Embargoed until: Saturday, November 12, 9:00 am PST Contact: media@sfn.org

Society for Neuroscience 2022 Outstanding Career and Research Achievements

SAN DIEGO, CA – The Society of Neuroscience (SfN) will honor leading researchers whose groundbreaking work has revolutionized neuroscience — including the understanding of synaptic plasticity, neuroepigenetics, addiction, and network development — with this year's Outstanding Career and Research Achievement Awards. The awards will be presented during SfN's annual meeting.

"The Society is honored to recognize this years' awardees, whose innovative ideas and research methods have transformed our understanding of the brain, from the molecular mechanisms to the network dynamics of learning and memory, and from neuroepigenetics to the synaptic plasticity of addiction," SfN President Gina Turrigiano, said. "This group of neuroscientists has pushed the boundaries of our understanding through rigorous, creative, and pioneering research."

Ralph W. Gerard Prize in Neuroscience: Richard Huganir

The Ralph W. Gerard Prize in Neuroscience — the highest honor bestowed by SfN — recognizes an outstanding scientist who has made significant contributions to neuroscience throughout his or her career. The prize is named for the revered neuroscientist Dr. Ralph W. Gerard who helped establish the Society for Neuroscience and served as its honorary president. The honoree receives a $30,000 prize in addition to complimentary registration and travel to SfN's annual meeting.

Richard Huganir, the director of the department of neuroscience at the Johns Hopkins University School of Medicine, established the molecular mechanisms underlying synaptic plasticity in the brain in heath and disease. His early work was among the first to demonstrate how phosphorylation of ion channels affects their function, including for the nicotinic receptor, GABA receptors, and glutamate receptors. He then discovered the molecular details of how synaptic plasticity is regulated by receptor phosphorylation and by interactions with novel proteins. He was the first to demonstrate that specific protein phosphorylation is critical for synaptic plasticity in intact animals and that mutating the phosphorylation sites results in memory deficits. He discovered numerous proteins that bind to NMDA-receptors and AMPA-receptors and how these interactions regulate synaptic plasticity. Huganir also elucidated the mechanism underlying fear memory and fear erasure, uncovering a potential therapeutic window for post-traumatic stress disorder treatments. He also developed new approaches to imaging receptor trafficking in intact animals as well as high throughput screens to isolate genes regulating synapse development. In parallel with another lab, Huganir also discovered homeostatic synaptic plasticity and has recently shown how it is engaged during sleep to help

memory consolidation. His research has been central to understanding how receptor regulation and synaptic plasticity is disrupted in many neurological disorders including intellectual disability, autism, schizophrenia, Alzheimer's disease, drug addiction, and depression. Through his groundbreaking work demonstrating the regulation of neurotransmitter receptors in synaptic plasticity and learning and memory, Huganir has transformed our understanding of brain function.

Jacob P. Waletzky Award: Ian Maze

The Jacob P. Waletzky award recognizes a young scientist whose independent research has led to significant conceptual and empirical contributions to the understanding of drug addiction. The award is endowed by The Waletzky Family and The Waletzky Award Prize Fund. The recipient receives a $30,000 award and complimentary registration and travel to SfN's annual meeting.

Ian Maze, a professor at the Icahn School of Medicine at Mount Sinai, is an internationally recognized expert in the field of neuroepigenetics and his work in the addiction field has been transformative. His research bridges the gap between chromatin biochemistry and applied neuroscience, which has completely changed the way the field thinks about epigenetic-related phenomena in the brain. In graduate school, Maze discovered that histone methylation epigenetically controls the expression of genes that determine which type of dopamine receptor striatal neurons go on to express. He also found that histone methylation regulates medium spiny neurons' responses to cocaine, which, in turn, contributes to addictive behaviors. As a post-doctoral researcher, Maze revealed the dynamics and highly regulated turnover of histones and nucleosomes, a fundamental new insight into gene regulation in the developing and adult brain. In his own lab, his multidisciplinary approach includes state-of-the-art genomic and proteomic methods and biochemical approaches coupled with complex animal behavioral procedures. He recently discovered a novel role for serotonin and dopamine in the direct regulation of gene expression and protein function through a process called monoaminylation. This work is a paradigm shift in the understanding of how these neurotransmitters operate in the brain, how they influence the most basic and important processes of the central nervous system, and the consequences of altered monoamine levels in addiction and disease. Maze was named an investigator of the Howard Hughes Medical Institute, one of the youngest researchers to currently hold this incredibly prestigious position. He has blended two interrelated disciplines and inspired a renewed interest in exploring fundamental aspects of chromatin biology as they relate to neuronal function.

