



Christina Kim

Postdoctoral Research Fellow, Genetics

 Curriculum Vitae available Online

Bio

BIO

Christina develops both optical and molecular tools for the detection and control of activated neural ensembles in living animals. She trained during her undergraduate career with Professor David Tank at Princeton University, generating transgenic strains of larval zebrafish for whole-brain, intact calcium imaging using 2-photon microscopy. She obtained a PhD in Neuroscience with Professor Karl Deisseroth at Stanford University, where she developed a microscope capable of simultaneously recording calcium activity from up to 7 different brain regions in a freely moving mouse. She also implemented simultaneous cellular-resolution calcium imaging and optogenetic stimulation of individual neurons to modulate behavior and probe causal circuit dynamics in mice. As a Postdoctoral Researcher with Professor Alice Ting at Stanford University, she is developing whole-brain techniques for coupling neural activity to transcriptomic molecular identity with precise temporal resolution.

HONORS AND AWARDS

- Career Awards at the Scientific Interfaces, Burroughs Wellcome Fund (2019)
- Allison Doupe Fellowship, The McKnight Foundation (2018)
- Hanna H. Gray Fellow Finalist Research Award, Howard Hughes Medical Institute (2018)
- Sammy Kuo Award for Neuroscience, 2nd place, Stanford Neurosciences Institute (2017)
- Walter V. and Idun Berry Postdoctoral Fellow, Stanford School of Medicine (2017)
- Ruth L. Kirschstein NRSA Individual Predoctoral Fellowship, National Institutes of Drug Addiction (2016-2017)
- Graduate Research Fellowship Program, National Science Foundation (2012-2014)
- Molecular Biology Senior Thesis Prize, Princeton University (2011)
- The John Brinster, Class of 1943, Prize in Neuroscience, Princeton University (2011)
- Shapiro Fund for Undergraduate Research in Neuroscience Award, Princeton University (2010)

PROFESSIONAL EDUCATION

- Doctor of Philosophy, Stanford University , NEURS-PHD (2017)
- Bachelor of Arts, Princeton University , Molecular Biology (2011)

STANFORD ADVISORS

- Alice Ting, Postdoctoral Faculty Sponsor

PATENTS

- Christina Kim, Samuel Yang, Karl Deisseroth, Isaac Kauvar. "United States Patent 62257140 Method and Systems for Measuring Neural Activity", The Board of Trustees of the Leland Stanford Junior University, Nov 18, 2015

LINKS

- Website: www.kimck.com
- GitHub: <https://github.com/kimck>
- Google Scholar: <https://scholar.google.com/citations?user=GsuUq2YAAAAJ&hl=en>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Simultaneous recording and manipulation of neural activity:

I actively pursue the development and application of techniques for all-optical recording and manipulation of neural activity in living animals. During my PhD I developed a microscope capable of performing bulk calcium recording and optogenetic stimulation in freely moving animals (Frame-projected Independent-fiber Photometry). We demonstrated its utility by recording from sparse dopaminergic axon terminals distributed throughout the brain during rewarding versus aversive stimuli, and by recording from up to 7 different brain regions during a social interaction test. Using simultaneous optogenetics and calcium recording, we could then fine-tune the optogenetic stimulation of dopamine neurons to produce activity that mimicked the naturally-occurring response profiles during behavior. This work was published in *Nature Methods*, and has been patented and licensed to a company that has commercialized the microscope (www.neurophotometrics.com).

