



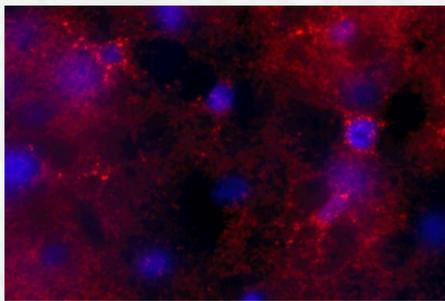
## SYSTEMS AND BEHAVIORAL NEUROSCIENCE GROUP

**OUR MISSION** To discover the neural processes underlying adaptive and maladaptive behavior observed in neurological and psychiatric disorders.

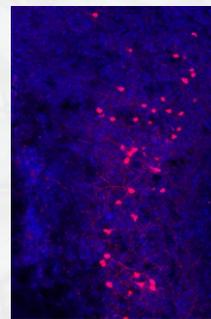
### ABOUT US

The Systems and Behavioral Neuroscience Group is dedicated to studying the molecular, cellular, network and behavioral mechanisms of sensory information processing, learning and memory, attention, emotion, ingestive behavior, and the neuropsychiatric disorders associated with these processes.

Interacting scientifically and collaborating within the group, the department, the University, and beyond, the Systems and Behavioral Neuroscience Group conducts state-of-the-art studies that lead to pioneering clinical trials and interventions.

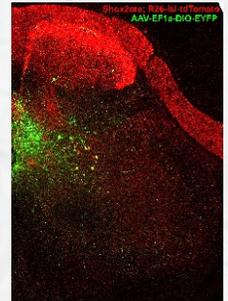


Chemogenetically activated astrocytes in the nucleus accumbens



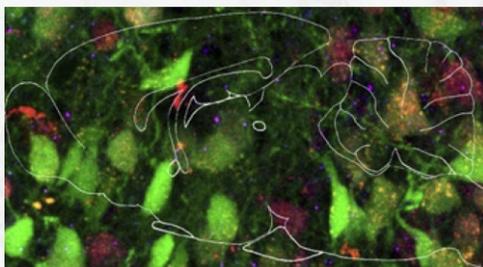
Neurons in the prefrontal cortex tagged with DREADD-mCherry viral vector

eYFP expressing Shox2 interneurons in the spinal cord following injection of a Cre-dependent virus.



### OUR RESEARCH

The Systems and Behavioral Neuroscience Group consists of faculty, students and postdocs who interrogate the neural mechanisms underlying behavior. The group uses an array of techniques to investigate the processes by which the brain orchestrates behavior and how dysregulation of these processes can lead to psychiatric disorders.



Neuropeptide-expressing cells in the rat paraventricular thalamus

- Alcohol use disorder (Jacqueline Barker, PhD; Jessica Barson, PhD)
- Anxiety, stress, depression, PTSD (Jessica Barson, PhD; Jacqueline Barker, PhD; Rodrigo España, PhD; Dong Wang, PhD; Ramesh Raghupathi, PhD)
- Autism (Wen-Jun Gao, MD, PhD; Ramesh Raghupathi, PhD)
- Binge eating (Jessica Barson, PhD)
- Executive function (Wen-Jun Gao, MD, PhD; Sandhya Kortagere, PhD; Ramesh Raghupathi, PhD)
- Learning and memory (Ramesh Raghupathi, PhD; Dong Wang, PhD)
- Locomotion and neural networks (Kimberly Dougherty, PhD)
- Pain (Megan Detloff, PhD)
- Parkinson's disease (Sandhya Kortagere, PhD)
- Psychostimulant drugs and ADHD (Jessica Barson, PhD; Jacqueline Barker, PhD; Rodrigo España, PhD, Ole Mortensen, PhD)
- Social behavior (Wen-Jun Gao, MD, PhD; Ramesh Raghupathi, PhD)
- Schizophrenia (Wen-Jun Gao, MD, PhD)
- Sleep and arousal (Rodrigo España, PhD; Dong Wang, PhD)
- Substance abuse (Jessica Barson, PhD; Jacqueline Barker, PhD; Rodrigo España, PhD)
- Traumatic brain injury (Ramesh Raghupathi, PhD)

