Aaron T. Kuan

ACADEMIC APPOINTMENTS AND EDUCATION

Assistant Professor	2023-
Department of Neuroscience, Yale School of Medicine	
NIH NIBIB K99 Postdoctoral Research Fellow	
Department of Neurobiology, Harvard Medical School	2021 – 2023
Co-mentors: Dr. Wei-Chung Lee and Dr. Christopher Harvey	
Postdoctoral Research Fellow	
Department of Neurobiology, Harvard Medical School	2016 – 2021
Supervisor: Dr. Wei-Chung Allen Lee	
Neurobiology Summer Course	
Marine Biology Laboratory, Woods Hole, MA	2016
Ph. D. Applied Physics	
Harvard University	2010 – 2016
Advisor: Professor Jene Golovchenko	
M.M. Violin Performance	
New England Conservatory	2009 - 2010
B.A. Physics	
Harvard College	2005 – 2009

HONORS AND AWARDS

2023-2024	Reynold and Michiko Spector Scholar in Neuroscience, Yale School of Medicine
2021	NIH NIBIB Pathway to Independence Award (K99/R00)
2019	Finalist, Life Sciences Research Foundation Postdoctoral Fellowship
2012-2015	Office of Science Graduate Research Fellowship, U.S. Dept. of Energy
2013	Harvard Horizons Scholar, Harvard Graduate School of Arts and Sciences
2012	National Defense Science and Engineering Graduate Fellowship (declined)
2011	Finalist, Hertz Graduate Fellowship
2009	B.A. awarded summa cum laude, Harvard College
2007	Herschel Smith Undergraduate Research Fellowship

FUNDING

2023-2026	NIH NIBIB R00: Brain-wide Neuronal Circuit Mapping with X-ray Nano-Holography (PI: 4R00EB032217-03)
2024-2026	ESRF Long-Term Project: Coherent, bright and focused light to resolve neural circuits (Co-PI: LS-3230)
2021-2023	NIH NIBIB K99: Brain-wide Neuronal Circuit Mapping with X-ray Nano-Holography (PI: 1K99EB032217-01)

2021-2023 ESRF Long-Term Project: Coherent, bright and focused light to resolve neural circuits (Co-PI: LS-2892)

2018 ESRF Standard Project: Reconstruction of a neural circuit that controls walking by combining X-ray nanotomography and electron microscopy". (PI: LS-2845)

2017 ESRF Standard Project: Accelerating connectomics by combining X-ray nanotomography with electron microscopy (PI: LS-2705).

PUBLICATIONS

A. Mamiya, A. Sustar, I. Siwanowicz, Y. Qi, T.-C. Lu, P. Gurung, C. Chen, J. S. Phelps, **A. T. Kuan,** A. Pacureanu, W.-C. A. Lee, H. Li, N. Mhatre, J. C. Tuthill. Biomechanical origins of proprioceptor feature selectivity and topographic maps in the Drosophila leg. *Neuron* (2023). https://doi.org/10.1016/j.neuron.2023.07.009

T. Nguyen, M. Narwani, M. Larson, Y. Li, X. Xie, H. Pfister, D. Wei, N. Shavit, L. Mi, A. Pacureanu*, W.-C. Lee*, **A.T. Kuan***. XPRESS: Xray Projectomic Reconstruction: Extracting Segmentation from Skeletons. *2023 IEEE 20th International Symposium on Biomedical Imaging* (2023). *https://arxiv.org/abs/2302.03819*, https://xpress.grand-challenge.org/

J. L. Rhoades, A. Sheridan, M. Narwani, B. Reicher, M. Larson, S. Xie, T. Nguyen, **A. T. Kuan,** A. Pacureanu, W. -C. A. Lee, J. Funke. Unpaired Image Enhancement for Neurite Segmentation in x-ray Tomography. *2023 IEEE 20th International Symposium on Biomedical Imaging* (2023). https://ieeexplore.ieee.org/document/10230381

Y.C. Li, L. Mi, Y. Meirovitch, **A. T. Kuan**, J. S. Phelps, W.-C. A. Lee, N. Shavit. X-ray2EM: Uncertainty-aware Cross-Modality Image Reconstruction from X-ray to Electron Microscopy in Connectomics. *2023 IEEE 20th International Symposium on Biomedical Imaging* (2023). https://arxiv.org/pdf/2303.00882.pdf.

