror symmetry. She is particularly interested in combining "modern" invariants, such as Floer cohomology or the Fukaya category, with tools from other areas, such as classical singularity theory or the study of mapping class groups.



#### Sean Keel

Algebraic Geometry · The University of Texas at Austin · s Funding provided by the Oswald Veblen Fund Sean Keel is an algebraic geometer with particular interests in moduli spaces and birational geometry. о н

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#### Ilya Khayutin

Number Theory, Dynamics  $\cdot$  Institute for Advanced Study and Princeton University  $\cdot$  vri

Ilya Khayutin is interested in the interaction between arithmetic and dynamics, which often incorporates methods and ideas from homogeneous dynamics and ergodic theory, arithmetic geometry and automorphic forms. Recently, he has been studying the distribution of toral periods.



#### Ju-Lee Kim

Representation Theory of p-adic Groups · Massachusetts Institute of Technology · vp Funding provided by the Giorgio and Elena Petronio Fellowship Fund Ju-Lee Kim is interested in representation theory and harmonic analysis on p-adic reductive groups.



Number Theory · Institute for Advanced Study Funding provided by the S. S. Chern Foundation for Mathematics Research Fund and the National Science Foundation

Nayoung Kim is primarily interested in the arithmetic of elliptic curves, especially twists of elliptic curves. She is currently working on the 3-Selmer rank in families of cubic twists of elliptic curves over arbitrary number fields in relation to Hilbert's Tenth Problem.



#### **Pravesh Kothari**

Theoretical Computer Science · Institute for Advanced Study and Princeton University

Pravesh Kothari is interested in computational complexity theory, with a specific focus in approximation algorithms, hardness of approximation, and pseudorandomness. At the Institute, he plans to continue his recent work on understanding the limitations of algorithmic schemes based on linear and semidefinite programming.



#### Daniel Le

Algebraic Number Theory · Institute for Advanced Study Funding provided by the National Science Foundation

Daniel Le is interested in the reciprocity between the mod p cohomology of arithmetic manifolds and mod p Galois representations. He plans to study the connection of these objects to automorphy lifting theorems and the Langlands program.

### MEMBERS AND VISITORS



**Heather Lee** 

Symplectic Geometry · Institute for Advanced Study Funding provided by the National Science Foundation Heather Lee's research is in symplectic geometry, with a focus on mirror symmetry and related topics.



## Catherine Lelay

Univalent Foundations · Institute for Advanced Study Funding provided by the National Science Foundation Catherine Lelay is working on the formalization of univalent foundations of mathematics in Coq proof assistant.



#### Francesco Lin

Low-Dimensional Topology, Differential Geometry  $\cdot$  Institute for Advanced Study and Princeton University  $\cdot$  vri

Francesco Lin studies differential equations coming from gauge theory and their applications to low-dimensional topology.



#### Cheuk Yu Mak

Symplectic Geometry · Institute for Advanced Study Funding provided by the National Science Foundation

In some situations, algebraic notions like mapping cones and autoequivalences in Fukaya category have very concrete geometric meanings via surgeries and symplectomorphisms, respectively. Cheuk Yu Mak is interested in investigating these and searching for their geometric applications.



#### **Maryanthe Malliaris**

Model Theory (Logic) · University of Chicago · vnf, s Funding provided by the National Science Foundation

Maryanthe Malliaris's research interests are in model theory, especially classification of theories. Her recent research builds a framework for comparing the complexity of theories via ultrapowers, a special kind of limit structure. There are connections to the study of complexity in finite combinatorics, set theory, and general topology and to the study of very large graphs.

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#### Adam Marcus

Combinatorics, Linear Algebra, Polynomials · Princeton University · vnf Funding provided by the National Science Foundation

Adam Marcus is interested in developing new combinatorial tools for linear algebra and convex geometry using properties of polynomials. These include a finite version of free probability theory and low temperature limits of random matrix ensembles.



# Paul Melvin

#### Geometric Topology $\cdot$ Bryn Mawr College $\cdot v, f$

Paul Melvin is researching the topology of 3- and 4-manifolds. Recently, he has focused on the study of 4-dimensional "corks," including the construction of families of exotic 2-sphere embeddings in 4-manifolds via "symmetric corks," and of "equivariant corks." He is also interested in applications of Heegaard-Floer theory to questions in knot concordance and 3-manifold complexity.



#### Djordjo Zeljko Milovic

#### Number Theory · Institute for Advanced Study Funding provided by the National Science Foundation

Djordjo Milovic's main interest is in solving problems in arithmetic statistics by combining algebraic and analytic techniques. He aims to expand on his previous results on the 16-rank of class groups of quadratic number fields and prove new density theorems about the negative Pell equation and the congruent number problem.



#### **Mariusz Mirek**

#### Analysis · Universität Bonn Schmidt Fellow; supported by Eric and Wendy Schmidt

Mariusz Mirek's research focuses on the field of harmonic analysis and its applications to ergodic theory and probability theory. Specifically, he is working on discrete harmonic analysis. He is also interested in problems in multi-linear harmonic analysis and in time-frequency analysis.



# Anders Mörtberg

Univalent Foundations  $\cdot$  Institute for Advanced Study  $\cdot f$ 

Anders Mörtberg is interested in constructive algebra, logic, and the formalization of mathematics in computer proof assistants. During his stay at the Institute, he will work on the formalization of models of type theory in univalent foundations.

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#### Sian Nie

Representation Theory  $\cdot$  Institute for Advanced Study  $\cdot f$ 

Sian Nie is interested in the geometric structures of affine Deligne-Lusztig varieties (e.g., classifying their connected components and irreducible connected components) and their application to Shimura varieties.



#### Alexandru Oancea

Differential Geometry · Université Pierre et Marie Curie · s Funding provided by the Charles Simonyi Endowment

Alexandru Oancea's field of research is symplectic and contact geometry, with an emphasis on symplectic invariants constructed from pseudoholomorphic curves. He is currently interested in the symplectic topology of Stein manifolds, which he plans to study using ideas from low-dimensional topology and singularity theory.

### **Dmitri Orlov**

Algebraic Geometry, Homological Algebra, Derived and Triangulated Categories, Mirror Symmetry · Steklov Mathematical Institute, Russian Academy of Sciences · s Schmidt Fellow; supported by Eric and Wendy Schmidt

Dmitri Orlov aims to describe different properties of non-commutative derived schemes and to find their geometric realizations. In particular, he plans to investigate phantom and quasi-phantom categories and Krull-Schmidt partners for smooth projective schemes, aiming to find natural relations of such categories with mirror partners in symplectic geometry.



# John Pardon

Geometry, Topology  $\cdot$  Institute for Advanced Study  $\cdot v$ 

John Pardon has recently been working on virtual fundamental cycles in symplectic geometry. At IAS, he hopes to better understand Fukaya categories of Stein manifolds.



### **James Pascaleff**

Symplectic Topology  $\cdot$  University of Illinois at Urbana-Champaign  $\cdot$  s James Pascaleff is studying holomorphic curve invariants of symplectic manifolds (symplectic cohomology, Lagrangian Floer cohomology, etc.) through the lens of homological mirror symmetry. He is particularly interested in the symplectic interpretation of wall-crossing phenomena and the role of equivariance in mirror symmetry.



#### **Timothy Perutz**

Differential Geometry · The University of Texas at Austin · vnf Funding provided by the National Science Foundation Timothy Perutz works in the field of symplectic topology. He applies

Floer-theoretic methods to situations involving mirror symmetry or low-dimensional topology. His current research centers on homological mirror symmetry and its relation to Hodge-theoretic aspects of mirror symmetry (e.g., enumeration of rational curves).



#### Sören Petrat

Mathematical Physics  $\cdot$  Institute for Advanced Study  $\cdot f$ Funding provided by the National Science Foundation Sören Petrat is interested in the mathematical physics of many-body quantum systems, in particular in the field of effective quantum dynamics. At IAS, he aims to work on fermionic scaling limits and the dynamics of spin waves.



#### **Aaron Potechin**

Computational Complexity Theory · Institute for Advanced Study Funding provided by the Simons Foundation and the National Science Foundation Aaron Potechin's current research is on the performance of the sum of squares hierarchy, a powerful generalization of semi-definite programming. While at IAS, he plans to continue this research and to work on circuit lower bounds.



#### **Dhruv Ranganathan**

Algebraic Geometry  $\cdot$  Institute for Advanced Study  $\cdot$  s Funding provided by the National Science Foundation

Dhruv Ranganathan's research centers around the development and application of combinatorial techniques in enumerative geometry and moduli spaces, particularly through connections to tropical and non-Archimedean geometry and logarithmic Gromov-Witten theory.



#### **Arash Rastegar**

Number Theory, Algebraic Geometry · Sharif University of Technology, Tehran

Funding provided by the Oswald Veblen Fund

Arash Rastegar is interested in modular forms, Diophantine geometry, self-similarity in arithmetic geometry, and deformations of algebras and their representations. He has also produced work in the areas of philosophy of mathematics, philosophy of science, anthropology, and education. His research at IAS will focus on number theory and algebraic geometry.