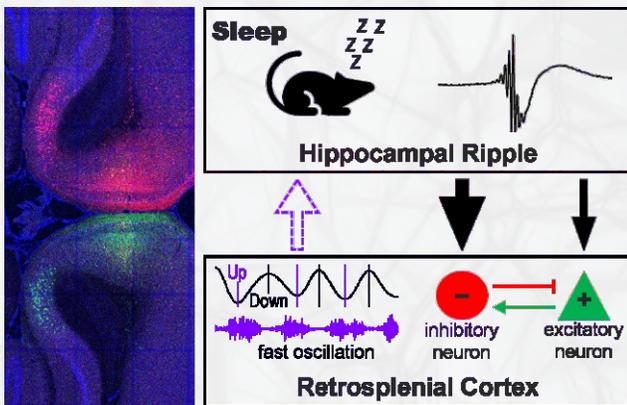


## SYSTEMS AND BEHAVIORAL NEUROSCIENCE GROUP

### TECHNIQUES

#### Behaviors

Morris water maze; T-maze; elevated plus maze; self-administration; light-dark box; open field; hole board; forced swim; fear conditioning; running wheel CatWalk; MotoTrak; treadmill; Hargreaves' heat; von Frey; attention; avoidance; three-chamber test; novel object; social interaction; sucrose preference



Left, retrograde tracing of retrosplenial cortex (RSC) inputs. Right, hippocampus-RSC communication during sleep.

#### Neural manipulation

Optogenetics; chemogenetics; drug infusion; lesion; closed-loop control

#### Neural recording

Whole-cell patch clamp; multichannel in vivo electrophysiology; fiber photometry; microendoscopy calcium imaging

#### Neuroanatomy

Tract tracing; immunohistochemistry; laser capture and molecular profiling with qRT-PCR; in situ hybridization (RNAScope); tissue clearing

#### Neurochemistry

Fast scan cyclic voltammetry; HPLC; Western blot; Flow cytometry

#### Transgenic models

Conditional KO; inducible/conditional transgenic models

#### Traumatic injury

Repetitive traumatic brain injury (TBI); pediatric TBI; sex differences in TBI; spinal transection and contusion models

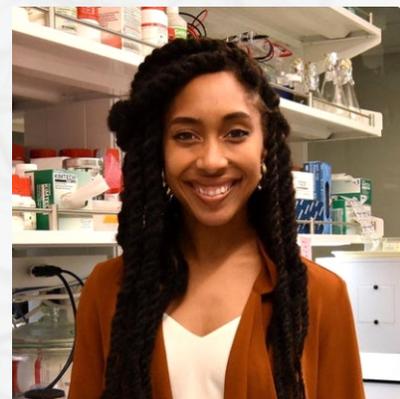
### OUTLOOK FOR OUR TRAINEES

#### Conferences & Networking Opportunities

Our students attend national and international conferences to network with leaders in science, medicine, industry and government.

#### Student Success

- 50% of students who applied for NIH funding received an NIH fellowship in the past three years.
- Students were primary or co-authors on 35 peer-reviewed publications in 2020.
- In the past three years, students were awarded nearly 50 awards for travel, presentations or research.
- Our graduates are postdoctoral fellows at the National Institutes of Health (NIH), Stanford University, University of Pennsylvania, University of California San Francisco (UCSF), Scripps Research, Salk Institute and other prestigious institutions.



Brielle Ferguson, PhD Neuroscience '17, is a postdoctoral fellow at Stanford University and will start as an Assistant Professor at Harvard University in 2022. She is cofounder of BlackInNeuro and was named one of Forbes' 30 under 30 Scientists. While at Drexel in Dr. Wen-Jun Gao's laboratory, she received a Dean's Fellowship and an F31 Fellowship.

#### Get in Touch

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