A. T. Kuan, G. Bondanelli, L. N. Driscoll, J. Han, M, Kim, D. G. C. Hildebrand, B. J. Graham, L. A. Thomas, S. Panzeri, C. D. Harvey, W.-C. A. Lee. Synaptic wiring motifs in posterior parietal cortex support decision-making. *In Review, invited revision, Nature* (2022). https://www.biorxiv.org/content/10.1101/2022.04.13.488176v1

Y. Xie, **A. T. Kuan**, W. Wang, Z. T. Herbert, O. Mosto, O. Olukoya, M. Adam, S. Vu, M. Kim, N. Gómez, D. Tran, C. Charpentier, I. Sorour, M. Y. Tolstorukov, B. L. Sabatini, W.-C. A. Lee, C. C. Harwell. Astrocyte-neuron crosstalk through Hedgehog signaling mediates cortical circuit assembly. *Cell Reports* (2022). https://www.biorxiv.org/content/10.1101/2020.07.15.204263v1

J. S. Phelps*, D. G. C. Hildebrand*, B. J. Graham*, **A. T. Kuan**, L. A. Thomas, T. Nguyen, J. Buhmann, A. W. Azevedo, B. L. Shanney, J. Funke, J. C. Tuthill, W.-C. A. Lee. Reconstruction of motor control circuits in adult Drosophila using automated transmission electron microscopy. *Cell* (2021). https://www.sciencedirect.com/science/article/abs/pii/S0092867420316834

A. T. Kuan*, J. S. Phelps*, L. A. Thomas, T. M. Nguyen, J. Han, C.-L. Chen, A. W. Azevedo, J. C. Tuthill, J.

Funke, P. Cloetens, A. Pacureanu, W.-C. A. Lee. Dense neuronal reconstruction through X-ray holographic nano-tomography. *Nature Neuroscience* (2020). https://www.nature.com/articles/s41593-020-0704-9

B. J. Graham*, D. G. C. Hildebrand*, **A. T. Kuan**, J. T. Maniates-Selvin, L. A. Thomas, B. L. Shanny, W.-C. A. Lee, High-throughput transmission electron microscopy with automated serial sectioning. *bioRxiv* (2019). https://www.biorxiv.org/content/10.1101/657346v1.full

T. M. Quan, D. G. C. Hildebrand, L. A. Thomas, **A. T. Kuan**, W.-C. A. Lee, W. K. Jeong, Removing Imaging Artifacts in Electron Microscopy using an Asymmetrically Cyclic Adversarial Network without Paired Training Data. *IEEE International Conference on Computer Vision Workshops* (2019). https://ieeexplore.ieee.org/document/9022346

T. Nguyen-Duc, I. Yoo, L. Thomas, **A. T. Kuan**, W. C. Lee, W. K. Jeong. Weakly Supervised Learning in Deformable EM Image Registration Using Slice Interpolation. *Proceedings - International Symposium on Biomedical Imaging* (2019). https://ieeexplore.ieee.org/document/8759290

X. Chen*, Y. Mu*, Y. Hu*, **A. T. Kuan*,** M. Nikitchenko, O. Randlett, A. B. Chen, J. P. Gavornik, H. Sompolinsky, F. Engert, M. B. Ahrens. Brain-wide Organization of Neuronal Activity and Convergent Sensorimotor Transformations in Larval Zebrafish. *Neuron* (2018). https://linkinghub.elsevier.com/retrieve/pii/S0896-6273(18)30844-4

B. P. Weiss†, H. Wang, T. G. Sharp, J. Gattacceca, D. L. Shuster, B. Downey, J. Hu, R. R. Fu, **A. T. Kuan**, C. Suavet, A. J. Irving, J. Wang, J. Wang, A nonmagnetic differentiated early planetary body. *Earth and Planetary Science Letters* (2017). (corresponding author listed first) https://www.sciencedirect.com/science/article/abs/pii/S0012821X17301620

R. C. Rollings*, **A. T. Kuan***, J. A. Golovchenko. Ion selectivity of graphene nanopores. *Nat. Commun.* (2016). https://www.nature.com/articles/ncomms11408

A. T. Kuan, B. Lu, P. Xie, T. Szalay, J. A. Golovchenko. Electrical pulse fabrication of graphene nanopores in electrolyte solution. *Appied Physics Letters* (2015). https://aip.scitation.org/doi/10.1063/1.4921620

R. R. Fu†, B. P. Weiss, E. A. Lima, R. J. Harrison, X.-N. Bai, S. J. Desch, D. S. Ebel, C. Suavet, H. Wang, D. Glenn, D. Le Sage, T. Kasama, R. L. Walsworth, **A. T. Kuan**, Solar nebula magnetic fields recorded in the Semarkona meteorite. *Science* (2014). (corresponding author listed first) https://www.science.org/doi/abs/10.1126/science.1258022

