

# Xinyang Li

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**Postdoctoral Research Assistant**

**Department of Automation, Tsinghua University**

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## Education & Academic Experience

**Jul. 2023 – now, Postdoctoral Research Assistant**

Department of Automation, Tsinghua University

Advisor: Prof. Qionghai Dai, academician of Chinese Academy of Engineering.

**Sep. 2018 – Jul. 2023, Ph.D., Control Science and Engineering**

Department of Automation, Tsinghua University

Dissertation: Ultrasensitive Fluorescence Imaging

Advisor: Prof. Qionghai Dai and Prof. Haoqian Wang

**Sep. 2014 - July 2018, B.Eng., Automation**

School of Electronic and Information Engineering, Xi'an Jiaotong University.

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## Research

I am currently engaged in interdisciplinary research in computational imaging, optical microscopy, and neuroscience. I have published a series of papers in top international journals including *Nature Methods*, *Nature Biotechnology*, *Nature Computational Science*, and *Light: Science & Applications*. My current research includes:

- 1. Intelligent microscopy:** Developing high-performance intelligent image processing methods to improve the performance of optical microscopy.
  - 2. Quantum imaging:** Exploring the new paradigm of combining quantum entanglement and optical imaging to surpass the photon shot-noise limit and diffraction limit.
  - 3. Neural functional imaging:** Improving the depth, speed, and signal-to-noise ratio of neural functional imaging. Developing advanced processing methods for large-scale neural imaging data to decipher the correlation between animal behavior and neural activity.
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## Publications

- [1] **Xinyang Li**, Yixin Li, Yiliang Zhou, et al. & Qionghai Dai. "Real-time denoising enables high-sensitivity fluorescence time-lapse imaging beyond the shot-noise limit." *Nature Biotechnology* (2023): 282-292. (IF: 46.9)
- [2] **Xinyang Li**, Xiaowan Hu, Xingye Chen, et al. & Qionghai Dai. "Challenges and

- opportunities in bioimage analysis." [\*Nature Methods\* \(2023\): 958-961](#). (IF: 48.0)
- [3] **Xinyang Li**, Guoxun Zhang, Jiamin Wu, et al. & Qionghai Dai. "Reinforcing neuron extraction and spike inference in calcium imaging using deep self-supervised denoising." [\*Nature Methods\* \(2021\): 1395-1400](#). (IF: 48.0)
- [4] **Xinyang Li**, Yuanlong Zhang, Jiamin Wu & Qionghai Dai. "Spatial redundancy transformer for self-supervised fluorescence image denoising." [\*Nature Computational Science\* \(2023\)](#). (IF: 11.3)
- [5] **Xinyang Li**, Guoxun Zhang, Hui Qiao, et al. & Qionghai Dai. (2021). Unsupervised content-preserving transformation for optical microscopy. [\*Light: Science & Applications\*, \(2021\): 44-54](#). (IF: 19.4)
- [6] **Xinyang Li**, Yuanlong Zhang, Kan Liu, et al. & Qionghai Dai. "Adaptive optimization for axial multi-foci generation in multiphoton microscopy." [\*Optics express\* \(2019\): 35948-35961](#). (IF: 3.8)
- [7] **Xinyang Li**, Zhifeng Zhao, Guoxun Zhang, Hui Qiao, et al. & Qionghai Dai. High-fidelity fluorescence image restoration using deep unsupervised learning. [\*OSA Biophotonics Congress: Biomedical Optics \(2020, Oral presentation\)\*](#).
- [8] Yuanlong zhang(#), **Xinyang Li**(#), Hao Xie, et al. & Qionghai Dai. "Hybrid spatio-spectral coherent adaptive compensation for line-scanning temporal focusing microscopy." [\*Journal of Physics D: Applied Physics\* \(2018\): 024001](#). (IF: 3.4)
- [9] Zhifeng Zhao, Yiliang Zhou, Bo Liu, Jing He, Jiayin Zhao, Yeyi Cai, Jingtao Fan, **Xinyang Li**, Zilin Wang, et al. & Qionghai Dai. "Two-photon synthetic aperture microscopy for minimally invasive fast 3D imaging of native subcellular behaviors in deep tissue." [\*Cell\* \(2023\): 2475-2491 e22](#). (IF: 64.5)
- [10] Guoxun Zhang, Xiaopeng Li, Yuanlong Zhang, Xiaofei Han, **Xinyang Li**, Jinqiang Yu, Boqi Liu, Jiamin Wu, Li Yu & Qionghai Dai. Bio-friendly long-term subcellular dynamic recording by self-supervised image enhancement microscopy. [\*Nature Methods\* \(2023\): 1-14](#). (IF: 48.0)
- [11] Yuanlong Zhang, Guoxun Zhang, Xiaofei Han, Jiamin Wu, Ziwei Li, **Xinyang Li**, Guihua Xiao, Hao Xie, Lu Fang & Qionghai Dai. Rapid detection of neurons in widefield calcium imaging datasets after training with synthetic data. [\*Nature Methods\* \(2023\): 747-754](#). (IF: 48.0)
- [12] Yi Zhang, Yuling Wang, Mingrui Wang, Yuduo Guo, **Xinyang Li**, Yifan Chen, Zhi Lu, Jiamin Wu, Xiangyang Ji, and Qionghai Dai. "Multi-focus light-field microscopy for high-speed large-volume imaging." [\*Photonix\* \(2022\): 1-20](#). (IF: 16.5)
- [13] Chaowei Zhuang, **Xinyang Li**, Yuanlong Zhang, et al. & Qionghai Dai. "Photobleaching imprinting Enhanced background rejection in line-scanning temporal focusing microscopy." [\*Frontiers in Chemistry\* \(2020\): 1185](#). (IF: 5.5)
- [14] Soheil Soltani, Ashkan Ojaghi, Hui Qiao, Nischita Kaza, **Xinyang Li**, Qionghai Dai, et al. & Francisco E. Robles. "Prostate cancer histopathology using label-free multispectral deep-UV microscopy quantifies phenotypes of tumor aggressiveness and enables multiple diagnostic virtual stains." [\*Scientific Reports\* \(2022\): 9329](#). (IF: 4.6)
- [15] Shi, Ruheng, Cheng Jin, Hao Xie, Yuanlong Zhang, **Xinyang Li**, Qionghai Dai &