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### **Orit Esther Raz**

Discrete Geometry, Combinatorics · Institute for Advanced Study Funding provided by the Ellentuck Fund and the National Science Foundation Orit Esther Raz works on problems in discrete geometry and general combinatorics. She is particularly interested in the interaction of combinatorics with other areas of mathematics.



Computational Complexity · Weizmann Institute of Science · vp Funding provided by the National Science Foundation

Ran Raz's main research area is complexity theory, with emphasis on proving lower bounds for computational models. More specifically, he is interested in Boolean and arithmetic circuit complexity, communication complexity, propositional proof theory, probabilistically checkable proofs, quantum computation and communication, and randomness and derandomization





Helge Ruddat studies Calabi-Yau manifolds using degeneration methods in algebraic geometry. His main interest is in topics around mirror symmetry. Recent work concerns period integrals for Gross-Siebert families, tropical and log Gromov-Witten invariants, and skeleta and mirror symmetry for varieties of general type.



# Joshua Sabloff

Contact and Symplectic Geometry · Haverford College · f Schmidt Fellow; supported by Eric and Wendy Schmidt

Joshua Sabloff investigates the topology and (symplectic) geometry of Legendrian submanifolds and Lagrangian cobordisms between them, especially using Floer-type invariants.



# Paul Seidel

Mirror Symmetry · Massachusetts Institute of Technology · dvp Funding provided by The Ambrose Monell Foundation Paul Seidel works on structures relevant to homological mirror symmetry, especially Floer cohomology, with applications to symplectic topology. While at IAS, he plans to study Gauss-Manin connections and their relatives.

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### MEMBERS AND VISITORS



#### Sobhan Seyfaddini

Symplectic Geometry · Institute for Advanced Study Funding provided by the Oswald Veblen Fund Sobhan Seyfaddini is interested in continuous symplectic geometry, symplectic dynamics, and, more generally, dynamical aspects of symplectic geometry. He is particularly interested in understanding dynamics of symplectic and Hamiltonian homeomorphisms.



#### Yiwei She

Arithmetic, Geometry · Institute for Advanced Study AMIAS Member; additional funding provided by the Oswald Veblen Fund Yiwei She's research concerns the arithmetic and geometry of algebraic surfaces.



#### **Egor Shelukhin**

Contact and Symplectic Topology · Institute for Advanced Study Funding provided by the National Science Foundation

Egor Shelukhin studies metrics on the spaces of natural diffeomorphisms and submanifolds in contact and symplectic topology, using approaches involving Floer theory, geometric quantization, quasi-morphisms, and persistence modules.



#### **Nicholas Sheridan**

Symplectic Geometry · Princeton University Funding provided by the National Science Foundation

Nick Sheridan works on symplectic geometry, especially homological mirror symmetry. At IAS, he plans to use tropical geometry to study invariants of symplectic manifolds, such as symplectic cohomology and the Fukaya category.



#### Jake Solomon

Differential Geometry, Symplectic Geometry  $\cdot$  The Hebrew University of Jerusalem  $\cdot$  v

Funding provided by the Ellentuck Fund

Part of Jake Solomon's research concerns J-holomorphic maps with Lagrangian boundary conditions, and finding situations in which open Gromov-Witten invariants, which count such maps, are well defined. Another part of his research concerns volume-minimizing Lagrangian submanifolds and how they interact with J-holomorphic maps.

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#### **Florian Sprung**

Number Theory  $\cdot$  Institute for Advanced Study and Princeton University  $\cdot v, f$ Florian Sprung likes to explore mysterious relationships between algebra and analysis. One such relationship is Iwasawa theory, which connects p-adic families of special values of L-functions to p-adic families of algebraic objects. In the case of elliptic curves, these techniques have applications for the conjecture of Birch and Swinnerton-Dyer.

### **Srimathy Srinivasan**

Algebraic Geometry · Institute for Advanced Study Funding provided by the National Science Foundation

Srimathy Srinivasan's research interests are mainly in algebraic geometry. Currently, her interests revolve around motives, algebraic groups, projective homogeneous varieties, quadratic forms, and coding theory. In particular, she studies the motivic decomposition of projective pseudohomogeneous varieties, which are a generalization of projective homogeneous varieties that occur over fields of non-zero characteristic.

#### **David Steurer**

#### Algorithms, Computational Complexity · Cornell University Funding provided by the National Science Foundation

David Steurer studies the power and limitations of efficient algorithms for optimization problems. His goal is to develop a unified approach to the design of algorithms for these problems based on the sum-ofsquares method. He also pursues a program to refute the unique games conjecture based on this method.



# **Zachary Sylvan**

Symplectic Geometry · Eidgenössische Technische Hochschule Zürich Funding provided by the National Science Foundation

Zack Sylvan is interested in symplectic geometry and mirror symmetry. At IAS, he will study Fukaya categories of Lagrangian skeleta and their relation to Legendrian invariants.



# Avishay Tal

Theoretical Computer Science · Institute for Advanced Study

Funding provided by the Simons Foundation and the National Science Foundation Avishay Tal's interests include complexity theory, analysis of Boolean functions, circuit and formula lower bounds, decision tree complexity, pseudorandomness, and the relation between algorithms and complexity. The aim of his work is proving lower bounds for computational tasks in restricted models. о н

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#### Yunging Tang

Number Theory, Arithmetic Geometry · Institute for Advanced Study Funding provided by the National Science Foundation

Yunqing Tang uses algebraicity criteria of formal schemes to investigate variants of the Grothendieck-Katz conjecture and the conjecture of Ogus on cycles in the de Rham cohomology of abelian varieties. The techniques involve transcendental methods and the theory of Frobenius tori in *l*-adic and crystalline settings.

#### **Roman Travkin**

Algebraic Geometry, Representation Theory · Institute for Advanced Study Funding provided by the National Science Foundation and the James D. Wolfensohn Fund Roman Travkin studies quantizations in characteristic p, with applications to geometric Langlands duality for D-modules in characteristic p and to other problems. He also wants to develop a theory of canonical quantization of symplectic schemes over Z/pn-schemes. Additionally, he is working on some questions related to categorical Hecke algebras.



#### **David Treumann**

Symplectic Geometry, Number Theory · Boston College · vnf Funding provided by the National Science Foundation David Truemann's work is centered on the algebraic aspects of symplectic geometry and number theory.



### **Karen Uhlenbeck**

Gauge Theory  $\cdot$  The University of Texas at Austin  $\cdot v$ 

Karen Uhlenbeck works primarily on geometric partial differential equations. She has worked in the areas of the calculus of variations, minimal surfaces, harmonic maps, gauge theory, and integrable systems. She is currently interested in flat complex connections and moduli spaces of geometric structures on complex connections.



#### **Dmitry Vaintrob**

Lie Groups · Institute for Advanced Study Funding provided by the National Science Foundation

The coherent-constructible correspondence for toric varieties relates the derived category of coherent sheaves on a toric variety to a certain category of equivariant constructible sheaves with respect to a lattice. This is a part of a mirror symmetry story for toric varieties. Dmitry Vaintrob is interested in non-abelian versions of this result, with the lattice replaced with a noncommutative group.

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f First Term · s Second Term · v Visitor · vp Visiting Professor · dvp Distinguished Visiting Professor vf Veblen Fellow · vri Veblen Research Instructorship · vnf von Neumann Fellowship



#### **Lauren Williams**

Algebraic Combinatorics · University of California, Berkeley · vnf, s Funding provided by the National Science Foundation and the Minerva Research Foundation Membership Fund

Lauren Williams's research is at the interface of algebra, combinatorics, and physics. Recent research themes include connections between the asymmetric exclusion process and Macdonald-Koornwinder polynomials, mirror symmetry and cluster duality for Grassmannians, and the positive Grassmannian and the amplituhedron.



### **Robert F. Williams**

Topology, Dynamical Systems  $\cdot$  The University of Texas at Austin  $\cdot v$ Robert Williams is a topologist working specifically in dynamical systems. Recently, he has worked in tiling theory. He expects that this, and perhaps some work in knotted periodic orbits of ordinary differential equations in three dimensions, will be his concern at IAS.



#### Dingyu Yang

### Geometry · Institute for Advanced Study Funding provided by the National Science Foundation

Dingyu Yang is interested in transversality theory, e.g., polyfold/Kuranishi theory and de Rham chains, and applications to constructions in symplectic topology (relative SFT and open FJRW invariants) and string topology (cobracket). At IAS, he plans to work on a continuous version of polyfold theory and involutivity between bracket and cobracket.



# Tony Yue Yu

# Algebraic Geometry $\cdot$ Institute for Advanced Study $\cdot$ v, s Shiing-Shen Chern Member

Tony Yue Yu works on non-Archimedean geometry, tropical geometry, and mirror symmetry. He aims to build a theory of enumerative geometry in the setting of Berkovich spaces to provide a new understanding of Calabi-Yau manifolds and the structure of their mirrors. This theory will be intimately related to the theory of cluster algebras and wall-crossing structures.



