



Speaker Biographies



Dora Angelaki, Ph.D.

Dr. Angelaki is Wilhelmina Robertson Professor and chair of the Department of Neuroscience at Baylor College of Medicine, and professor in the Department of Psychology and Electrical and Computer Engineering at Rice University. She holds a Ph.D. in biomedical engineering and an M.B.E. from the University of Minnesota and a B.Sc. in electrical engineering from the National Technical University of Athens, Greece. Her key professional interests are navigation circuits, multisensory integration, and computational neuroscience. The tools used involve both

computational and experimental approaches, including behavioral analyses, single-unit recording, and microsimulation/inactivation of different brain regions—the brainstem, cerebellum, thalamus, and cortex—in macaque monkeys, as well as in mouse models. Her research focuses on understanding how multisensory information flows between subcortical and cortical brain areas, as well as the spatial navigation, decision making, and episodic memory circuits, and how internal states modulate this information flow.



Giorgio A. Ascoli, Ph.D.

Dr. Ascoli is professor in the Molecular Neuroscience Department and founding director of the Center for Neural Informatics at the Krasnow Institute for Advanced Study, George Mason University, where he has been since 1997. Dr. Ascoli was born in Milan, Italy. After an education in the humanities and achieving top national youth ranking in competitive chess, he studied chemistry at the Scuola Normale Superiore of Pisa, and received a Ph.D. studying proteins involved in learning and neurodegeneration. Dr. Ascoli won the European Phillips Young Investigator Award in 1989 for the synthesis of a new organic molecule and moved to the National Institutes of Health in 1994. Dr. Ascoli is

internationally recognized in computational neuroanatomy and edited the first book on this topic in 2002. He is a pioneer in neuroinformatics and founding editor-in-chief of the premier journal in the field. Dr. Ascoli created and curates <http://www.neuromorpho.org>, the largest collection of three-dimensional digital reconstructions of neurons. This free resource was accessed over 100,000 times from hundreds of countries to download more than 3 million files in nine years. Dr. Ascoli is also active in cognitive science and co-edited the 2005 book *Consciousness, Mind and Brain*. The original test he designed to quantify autobiographic memories, <http://www.cramtest.info>, was taken by more than 2,200 subjects, who scored over 16,000 memories. His latest public resource is <http://www.hippocampome.org>, a knowledge base of neuron types of the hippocampal formation. Dr. Ascoli's 120 peer-reviewed publications were cited more than 5,000 times, and his work was presented at more than 400 conferences and invited talks and described in textbooks and national media. His 2015 book, *Trees of the Brain, Roots of the Mind*, is published by MIT Press.



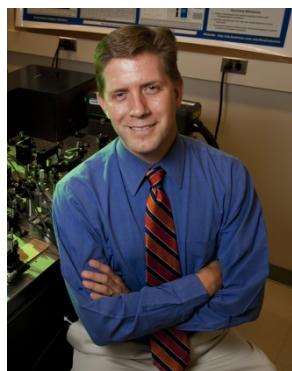
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Aron K. Barbey, Ph.D.

Dr. Barbey is director of the Decision Neuroscience Laboratory at the Beckman Institute for Advanced Science and Technology at the University of Illinois. He received a Ph.D. in psychology from Emory University in 2007 and completed a research fellowship in cognitive neuroscience at the National Institutes of Health in 2011. He is a faculty member of the Beckman Institute for Advanced Science and Technology and in the Departments of Bioengineering, Internal Medicine, Neuroscience, Psychology, and Speech and Hearing Science.

Dr. Barbey's research investigates the neural mechanisms of human intelligence. Through a combination of brain imaging (structural and functional MRI) and neuropsychological patient studies, his research seeks to uncover the mechanisms that shape higher cognitive processes and to develop predictive models of brain function that link neural systems to specific patterns of inference and behavior. His research has helped to identify and characterize the brain networks that are essential to higher cognitive functions (general intelligence, fluid intelligence, cognitive flexibility, and working memory), and examined their roles in language processing (discourse comprehension) and social cognition (emotional intelligence and social problem solving). A central aim of his current research is to develop cognitive neuroscience—directed interventions to improve higher cognitive functions—investigating the beneficial effects of cognitive, physical fitness, and nutritional interventions on executive control, learning, and memory. Dr. Barbey has received multiple early-career academic achievement awards and won \$16 million in private and federal research grants and contracts as a Principal Investigator since joining the University of Illinois in 2011. He is currently associate editor of *Frontiers in Human Neuroscience* and on the editorial board of *Thinking & Reasoning* and *Collabra*.



Stephen A. Boppart, M.D., Ph.D.

Dr. Boppart is an Abel Bliss Professor of Engineering with appointments in the Departments of Electrical and Computer Engineering, Bioengineering, and Medicine. He is also a full-time faculty member at the Beckman Institute for Advanced Science and Technology. His Biophotonics Imaging Laboratory is focused on developing novel optical biomedical diagnostic and imaging technologies and translating them into clinical applications. Dr. Boppart received his Ph.D. in medical and electrical engineering from MIT, his M.D. from Harvard Medical School, and did his residency training at the University of Illinois in internal medicine.

Since joining the faculty at the University of Illinois at Urbana-Champaign in 2000, he has published over 300 invited and contributed publications and over 40 patents related to optical biomedical imaging technology. He has mentored over 90 undergraduate, graduate, and post-graduate interdisciplinary researchers. He was recognized by *MIT Technology Review* magazine as one of the top 100 young innovators in the world for his development of medical technology, received the Institute of Electrical and Electronics Engineers (IEEE) Engineering in Medicine and Biology Society Early Career Achievement Award, and the Paul F. Forman Engineering Excellence Award from the Optical Society of America (OSA) for dedication and advancement in undergraduate research education. More recently, he received the international Hans Sigrist Prize in the field of diagnostic laser medicine. He was founding director of the Mills Breast Cancer Institute at Carle Foundation Hospital, Urbana, Illinois, and has worked to establish and strengthen partnership ties between the University of Illinois and local medical institutions.



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Dr. Boppart has co-founded three start-up companies—LightLab Imaging, Diagnostic Photonics, and PhotoniCare—to commercialize and disseminate his optical technologies for biomedical imaging. He is a fellow of the American Association for the Advancement of Science, the American Institute for Medical and Biological Engineering, IEEE, OSA, and the Society of Photographic Instrumentation Engineers. Currently, he is director of a campus-wide *Imaging at Illinois* initiative to integrate imaging science, technology, and applications across multiple modalities and fields, and has been a strong supporter for the integration of engineering and medicine to advance human health and our health care system.



Ed Boyden, Ph.D.

Dr. Boyden is a professor of biological engineering and brain and cognitive sciences at the MIT Media Lab and the McGovern Institute for Brain Research at MIT. He leads the Synthetic Neurobiology group, which develops tools for analyzing and repairing complex biological systems such as the brain, and applies them systematically to reveal ground-truth principles of biological function, as well as to repair these systems. These technologies include expansion microscopy, which enables complex biological systems to be imaged with nanoscale precision, optogenetic tools, which enable the activation and silencing of neural activity with light, and optical, nanofabricated, and robotic interfaces that enable recording and control of neural dynamics. He also co-directs the MIT Center for Neurobiological Engineering, which aims to develop new tools to accelerate neuroscience progress.