LAB AFFILIATIONS

- Alice Ting (8/1/2017)
- Karl Deisseroth (4/1/2012)

Teaching

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Neurosciences (Phd Program)

Publications

PUBLICATIONS

- **Molecular tools for imaging and recording neuronal activity.** *Nature chemical biology*
Wang, W., Kim, C. K., Ting, A. Y.
2019; 15 (2): 101–10
- **Interacting neural ensembles in orbitofrontal cortex for social and feeding behaviour.** *Nature*
Jennings, J. H., Kim, C. K., Marshel, J. H., Raffiee, M., Ye, L., Quirin, S., Pak, S., Ramakrishnan, C., Deisseroth, K.
2019
- **A Neural Circuit Mechanism for Encoding Aversive Stimuli in the Mesolimbic Dopamine System.** *Neuron*
de Jong, J. W., Afjei, S. A., Pollak Dorocic, I., Peck, J. R., Liu, C., Kim, C. K., Tian, L., Deisseroth, K., Lammel, S.
2018
- **Integration of optogenetics with complementary methodologies in systems neuroscience** *NATURE REVIEWS NEUROSCIENCE*
Kim, C. K., Adhikari, A., Deisseroth, K.
2017; 18 (4): 222-235
- **Molecular and Circuit-Dynamical Identification of Top-Down Neural Mechanisms for Restraint of Reward Seeking.** *Cell*
Kim, C. K., Ye, L., Jennings, J. H., Pichamoorthy, N., Tang, D. D., Yoo, A. W., Ramakrishnan, C., Deisseroth, K.
2017; 170 (5): 1013–27.e14
- **Modulation of prefrontal cortex excitation/inhibition balance rescues social behavior in CNTNAP2-deficient mice.** *Science translational medicine*

Selimbeyoglu, A., Kim, C. K., Inoue, M., Lee, S. Y., Hong, A. S., Kauvar, I., Ramakrishnan, C., Fenno, L. E., Davidson, T. J., Wright, M., Deisseroth, K.
2017; 9 (401)

● **Rabies screen reveals GPe control of cocaine-triggered plasticity.** *Nature*

Beier, K. T., Kim, C. K., Hoerbel, P., Hung, L. W., Heifets, B. D., DeLoach, K. E., Mosca, T. J., Neuner, S., Deisseroth, K., Luo, L., Malenka, R. C.
2017

● **Simultaneous fast measurement of circuit dynamics at multiple sites across the mammalian brain.** *Nature methods*

Kim, C. K., Yang, S. J., Pichamoorthy, N., Young, N. P., Kauvar, I., Jennings, J. H., Lerner, T. N., Berndt, A., Lee, S. Y., Ramakrishnan, C., Davidson, T. J., Inoue, M., Bito, et al
2016; 13 (4): 325-328

● **Extended field-of-view and increased-signal 3D holographic illumination with time-division multiplexing** *OPTICS EXPRESS*

Yang, S. J., Allen, W. E., Kauvar, I., Andalman, A. S., Young, N. P., Kim, C. K., Marshel, J. H., Wetzstein, G., Deisseroth, K.
2015; 23 (25): 32573-32581

● **Projections from neocortex mediate top-down control of memory retrieval.** *Nature*

Rajasethupathy, P., Sankaran, S., Marshel, J. H., Kim, C. K., Ferenczi, E., Lee, S. Y., Berndt, A., Ramakrishnan, C., Jaffe, A., Lo, M., Liston, C., Deisseroth, K.
2015; 526 (7575): 653-659

● **Prolonged, brain-wide expression of nuclear-localized GCaMP3 for functional circuit mapping** *FRONTIERS IN NEURAL CIRCUITS*

Kim, C. K., Miri, A., Leung, L. C., Berndt, A., Mourrain, P., Tank, D. W., Burdine, R. D.
2014; 8

● **Gating of neural error signals during motor learning.** *eLife*

Kimpo, R. R., Rinaldi, J. M., Kim, C. K., Payne, H. L., Raymond, J. L.
2014; 3

● **Diverging neural pathways assemble a behavioural state from separable features in anxiety** *NATURE*

Kim, S., Adhikari, A., Lee, S. Y., Marshel, J. H., Kim, C. K., Mallory, C. S., Lo, M., Pak, S., Mattis, J., Lim, B. K., Malenka, R. C., Warden, M. R., Neve, et al
2013; 496 (7444): 219-223