### Amitai Netser Zernik

Symplectic Geometry · Institute for Advanced Study Funding provided by the National Science Foundation Amitai Netser Zernik is interested in fixed-point expressions for open

Gromov-Witten theory, and in using such expressions to shed light on homological mirror symmetry.

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### Jingyu Zhao

Symplectic Topology · Institute for Advanced Study Funding provided by the Ky Fan and Yu-Fen Fan Membership Fund and the National Science Foundation

Jingyu Zhao is interested in symplectic topology and its relationship with mirror symmetry. In particular, she studies the existence of Lagrangian embeddings and the structure of the symplectic mapping class group using equivariant Floer theory. At IAS, she plans to explore the structures of the Fukaya categories associated with open symplectic manifolds via mirror symmetry correspondence.

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# School of Natural Sciences

Administrative Officer: Michelle Sage

Executive Director and Administrator The Simons Center for Systems Biology: Suzanne P. Christen

THE SCHOOL OF NATURAL SCIENCES, established in 1966, provides a unique atmosphere for research in broad areas of theoretical physics, astronomy, and systems biology.

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 mathematics, astrophysics, and biology. 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, established in the School in 2004, the tools of modern physics and mathematics are being applied to biological investigation. This collaborative and pioneering approach to the sciences, which extends to the Institute's School of Mathematics, Princeton University, The Rockefeller University, and the larger scientific community, has transformed research in these fields and presents opportunities for powerful and important discoveries.

Areas of current interest in theoretical physics include elementary particle physics, particle phenomenology, string theory, quantum theory, and quantum gravity, and their relationship to geometry, theoretical and observational astrophysics, and cosmology. The astrophysics group combines theory with modern observational studies to understand a wide variety of astrophysical phenomena, from nearby planets to distant galaxies, from black holes to the dark matter and dark energy that dominate the evolution of the universe. The Simons Center conducts research at the interface of biology and the physical sciences, developing theoretical and experimental methods necessary for studying the collective behavior of biomolecules, cells, and organisms, exploring how individual components can give rise to complex, collective phenomena, and in some cases focusing on understanding disease processes.

The School also sponsors Prospects in Theoretical Physics, a two-week residential summer program held at the Institute for promising graduate students and postdoctoral scholars, who attend lectures and sessions on the latest advances and open questions in the field of theoretical physics.



# Nima Arkani-Hamed

Professor · Particle Physics

One of the leading particle physics phenomenologists of his generation, Nima Arkani-Hamed is concerned with the relation between theory and experiment. His research has shown how the extreme weakness of gravity, relative to other forces of nature, might be explained by the existence of extra dimensions of space, and how the structure of comparatively low-energy physics is constrained within the context of string theory. He has taken a lead in proposing new physical theories that can be tested at the Large Hadron Collider at CERN in Switzerland.



### **Stanislas Leibler**

Professor · Biology

Stanislas Leibler has made contributions to theoretical and experimental biology, extending the interface between physics and biology to develop new solutions and approaches to problems. Interested in the quantitative description of microbial systems, both on cellular and population levels, Leibler is developing the theoretical and experimental methods necessary for studying the collective behavior of biomolecules, cells, and organisms. By selecting a number of basic questions about how simple genetic and biochemical networks function in bacteria, he and his laboratory colleagues are beginning to understand how individual components can give rise to complex, collective phenomena.



# Juan Maldacena

Carl P. Feinberg Professor · Theoretical Physics

Juan Maldacena's work focuses on quantum gravity, string theory, and quantum field theory. He has proposed a relationship between quantum gravity and quantum field theories that elucidates various aspects of both theories. He is studying this relationship further in order to understand the deep connection between black holes and quantum field theories, and he is also exploring the connection between string theory and cosmology.



#### Nathan Seiberg

#### Professor · Mathematical Physics

Nathan Seiberg's research focuses on various aspects of string theory, quantum field theory, and particle physics. His work has shed light on the worldsheet description of string theory as a two-dimensional conformal field theory and its space-time manifestations. Seiberg has contributed to the understanding of the dynamics of quantum field theories, especially supersymmetric quantum field theories. His exact solutions of such theories have uncovered many new and unexpected insights, including the fundamental role of electric-magnetic duality in these theories. These exact solutions have led to many applications in physics and in mathematics. He has also clarified how supersymmetry can be dynamically broken, and has explored the phenomenological consequences of supersymmetry breaking. These consequences will be tested at the Large Hadron Collider.



#### **Scott Tremaine**

#### Richard Black Professor · Astrophysics

Scott Tremaine has made seminal contributions to understanding the formation and evolution of planetary systems, comets, black holes, star clusters, galaxies, and galaxy systems. He predicted the Kuiper belt of comets beyond Neptune and, with Peter Goldreich (Professor Emeritus, School of Natural Sciences), the existence of shepherd satellites and density waves in Saturn's ring system, as well as the phenomenon of planetary migration. He interpreted double-nuclei galaxies, such as the nearby Andromeda galaxy, as eccentric stellar disks and elucidated the role of dynamical friction in galaxy evolution.



#### Edward Witten

#### Charles Simonyi Professor · Mathematical Physics

Edward Witten's work exhibits a unique combination of mathematical power and physics insight, and his contributions have significantly enriched both fields. He has greatly contributed to the modern interest in superstrings as a candidate theory for the unification of all known physical interactions. Most recently, he has explored quantum duality symmetries of field theories and string theories, opening significant new perspectives on particle physics, string theory, and topology.



#### Matias Zaldarriaga

#### Professor · Astrophysics and Cosmology

Matias Zaldarriaga has made many influential and creative contributions to our understanding of the early universe, particle astrophysics, and cosmology as a probe of fundamental physics. Much of his work centers on understanding the clues about the earliest moments of our universe encoded in the cosmic microwave background, the faint glow of radiation generated by the Big Bang. His recent research has focused on intergalactic hydrogen gas in the early universe, and he is at the forefront of developing machinery to study this gas using the spectral line from neutral hydrogen at 21-centimeter wavelength.



#### Stephen L. Adler

#### Professor Emeritus · Particle Physics

In a series of remarkable, difficult calculations, Stephen Adler demonstrated that abstract ideas about the symmetries of fundamental interactions could be made to yield concrete predictions. The successful verification of these predictions was a vital step toward the modern Standard Model of particle physics. In some of his more recent work, he has been exploring generalized forms of quantum mechanics, both from a theoretical and a phenomenological standpoint, and the implications for gravitational physics. He has developed new algorithms for multidimensional numerical integration, and is currently exploring a particle unification model based on boson-fermion balance without full supersymmetry.



#### Freeman J. Dyson

#### Professor Emeritus · Mathematical Physics and Astrophysics

Freeman Dyson's work on quantum electrodynamics marked an epoch in physics. The techniques he used in this domain form the foundation for most modern theoretical work in elementary particle physics and the quantum many-body problem. He has made highly original and important contributions to an astonishing range of topics, from number theory to adaptive optics. His most recent research, in collaboration with William Press of the University of Texas, found new strategies for Prisoners' Dilemma, a game used by population biologists as a model for the evolution of cooperation.



#### Peter Goddard

#### Professor Emeritus · Mathematical Physics

Peter Goddard's research concerns quantum field theory and string theory. With his collaborators, he has made pioneering contributions to these areas, including string quantization and its consistency, electric-magnetic duality in gauge theories, the construction of conformal field theories, and the realization of gauge symmetry in string theory. Before serving as the eighth Director (2004–12) of the Institute, he was Master of St. John's College and Professor of Theoretical Physics in the University of Cambridge, England, where he played a leading role in establishing the Isaac Newton Institute for Mathematical Sciences and the University of Cambridge Centre for Mathematical Sciences.



# Peter Goldreich

#### Professor Emeritus · Astrophysics

Peter Goldreich has made profound and lasting contributions to planetary science and astrophysics, providing fundamental theoretical insights for understanding the rotation of planets, the dynamics of planetary rings, pulsars, astrophysical masers, the spiral arms of galaxies, oscillations of the sun and white dwarfs, turbulence in magnetized fluids, and planet formation. His current research is focused on the production of impact spherules.



#### Arnold J. Levine Professor Emeritus · Biology

Arnold Levine is a widely acclaimed leader in cancer research. In 1979, Levine and others discovered the p53 tumor suppressor protein, a molecule that inhibits tumor development. He established and heads the Simons Center for Systems Biology at the Institute, which concentrates on research at the interface of molecular biology and the physical sciences: on genetics and genomics, polymorphisms and molecular aspects of evolution, signal transduction pathways and networks, stress responses, and pharmacogenomics in cancer biology.