Among other recognitions, he has received the Breakthrough Prize in Life Sciences (2016), the Society for Neuroscience Young Investigator Award (2015), the Andrew Carnegie Prize in Mind and Brain Sciences (2015), the Stephen M. Schuetze Prize (2014), the Jacob Heskel Gabbay Award (2013), the Grete Lundbeck Brain Prize (2013), the NIH Director's Pioneer Award (2013), the NIH Director's Transformative Research Award (2012 and 2013), and the Perl-UNC Neuroscience Prize (2011). His group has hosted hundreds of visitors in order to instruct them how to use new biotechnologies, and he also regularly teaches at summer courses and workshops in neuroscience and lectures to the broader public (e.g., TED [2011]; World Economic Forum [2012 and 2013]). Dr. Boyden received his Ph.D. in neurosciences from Stanford University as a Hertz Fellow, where he discovered that the molecular mechanisms used to store a memory are determined by the content to be learned. Before that, he received degrees in electrical engineering, computer science, and physics from MIT. He has contributed to over 300 peer-reviewed papers, current or pending patents, and articles, and has given over 300 invited talks.



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Randal Burns, Ph.D.

Dr. Burns is building the high-performance, scalable data systems that allow scientists to make discoveries through the exploration, mining, and statistical analysis of big data. His research contributions tear down the barriers to using massive amounts of data, either by making data access more efficient or improving the performance of I/O and memory systems. He is a founder of multiple public-access sites for data intensive analysis of brain data, the Open Connectome Project, and Neurodata (<http://neurodata.io>), as well as numerical simulations, the Johns Hopkins Turbulence Databases. Dr. Burns is a professor of computer science at

Johns Hopkins University, a Kavli fellow (2012), and a member of the Defense Science Study Group class of 2012–2013.



Cynthia A. Chestek, Ph.D.

Dr. Chestek received her B.S. and M.S. in electrical engineering from Case Western Reserve University in 2005 and her Ph.D. in electrical engineering from Stanford University in 2010. From 2010 to 2012, she was a research associate in the Stanford University Department of Neurosurgery. In 2012, she became an assistant professor of biomedical engineering at the University of Michigan in Ann Arbor. She is the author of 26 full-length scientific articles. Her research interests include high-density interfaces to the nervous system for the control of multiple degree of freedom hand and finger movements.



Michael C. Crair, Ph.D.

Dr. Crair is the William Ziegler III Professor of Vision Research at Yale University, vice chairman and director of graduate studies of the Department of Neuroscience, and professor of ophthalmology and visual sciences. From 1998 to 2006, Dr. Crair taught at Baylor College of Medicine, where he was also the co-director of the Medical Scientist (M.D./Ph.D.) Training Program. A graduate of the University of California, Berkeley, where he earned his A.B., M.A. and Ph.D. degrees, Dr. Crair was a postdoctoral researcher at Kyoto University and Kyoto Prefectural Medical School in Japan and later at the University of California, San

Francisco. He has been awarded numerous honors for his research and teaching, including the Esther A. and Joseph Klingenstein Foundation Fellowship Award in the Neurosciences, the Baylor College of Medicine's MRRC New Program Development Award and its Marc Dresden Excellence in Graduate Education Award, and a NARSAD-Sidney R. Baer Jr. Foundation Young Investigator Award. He has been named an Alfred P. Sloan Foundation Research Fellow, a John Merck Fund Scholar and the March of Dimes Foundation's Basil O'Connor Fellow. He currently serves on the board of directors of the E. Matilda Ziegler Foundation for the Blind, Inc., and chairs their Scientific Advisory Committee.



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Karl Deisseroth, M.D., Ph.D.

Dr. Deisseroth is the D.H. Chen Professor of Bioengineering and of Psychiatry and Behavioral Sciences at Stanford University, and investigator at the Howard Hughes Medical Institute. He received his undergraduate degree from Harvard University and his Ph.D. and M.D. from Stanford University, where he also completed his postdoctoral training, medical internship, and adult psychiatry residency. He is board-certified by the American Board of Psychiatry and Neurology. He continues as a practicing psychiatrist at Stanford with specialization in affective disorders and autism spectrum disorder, employing medications along with neural stimulation. In Stanford's engineering school, he developed and launched the undergraduate degree program in bioengineering and continues to serve as director of undergraduate education in bioengineering, while also teaching yearly medical physiology and optics courses. National-scale service has included the NIH BRAIN Initiative Working Group and nonprofit disease foundations, including the Brain & Behavior Research Foundation (formerly NARSAD) and the Michael J. Fox Foundation for Parkinson's Research. He was selected as a Howard Hughes Medical Institute investigator in 2013, began serving as a foreign adjunct professor at the Karolinska Institutet, Sweden, in 2013, and was elected to the U.S. Institute of Medicine in 2010, the U.S. National Academy of Sciences in 2012, and the German National Academy of Sciences Leopoldina in 2014.

Over a period of less than 12 years, his laboratory created and developed both optogenetics (a technology for precisely controlling millisecond-scale activity patterns in specific cell types using microbial opsin genes and fiberoptic-based neural interfaces) and CLARITY (a technology for creating composites of biological molecules in tissue covalently linked to polymer hydrogels, allowing removal of unlinked tissue elements to create transparency and accessibility to macromolecular labels; the resulting new structure allows high-resolution optical access to structural and molecular detail within intact tissues without disassembly). He also has employed his technologies to discover the neural cell types and connections that cause adaptive and maladaptive behaviors, and has disseminated the technologies to thousands of laboratories around the world. For his discoveries, Dr. Deisseroth has received the NIH Director's Pioneer Award (2005), the Zülch Prize (2012), the Perl-UNC Neuroscience Prize (2012), the Grete Lundbeck Brain Prize (2013), a Pasarow Foundation Award (2013), and among other honors, was the sole recipient for optogenetics of the 2010 Koetser Prize, the 2010 Nakasone Award, the 2011 Alden Spencer Award, the 2013 Richard Lounsbery Award, the 2014 Dickson Prize in Science, the 2015 Keio Medical Science Prize, the 2015 Lurie Prize, the 2015 Albany Prize, the 2015 Dickson Prize in Medicine, and the 2015 Breakthrough Prize in Life Sciences.



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Michael Dickinson, Ph.D.

Dr. Dickinson was born in Seaford, Delaware in 1963, but spent most of his youth in Baltimore and Philadelphia. He attended college at Brown University, originally with the intent of majoring in visual arts, but eventually switched to neuroscience, driven by a fascination for the mechanisms that underlie animal behavior. While in college, he studied the roles of neurons and neurotransmitters in the control of feeding behavior in leeches. He received a Ph. D. in zoology from the University of Washington in Seattle in 1991. His dissertation project focused on the physiology of sensory cells on the wings of flies. It was this study of wing sensors that led to an interest in insect aerodynamics and flight control circuitry. Dr. Dickinson worked briefly at the Max Planck Institute for Biological Cybernetics in Tübingen, Germany, and served as an assistant professor in the Department of Anatomy at the University of Chicago in 1991. He moved to the University of California, Berkeley, in 1996 and was appointed Williams Professor in the Department of Integrative Biology in 2000. Dr. Dickinson served on the faculty at California Institute of Technology from 2002 to 2010. From 2010 to 2014, he was the Benjamin Hall Endowed Chair in Basic Life Sciences in the Department of Biology at the University of Washington. He is now the Esther M. and Abe M. Zarem Professor of Bioengineering at California Institute of Technology.



