Stanford



Sean Quirin

Assistant Professor (Research) of Psychiatry and Behavioral Sciences (Major Laboratories and Clinical & Translational Neurosciences Incubator)

Curriculum Vitae available Online

Bio

BIO

Dr. Quirin's laboratory develops minimally invasive methods to explore the causal role individual neurons play in the emergence of behavior. To this end, the lab's strength is the development of techniques which manipulate light to both detect and restoratively modulate brain activity down to the single-neuron scale. His lab continues to innovate with new tools which map these functional relationships onto the molecular and anatomical architecture of the brain. Utilizing these techniques, the lab aims to characterize how ensembles of neurons coordinate to encode and communicate information throughout the brain for sensing and behavior.

ACADEMIC APPOINTMENTS

- Assistant Professor-Research, Psychiatry and Behavioral Sciences
- Member, Bio-X
- Member, Wu Tsai Neurosciences Institute

PROFESSIONAL EDUCATION

- B.A., University of Colorado, Boulder , Astronomy/Astrophysics (2004)
- PhD, University of Colorado, Boulder , Electrical Engineering (2012)

Publications

PUBLICATIONS

- **Compact module for video-rate image mosaics in two-photon microscopy** *OPTICS EXPRESS*
  Quirin, S.
  2025; 33 (2): 1647-1659
- **All-optical physiology resolves a synaptic basis for behavioral timescale plasticity.** *Cell*
  Fan, L. Z., Kim, D. K., Jennings, J. H., Tian, H., Wang, P. Y., Ramakrishnan, C., Randles, S., Sun, Y., Thadhani, E., Kim, Y. S., Quirin, S., Giocomo, L., Cohen, et al
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- **Structural basis for channel conduction in the pump-like channelrhodopsin ChRmine.** *Cell*
  Kishi, K. E., Kim, Y. S., Fukuda, M., Inoue, M., Kusakizako, T., Wang, P. Y., Ramakrishnan, C., Byrne, E. F., Thadhani, E., Paggi, J. M., Matsui, T. E., Yamashita, K., Nagata, et al
  1800
- **Dendritic calcium signals in rhesus macaque motor cortex drive an optical brain-computer interface.** *Nature communications*
  Trautmann, E. M., O'Shea, D. J., Sun, X., Marshel, J. H., Crow, A., Hsueh, B., Vesuna, S., Cofer, L., Bohner, G., Allen, W., Kauvar, I., Quirin, S., MacDougall, et al

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- **Optical Interrogation of Memory Related Activity Across the Rodent Default Mode Network**
  Shilyansky, C., Young, N., Ramakrishnan, C., Quirin, S., Deisseroth, K.
  ELSEVIER SCIENCE INC.2020: S207

- **Rational Engineering of XCaMPs, a Multicolor GECI Suite for In Vivo Imaging of Complex Brain Circuit Dynamics** *CELL*
  Inoue, M., Takeuchi, A., Manita, S., Horigane, S., Sakamoto, M., Kawakami, R., Yamaguchi, K., Otomo, K., Yokoyama, H., Kim, R., Yokoyama, T., Takemoto-Kimura, S., Abe, et al
  2019; 177 (5): 1346-+

- **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.
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- **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

- **Rational Engineering of XCaMPs, a Multicolor GECI Suite for In Vivo Imaging of Complex Brain Circuit Dynamics.** *Cell*
  Inoue, M. n., Takeuchi, A. n., Manita, S. n., Horigane, S. I., Sakamoto, M. n., Kawakami, R. n., Yamaguchi, K. n., Otomo, K. n., Yokoyama, H. n., Kim, R. n., Yokoyama, T. n., Takemoto-Kimura, S. n., Abe, et al
  2019

- **Cortical layer-specific critical dynamics triggering perception.** *Science (New York, N.Y.)*
  Marshel, J. H., Kim, Y. S., Machado, T. A., Quirin, S. n., Benson, B. n., Kadmon, J. n., Raja, C. n., Chibukhchyan, A. n., Ramakrishnan, C. n., Inoue, M. n., Shane, J. C., McKnight, D. J., Yoshizawa, et al
  2019

- **Calcium imaging of neural circuits with extended depth-of-field light-sheet microscopy** *OPTICS LETTERS*
  Quirin, S., Vladimirov, N., Yang, C., Peterka, D. S., Yuste, R., Ahrens, M. B.
  2016; 41 (5): 855-858

- **Simultaneous imaging of neural activity in three dimensions** *FRONTIERS IN NEURAL CIRCUITS*
  Quirin, S., Jackson, J., Peterka, D. S., Yuste, R.
  2014; 8: 29

- **The Pocketscope: a spatial light modulator based epi-fluorescence microscope for optogenetics**
  Linnenberger, A., Peterka, D. S., Quirin, S., Yuste, R.
  edited by Dholakia, K., Spalding, G. C.
  SPIE-INT SOC OPTICAL ENGINEERING.2014

- **Instantaneous three-dimensional sensing using spatial light modulator illumination with extended depth of field imaging** *OPTICS EXPRESS*
  Quirin, S., Peterka, D. S., Yuste, R.
  2013; 21 (13): 16007-16021

- **Quantitative Multicolor Subdiffraction Imaging of Bacterial Protein Ultrastructures in Three Dimensions** *NANO LETTERS*
  Gahlmann, A., Ptacin, J. L., Grover, G., Quirin, S., von Diezmann, A. R., Lee, M. K., Backlund, M. P., Shapiro, L., Piestun, R., Moerner, W. E.
  2013; 13 (3): 987-993

- **Depth estimation and image recovery using broadband, incoherent illumination with engineered point spread functions** *APPLIED OPTICS*
  Quirin, S., Piestun, R.
  2013; 52 (1): A367-A376

- **Limits of 3D dipole localization and orientation estimation for single-molecule imaging: towards Green's tensor engineering** *OPTICS EXPRESS*
  Agrawal, A., Quirin, S., Grover, G., Piestun, R.
  2012; 20 (24): 26667-26680

- **Super-resolution photon-efficient imaging by nanometric double-helix point spread function localization of emitters (SPINDLE)** *OPTICS EXPRESS*
  Grover, G., DeLuca, K., Quirin, S., DeLuca, J., Piestun, R.
  2012; 20 (24): 26681-26695

- **Optimal 3D single-molecule localization for superresolution microscopy with aberrations and engineered point spread functions** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Quirin, S., Pavani, S., Piestun, R.
  2012; 109 (3): 675-679

- **Optimal 3D single-molecule super-resolution microscopy with engineered point spread functions**
  Quirin, S., Grover, G., Piestun, R., IEEE
  IEEE.2012: 926-927

- **Double helix PSF engineering for computational fluorescence microscopy imaging**
  Ghosh, S., Quirin, S. A., Grover, G., Piestun, R., Preza, C.
  edited by Conchello, J. A., Cogswell, C. J., Wilson, T., Brown, T. G.
  SPIE-INT SOC OPTICAL ENGINEERING.2012

- **Photon efficient double-helix PSF microscopy with application to 3D photo-activation localization imaging** *BIOMEDICAL OPTICS EXPRESS*
  Grover, G., Quirin, S., Fiedler, C., Piestun, R.
  2011; 2 (11): 3010-3020

- **Double-Helix 3D Photo-activation Localization Microscopy with a Phase Mask for Efficient Photon Collection**
  Grover, G., Quirin, S., Piestun, R., IEEE
  IEEE.2011

- **Double-helix microscopy for wide-field 3D single-molecule fluorescence imaging**
  Sharma, G., Pavani, S., Quirin, S., Piestun, R., IEEE
  IEEE.2010