#### Victor Aleksandrov

Biology · Institute for Advanced Study Starr Foundation Member in Biology Victor (Vitya) Aleksandrov is interested in several topics in biophysics,

especially evolutionary biology and big data problems. He plans to work on topological approaches to evolutionary networks.



#### **Dionysios Anninos**

Quantum Gravity · Institute for Advanced Study AMIAS Member; additional funding provided by the National Science Foundation Dionysios Anninos is studying how holographic notions are applied to cosmological spacetimes, such as an expanding universe. He also studies

cosmological spacetimes, such as an expanding universe. He also studies the structure of black holes, as well as geometries containing multiple, fragmented horizons. Both subjects have curious connections to the physics of glasses, which he is currently exploring.



#### Valentin Assassi

Astrophysics · Institute for Advanced Study Ralph E. and Doris M. Hansmann Member

Valentin Assassi's research focuses on the physics of inflation and its implication for cosmological observations today. He is also interested in the large-scale structure of the universe and using the principles of effective field theory to describe structure formation on large scales.



#### Ben Bar-Or

Astrophysics · Institute for Advanced Study Funding provided by the National Science Foundation and NASA Ben Bar-Or is interested in the statistical mechanics of stellar systems, particularly in the context of Keplerian systems such as nuclear star clusters and planetary systems.



#### Francesco Benini

Theoretical Physics · Scuola Internazionale Superiore di Studi Avanzati, Trieste, Italy · *jvp* IBM Einstein Fellow

Francesco Benini is interested in the non-perturbative dynamics of quantum field theories. Recently, he has investigated methods to perform exact computations in supersymmetric theories at strong coupling, and what this can teach us about quantum gravity and black holes.



#### **Timothy David Brandt**

Astrophysics · Institute for Advanced Study NASA Exoplanet Science Institute Carl Sagan Fellowship

Recent technological advances enable us to directly image the most massive exoplanets around nearby young stars. Timothy Brandt is studying the hardware and image processing needed to see smaller and fainter planets and, ultimately, another Earth. He also plans to use statistics to constrain these exoplanets' properties and demographics.



# **Todd Brun**

Quantum Theory · University of Southern California · f IBM Einstein Fellow

Todd Brun works on quantum theory and quantum information science. His current areas of interest include fault-tolerant quantum computing, quantum walks, decoherence, the arrow of time, quantum measurement theory, and the foundations of quantum mechanics.



#### Hsin-Chia Cheng

Theoretical High-Energy Physics · University of California, Davis · s Funding provided by The Ambrose Monell Foundation Hsin-Chia Cheng works on theoretical high-energy physics and physics beyond the Standard Model.



#### **Clay Cordova**

Theoretical Physics  $\cdot$  Institute for Advanced Study  $\cdot$  m Martin A. and Helen Chooljian Member; additional funding provided by the U.S. Department of Energy

Clay Cordova works on quantum field theory and mathematical physics with connections to related topics in string theory and geometry. His current focus is supersymmetric field theories in diverse dimensions.



#### Bartlomiej Stanislaw Czech

Theoretical Physics · Stanford University The Peter Svennilson Membership

Bartek Czech wants to understand how the fabric of space and time emerges from pre-geometric, fundamental degrees of freedom. In working toward that goal, he uses a broad set of tools, including holographic duality, aspects of information theory, tensor networks, and others. SC

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#### **Raffaele Tito D'Agnolo**

Particle Physics  $\cdot$  Institute for Advanced Study  $\cdot f$ Funding provided by the U.S. Department of Energy

Raffaele D'Agnolo's research interests cover different aspects of particle phenomenology and experimental high-energy physics, including Higgs and flavor physics, supersymmetry, and collider searches at high jet multiplicities.



### Liang Dai

### Cosmology · Institute for Advanced Study NASA Einstein Fellowship Program

Liang Dai studies the phenomenology of the large-scale structure of the universe and the various cosmic objects it consists of, and the inferences they can yield about the physics of the very early universe. The focus of his recent research includes modeling and quantification of the nonlinear dynamics of the large-scale structure, gravitational lensing, and possible probes of gravitational waves.

#### Xi Dong

#### Theoretical Physics · Stanford University

Martin A. and Helen Chooljian Founders' Circle Member; additional funding provided by the National Science Foundation

Xi Dong's research interests range from formal questions in quantum gravity and quantum field theory to phenomenological aspects of particle physics and cosmology. He is currently exploring a connection between quantum entanglement and emergent spacetime, especially in the context of better understanding the holographic duality between string theory and quantum field theories.



#### **Jean-Baptiste Fouvry**

Astrophysics · Institut d'Astrophysique de Paris Space Telescope Science Institute Hubble Fellow

Jean-Baptiste Fouvry's research focuses on the secular evolution of selfgravitating systems over cosmic age. He is interested in the kinetic theory of long-range interacting systems, from galactic discs to Keplerian systems.



### **Maxime Gabella**

Theoretical Physics · Institute for Advanced Study

Maxime Gabella's research is about a correspondence that arises in string theory between supersymmetric gauge theories and the geometry and topology of 3-manifolds.

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#### Abhiiit Gadde

Theoretical Physics · Institute for Advanced Study Roger Dashen Member; additional funding provided by the National Science Foundation

Abhijit Gadde is interested in understanding strongly coupled quantum field theories as well as conformal field theories. Most of his work has focused on exact computations in supersymmetric field theories. The interplay of physics and mathematics fascinates him.

# **Yvonne Gever** Particle Physics · University of Oxford

Funding provided by the W. M. Keck Foundation Fund and the National Science Foundation Yvonne Geyer is working on theoretical high-energy physics, and in

particular scattering amplitudes in gauge theory and gravity. Recently, her work has focused on their mathematical structures, and more specifically on twistor and ambitwistor strings.



Cosmology, Astrophysics · Institute for Advanced Study Schmidt Fellow; supported by Eric and Wendy Schmidt

Vera Gluscevic's research focuses on using the cosmic microwave background to test physical theories, including those invoked to explain dark energy and inflation. She is also investigating a range of other topics, such as the direct detection of dark matter, probes of reionization, and the origins of magnetic fields in the universe.



### **Adrian Hamers**

Astrophysics · Universiteit Leiden Funding provided by NASA

Adrian Hamers is interested in gravitational dynamics, and theoretical astrophysics in general. He is working on the long-term evolution of hierarchical systems such as planetary systems in single and multistar systems. He plans to continue working on this at IAS, and also to investigate the implications of secular evolution on climate and life.



# Sanjay Jain

Theoretical Systems Biology, Complex Systems · University of Delhi · f Addie and Harold Broitman Member in Biology

Sanjay Jain is a theoretical physicist currently interested in dynamical models of cells and protocells, the structure and evolution of complex networks, and the origin-of-life problem.

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# Alexander A. Kaurov

Astrophysics, Cosmology · The University of Chicago Friends of the Institute for Advanced Study Member

Alexander Kaurov's research interests range from the physics of neutron stars to the epoch of reionization. At the Institute, he will work on developing theoretical models of reionization and investigating techniques for analyzing the data from the upcoming probes of the early universe.



#### Shinta Kobayashi

Biology · Chugai Pharmaceutical Co., Ltd., Tokyo · vShinta Kobayashi works on cancer and stem cells. He plans to establish

stem cell-derived cancer organoid models that have the potential to improve preclinical testing and validation of anti-tumor drugs.



#### **Dmitry Krotov**

Biology · Institute for Advanced Study Martin A. and Helen Chooljian Member in Biology

Dmitry Krotov is a physicist studying various problems in theoretical and computational biology. The central theme that runs through his research is the impact of microscopic noise on the collective properties of biological systems at the "network" level. He is interested in both purely theoretical problems and data-motivated questions.



#### **Paul Langacker**

#### Particle Physics $\cdot$ Princeton University $\cdot v$

Paul Langacker will explore the physics implications of concrete string constructions. This will include possibilities for extended gauge, Higgs, fermion, quasi-hidden sectors for collider physics, and nonstandard mechanisms for generating neutrino mass. He is also completing an advanced textbook on the Standard Model and beyond.



#### **Michael Lesnick**

Biology  $\cdot$  Princeton University  $\cdot$  v

Michael Lesnick's research focuses on topological data analysis. He is interested in theoretical foundations, development of computational tools, and applications to biology.





Particle Physics · Institute for Advanced Study William D. Loughlin Member; additional funding provided by the U.S. Department of Energy

Jennifer Lin is interested in quantum field theory, string theory, and quantum gravity. Recently, she has been studying quantum entanglement and its implications for gauge/gravity duality. She is also interested in supersymmetric gauge theory.

# **Matthew Low**

Particle Physics · Institute for Advanced Study Frank and Peggy Taplin Member; additional funding provided by the U.S. Department of Energy

Matthew Low works on various topics within particle physics, including collider physics, dark matter, and supersymmetry. His research interests center on understanding the physics at the weak scale via the Large Hadron Collider but also extend to general properties of quantum field theories.