Joseph Dougherty, Ph.D.

Dr. Dougherty graduated magna cum laude with a B.A. and B.S. in psychology from Truman State University in 1999, after which he held a predoctoral fellowship at Howard Hughes Medical Institute. In 2005, Dr. Dougherty received his Ph.D. in neuroscience from the University of California, Los Angeles, where he trained with Dr. Daniel Geschwind, a leader in high-throughput gene expression analysis for neuroscience. Dr. Dougherty's dissertation included extensive transcript profiling of neural progenitor populations, followed by anatomical and functional studies of candidate genes for proliferation and differentiation of neural progenitor cells. He spent the next five years working as a postdoctoral associate in Dr. Nathaniel Heintz's laboratory, where he focused on developing and applying analytical methods for high-throughput in vivo studies of genetically defined cell types in mice, culminating in a broad survey of translational profiles across the central nervous system. His work included generating and characterizing many TRAP (translating ribosome affinity purification) mouse lines, extensive TRAP experiments profiling different cell types, optimizing protocols for working with small amounts of RNA, and developing analytical pipelines. Dr. Dougherty's background has given him a unique combination of expertise in cellular and molecular neuroscience, mouse transgenesis, transcriptome profiling, and analytical method development. He has built a team that has technical expertise in genetically motivated mouse models and high-throughput in vivo analysis of distinct cell types, focused on the study mechanisms of neurological disease and disorder.



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Joseph R. Ecker, Ph.D.

Dr. Ecker is a professor at the Salk Institute, where he holds the Salk International Council Chair in Genetics. He is also an adjunct professor of biology at the University of California, San Diego. His research focuses on epigenetic regulation in plants and animals. Ecker served on the faculty at the University of Pennsylvania (1987–2000) before joining the Salk Institute (2000) where he is director of the Genomic Analysis Laboratory and co-director of the CIRM Center for Excellence in Stem Cell Genomics (with Michael Snyder, Stanford School of Medicine). Dr. Ecker serves on numerous national and international advisory committees and editorial boards, and is the recipient of numerous awards. He is a member of the U.S. National Academy of Sciences and the American Academy of Arts and Sciences, and a fellow of the American Association for the Advancement of Science.



Valentina Emiliani, Ph.D.

Dr. Emiliani is head of the Department of Neurophotonics and leader of the Wavefront Engineering Microscopy Group at Paris Descartes University, Paris, France.

She obtained her Ph.D. in physics from the Sapienza University of Rome, Italy, working on the investigation of tunneling effect in quantum wells by ultrafast spectroscopy. As a postdoctoral researcher at the Max Born Institute, Berlin, Germany, she investigated carrier transport in quantum wires by low-temperature scanning near-field optical microscopy (SNOM).

In 2000, she formed a research team on high-resolution microscopy at the European Laboratory for Non-linear Spectroscopy in Florence, Italy, focused on the investigation of light propagation in disordered structure by SNOM. In 2002, she moved to Paris where she started working on interdisciplinary projects, projects that lay at the interface between physics and biology, at the Institut Jacques Monod, Paris, France. Here she studied the role of mechanical forces on the establishment of cell polarity by holographic optical tweezers. In 2004 she became a researcher at Centre National de la Recherche Scientifique (CNRS international magazine), then research director in 2011.

In 2005, she formed the Wavefront Engineering Microscopy Group. Today, the group comprises more than 20 people with complementary skills and knowledge on non-linear optics, ultra-fast spectroscopy, in vivo imaging, super resolution imaging, spatial light modulator technology, thermal imaging, electrophysiology, and neurophysiology. The team has pioneered the use of phase modulation-based techniques for the optical control of brain signalling. In particular, the group has demonstrated a number of new techniques for efficient photoactivation of caged compounds and optogenetics molecules, techniques based on computer-generated holography, generalized phase contrast, and temporal focusing. These new approaches are currently used in a series of collaborative projects, including the analysis of the zebrafish swim circuit, the investigation of the retinal circuit, the study of calcium dynamics in respiratory-related neurons, the investigation of *hub* neuronal function in vivo, the mapping of functional circuits in visual cortex, and the optical detection of neuronal membrane voltage. The team has also developed an optical microscope for super-resolution based on the principle of



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Stimulated Emission Depletion (STED), and very recently has demonstrated a new optical scheme for super-resolution wide-field speckle imaging.

Dr. Emiliani received a European Young Investigator Award in 2005 and an award from the Bettencourt-Shueller Foundation in 2014.



Florian Engert, Ph.D.

Dr. Engert received his B.S. in physics from Ludwig Maximilian Universität München in 1993 and his Ph.D. in neuroscience from the Max Planck Institute for Neurobiology in 1997, followed by postdoctoral fellowships at the Max Planck Institute for Neurobiology from 1997 to 1999; the University of California, San Diego, from 1999 to 2000; and the University of California, Berkeley, from 2000 to 2001. His current focus is the development of larval zebrafish as a model for the comprehensive identification and examination of neural circuits, which control various aspects of natural behaviors. Dr. Engert has published several essays regarding a series of visually induced behaviors, allowing both analysis of the individual resulting motor components and the

ability to monitor neuronal activity throughout the zebrafish's conscious, intact brain. Dr. Engert is currently studying how changes or variations in behavior are reflected in changes in underlying neuronal activity. He has received several honors, including the ECMM Young Investigators Travel Award, a McKnight Fellowship, a Klingenstein-Simons Fellowship, a Herchel Smith Research Fellowship, and an NIH Pioneer Award. Dr. Engert is currently a professor of molecular and cellular biology at Harvard University.



Jeremy Freeman, Ph.D.

Dr. Freeman is a neuroscientist at the intersection of biology, computation, data, and visualization. He wants to understand how the brain supports complex behavior, and how it might inform the design of intelligent systems. He is also passionate about open source and open science, contributing to a variety of open source technologies, building platforms for collaborative data sharing and analysis, and working with scientists and developers across a range of fields.



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Michael Garwood, Ph.D.

Dr. Garwood earned his B.A. (1981) and Ph.D. (1985) in chemistry from the University of California, Santa Cruz. As a graduate student, he developed nuclear magnetic resonance spectroscopy (MRS) techniques to perform spatially-localized in vivo spectroscopy. He moved to the University of Minnesota in 1986, where he has developed advanced MRI techniques, including frequency-modulated pulses and MRI sequences, and applied them in studies of neurodegeneration, cancer, and other diseases. He holds the Malcolm B. Hanson Professorship of Radiology, and is associate director of the Center for Magnetic Resonance at the University of Minnesota. In 2007, he was awarded the Gold Medal of the International Society of Magnetic Resonance in Medicine for his contributions to the field.



Bin He, Ph.D.