Julius Axelrod Prize: Marina Wolf

The Julius Axelrod Prize honors a scientist with distinguished achievements in the broad field of neuropharmacology or related area and exemplary efforts in mentoring young scientists. The

award, endowed by the Eli Lilly and Company Foundation, includes a $30,000 prize in addition to complimentary registration and travel to SfN's annual meeting.

Marina Wolf, a professor of behavioral neuroscience at Oregon Health & Science University, pioneered the idea that synaptic plasticity is a mechanism fundamental to the development of substance use disorder. Her groundbreaking work has been at the forefront of understanding the persistence of vulnerability to drug craving and relapse even after long periods of abstinence. In the 1990's, when the field was largely centered on dopamine, she championed a theory of addiction that focused on plasticity of glutamatergic synapses in the reward circuitry. Though the role of synaptic plasticity in addiction is now dogma, Wolf faced tremendous resistance at the time, a challenge she overcame by publishing rigorous papers. In early work using the behavioral sensitization model, she published one of the first papers demonstrating the relevance of glutamatergic transmission to psychostimulant action, the first evidence that sensitization involved enhanced responsiveness of AMPA receptors in the ventral tegmental area, and the first demonstration of increased AMPA receptor surface expression in the nucleus accumbens after cocaine sensitization. Using primary culture models, she published the first data on AMPA receptor trafficking and its modulation by dopamine receptors in reward-related brain areas, including the first demonstration that synaptic scaling — a form of homeostatic plasticity — occurs in the nucleus accumbens. In a landmark paper, Wolf discovered that upregulation of calcium-permeable AMPA receptors in the nucleus accumbens sustains craving after prolonged abstinence from cocaine self-administration, raising awareness of the significance of these atypical AMPA receptors for behavioral plasticity in the addiction field and beyond. This line of work holds promise for the potential development of anti-craving drugs and she has founded Eleutheria Pharmaceuticals with this hope. Wolf also demonstrates a career-long commitment to graduate education and mentoring. She founded the neuroscience doctoral program at the Chicago Medical School and has worked towards advancement of women and under-represented minorities in the sciences through service on many committees and during her tenure as president of the American College of Neuropsychopharmacology. She has trained seventeen graduate students and fifteen postdoctoral fellows, over half of them women. She is a fierce advocate for her trainees and provides career-long support while also fostering independence, self-confidence, and self-sufficiency. Her trainees are inspired by her work ethic and scientific and personal ideals, which have combined to yield such innovations in the field of neuropharmacology.

Swartz Prize for Theoretical and Computational Neuroscience: Ila Fiete

The Swartz Prize for Theoretical and Computational Neuroscience is given to an individual who greatly impacted the field through sustained contributions or recent breakthroughs in theoretical models or computational methods in neuroscience. The prize is endowed by the Swartz Foundation and the recipient receives a $30,000 award and complimentary registration and travel to SfN's annual meeting.

Ila Fiete, a professor in the Department of Brain and Cognitive Sciences and the McGovern Institute at Massachusetts Institute of Technology, has advanced our knowledge of neural circuit mechanisms and function through her creative theoretical work on grid cells, a component of the navigational system of the mammalian brain. Fiete has shown that grid cells spike as a consequence of circuit connectivity that drives activity patterning by a process similar to Turing patterning in morphogenesis, and these patterns form a torus-shaped attractor that integrates velocity signals to update an internal position estimate during navigation. She also proposed how these attractor networks form during development and went on to define and perform robust experimental tests of her ideas. Through analysis of multiple data sets of grid-cell recordings, she demonstrated rare direct evidence for continuous attractor dynamics in the brain. Fiete elucidated the utility of the grid code, combining number theory and coding theory to find that it enables precise noise-robust representation of a large range of locations with few neurons while being structured enough to permit the operation of summing the codes for displacements to obtain a consistent code for the new position. She modeled how entorhinal cortex could interact with hippocampus to efficiently and robustly store large numbers of memories, and developed a remarkable method to discern the structure of intrinsic dynamics in neuronal circuits, which led to the discovery that a thalamic mammalian network representing head direction represents exactly a one-dimensional ring of states and that each grid module is a two-dimensional torus, as predicted. Recently, Fiete has explored the emergence of modular organization, a line of work that elucidates how grid cell modularity and general cortical modules might self-organize from smooth genetic gradients. Fiete's body of work has already significantly shaped the field of neuroscience and will continue to do so for the foreseeable future.