

Swartz Foundation Fellows for Theory in Neuroscience 2020–2022

The Swartz Foundation expects to appoint two theorists in early stages of their career beginning in late summer of this year. Fellowships are in the amount of \$200,000, to be spent over at least two years in support of the Fellow's salary, benefits, and research expenses. Postdoctoral candidates should be no more than six years past their PhD, and applications from groups currently underrepresented in our community are encouraged.

Candidates should submit — in one mailing — a CV, publication list, and research statement no longer than three pages. The research statement should include a brief summary of previous work, as well as a vision for the next couple of years. Applicants must also submit a reference letter from their prospective mentor as part of their application. The mentor's letter should distinguish the postdoc fellow's proposal from ongoing research work in that environment.

All materials should be submitted to fellow.apps@theswartzfoundation.org by August 5th, 2020. The Swartz Foundation highly encourages and intends to favor research statements that support its current focus on research leading to global multi-level brain theories (project description on the next page). The Swartz Foundation hopes to support scientists who will mature into leaders of the field, and thus encourages candidates to be bold in their proposals. Please note that only award recipients will be notified about the Fellowship prize.

The Swartz Foundation was established in 1994, and supports the development of theoretical approaches to mind and brain. The Foundation funds research at numerous centers around the US, supports conferences, and previously endowed the annual Swartz Prize for Theoretical and Computational Neuroscience through the Society for Neuroscience.

All-Brain Challenge Project

Large-Scale Brain Systems

Over the last several decades, neuroscience has expanded its reach dramatically to include cognitive, computational, communicative, and behavioral approaches to understanding "how the brain works", namely, the relationship between brain activity and observable inputs and outputs. The huge diversity of outputs and the overwhelming complexity of brain structure and physiology make it unlikely that there will be a single, simple 'master' equation governing these relationships. However, by relentlessly developing, discovering, and combining new theories, analytical methods, and experimental tools, the level of our understanding has significantly grown from single neurons to sensory perception to neural circuits and beyond. Some notable recent examples include network analysis, deep learning as a tool for discovery, the development of sophisticated statistical modeling of neural populations, and the rapid development of in vivo high-throughput recording of neurons and sub-second neuromodulator dynamics via techniques such as Optogenetics and calcium imaging. Thus, we can expect the next several years to yield even further progress as researchers continue to scale this 'neural stack' towards an ultimate understanding of brain functionality in its entirety.

The Swartz Foundation views as the core of its mission to actively encourage and support such theory-centric research that shows promise in making great strides toward achieving this All-Brain "grand challenge" that provides global and multi-level formalism describing how the brain functions. Such research may involve, for example, new theoretical perspectives addressing the behavior and evolution of complex systems, multi-scale/multi-layer investigations that link cellular and system properties to global activity, and extracting new insights from breakthrough experimental methods yielding high-throughput data, all making it possible to propose and confirm new theories that provide deeper understanding of how the human brain learns, remembers, predicts, plans, and creates.