Dr. He is Distinguished McKnight University Professor of Biomedical Engineering, Medtronic-Bakken Endowed Chair for Engineering in Medicine, and director of the Institute for Engineering in Medicine and the Center for Neuroengineering at the University of Minnesota. Dr. He has made significant research contributions to the fields of neuroengineering and functional biomedical imaging related to human neuroscience, including electrophysiological source imaging, multimodal neuroimaging, and noninvasive brain-computer interface. His lab demonstrated the capability of high-resolution imaging of spontaneous seizure from noninvasive EEG and of noninvasive controlling a quadcopter flying in the sky by “thoughts” alone. Dr. He has received the Academic Career Achievement Award from the Institute for Electrical and Electronics Engineers (IEEE) Engineering in Medicine and Biology Society, the Established Investigator Award from the American Heart Association, and was elected as Fellow of the International Academy of Medical and Biological Engineering (IAMBE), IEEE, and American Institute of Medical and Biological Engineering. Dr. He served as a past president of the IEEE Engineering in Medicine and Biology Society, and is chair-elect of IAMBE. He serves as the editor-in-chief of *IEEE Transactions on Biomedical Engineering*.



Elizabeth Hillman, Ph.D.

Dr. Hillman is an associate professor of biomedical engineering and radiology and a member of the Zuckerman Mind Brain Behavior Institute and Kavli Institute for Brain Science at Columbia University. Dr. Hillman completed her undergraduate degree in physics and her Ph.D. in medical physics and bioengineering at University College London. After a year working for a Boston-based medical device start-up, Dr. Hillman became a postdoctoral fellow, and later junior faculty, at Massachusetts General Hospital/Harvard Medical School at the Martinos Center for Biomedical Imaging.

Dr. Hillman started her lab at Columbia University in 2006. Dr. Hillman has developed a range of novel approaches to in vivo optical imaging across scales, beginning with time-resolved diffuse optical



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tomography during her Ph.D., and including laminar optical tomography, dynamic contrast small animal molecular imaging, hyperspectral two-photon microscopy, and most recently, SCAPE microscopy for very high-speed 3-D imaging of the living brain. Dr Hillman's lab also has an active research program applying these imaging tools to studying neurovascular coupling in the healthy, diseased, and developing brain. Dr. Hillman has received young investigator awards from the Human Frontier Science Program and Coulter Foundation as well as a National Science Foundation Faculty Early Career Development (CAREER) award and the Optical Society of America's Adolph Lomb Medal for contributions to optics at a young age.



Leigh R. Hochberg, M.D., Ph.D.

Dr. Hochberg is a vascular and critical care neurologist and neuroscientist. His research focuses on the development and testing of novel neurotechnologies to help people with paralysis and other neurologic disorders, and on understanding cortical neuronal ensemble activities in neurologic disease. Dr. Hochberg has appointments as neurologist at Massachusetts General Hospital (MGH), where he attends in the NeuroICU and on the acute stroke service; professor of engineering at the School of Engineering and Institute for Brain Science, Brown University; director of

the Veterans Affairs Center for Neurorestoration and Neurotechnology, Providence Veterans Affairs Medical Center (VAMC); and senior lecturer on neurology at Harvard Medical School. He also directs the Neurotechnology Trials Unit for MGH Neurology, where he is the investigational device exemption sponsor-investigator and principal investigator of the BrainGate pilot clinical trials, which are conducted by a close collaboration of scientists and clinicians at Brown University, Case Western Reserve University, MGH, Providence VAMC, and Stanford University. Dr. Hochberg is a fellow of the American Academy of Neurology and the American Neurological Association, and he and his research with the collaborative BrainGate team have been honored with the Joseph Martin Prize for Basic Research; the Herbert Pardes Clinical Research Excellence Award; the first Israel Brain Technologies international B.R.A.I.N. Prize, presented by President Shimon Peres; and the Derek Denny-Brown Young Neurological Scholar Award. Dr. Hochberg's BrainGate research, which has been published in *Nature*, *Science Translational Medicine*, *Nature Medicine*, *Nature Neuroscience*, *Journal of Neuroscience*, and others, is supported by the Rehabilitation Research and Development Service of the U.S. Department of Veterans Affairs, the National Institute of Neurological Disorders and Stroke, the National Institute on Deafness and Other Communication Disorders, and the Eunice Kennedy Shriver National Institute of Child Health and Human Development National Center for Medical Rehabilitation Research.



Ute Hochgeschwender, M.D.

Dr. Hochgeschwender received her degrees in medicine (M.D.) and philosophy (M.A.) from the Free University of Berlin, Germany. Dr. Hochgeschwender is currently an associate professor in the Neuroscience Program at Central Michigan University (CMU), and a faculty member of the College of Medicine at CMU. Her expertise is in the design, generation, and analysis of gene-modified mice for studying the molecular basis of brain function. Her current research focuses on

combining genetic approaches of light emission and light sensing for neuronal manipulation. This



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“non-invasive optogenetics” approach uses a light-generating protein (luciferase) to activate light-sensing opsins (ion channels, proton pumps). Most recent efforts concentrate on further advancing the concept of combining bioluminescence and optogenetics toward neural activity regulated self-control of neurons by employing calcium-sensitive luciferases.



Ehud Isacoff, Ph.D.

Dr. Isacoff is Evan Rauch Professor of Neuroscience at the University of California, Berkeley. He received his B.S. in biology in 1981 and his Ph.D. in physiology in 1987, both from McGill University, and did his postdoctoral work in biophysics at the University of California, San Francisco. Dr. Isacoff works on the mechanisms of ion channel and neurotransmitter receptor function, the molecular basis of synaptic transmission and plasticity, and the development of neural circuits. His work has shed light on the basis of voltage sensing and gating of voltage-gated potassium and proton channels and the voltage-activated phosphatase. He has also contributed to the understanding of the molecular assembly of channels and receptors and has developed novel methods in biological optics for channel biophysics and neuroscience. Some of his most exciting work has been the development of photoswitched tethered ligands, opto-chemical toggles that agonize, antagonize, or block potassium channels, and ionotropic and metabotropic receptors on the microsecond scale, with control that rivals that of the voltage clamp. This provides a powerful tool for molecular biophysical analysis of receptor function. It has also opened a novel branch of chemical optogenetics that enables real-time probing of synaptic connections in intact circuits at multiple scales, from single synapses to single cells to groups of cells, and with sub-millisecond temporal precision and the ability to selectively manipulate receptors that are present at multiple sites within a synapse: presynaptically, postsynaptically in dendritic spines and shafts, and in glial processes. His lab has been using light-gated glutamate receptors and advanced confocal, two-photon and light sheet imaging methods, along with high-speed imaging of behavior to study synapse formation, plasticity, neural circuit function, and behavior in zebrafish, in an effort to create a treatment for blindness by installing light sensitivity in surviving retinal layers following photoreceptor cell degeneration.



Thomas Kalil

Mr. Kalil is Deputy Director for Policy for the White House Office of Science and Technology Policy and is Senior Advisor for Science, Technology and Innovation for the National Economic Council. From 2001 to 2008, Kalil was Special Assistant to the Chancellor for Science and Technology at UC Berkeley. He was responsible for developing major new multi-disciplinary research and education initiatives at the intersection of information technology, nanotechnology, microsystems, and biology. He also conceived and launched a program called “Big Ideas @ Berkeley,” which provides support for multidisciplinary teams of Berkeley students that are interested in addressing economic and societal challenges such as clean energy, safe drinking water, and poverty alleviation.



