

FUNDING

The below table shows my direct (total) cost expenditures since being hired, indicating a steady increase >30% per year.

FY15: \$113,761 (\$168,924)
FY16: \$360,123 (\$524,225)
FY17: \$459,523 (\$709,019)
FY18: \$550,011 (\$887,186)
FY19: \$850,836 (\$1,366,308)

Current:

2017 – 20 Multiscale Generalized Correlation: A Unified Distance-Based Correlation Measure for Dependence Discovery

National Science Foundation Research Grant (132031)

Role on project: Co-Investigator (PI: Cencheng, S)

Term: 01-May-2017 to 30-April-2020

Budget: \$124,189 (direct) \$200,000 (total)

Establish a unified methodology framework for statistical testing in high-dimensional, noisy, big data, through theoretical advancements, comprehensive simulations, and real data experiments.

2017 - 20 CRCNS US-German Res Prop: functional computational anatomy of the auditory cortex

National Institutes of Health Research Grant 1R01DC016784-01 (126308)

Role on Project: Co-Investigator (PI: Ratnanather, J)

Term: 01-July-2017 to 30-June-2020

Budget: \$458,519 (direct cost) \$747,143 (total)

Create a robust computational framework for analyzing the cortical ribbon in a specific region: the auditory cortex.

2016 – 20 D3M: What Would Tukey Do?

Defense Advanced Research Projects Agency Research Grant FA8750-17-2-0112 (125863)

Role on project: Co-Investigator (PI: Priebe, C)

Term: 01-Oct-2016 to 30-Sep-2020

Budget: \$2,746,050 (direct) \$4,406,360 (total)

Develop theory & methods for generating a discoverable archive of data modeling primitives and for automatically selecting model primitives and for composing selected primitives into complex modeling pipelines based on user-specified data and outcome(s) of interest.

2017– 22 Sensorimotor processing, decision making, and internal states: towards a realistic multiscale circuit model of the larval zebrafish brain

NIH Research Grant 1U19NS104653-01 (127940)

Role on Project: Co-Investigator (PI: Engert)

Term: 01-Sept-2017 to 31-Aug-2022

Budget: \$655,206 (direct); \$1,050,000 (total) (JHU sub-award)

Generate a realistic multiscale circuit model of the larval zebrafish's brain – the multiscale virtual fish (MSVF). The model will span spatial ranges from the nanoscale at the synaptic level, to local microcircuits to inter-area connectivity - and its ultimate purpose is to explain and simulate the quantitative and qualitative nature of behavioral output across various timescales.

2018 – 19 Connectome Coding at the Synaptic Scale

Schmidt Science Foundation (128503)

Role on Project: Investigator
Term: 01-Jan-2018 to 31-Dec-2019
Budget: \$250,000 (total)

Study learning and plasticity at an unprecedented scale, revealing the dynamics of large populations of synapses comprising an entire local cortical circuit. No previously conducted experiment could answer the questions about the dynamics of large populations of synapses, which is crucial to understanding the learning process.

2017 – 21 Lifelong Learning Forests

Defense Advanced Research Projects Agency Research Grant FA8650-18-2-7834 (128567)
Role on Project: Investigator

Term: 01-Jul-2018 to 30-Jun-2020

Budget: \$1,123,474 (direct); \$1,839,308 (total)

Lifelong Learning Forests (L2Fs) will learn continuously, selectively adapting to new environments and circumstances utilizing top-down feedback to impact low-level processing, with provable statistical guarantees, while maintaining computational tractability at scale.

2017 – 21 Continual Learning Across Synapses, Circuits, and Brain Areas

Defense Advanced Research Projects Agency Research Grant FA8650-18-2-7834 (129061)

Role on project: Co-Investigator (PI: Tolia)

Term: 01-Nov-2017 to 30-Oct-2021

Budget: \$486,666 (direct) \$796,715 (total)

Develop the pre-processing analysis pipeline for the imaging data collected in this project.

2017 – 19 NeuroNex Innovation Award: Towards Automatic Analysis of Multi-Terabyte Cleared Brains

National Science Foundation 1707298

Role on Project: Investigator

Term: 01-Sept-2017 to 31-aug-2020 (No Cost Extension)

Budget: \$588,758 (direct) \$959,999 (total)

We propose to lower the barrier to connecting data to analyses and models by providing a coherent cloud computational ecosystem that minimizes current bottlenecks in the scientific process.