# Marta Luksza

Biology · Institute for Advanced Study · ra Janssen Fellow

Marta Luksza is interested in questions at the interface of computer science, information theory, and biology. She is studying the evolution of viruses to understand the patterns of adaptation on the genetic and phenotypic levels.



### Morgan MacLeod

Astrophysics · University of California, Santa Cruz NASA Einstein Fellowship Program

Morgan MacLeod studies the astrophysics of stellar interactions. His current research uses computational methods to explore close encounters between stars and compact objects in binary systems and dense stellar clusters.



### **Matthew McQuinn**

#### Extragalactic Astrophysics, Cosmology · University of Washington · jvp John N. Bahcall Fellow

Matthew McQuinn's research is mainly in cosmology, with a focus on structure formation across cosmic time. During his stay at IAS, he will work on the circumgalactic medium, the high-redshift Lyman-alpha forest, and hopefully on new topics.

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#### **Gregory Moore**

*Physical Mathematics* · Rutgers, The State University of New Jersey · *dvp*, *f IBM Einstein Fellow* 

Gregory Moore's work focuses on mathematical aspects of physics with an emphasis on string theory, M-theory, and gauge theories more generally. His work places particular emphasis on the underlying mathematical structures and applications to and from modern mathematics.



#### **Timothy Morton**

Astrophysics  $\cdot$  Princeton University  $\cdot v$ 

Timothy Morton studies extrasolar planets. In particular, he is interested in the diversity of exoplanetary systems, and how to use all different sorts of observational data to inform our understanding of how planetary systems form and evolve.

#### Jeff Murugan



Mathematical Physics, String Theory, Quantum Gravity  $\cdot$  University of Cape Town  $\cdot f$ Funding provided by the National Science Foundation

Jeff Murugan's current interests lie in the interface of topology and physics. In particular, he is trying to understand certain aspects of the topology of quantum states, including the role played by low-dimensional dualities in planar topological superconductors and insulators.





#### Tejaswi Venumadhav Nerella

Cosmology, Astrophysics · Institute for Advanced Study Schmidt Fellow; supported by Eric and Wendy Schmidt

Tejaswi Nerella's primary research is in cosmology. He aims to study the physical principles underlying futuristic probes, such as the 21-cm signal from cosmic dawn and the epoch of reionization, in order to shed light on both the practical challenges involved and their potential applications for studying the early universe.

#### Kantaro Ohmori

#### Quantum Field Theory, String Theory · The University of Tokyo Friends of the Institute for Advanced Study Member

Kantaro Ohmori is interested in a broad range of string theory and the quantum field theory. He becomes most excited when intuitive realizations of intricate physics are achieved by means of mathematical, in particular geometric, structures. His main areas of interest and expertise include six-dimensional superconformal field theories and their compactifications.

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#### **James Owen**

Astrophysics · Institute for Advanced Study Space Telescope Science Institute Hubble Fellow

James Owen is interested in star and planet formation, particularly the interaction between the parent star, the planet-forming disc, and planets themselves. His research plans include understanding exoplanet structure and evolution along with the final stages of planet formation.

### **Pavel Putrov**

Theoretical Physics · Institute for Advanced Study Marvin L. Goldberger Member; additional funding provided by the U.S. Department of Energy

Pavel Putrov is interested in obtaining exact results in supersymmetric gauge theories. One of the directions that he plans to explore further at IAS is the relation between d-dimensional geometry and the physics of superconformal field theories in 6-d dimensions, arising from compact-ifications of fivebranes on d-manifolds.

# **David Radice**

# Astrophysics · California Institute of Technology Schmidt Fellow; supported by Eric and Wendy Schmidt

The focus of David Radice's research at IAS will be the study of binary neutron star mergers by means of fully relativistic numerical simulations. His goal is to develop robust theoretical predictions for the interpretation and guidance of upcoming multi-messenger observations of merging neutron stars by gravitational wave and electromagnetic detectors.



# **Roman Rafikov**

#### Astrophysics · Princeton University

Roman Rafikov works in the areas of planetary sciences, planet formation, N-body dynamics, fluid dynamics, accretion disks, and high-energy astrophysics.



### **Matthew Reece**

Theoretical Particle Physics · Harvard University · jvp, f

Matt Reece is broadly interested in physics beyond the Standard Model. Current topics of research include the physics goals for future collider experiments, the weak gravity conjecture and its implications for inflation, dark matter models with novel astrophysical signatures, and cosmological dynamics in the early universe linked to fine tuning. SC

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Theoretical Physics · Massachusetts Institute of Technology Funding provided by the National Science Foundation and the Paul Dirac Fund

Dan Roberts works on quantum gravity, quantum field theory, and quantum information theory. Using holography, he studies the relationship between chaos in strongly coupled quantum systems and black holes in anti-de Sitter space. He is also interested in machine learning and artificial intelligence (with an eye towards applications in theoretical physics).

# Mauricio Romo

#### String Theory · Institute for Advanced Study

Funding provided by the U.S. Department of Energy and the Adler Family Fund Mauricio Romo's current research lies at the interface between physics and mathematics. He has been focusing on two-dimensional field theories associated with the quantum geometry of compact Calabi-Yau manifolds and, recently, on three-dimensional theories related to invariants of 3-manifolds and knots.

#### Yasser Roudi

Statistical Physics, Statistical Inference, Theoretical Biology · Kavli Institute for Systems Neuroscience and Centre for Neural Computation, Norwegian University of Science and Technology · m Starr Foundation Member in Biology

Yasser Roudi researches the principles of information processing and their relation to statistical mechanics and biological implementation. He is focused on understanding the underlying mechanisms and evolution of an organism's ability to successfully process environmental signals.

#### **Marcel Manfred Schmittfull**

# *Cosmology* · University of California Berkeley and Lawrence Berkeley National Laboratory

Bezos Member; additional funding provided by the National Science Foundation Marcel Schmittfull studies the large-scale structure of the universe and gravitational lensing of photons from the Cosmic Microwave. During his stay at IAS, he will develop new data analysis methods inspired by theory and simulation, aiming to add to our knowledge of the origin of the universe, dark energy, gravity, and neutrinos.



#### **Shu-Heng Shao**

Particle Physics · Harvard University Funding provided by the National Science Foundation

Shu Hang Shap has a wide range of interests

Shu-Heng Shao has a wide range of interests in theoretical physics, including supersymmetry and conformal symmetry in diverse dimensions, scattering amplitudes in quantum field theory and string theory, and mathematical physics.

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**Guillermo Silva** 

AdS/CFT Correspondence, Quantum Field Theory, Gravity  $\cdot$  Universidad Nacional de la Plata, Argentina  $\cdot$  v, f

Guillermo Silva is interested in the applications of the gauge/gravity correspondence to the study of strongly coupled physics in gauge theories.



David Simmons-Duffin

Particle Physics · Institute for Advanced Study · m Funding provided by the U.S. Department of Energy David Simmons-Duffin's work concerns conformal field theories in

diverse dimensions, with an interest in both their phenomenological applications and their implications for quantum gravity.



#### Marko Simonović

Cosmology · Institute for Advanced Study Funding provided by the National Science Foundation

Marko Simonović is researching different aspects of theoretical cosmology, including inflation, primordial non-Gaussianities, and large-scale structure. At IAS, he plans to focus on the study of large-scale structure as a tool to investigate statistics of the initial conditions and possible modifications of gravity.



#### **Douglas Stanford**

*Theoretical Physics* · Institute for Advanced Study · *m Funding provided by the Simons Foundation* Douglas Stanford is studying quantum gravity, quantum field theory,

and string theory. He has worked on the AdS/CFT description of black hole interiors and the relationship to chaotic dynamics in quantum field theory.



#### **Rashid Sunyaev**

Astrophysics · Max-Planck Institute for Astrophysics · vp Maureen and John Hendricks Visiting Professor

Rashid Sunyaev has made major contributions in the fields of physical cosmology and high-energy astrophysics. His current research interests include the cosmological recombination of hydrogen and helium, the physics of gas accretion onto neutron stars and black holes, the problem of matter, and radiation interaction under extreme astrophysical conditions.











#### **Dmitri Anatoljevich Uzdensky**

Astrophysics · University of Colorado · jvp Funding provided by The Ambrose Monell Foundation

Dmitri Uzdensky works in the field of plasma astrophysics, aiming at developing a theoretical understanding of basic physical processes behind various high-energy astrophysical phenomena. During his sabbatical at IAS, he will focus on building radiative plasma astrophysics, i.e., on understanding how plasma processes like magnetic reconnection, shocks, and turbulence are affected by radiation.

#### Ken Van Tilburg

#### Particle Physics · Stanford University Schmidt Fellow; supported by Eric and Wendy Schmidt

Ken Van Tilburg's research covers various aspects of particle physics phenomenology, in particular model building and novel techniques to look for new physics. His current work focuses on the development of precision search strategies for dark matter, gravitational waves, new forces, and other manifestations of weakly coupled physics both in and beyond the Standard Model.