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In 2007 and 2008, Mr. Kalil was the Chair of the Global Health Working Group for the Clinton Global Initiative, where he developed new public and private sector initiatives in areas such as maternal and child health, under-nutrition, and vaccines. Mr. Kalil was also a Senior Fellow with the Center for American Progress, where he co-authored A National Innovation Agenda, one of the four pillars of CAP's Economic Plan for Plan for the Next Administration. He was also a member of the Scientific Advisory Board of Nanomix and has served on three committees of the National Academy of Sciences, including the Committee to Facilitate Interdisciplinary Research.

Previously, Mr. Kalil served as the Deputy Assistant to President Clinton for Technology and Economic Policy, and the Deputy Director of the White House National Economic Council. He was the NEC's "point person" on a wide range of technology and telecommunications issues, such as the liberalization of Cold War export controls, the allocation of spectrum for new wireless services, and investments in upgrading America's high-tech workforce. He led a number of White House technology initiatives, such as the National Nanotechnology Initiative, the Next Generation Internet, bridging the digital divide, e-learning, increasing funding for long-term information technology research, making IT more accessible to people with disabilities, and addressing the growing imbalance between support for biomedical research and for the physical sciences and engineering. He was also appointed by President Clinton to serve on the G-8 Digital Opportunity Task Force (dot force).

Prior to joining the White House, Tom was a trade specialist at the Washington offices of Dewey Ballantine, where he represented the Semiconductor Industry Association on U.S.–Japan trade issues and technology policy. He also served as the principal staffer to Gordon Moore in his capacity as Chair of the SIA Technology Committee.

Tom received a B.A. in political science and international economics from the University of Wisconsin at Madison, and completed graduate work at the Fletcher School of Law and Diplomacy. He is the author of articles and op-eds on S&T policy, the use of prizes as a tool for stimulating innovation, nanotechnology, nuclear strategy, newborn health, vaccines, the impact of mobile communications in developing countries, U.S.–Japan trade negotiations, U.S.–Japan cooperation in science and technology, the National Information Infrastructure, distributed learning, and electronic commerce.



Kendall H. Lee, M.D., Ph.D.

Dr. Lee is a consultant and professor in the Department of Neurologic Surgery with joint appointments in the Department of Physiology and Biomedical Engineering and the Department of Physical Medicine and Rehabilitation at Mayo Clinic. He is also the director of the Neural Engineering Laboratory at Mayo Clinic.

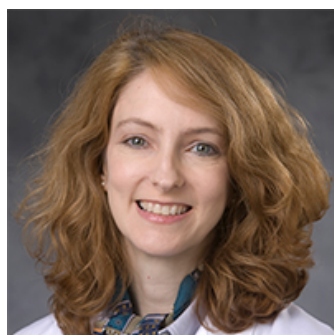
Dr. Lee received a B.A. degree in biology with a minor in philosophy from the University of Colorado Denver. He attended Yale University Graduate School where he received a Master of Philosophy degree, as well as an M.D. and a Ph.D. in neurobiology. He completed an internship in internal medicine at the Hospital of Saint Raphael, Yale University School of Medicine, and a residency year in neurology at Harvard Medical School. He trained further at Dartmouth-Hitchcock Medical Center, completing an internship in general surgery, a residency in neurosurgery, and a chief residency in neurosurgery.



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In his clinical practice, Dr. Lee is an expert on neurological disorders, seeing patients with Parkinson's disease, Tourette's syndrome, dystonia, and other neurodegenerative and psychiatric diseases. He is leading research efforts at Mayo Clinic to develop the Wireless Instantaneous Neurotransmitter Concentration System (WINCS), a series of devices to monitor and record electrical/chemical reactions in the brain during deep brain stimulation (DBS). WINCS will allow physicians to establish a precise relationship between stimulation and the resulting amount and type of chemicals the brain releases during DBS. This technology will provide a powerful new tool for intraoperative neurochemical monitoring for use during functional neurosurgery.

Dr. Lee's research is funded by National Institutes of Health, National Institute of Neurological Disorders and Stroke, and multiple private donor foundations. His findings have been published in peer-reviewed journals such as *Proceedings of the National Academy of Sciences*, *Neuron*, *Journal of Neural Engineering*, *Epilepsia*, *Movement Disorders*, *Journal of Neurosurgery*, and *Archives of Neurology*. He is an internationally recognized speaker and serves as an editorial board member on the following journals: *Journal of Neural Engineering*; *Biomedical Engineering Letters*; *Stereotactic and Functional Neurosurgery*; and *Neuromodulation*. Dr. Lee is also a commander in the United States Navy Reserve.



Sarah Hollingsworth Lisanby, M.D.

Dr. Lisanby is the Director of the Division of Translational Research at the National Institute of Mental Health. She is also chair of the Department of Psychiatry and Behavioral Sciences at Duke University School of Medicine, and she holds the J.P. Gibbons Professor of Psychiatry endowed chair.

Dr. Lisanby is one of the leading researchers in neuromodulatory interventions for treating major depression, serving as a principal investigator on studies that range from basic research through clinical trials. A prolific author with approximately 200 scientific articles and book chapters, she has also received national and international recognition, including a Distinguished Investigator Award from the National Alliance for Research on Schizophrenia and Depression (NARSAD), the Max Hamilton Memorial Prize of the Collegium Internationale Neuro-Psychopharmacologicum (CINP), the Gerald Klerman Award from the National Depression and Manic Depression Association (NDMDA), and the Eva King Killam Research Award from the American College of Neuropsychopharmacology (ACNP).



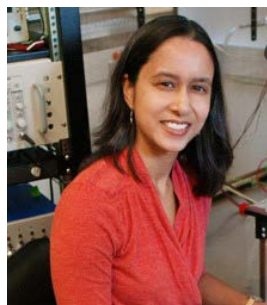
Amit Majumdar, Ph.D.

Dr. Majumdar is the division director of the Data Enabled Scientific Computing (DESC) division at the San Diego Supercomputer Center (SDSC) and is an associate professor in the Department of Radiation Medicine and Applied Sciences at the University of California, San Diego. He received his B.S. from Jadavpur University, Kolkata, India, in electrical engineering in 1985; M.S. from Idaho State University in nuclear engineering in 1988; M.S. in mathematics from University of Michigan in 1994; and Ph.D. in the interdisciplinary program of nuclear engineering and scientific computing from University of Michigan in 1996. His research interests are in high performance computing (HPC), computational science, cyberinfrastructure (CI), and science gateways. He is also interested in convergence of HPC and data science and associated CI needs.



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of science communities. He has developed parallel algorithms for various kinds of HPC machines and is interested in understanding performance and scalability of scientific applications on HPC machines. One of his current National Science Foundation (NSF) funded projects is the neuroscience gateway (NSG) project, which enables large-scale neuronal simulations on HPC resources. He is the principal investigator of multiple research projects funded by the Air Force Office of Scientific Research, NSF, Intel, and Microsoft.



Mala Murthy, Ph.D.