2018 – 21 SemiSynBio: Collaborative Research: YeastOns: Neural Networks Implemented in Communication Yeast Cells

National Science Foundation Research Grant (129439)

Role on project: Co-Investigator (PI: Schuman)

Term: 01-July-2018 to 30-June-2021

Budget: \$172,971 (direct cost) \$263,942 (total cost)

Provide neuroscience and machine learning expertise to guide the design of the computational learning capabilities of the system.

2019 – 20 Reproducible imaging-based brain growth charts for psychiatry

NIH R01 Research Grant

Role on project: Co-Investigator (PI: Saterthwaite)

Term: 01-Aug-2019 to 31-May-2020

Budget: \$231,276 (direct cost) \$362,861 (total cost)

Aggragate, harmonize, and analyze existing large-scale pediatric neuroimaging datasets to identify normative and clinical brain growth curves.

2019 - Microsoft Research Award

Mirco Soft Research Gift

Role on Project: Investigator

Term: Unrestricted Gift

Budget: 50,000 (total cost)

Research and development of neuroscience and connectomes around neuronal circuit and system modelling, application of time-series-of-graphs and dynamics to neuronal signaling analysis and connectomes, and in the abstractions of matter, math, machines that point toward complex systems composed of low-level components.

2019 – 22 Accessible technologies for high-throughput, whole-brain reconstructions of molecularly characterized mammalian neurons

NIH RO1

Role on project: Co-Investigator (PI: Muller, Miller)

Term: 01-Sept-2019 to 31-Aug-2022

Total budget: \$753,974 (direct cost) \$1,180,445 (total cost)

The overall goal of the proposal is to develop technologies for the brain wide reconstruction of axonal arbors of molecularly defined neurons. The proposal aims at overcoming barriers in neuronal labeling, imaging and computation to achieve this goal, and to develop a technology platform that can be scaled to all neurons of the brain

Pending:

2019 – 22 High throughput mapping pipeline for incomplete and censored neuroimaging data

NIH / MH-19-148

Role on Project: Co-Investigator (PI: Miller)

Term: 01-Dec-2019 to 30-Nov-2022

Budget: \$1,107,698 (direct) \$1,744,857 (total)

GOAL of Project

2020 – 25 CAREER: Foundational Statistical Theory and Methods for Analysis of Populations of Attributed

NSF 17-537

Role on project: Principal Investigator

Term: 01-Jan-2020 to 31-Dec-2025

Budget: \$384,873 (direct) \$630,230 (total)

The goal is to establish foundational theory and methods for analyzing populations of attributed connectomes.

2020 – 23 A Novel Framework for Mapping Brain Dynamics and Substrates of Human Cognition Across Species

NIH MH-20-120

Role on project: Co-Investigator (PI: Milham)

Term: 01-July-2020 to 30-June-2023

Budget: \$178,898 (direct) \$292,945 (total)

Develop and apply modern alignment methods to compare and contrast human and non-human brain imaging.

2020– 23 Graspy: A python package for rigorous statistical analysis of populations of attributed connectomes

NIH MN-19-147

Role on project: Principal Investigator

Term: 01-Jan-2020 to 31-Dec-2021-July-2020 to 30-June-2023

Budget: \$861,240 (direct) \$1,410,279 (total)

The goal of this project is to establish a state-of-the-art toolbox for analysis of connectomes, spanning taxa, scale, and complexity. More specifically, we will develop and extend implementations to enable neurobiologists to 1) estimate latent structure from attributed connectomes, (2) identify meaningful clusters among populations of connectomes, and (3) detect relationships between connectomes and multivariate phenotypes, such as behavior, genetics, and physiology.

2020 – 23 MBAC: Mouse Brain Atlasing in the Cloud

NIH MN-19-147

Role on project: Co-Investigator (PI: Osten)

Term: 01-July-2020 to 30-June-2023

Budget: \$1,520,570 (direct) \$2,489,933 (total)

Develop and disseminate CloudReg, a cloud brain atlasing tool for microscale whole mouse brains.

2020 – 24 Exploiting latent structure for efficient and robust inference

Role on project: Co-Investigator (PI: Priebe)

Term: 01-July-2020 to 30-June-2024

Budget: \$999,330 (direct) \$1,504,662 (total)

Develop theory and methods for analysis of networks and populations thereof.