#### **Aron Wall**

#### Particle Physics, Gravity · Institute for Advanced Study Funding provided by the National Science Foundation and the Raymond and Beverly Sackler Foundation Fund

Aron Wall studies the thermodynamics of black holes and other horizons, mostly by proving theorems that connect gravity to information theory. He would like to find out what to postulate about the microstates of quantum gravity in order to get these thermodynamics principles to arise naturally.

#### Juven Chun-Fan Wang

#### Theoretical Physics · Institute for Advanced Study Funding provided by the Corning Glass Works Foundation Fellowship and the National Science Foundation

Juven Wang's research concerns the emergence-reductionism interplay between condensed matter and high-energy physics. Inspired by physical problems from exotic entangled quantum matter, he investigates the statistical and geometrical properties that emerge from quantum and classical many-body systems, reconciling issues of symmetry, topology, anomalies, lattice, and strong interactions.

#### **Amanda Weltman**

Astrophysics, High-Energy Physics  $\cdot$  University of Cape Town  $\cdot f$ 

At IAS, Amanda Weltman will be exploring the ways of constraining fundamental physics using multi-messenger astronomy. With the dawn of gravitational-wave astronomy as well as the coming era of radio astronomy burgeoning, the timing is appropriate to consider how to use these observations as tools to constrain theories of gravity as well as our large-scale cosmological observables.



#### BingKan Xue

Biology · Institute for Advanced Study Eric and Wendy Schmidt Member in Biology

BingKan Xue works in systems biology and studies evolutionary dynamics and adaptation mechanisms from a theoretical perspective. He is interested in the phenomena of phenotypic variations and transgenerational inheritance among biological populations in response to changing environments.



# Ellis Ye Yuan

Theoretical Physics · Institute for Advanced Study Carl P. Feinberg Founders' Circle Member; additional funding provided by the U.S. Department of Energy

Ellis Yuan is interested in string theory and quantum field theory. His current research focuses on general aspects of the scattering amplitudes and the mathematical structures therein.

# School of Social Science

#### Administrative Officer: Donne Petito

FOUNDED IN 1973, THE SCHOOL OF SOCIAL SCIENCE takes as its mission the analysis of contemporary societies and social change. It is devoted to a pluralistic and critical approach to social research from a multidisciplinary and international perspective.

The School operates under the guiding principles of informality and collegiality and with a shared understanding that the social sciences are not to be narrowly defined. Each year, the School brings together scholars with various perspectives, methods, and topics, providing a space for intellectual debate and mutual enrichment. Scholars are drawn from a wide range of fields, notably political theory, economics, law, psychology, sociology, anthropology, history, philosophy, and literature, to examine historical and contemporary problems.

Each year, the School designates a theme, which is neither exclusive nor excluding. The theme for the 2016-17 academic year is "Law and the Social Sciences," which will be led jointly by Didier Fassin, James D. Wolfensohn Professor in the School, and Visiting Professor Bernard E. Harcourt, Isidor and Seville Sulzbacher Professor at Columbia Law School. The interface between law and society has long been a domain of inquiry explored by legal scholars as well as social scientists. In recent decades, the revival of the law and society movement and Critical Legal Studies, the rise of New Legal Realism and global legal pluralism, the renewed interest in Islamic law and indigenous rights, and the debates regarding humanitarianism and human rights in international law have opened new avenues for theoretical approaches. In parallel, the work of law enforcement, the evolution of criminal justice, the phenomenon of mass incarceration, the repression of undocumented immigrants, the adjudication of asylum seekers, the creation of international courts, the judicialization of political affairs, and the politicization of judicial decisions have led to an increasing production of empirical research both qualitative and quantitative. It is this broad multidisciplinary field that the theme will revisit. The scholars in the School will explore a range of questions, including: What are the place, meaning, and functions of the law, its institutions, and its professionals in contemporary society? How have values, norms, and doctrines embedded in legal theories and practices changed over time, and what legacies do they leave? How do legal systems vary across cultures, and what sort of arrangements are made when they are confronted with one another? How are new technologies, such as DNA testing, or new knowledge, such as neuroscience, transforming legal practices? How are the legal disciplines responding to the dialogue with and critique from the social sciences and humanities? These topics will be addressed from the multiple perspectives of law, criminology, and political theory as well as history, sociology, anthropology, psychology, philosophy, economics, and political science.



#### **Didier Fassin** James D. Wolfensohn Professor

Didier Fassin is an anthropologist and a sociologist who has conducted fieldwork in Senegal, Ecuador, South Africa, and France. Trained as a physician in internal medicine and public health, he dedicated his early research to medical anthropology, illuminating important dimensions of the AIDS epidemic, mortality disparities, and global health. He later developed the field of critical moral anthropology, which explores the historical, social, and political signification of moral forms involved in everyday judgment and action as well as in the making of international relations with humanitarianism. He recently conducted an ethnography of the state, through a study of urban policing as well as the justice and prison systems in France. His current work is on punishment, asylum, inequality, and the politics of life, and he is developing a reflection on the public presence of the social sciences.

# Joan Wallach Scott Professor Emerita Joan Scott's groundb foundations of conver the nature of historica

Joan Scott's groundbreaking work has challenged the foundations of conventional historical practice, including the nature of historical evidence and historical experience and the role of narrative in the writing of history. Her recent books have focused on the vexed relationship of the particularity of gender to the universalizing force of democratic politics. More broadly, the object of her work is the question of difference in history: its uses, enunciations, implementations, justifications, and transformations in the construction of social and political life.



# Michael Walzer Professor Emeritus

One of America's foremost political thinkers, Michael Walzer has written about a wide variety of topics in political theory and moral philosophy, including political obligation, just and unjust war, nationalism and ethnicity, economic justice, and the welfare state. In addition to writing frequently about war and terrorism, he is currently addressing questions of religion and politics. He continues to work on volumes three and four of a major collaborative project focused on the history of Jewish political thought. m

#### VISITING PROFESSOR



#### **Bernard E. Harcourt**

Contemporary Critical Thought, Legal and Political Theory · Columbia University and École des Hautes Études en Sciences Sociales, Paris Bernard Harcourt is a critical theorist, with a particular interest in punishment regimes, political economy, and critical theory. He is also an active death penalty lawyer, currently representing inmates sentenced to death and to life imprisonment without parole in Alabama.







#### Lori A. Allen

#### Anthropology · University of London

Lori Allen's project offers a major reconsideration of international politics by analyzing Palestinian engagement with a rarely studied global governance technology: the investigative commission. Based on ethnographic interviews and archival research, the project analyzes six commissions convened in Palestine over the past century and shows how they have functioned as a liberal colonial device—one that operates on a pretense of consultation.

#### Lalaie Ameeriar

#### Anthropology · University of California, Santa Barbara

Lalaie Ameeriar's current research explores the relationship between women's rights, human rights, and humanitarianism through an analysis of legal protections involving cases of forced marriage and so-called honor killings within Muslim communities in the United Kingdom. This research examines the disjunction between law and community and between human rights and humanitarianism, particularly within discourses regarding women's rights in marginalized communities.

#### Fadi A. Bardawil

Anthropology · The University of North Carolina at Chapel Hill

Fadi A. Bardawil investigates the traditions of intellectual inquiry, practices of public criticism, and modalities of political engagement of contemporary Arab intellectuals, both at home and in the diaspora. In doing so, he tracks the international circulation of theoretical discourses. His current project examines the high tides and ebbing away of leftist revolutionary thought and practice in the Levant.

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#### **Ruha Benjamin**

Science and Technology Studies, Critical Race Studies · Princeton University AMIAS Member

Ruha Benjamin is studying the relationship between science, law, and society in the wake of new policies that restrict foreign access to a population's genetic information. Examining how genomic knowledge circulates across government initiatives, private enterprises, and subaltern mobilization, she argues that genomics is powerful and problematic due to its epistemic and normative agility, rather than its strict enforcement of hierarchy.

# Céline Bessière

#### Sociology · Université Paris-Dauphine Funding provided by the Florence Gould Foundation Fund

Céline Bessière is interested in family justice as an institution that maintains and justifies wealth inequality in contemporary France. She is carrying out an ethnographic and statistical study of the legal and judicial treatment of patrimonial transfers and marital breakdowns, as these are two crucial moments in family settlements.

#### Amy Borovoy

#### Anthropology $\cdot$ Princeton University $\cdot v$

Amy Borovoy works on regimes of social care in postwar Japanese democracy, including family and corporate welfare, and is interested in how the advance of life-extending technology affects basic ideas about family obligations. At IAS, she will focus on live kidney donation, which transplant protocols describe as "non-reciprocal" and altruistic. However, Japanese ethical guidelines limit live donation to within families and cope with pressure to meet demands for organs in a super-aging society.