Dr. Murthy is an assistant professor in the Princeton Neuroscience Institute and Department of Molecular Biology at Princeton University. She received a B.S. in biology from MIT, a Ph.D. in neuroscience from Stanford University, and did postdoctoral research in systems neuroscience at California Institute of Technology. Her research is focused on how the brain extracts salient information from the sensory world and uses this information to modulate behavior. She uses the genetically tractable model system of *Drosophila* and studies its acoustic behaviors using a combination of quantitative behavioral assays, in vivo neural recordings, and computational modeling. During courtship, male flies produce dynamic songs while females arbitrate mating decisions based on song information; research in the Murthy lab is solving the cellular-level neural mechanisms that link sensory processing to behavior, in the context of communication. Her research has won numerous awards, including awards from the McKnight Foundation, the Klingenstein Fund and the Simons Foundation, the Sloan Foundation, the Human Frontier Science Program, the NIH Director's New Innovator Award, and the National Science Foundation Faculty Early Career Development (CAREER) Award.



Ken Norman, Ph.D.

Dr. Norman conducts memory research at Princeton University, where he is a professor in the Department of Psychology and the Princeton Neuroscience Institute, and co-director of the T32-supported Quantitative Neuroscience Training Program. He received a B.S. in symbolic systems from Stanford University in 1993 and a Ph.D. in psychology from Harvard University in 1999. Prior to taking his faculty position at Princeton in 2002, Norman was a postdoctoral researcher in Randall O'Reilly's lab at the University of Colorado Boulder. In his research, Norman uses multivariate neural decoding methods, applied to fMRI and EEG data, to test the predictions of computational models of learning and memory.



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Aude Oliva, Ph.D.

Dr. Oliva holds a French baccalaureate in physics and mathematics, two master's degrees, and a doctorate in cognitive science from the Grenoble Institute of Technology, France, which she received in 1995. She joined the Massachusetts Institute of Technology (MIT) faculty in 2004 and the MIT Computer Science and Artificial Intelligence Laboratory as a principal research scientist in 2012. Dr. Oliva's work combines state-of-the-art methods in neuroscience, cognitive science, and computer science, to discover and model how perception and cognition are realized in human and artificial minds. Her cross-disciplinary research bridges theory to experiments to applications. Her work has been featured in high-profile journals and textbooks of various scientific disciplines, the scientific and popular press, and museums of art and science. She is the recipient of a 2006 National Science Foundation Faculty Early Career Development (CAREER) award in computational neuroscience, and was named the 2014 Guggenheim Fellow in Computer Science.



Ken Paller, Ph.D.

Dr. Paller conducts memory research at Northwestern University, where he is a professor in the Department of Psychology, director of the Cognitive Neuroscience Program, and director of the T32-supported Training Program in the Neuroscience of Human Cognition. He completed undergraduate training at the University of California, Los Angeles and graduate training in neuroscience at the University of California, San Diego. He is a fellow of the Association for Psychological Science, a fellow of the Mind and Life Institute, journal editor at *Neuropsychologia*, and recipient of the Senator Mark Hatfield Award from the Alzheimer's Association. His research makes use of behavioral measures, analyses of brain electrical activity from the EEG, patterns of cognitive deficits in neurological patients, and MRI methods. His work has contributed to understanding sleep's role in memory and memory dysfunction, sensory processing during sleep to reinforce prior learning, the neural substrates of conscious memory experiences, and the juxtaposition of those memory experiences with various ways in which memory can influence our behavior in the absence of awareness of memory retrieval, as in intuition.



Francisco Pereira, Ph.D.

Dr. Pereira is a staff scientist at Medical Imaging Technologies, Siemens Healthcare in Princeton, New Jersey. He is the lead principal investigator in a team in the Intelligence Advanced Research Projects Activity Knowledge Representation in Neural Systems program, where he works on combining machine learning and brain imaging to understand how semantic knowledge is represented in the brain and used in language processing. He also works on data science approaches to answering scientific and clinical questions using data from multiple modalities—functional, structural and diffusion MRI, as well as spectroscopy—and for automatically providing explanations and



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context for those answers in terms of models of the underlying condition or mental process. He was a postdoctoral researcher at the Princeton Neuroscience Institute, Princeton University, in Matthew Botvinick's lab, where he also worked closely with students of Ken Norman and Jonathan Cohen. He has a Ph.D. in computer science and neural basis of cognition from Carnegie Mellon University, where he worked with Tom Mitchell and Marcel Just.



Xaq Pitkow, Ph.D.

Dr. Pitkow's primary focus is on developing theories of the computational functions of neural networks, especially how they compute properties of the world using ambiguous sensory evidence. Although he is a theorist, he at one point did perform neuroscience experiments and still collaborates closely with experimentalists to ground his theories, help design experiments, and analyze data. He was trained in physics as an undergraduate student at Princeton University, and went on to study biophysics for his Ph.D. at Harvard University. He then took postdoctoral positions in the Center for Theoretical Neuroscience at Columbia University and then in the Department of Brain and Cognitive Sciences at the University of Rochester. In 2013 he moved to Houston to become a faculty member jointly at the Baylor College of Medicine and Rice University, in the Departments of Neuroscience and Electrical and Computer Engineering.



Nicholas J. Priebe, Ph.D.

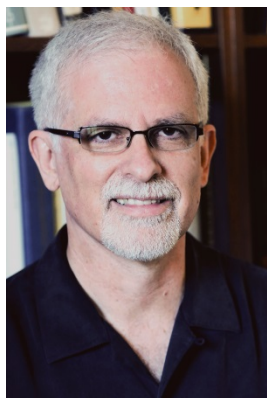
Dr. Priebe is an associate professor at the University of Texas at Austin in the Department of Neuroscience and is a member of the Center for Learning and Memory and the Center for Perceptual Systems. His research focuses on the nature of cortical computation, utilizing information processing through the visual pathway as a model system. Dr. Priebe's laboratory explores several related questions: What are the transformations that occur at each stage of the visual pathway? What are the mechanisms underlying these transformations? And how do these transformations in the neural representation of visual information contribute to both our perceptions and actions?

Dr. Priebe received undergraduate bachelor's degrees in cognitive science and computer science from the University of California, San Diego. He received his Ph.D. from the University of California, San Francisco, where he worked with Dr. Stephen Lisberger to define the mechanisms for adaptation in motion-selective neurons in the neocortex. During his doctoral work, he also studied smooth pursuit, a voluntary eye movement that depends critically on motion processing within the neocortex. He worked with Dr. David Ferster at Northwestern University as a postdoctoral fellow, describing the emergence of motion and form selectivity in the primary visual cortex using intracellular recordings.

Since establishing his lab in Austin, Dr. Priebe has focused on studying the circuitry elements responsible for the integration of binocular signals that underlie our perception of depth, and how this circuitry is sculpted by experience. The lab utilizes a combination of intracellular electrophysiology and two-photon microscopy in vivo to gain access to the circuitry responsible for cortical computations.



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Michael Roukes, Ph.D.