2020 – 24 Distributed ensemble neural representations of anxiety states

NIH 0 NS 18-303 BrainInitiative RO1

Role on project: Co-Investigator (PI: Adwanikar)

Term: 01-July-2020 to 30-June-2024

Budget: \$2,672,969 (total)

Imaging the coordinated, multi-area, ensemble neural signaling of anxiety and attention states at cellular-resolution in freely behaving mice.

2020 – 25 NeuroNex: Enabling Identification and Impact of Synaptic Weight in Functional Networks

NSF 19-563

Role on project: Co-Investigator (PI: Harris)

Term: 01-April 2020 to 31-March-2025

Budget: \$609,294 (direct) \$997,719 (total)

Develop the requisite technology to understand the impact of synaptic weight on functional networks.

2020 – 25 Identifying Neurobehavioral Pathways for Cannabis Use Disorder: Multimodal MRI Investigations of Control and Reward Neural Networks

NIH18-062 - National Institute on Drug Abuse

Role on project: Co-Investigator (PI: Hanson)

Term: 01-April-2020 to 31-March-2025

Budget: \$234,338 (direct) \$383,727 (total)

This project will connect strong behavioral markers of addiction risk, measures of drug use, and measures of brain network connectivity to aid in understanding what causes drug use, versus what is a consequence of it.

2020 – 25 The NKI-Rockland Sample II: An open resource of multimodal brain, physiology, and behavior data from a community lifespan sample

NIH 19-056

Role on project: Co-Investigator (PI: Milham)

Term: 01-July-2020 to 30-June-2025

Budget: \$30,713 (direct) \$ 78,891 (total)

We will continue collecting, organizing, and analyzing another cohort of the NKI-Rockland Sample.

Previous:

2012 – 15 CRCNS: Data Sharing: The EM open Connectome Project

National Institute of Biomedical Imaging and Bioengineering RO1EB16411

Role of Project: Co-Investigator (PI: Burns)

Develop cyberinfrastructure to support management, visualization, storage, and analysis of large-scale electron microscopy data.

2014 – 16 Scalable Grain Graph Analyses Using Big-Memory, High-IPS Compute Architectures

Defense Advance Research Project Agency Grant N66001-14-1-4028

Role on Project: Co-Investigator (PI: Burns)

Build software infrastructure to enable analytics on billion node, terabyte sized networks using commodity hardware.

2014 - 19 Synaptomes of Mouse and Man

R01NS092474

Role on project: Co-Investigator (PI: Smith)

The major goals of this project are to discover the synaptic diversity and complexity in mammalian brains, specifically comparing and contrasting humans with mice, the leading experimental animal.

2015 – 18 From RAGs to Riches: Utilizing Richly Attributed Graphs to Reason from

Defense Advance Research Project Agency Grant N66001-15-C-40401

Role on Project: Principal Investigator

Multiple, large, multifarious brain imaging datasets are rapidly becoming standards in neuroscience. Yet, we lack the tools to analyze individual datasets, much less populations thereof. Therefore, we will develop theory and methods to analyze and otherwise make such data available.

2016 – 19 A Scientific Planning Workshop for Coordinating Brain Research Around the Globe

National Science Foundation 1637376 Part 1 of 2

Role of the Project: Principal Investigator

This travel grant is for the expressed purposes of gathering researchers from around the globe to discuss the new way to further brain research during part one of a two day conference.

2016 – 19 A Scientific Planning Workshop for Coordinating Brain Research Around the Globe

National Science Foundation 1637376 Part 2 of 2

Role of the Project: Principal Investigator

This travel grant is for the expressed purposes of gathering researchers from around the globe to further discuss advancements in brain research during the second part of a two day conference.

2017 – 18 The International Brain Station

The Kavli Foundation 90071826

Role of the Project: Principal Investigator

Take the first few steps towards building the international brain station.

2017 – 2018 Brain Comp Infra: EAGER: BrainLab CI: Collaborative, Community Experiments with

National Science Foundation ACI-1649880

Role of Project: Co-Investigator (PI: Miller, Burns)

The BrainLab CI prototype system will deploy an experimental-management infrastructure that allows users to construct community-wide experiments that implement data and metadata controls on the inclusion and exclusion of data.

2017 – 18 The Brain Ark

Defense Advance Research Project Agency Grant 90076467

Role of the Project: Principal Investigator

Characterize the statistical properties of the individual graphs, to identify circuit motifs, both that specialize in a species specific fashion, and that are preserved across species. As a test, will compare the connectomes of sea lions and coyotes.