### Linda Bosniak

#### Law, Legal Theory $\cdot$ Rutgers, The State University of New Jersey $\cdot v$

Linda Bosniak is completing a book that examines normative debates over the status and treatment in liberal states of unauthorized immigrants, who are perceived as both culpable and vulnerable, giving rise to sometimes convoluted political and legal responses. Her project treats unauthorized migration as one case among others in which growing cross-national movements of persons irrevocably test the insular ethical orders of liberal states.



### **Nick Cheesman**

#### Politics · The Australian National University

How does torture persist worldwide? Positing that torture is not just a problem of instrumentality, Nick Cheesman aims to understand the political arrangements by virtue of which it exists. While at the Institute, he will be working on theoretical explanations and bringing them into dialogue with Southeast Asian case studies. m











#### **Anne-Claire Defossez**

#### Sociology $\cdot$ Institute for Advanced Study $\cdot v$

Anne-Claire Defossez's current work addresses the question of women's political participation and representation by exploring the trajectory and experience of women formally involved in politics at local and national levels in France. In particular, she is analyzing how family background and personal history, as well as class, residence, and ethnicity, have influenced their engagement, career, and practices in politics.

#### Marcello Di Bello

# *Philosophy* · Lehman College, The City University of New York *Infosys Member*

In recent years, statistics, probability, and quantitative evidence more generally have become increasingly common in criminal trials. Marcello Di Bello's project examines the use of statistics and probability in criminal trials as a lens to think about the fair trial, the right to a defense, and the requirement that guilt be established beyond a reasonable doubt.

#### **Andrew Dilts**

#### Political Science · Loyola Marymount University

Andrew Dilts is a political theorist who focuses on the relationships between race, sexuality, political membership, sovereignty, and punishment in the United States. Drawing on the tradition of U.S. abolitionist movements and, in particular, the work of queer and trans prison abolitionists, Dilts offers an account of how we might better question, resist, and ultimately destroy white supremacist and heteropatriarchal institutions and practices.

#### **Karen Engle**

#### Law · The University of Texas at Austin Deborah Lunder and Alan Ezekowitz Founders' Circle Member

Karen Engle is a legal scholar specializing in international human rights law and advocacy, particularly as they intersect with women's rights and indigenous rights movements. Her current project critically maps the relatively recent turn to criminal law in human rights, situating it in the post–Cold War, neoliberal era in which it has emerged.

#### Lee Ann Fujii

#### Political Science · University of Toronto

What explains violent display? Lee Ann Fujii's project compares three coordinated, collective efforts to stage violence: a massacre of civilian men during the Bosnian war, the lynching of a black man during Jim Crow, and the killing of a prominent family during the Rwandan genocide. The theoretical focus is on mechanisms that are similar across the three sites, while analytic attention is on contextual layers that shaped the local processes through which violence unfolded.



#### Vanja Hamzić

#### Law, History, Anthropology · University of London

Vanja Hamzić is looking into the ways the law relates to human subjectivity formation, especially with regard to various historical and presentday Muslim gender-variant communities. He is interrogating praxis and insurrectionary vernacular knowledge as broad analytical categories, applicable to modes of resistance to formal justice systems.



# David Kazanjian

American Studies, Latin American Studies · University of Pennsylvania David Kazanjian is examining dispossession in colonial New England and Yucatán. Focusing on court cases of indentured and enslaved Afrodiasporans, he considers how racial capitalism works not simply to take possessions like labor and land from exploited subjects, but also to possess or invest such subjects with racial being, and how Afro-diasporans responded by repurposing race.

#### Jaeeun Kim

#### Sociology, Religion · University of Michigan

Jaeeun Kim is examining the hitherto underexplored nexus of migration, religion, and nation-states, focusing on the asylum-seeking of unauthorized migrants on religious grounds. Drawing on multi-sited ethnographic research, she situates asylee-making in the "probationary citizenship" regime of contemporary immigration states, in which various state and non-state actors mobilize multiple, and often mutually contradictory, understandings of the "redeemability" of unauthorized migrants.



### **Donald W. Light**

## $Law \cdot Rowan University \cdot v, f$

The proliferation of patents since 1980 has not resulted in an increased rate of clinically superior drugs. Donald Light plans to investigate non-profit, collaborative kinds of research based on alternative models and incentives for innovation that appear to minimize commercial biases and develop superior drugs at affordable prices for the two-thirds of the world that live on \$10 a day or less.



### Sida Liu

#### Sociology · University of Toronto

Sida Liu's theoretical interests focus on understanding the social processes that produce the shape of social spaces. His current empirical project uses the case of lawyer mobilization in China to examine the ecology of political activism. He is also writing an essay tracing the theoretical lineage of social space in the Chicago School tradition.



#### **Pascal Marichalar**

Sociology · Institut de Recherche Interdisciplinaire sur les Enjeux Sociaux, École des Hautes Études en Sciences Sociales, Paris ·  $\nu$ Pascal Marichalar's research deals with industrial disease. His current work focuses on contradictions between employment and health in areas that are heavily dependent on polluting and dangerous industries. At IAS, he will start new fieldwork in an industrial community in New Jersey.



#### Allegra M. McLeod

Law, Political Theory · Georgetown University

Allegra McLeod's current research focuses broadly on efforts to radically reform criminal and immigration law enforcement. One current project critically engages the globalization of U.S. crime control initiatives, and a second project explores prison abolitionist movements, which aim to end the racialized brutality of U.S. carceral practices.



#### **Elizabeth Mertz**

Anthropology, Language, Law  $\cdot$  American Bar Foundation  $\cdot v, f$ 

Elizabeth Mertz's writing project on New Legal Realism challenges traditional Anglo-American jurisprudence from the vantage of interdisciplinary and transcultural work in social science. It draws on her previous anthropological linguistic research on the epistemology and language of U.S. law, as well as current work on the discourses of interdisciplinary translation.



#### **Sophie Meunier**

International Affairs, European Politics  $\cdot$  Princeton University  $\cdot v$ Sophie Meunier is a political scientist working on the politics of globalization in the European Union, especially trade and investment policy. At IAS, she plans to start writing a book on the European Union and the politics of foreign direct investment.



#### **Reuben Jonathan Miller**

Sociology of Punishment, Social Welfare · University of Michigan Friends of the Institute for Advanced Study Member

Reuben Jonathan Miller's research examines life at the intersection of punishment and social welfare policy. His project, an ethnography of prisoner reentry in Chicago and Detroit, demonstrates how emergent techniques of state and third-party supervision have transformed citizenship, activism, public health, community, and family life in this carceral age.

#### MEMBERS AND VISITORS



### **Jonathan Morduch**

Economics · New York University Roger W. Ferguson, Jr., and Annette L. Nazareth Member

Jonathan Morduch is interested in ways that markets and states shape the dynamics of poverty and inequality. His project this year focuses on blurring lines between profit-driven business and socially driven investment. The project describes the contradictions and opportunities created by this blurring, and what they imply for economic theory.



#### Sherally K. Munshi

Law · Georgetown University · v

Sherally Munshi is exploring the role that race and migration have played in shaping the contemporary nation-state. Her current project, exploring the history of Asian exclusion from white-settler nations, explores the continuity between nineteenth-century imperial formations and twentieth-century immigration controls.



#### Juan Obarrio

#### Anthropology · Johns Hopkins University

Juan Obarrio's comparative study of five case studies from Africa examines articulations and clashes between liberal rule of law and local norms through an analysis of three main instances: sites of access to justice and locales of dispute resolution, post-conflict contexts and transitional justice, and land-property disputes and juridico-political imaginations of land.



#### Ayşe Parla

#### Anthropology · Sabanci University Wolfensohn Family Member

Ayse Parla will be completing a book that explores the significance of law in producing anxious hope as a structure of feeling among Bulgarian Turkish migrants, a group that possesses relative privilege within the migrant land-scape in Turkey. She plans to address how anxious hope is sustained through historical-legal legacy and contemporary regulations, and circulated among migrants through their encounters with law's informal manifestations.



#### **Peter Redfield**

Anthropology · The University of North Carolina at Chapel Hill

Peter Redfield is exploring humanitarian design and efforts to create innovative devices in response to disaster and poverty globally. His research focuses on conceptions of human needs and ethical responsibilities. He is interested in the politics of technology, particularly questions of scale and accountability beyond state-administered infrastructure.



### Yüksel Sezgin

Political Science, Law · Syracuse University · v, s

Yüksel Sezgin's research deals with pluri-legal religious family laws and human rights. While at IAS, he will work on a book project that examines the relationship between shari'a and democracy in non–Muslim majority countries by specifically focusing on the cases of Israel, Greece, India, and Ghana.



# **Amr Shalakany**

Law · American University in Cairo

A sharp legal inflection marks post–Arab Spring politics in Egypt in comparison to its next-door siblings. This informs Amr Shalakany's book project to chronicle and interrogate the role of legal professionals and their disciplinary logic in the country's failed revolution, where the "rule of law" emerges since 2011 as both cause and casualty of authoritarianism.