Dr. Roukes is the Robert M. Abbey Professor of Physics, Applied Physics, and Bioengineering at the California Institute of Technology (Caltech). His scientific interests range from quantum measurement to applied biotechnology—with a unifying theme of the development, very-large-scale integration, and application of complex nanosystems to precision measurements in the life sciences and medicine. Roukes obtained a Ph.D. in physics in 1985 from Cornell University, working with Nobel Laureate Robert C. Richardson on energy transport in microstructures at ultralow temperatures. Before joining Caltech, Roukes was a member of technical staff/principal investigator in the Quantum Structures Research group at Bell Communications Research. He joined Caltech

in 1992 as a tenured professor of physics, and he was named the founding director of Caltech's Kavli Nanoscience Institute (KNI) from 2003 to 2006. In 2007, he co-founded the Alliance for Nanosystems VLSI (very-large-scale integration) with scientists and engineers at CEA-Leti in Grenoble, France, which maintains a billion dollar-scale micro-/nano-electronics research foundry. He then continued as co-director of Caltech's KNI from 2008 to 2013. Since then, he has returned to full-time pursuit of research efforts with his group and collaborators. Concurrent with his Caltech appointment, he has held a chaire d'excellence in nanoscience in Grenoble since 2008. Among his honors, Dr. Roukes is a recipient of the NIH Director's Pioneer Award and has been awarded Chevalier (Knight) dans l'Ordre des Palmes Academiques by the Republic of France.



Jon Sack, Ph.D.

Dr. Sack is an assistant professor in the Department of Physiology and Membrane Biology at the University of California, Davis. The Sack laboratory develops novel means of controlling and visualizing ion channel function. Our goals include identifying when and where endogenous ion channel subtypes activate under physiological conditions. Most recently, we developed the first optical method to detect activating conformational changes of wild-type voltage-gated ion channels. The laboratory is currently focused on engineering a toolbox of "voltage tracers" for probing neural electrical activity.

Dr. Sack developed a fascination with ion channel gating when he was a biochemistry major at Reed College in Portland, Oregon. In his Ph.D. research with William Gilly at Stanford University, he studied how a snail's defensive mucus modulates ion channels. In postdoctoral studies with Richard Aldrich at Stanford, Dr. Sack investigated cooperative interactions of ligands with the voltage sensors of the Shaker K⁺ channel. He then accepted a Fulbright Scholarship with the Marine Institute of Ireland, and continued research as a lecturer at the International Centre for Neurotherapeutics of Dublin City University, investigating drug targeting to ion channel heteromers. In addition to his position at UC Davis, he is faculty of the neurobiology course at the Marine Biological Laboratory in Woods Hole.



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Ivan Soltesz, Ph.D.

Dr. Soltesz is currently the James R. Doty Professor of Neurosurgery and Neurosciences in the School of Medicine at Stanford University. He received his doctorate from Eötvös Loránd University in Budapest, conducted postdoctoral research at Oxford University, England, Stanford University, and The University of Texas Southwestern Medical Center, and established his laboratory at the University of California, Irvine, in 1995, where he served as department chair from 2006 to 2015. His major research interest is focused on neuronal microcircuits, network oscillations, cannabinoid signaling, and the mechanistic bases of circuit dysfunction in epilepsy. His laboratory at Stanford employs a combination of closely integrated experimental and theoretical techniques, including closed-loop in vivo optogenetics, paired patch clamp recordings, in vivo recordings from identified interneurons in awake mice, functional imaging, video-EEG recordings, behavioral approaches, and large-scale computational modeling methods using supercomputers. In terms of synergistic activities, he wrote a monograph book on GABAergic microcircuits (Oxford University Press), co-edited a book on computational neuroscience in epilepsy (Academic Press/Elsevier), and is a founder of the Gordon Research Conference on the mechanisms of neuronal synchronization and epilepsy. He was the recipient of the National Institute of Neurological Disorders and Stroke Javits Neuroscience Investigator Award, the American Epilepsy Society's Research Recognition Award, and the international Michael Prize for basic research in epilepsy.



Friedrich T. Sommer, Ph.D.

Dr. Sommer is an adjunct professor at the Redwood Center for Theoretical Neuroscience and at the Helen Wills Neuroscience Institute at the University of California, Berkeley. He started at UC Berkeley in 2005 as associate adjunct professor and served in 2008 and 2009, two terms, as the acting director of the Redwood Center. From 2003 to 2005, he was one of the principal investigators at the Redwood Neuroscience Institute in Menlo Park. After completing two postdoctoral fellowships, one at MIT and the other at the University of Tübingen, Germany, he was assistant professor in the Department of Computer Science at Ulm University, Germany, from 1998 to 2002. In 2002 he received his habilitation in computer science from Ulm University. He holds a Ph.D. and a diploma in physics from the University of Düsseldorf and the University of Tübingen. Dr. Sommer's current work focuses on understanding computational roles of neural oscillations, modeling the visual system and memory, as well as developing theories for unsupervised learning in action-perception loops. Further, he is actively engaged in developing platforms and standards for sharing neurophysiology data.



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Allen W. Song, Ph.D.

Dr. Song is currently professor of radiology, psychiatry, neurobiology and biomedical engineering at Duke University, director of the Brain Imaging and Analysis Center, and interim director of the Duke Institute for Brain Sciences. After receiving his Ph.D. in biophysics from the Medical College of Wisconsin in 1995, he was granted a postdoctoral fellowship in neuroimaging at the National Institute of Mental Health Laboratory of Brain and Cognition. He joined Duke University as an assistant professor in 1999. Dr. Song's research is centered on the acquisition methodology of MRI and

its applications in neuroscience. He is also a co-author of the popular textbook *Functional Magnetic Resonance Imaging*, now in its third edition.



Sarah A. Stanley, M.B. B.Chir., Ph.D.

Dr. Stanley is an assistant professor at Mount Sinai School of Medicine, with dual appointments in the Division of Endocrinology, Diabetes, and Bone Disease and the Department of Neuroscience. Her research focuses on developing techniques for remote regulation of cell activity using radio waves or magnetic fields acting on nanoparticles and applying these to investigate the role of CNS populations in the regulation of metabolism.



Jason Stein, Ph.D.

Dr. Stein is an assistant professor in the Department of Genetics and the Neuroscience Center at the University of North Carolina at Chapel Hill. He received his Ph.D. in neuroscience, working under Paul Thompson, from the University of California, Los Angeles (UCLA), where he worked on discovering the genetic influences on macroscale human brain structure and is a co-founder of the ENIGMA (Enhancing Neuro Imaging Genetics Through Meta Analysis) consortium. During his postdoctoral training under Dan Geschwind at UCLA, he developed tools to evaluate how well neural stem cells model brain development. He is working on the BRAIN Initiative Cell Census project in collaboration with Dan Geschwind (grant Principal Investigator).



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Jonathan V. Sweedler, Ph.D.

Dr. Sweedler received his Ph.D. in chemistry from the University of Arizona in 1988 and spent several years at Stanford University before moving to the University of Illinois at Urbana-Champaign in 1991, where he has been ever since. At the University of Illinois, he is the James R. Eiszner Family Professor of Chemistry, director of the School of Chemical Science, and affiliated with the Institute of Genomic Biology and the Beckman Institute for Advanced Science and Technology. His research interests focus on developing new metabolomics and peptidomics approaches for assaying small volume samples, and in applying these methods to study cell-to-cell chemical communication within the brain. Tool development includes micro- and nanofluidics, miniaturized separations, mass spectrometry, and NMR. He has used these tools to characterize small molecules and peptides in a range of animal models across metazoan life and in samples as small as individual cells. Dr. Sweedler, with large international teams of biologists and technologists, has performed comprehensive interrogation of the genome, transcriptome, and peptidome in animals ranging from mollusks, insects, and mammals, to uncover cell-to-cell signaling peptides, transmitters, and pathways involved in wide range of functions and behaviors.