Lingjie Kong. "Multi-plane, wide-field fluorescent microscopy for biodynamic imaging in vivo." *Biomedical Optics Express* (2019): 6625-6635. (IF: 3.4)

- [16] Zhang, Yuanlong, Tiankuang Zhou, Xuemei Hu, **Xinyang Li**, Hao Xie, et al. & Qionghai Dai. "Overcoming tissue scattering in wide-field two-photon imaging by extended detection and computational reconstruction." *Optics Express* (2019): 20117-20132. (IF: 3.8)
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## Lectures

- ✧ **Xinyang Li**, "Deep self-supervised denoising enables ultrasensitive fluorescence imaging beyond the shot-noise limit", *The 3rd CAAI International Conference on Artificial Intelligence*, invited talk on intelligent microscopy, July 2023.
  - ✧ **Xinyang Li**, "Real-time denoising of fluorescence imaging using DeepCAD-RT", *Tsinghua Laboratory of Brain and Intelligence*, Lab Seminar, April 2023.
  - ✧ **Xinyang Li**, "Deep self-supervised denoising enables ultrasensitive fluorescence imaging beyond the shot-noise limit", *Tsinghua IDG/McGovern Institute for Brain Research*, Seminar on Neuroscience Frontiers, September 2022.
  - ✧ **Xinyang Li**, "Reinforcing neuron extraction and spike inference in calcium imaging using deep self-supervised denoising", *Peking University*, Lab Seminar, March 2022.
  - ✧ **Xinyang Li** and Guoxun Zhang, "High-fidelity fluorescence image restoration using deep unsupervised learning", *OSA Biophotonics Congress*, Oral Presentation, April 2020.
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## Honors

- ✧ Outstanding Ph.D. Graduate of Beijing, 2023.
- ✧ Outstanding Ph.D. Graduate of Tsinghua University, 2023.
- ✧ Outstanding Doctoral Dissertation of Tsinghua University, 2023.
- ✧ Award for Excellent Academic Lecture, THU-IDG/McGovern Institute for Brain Research, 2023.
- ✧ National Scholarship, Tsinghua University, 2022.
- ✧ THU-IDG/McGovern Award for Outstanding Research Achievement, 2022.
- ✧ National Scholarship, Tsinghua University, 2021.
- ✧ First Prize for Outstanding Laboratory Contribution, Tsinghua University, 2021.
- ✧ Outstanding Graduate Student Leaders, Xi'an Jiaotong University, 2018.
- ✧ National Scholarship, Xi'an Jiaotong University, 2017.
- ✧ National Scholarship, Xi'an Jiaotong University, 2016.
- ✧ Outstanding Student Leaders, Xi'an Jiaotong University, 2016.
- ✧ National Scholarship, Xi'an Jiaotong University, 2015.