# Criminal Justice, Human Rights, Democratization $\cdot$ Institute for Advanced Study $\cdot v$

Teng Biao taught constitutional law and jurisprudence in Beijing for twelve years. During his stay at IAS, he plans to write a book on the human rights movement in China from 2003 to 2016. His research interests include criminal justice, political transition, social movement, and political philosophy.



Philosophy, Political Theory · Università degli Studi di Padova

Instead of an abstract and juridical conception of universalism, Massimiliano Tomba makes a case for an alternative tradition of "insurgent universality" that, on the one hand, holds together political experiments such as the Paris Commune and the first Soviet Constitution and, on the other hand, allows us to think of different pathways of modernization, which bridge Western and non-Western juridical, political, and economic conceptions.



### **Emily Zackin**

Political Science · Johns Hopkins University Richard B. Fisher Member

Emily Zackin's current project examines America's long history of debtors' rights movements and the constitutional controversies surrounding their demands. In particular, it asks how insolvent debtors were able to fashion a social safety net from bankruptcy's narrow, creditor-friendly origins, despite the potentially prohibitive private property rights in the U.S. Constitution.



# Linda M. G. Zerilli

Political Science · The University of Chicago

Linda Zerilli's project aims to explore the two tasks of critical theory, which Seyla Benhabib has usefully characterized as "explanatory-diagnostic" and "anticipatory-utopian." Central to this project will be an examination of how the loss of the second of these tasks results in a failure to adequately fulfill the first.

# Program in Interdisciplinary Studies

THE PROGRAM IN INTERDISCIPLINARY STUDIES explores different ways of viewing the world, spanning a range of disciplines from physics and astrophysics, geology, paleontology, and biology, to artificial intelligence, cognitive psychology, and philosophy. The most recent interdisciplinary focus is on questions related to origins of life and the nature of complexity. The program is headed by Professor Piet Hut.



#### Piet Hut Professor

One focus of Piet Hut's research is computational astrophysics, in particular multiscale multiphysics simulations of dense stellar systems. Another focus is interdisciplinary explorations in the areas of cognitive science and philosophy of science centered around questions involving the nature of knowledge. A third focus is the question of the origins of life, on Earth as well as elsewhere in the universe, for which he is a foreign Principle Investigator at ELSI, the Earth-Life Science Institute at the Tokyo Institute of Technology. The author of more than two hundred publications, Hut was honored in 2004 when a main-belt asteroid was named "17031 Piethut" by the International Astronomical Union's Committee on Small Body Nomenclature.
## VISITORS



#### **Eran Agmon**

#### Complex Systems, Cognitive Science · Indiana University · v

Eran Agmon is interested in the foundations of biological agency. To explore various issues regarding agency, he builds minimal computational models of whole cells. Theoretical understanding comes from the analysis of these models. To accomplish this, he employs analytical techniques of complex systems science, which include network theory, dynamical systems theory, and information theory.



### Jeff Ames

Computer Science  $\cdot$  Rutgers, The State University of New Jersey  $\cdot v$ Jeff Ames is interested in the potential of virtual worlds in education, to facilitate experiential learning and to add an element of play, and in scientific research, especially for collaborative data visualization and simulation.



#### Catherine Chung

## Writing $\cdot$ Institute for Advanced Study $\cdot v$

Catherine Chung is researching and writing a novel that will explore math and physics, as well as history, race, gender, and war, and how seemingly distant, unrelated stories, lives, and ideas can turn out to be inextricably linked to each other.



#### Henderson (Jim) Cleaves

#### Chemistry $\cdot$ Carnegie Institution for Science $\cdot v$

Jim Cleaves is studying the origin of life on Earth and elsewhere, specifically with the question of how chemistry becomes biology. He is interested in how simple organic compounds are produced from cosmically abundant inorganic compounds under geochemically plausible conditions, and how these compounds self-organize to form more complex and potentially self-replicating systems.



#### Ayako Fukui

#### Harmonic Analysis · ARAYA Brain Imaging · v

Ayako Fukui is working on a project exploring the nature and origin of awareness with a cross-disciplinary approach, engaging science, humanities, art, design, and technology. She is particularly interested in mathematical models of complex systems, including consciousness. Her interests also include research on creativity, imagination, and inspiration. τ

## VISITORS



#### **Donato Giovannelli**

Geomicrobiology  $\cdot$  Rutgers, The State University of New Jersey, and Earth-Life Science Institute, Tokyo Institute of Technology  $\cdot v$ 

Donato Giovannelli is interested in how life coevolved with our planet. He is using model microorganisms from deep-sea hydrothermal vents in an attempt to reconstruct the emergence and evolution of metabolism and to better understand the interplay between the biosphere and the geosphere.



### Erik Hoel

Neuroscience  $\cdot$  Columbia University  $\cdot v$ 

Erik Hoel is researching neuroscientific measures of the level and content of conscious experience.



#### Monica Manolescu

American Literature and Art · Université de Strasbourg · v, sMonica Manolescu is working on a research project that considers the

urban site as a catalyst in the experimental practices of a variety of postwar American artists and practitioners of space. Her focus is on practices of walking and mapping, focusing especially on their critical and subversive components.



#### **Barnaby Marsh**

#### Evolutionary Dynamics · Harvard University · v

With training in evolutionary biology, economic theory, and psychology, Barnaby Marsh has helped to pioneer new approaches to decision strategies in complex and dynamic environments. He is currently working on the role of chance events in fitness landscapes, and on novel approaches to awareness, representation, imagination, and innovation.



#### **Michael Th. Rassias**

Mathematical Analysis, Analytic Number Theory  $\cdot$  Universität Zürich  $\cdot v$ Michael Rassias's research interests lie in mathematical analysis, analytic number theory, and more specifically in exponential/trigonometric sums, zeta functions, approximation theory, functional equations, and analytic inequalities. He is also interested in the distribution of prime numbers, the analytic investigation of elliptic curves, and cryptography.

## VISITORS



## **Emily Su**

Neuroscience, Regeneration  $\cdot$  Rutgers, The State University of New Jersey  $\cdot v$ 

Emily Su studies morphology and arborization architectures in the context of neuroregeneration and neurodevelopment. She combines in vitro and in silico approaches to investigate mechanisms that govern growth and connectivity in neuronal systems. She is especially interested in how elimination strategies, such as pruning or modular death, contribute constructively to functional network design in nature.



## Edwin L. Turner

## Astrophysics · Princeton University · v

Edwin Turner is working on statistical biases and estimators for samples of exoplanets, on the Subaru Strategic Exploration of Exoplanets and Disks project, and on implications of complexity in cellular automata systems for the limits of reductionism, as well as related topics in the philosophy of science.



## **Olaf Witkowski**

#### Complex Systems, Artificial Life · The University of Tokyo · v

Olaf Witkowski's current research is in information dynamics in the origins of cognition, collective intelligence, and complex life. His approach uses large-scale artificial life simulations, evolutionary robotics, machine learning, and information and game theories to better comprehend the emergence of life and integrated cognition, the information flows in the major transitions in evolution, and the future of intelligent societies.

# Director's Visitors

DIRECTOR'S VISITORS contribute much to the vitality of the Institute. Scholars from a variety of fields, including areas not represented in the Schools, are invited to the Institute for varying periods of time, depending on the nature of their work.



## **Graham Farmelo**

Writer; By-Fellow, Churchill College, University of Cambridge Graham Farmelo is writing a book on the relationship between fundamental physics and pure mathematics. During his visit, he intends to write three chapters of the "modern" section, featuring several contributions from IAS theoreticians, with whom he shall consult.



## Siobhan Roberts

Author

Siobhan Roberts is researching a new book project in the Kurt Gödel archives, while also completing a biography of the mathematician Andreas Floer with Helmut Hofer.



Augusta Read Thomas Composer; University Professor, University of Chicago While at the Institute, Augusta Read Thomas will be composing a violin concerto.

# Artist-in-Residence Program

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. Composer David Lang embarks on his first season as Artist-in-Residence and will curate the Edward T. Cone Concert series and host conversations with artists while pursuing his creative and intellectual work as part of the Institute's community of scholars.



#### David Lang Composer

David Lang is a Pulitzer Prize-winning composer whose works have been performed worldwide by distinguished artists and ensembles, including the BBC Symphony, the International Contemporary Ensemble, eighth blackbird, Santa Fe Opera, the New York Philharmonic, the Netherlands Chamber Choir, the Boston Symphony, the Munich Chamber Orchestra, and the Kronos Quartet. A recipient of the prestigious Grammy Award, Lang has received numerous honors, including Musical America's Composer of the Year, Carnegie Hall's 2013-14 Debs Composer's Chair, the Rome Prize, the BMW Music-Theater Prize (Munich), and grants from the Guggenheim Foundation, the Foundation for Contemporary Performance Arts, the National Endowment for the Arts, the New York Foundation for the Arts, and the American Academy of Arts and Letters. Lang is Professor of Music Composition at the Yale School of Music and is cofounder and co-artistic director of New York's legendary music festival Bang on a Can.

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