Dr. Sweedler has published more than 350 manuscripts and presented 400 invited lectures. He has received numerous awards including the American Chemical Society Award in Analytical Chemistry, the Benedetti-Pichler Award in Microanalysis, and the Gill Prize in Neuroscience. He is currently the editor-in-chief for *Analytical Chemistry*.



Andreas Savas Tolias, Ph.D.

Dr. Tolias is an associate professor of neuroscience at Baylor College of Medicine in Houston, Texas. He studies the structure and function of neocortical circuits, with the goal of deciphering how they compute information—deciphering the canonical algorithms of the neocortex. Research in his lab combines electrophysiological (multiple whole-cell and multi-electrode extracellular) methods, two-photon imaging, and molecular, behavioral, and computational techniques. He studied natural sciences in the University of Cambridge and did his Ph.D. at the Massachusetts Institute of Technology and his postdoctoral work at the Max Planck Institute for Biological Cybernetics in Tuebingen. He was trained as a systems and computational neuroscientist. His ultimate goal is to apply these neuroscience-inspired canonical algorithms to advance machine learning. He also has a keen interest in the development of neurotechnologies for basic and applied/clinical research.



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Vanessa Tolosa, Ph.D.

Dr. Tolosa is a principal investigator in the Materials Engineering Division at Lawrence Livermore National Laboratory (LLNL). Her research focuses on the development of long-term implantable neural interfaces and biochemical microsensors for therapeutic applications in humans and for scientific investigational platforms. Dr. Tolosa is a member of the Neurotech team at LLNL. The team was instrumental in the development of the world's first commercial retinal prosthesis (<http://www.artificialretina.energy.gov>). In recent years, Dr. Tolosa and her team have expanded the retinal prosthesis technology to a larger field of neural applications, from large-scale recordings in rodents to closed-loop stimulation in humans. Dr. Tolosa currently leads and

contributes to multiple projects funded by the Defense Advanced Research Projects Agency, National Institutes of Health, and Department of Energy. As part of a dynamic program at a national lab, Dr. Tolosa integrates engineering, basic science, and clinical applications through partnerships with industry, academia, and research institutes. She holds a B.S. in chemical engineering from the University of Florida and a Ph.D. in chemical engineering from the University of California, Los Angeles. She was hired as a postdoctoral researcher at LLNL under the supervision of Sat Pannu in 2010, before converting to a staff position a year later.



Josh Vogelstein, Ph.D.

Dr. Vogelstein received his B.S. from the Department of Biomedical Engineering (BME) at Washington University in St. Louis in 2002, his M.S. from the Department of Applied Mathematics and Statistics (AMS) at Johns Hopkins University (JHU) in 2009, and his Ph.D. from the Department of Neuroscience at JHU in 2009. He was a postdoctoral fellow in AMS at JHU from 2009 until 2011, during which he was appointed an assistant research scientist, later becoming a member of the Institute for Data Intensive Science and Engineering. Dr. Vogelstein spent two years at Duke University's Information Initiative, before his

current appointment as assistant professor in BME at JHU and core faculty member at the Institute for Computational Medicine and the Center for Imaging Science.

Dr. Vogelstein's research interests include computational statistics, big data, wide data, and icky data, especially neuroscience and connectomics. His group's research has been featured in a number of prominent scientific and engineering journals and conferences, including *Annals of Applied Statistics*, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, *Advances in Neural Information Processing Systems*, *SIAM Journal on Matrix Analysis and Applications*, *Science Translational Medicine*, *Nature Methods*, and *Science*. In 2011, he co-founded the Open Connectome Project, which expanded in 2015 to become NeuroData, whose mission is to enable data-driven neuroscience at scale.



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R. Jacob Vogelstein, Ph.D.

Dr. Vogelstein is a program manager at the Intelligence Advanced Research Projects Activity (IARPA) in the Office of the Director of National Intelligence. At IARPA, his areas of interest include neuromimetic algorithms, neuromorphic hardware, brain-computer interfaces, and other neurotechnology that can help to advance the capabilities of the Intelligence Community. Prior to joining IARPA, Dr. Vogelstein served as the program manager for applied neuroscience in the Research and Exploratory Development Department of the Johns Hopkins University Applied Physics Laboratory and as an assistant research professor in the Department of Electrical and Computer Engineering at the Johns Hopkins University Whiting

School of Engineering. Dr. Vogelstein received an Sc.B. in neural engineering from Brown University and a Ph.D. in biomedical engineering from the Johns Hopkins University School of Medicine. He is the author of over 50 peer-reviewed publications, and his work has been featured in myriad venues including the President's Council of Advisors on Science and Technology, the Intelligence Community's Technology Exposition, and the Global Futures Forum.



Lihong V. Wang, Ph.D.

Dr. Wang holds the Gene K. Beare Distinguished Professorship of Biomedical Engineering at Washington University in St. Louis. His book, *Biomedical Optics: Principles and Imaging*, one of the first textbooks in the field, won the 2010 Joseph W. Goodman Book Writing Award. He edited the first book on photoacoustic tomography. Dr. Wang has published 435 peer-reviewed journal articles and delivered 430 keynote, plenary, or invited talks. His Google Scholar h-index and citations have reached 100 and 40,000, respectively. His laboratory was the first to report functional photoacoustic tomography, 3-D photoacoustic microscopy, photoacoustic endoscopy, photoacoustic reporter gene imaging, the photoacoustic Doppler effect, and the universal photoacoustic reconstruction algorithm. He is the editor-in-chief

of the *Journal of Biomedical Optics*. He chairs the annual Photons Plus Ultrasound conference. He received the NIH First Independent Research Support and Transition (FIRST) Award, the National Science Foundation Faculty Early Career Development (CAREER) Award, the NIH Director's Pioneer Award, and the NIH Director's Transformative Research Award. He also received the Optical Society of America C.E.K. Mees Medal, Institute of Electrical and Electronics Engineers (IEEE) Technical Achievement Award, the IEEE Biomedical Engineering Award, the Society of Photographic Instrumentation Engineers Britton Chance Biomedical Optics Award, and senior prize of the International Photoacoustic and Photothermal Association for "seminal contributions to photoacoustic tomography and Monte Carlo modeling of photon transport in biological tissues." An honorary doctorate was conferred on him by Lund University, Sweden. His lab is transitioning to the California Institute of Technology.



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Ian Wickersham, Ph.D.

Dr. Wickersham is a principal research scientist at the McGovern Institute for Brain Research at MIT, where he develops virus-based genetic techniques for understanding the organization of the brain. His laboratory is focused on engineering methods for targeting transgene expression to specific neuronal populations based on their connectivity as well as their gene expression profiles, in order to allow their study and manipulation using optogenetics, chemogenetics, and other techniques. Current projects include the development of systems for nontoxic retrograde monosynaptic tracing and transduction; systems for anterograde monosynaptic tracing (including nontoxic versions); and systems for cell-type-specific transgene expression in wildtype animals, potentially including humans.

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