A. T. Kuan, J. A. Golovchenko. Nanometer-thin solid-state nanopores by cold ion beam sculpting. *Applied Physics Letters* (2012). https://aip.scitation.org/doi/10.1063/1.4719679

A. Han, **A. T. Kuan**, J. Golovchenko, D. Branton, Nanopatterning on nonplanar and fragile substrates with ice resists. *Nano Letters* (2012). https://pubs.acs.org/doi/abs/10.1021/nl204198w

R. R. Fu[†], B. P. Weiss, D. L. Shuster, J. Gattacceca, T. L. Grove, C. Suavet, E. A. Lima, L. Li, **A. T. Kuan**, An Ancient Core Dynamo in Asteroid Vesta. *Science* (2012). (corresponding author listed first) https://www.science.org/doi/10.1126/science.1225648

P. S. Waggoner, **A. T. Kuan**, S. Polonsky, H. Peng, S. M. Rossnagel, Increasing the speed of solid-state nanopores. *Journal of Vacuum Science Technology* (2011). https://avs.scitation.org/doi/abs/10.1116/1.3585536?journalCode=jvb

TEACHING AND MENTORSHIP

2016 Teaching Assistant to Prof. Eli Tziperman
Applied Math 120: Applied Linear Algebra and Big Data
Harvard College, School of Engineering and Applied Sciences

2012 Teaching Assistant to Prof. Eli Tziperman
Applied Math 105: Ordinary and Partial Differential Equations
Harvard College, School of Engineering and Applied Sciences

2009 Teaching Assistant to Prof. Jene Golovchenko
Freshman Seminar 24e: Applied Physics Freshman Research Laboratory
Harvard College, Freshman Seminar Program

Supervisor to Research Technician / Engineer:
2019 – Minsu Kim (now PhD student at Harvard University Program in Biological and Biomedical Sci.)
2019 – 2020 Julie Han (now Masters student at Northeastern University – Khoury College of Comp. Sciences)
2017 – 2019 Logan Thomas (now PhD student at UC Berkeley University Dept of Biophysics)

Supervisor to Graduate Rotation Student:
2016: Seul Ah Kim

Supervisor to Full-Time Undergraduate Intern:
2022: Catrin Zharyy, Shuhan Xie, Olivia Sato, Katie Molloy, Mark Larson
2021: Elaina Phalen, Laurel Guo, Manuela Eroles, Lauren Holshof, Karenna Ng
2020: Sarah Kushner, Emily DiPietro, Trevor Khanna, Leticia Sadilina, Triston Xie, Elissa Zboinski
2019: Lia Decoursey, Thedita Pederson, Rholee Xu
2018: Zach Diaks, Ziwei Wing Fan, Julie Han, Amelia Buckner, Weiwei Lou

Supervisor to Undergraduate Summer Student:
2018: Jimin Shin

COMMUNITY ENGAGEMENT

2016 – 2023 Non-resident Academic Tutor, Dunster House, Harvard College
2012 – 2016 Dudley House Music Fellow, Harvard Graduate School of Arts and Sciences

PRESENTATIONS

INVITED TALKS:

Brown University Carney Institute Brain Science External Postdoc Seminar Series: Neural Cartography: Mapping the Brain with X-ray and Electron Microscopy. Nov 2022

Max-Planck / HHMI Annual Connectomics Meeting, Berlin, Germany: Synaptic wiring motifs in posterior parietal cortex support decision-making, May 2022

EMBL "From 3D light to 3D electron microscopy" Conference (virtual): Neural cartography: mapping decision-making circuits with light, x-ray, and electron microscopy, Mar 2022

Future Leaders in Neuroscience Lecture Series, Weill Cornell Medicine Feil Family Brain & Mind Research Institute (virtual): Neural Cartography: Mapping the Brain with X-ray and Electron Microscopy, March 2022

MRC-LMB seminar, Cambridge, UK (virtual): Neural Cartography: Mapping the Brain with X-ray and Electron Microscopy, April 2021

Mouse Connectomic Project Working Group (virtual): X-ray Nano-Holography for Connectomics, March 2021

EMBL Rome seminar, Rome, Italy (virtual): Multiscale Connectomics: X-ray and Electron Imaging for Mapping Neuronal Circuits, December 2020

TALKS:

Max-Planck / HHMI Annual Connectomics Meeting, Berlin, Germany: Phase-contrast X-ray Tomography for Neuronal Circuit Reconstruction, April 2019.

Cold Spring Harbor Laboratory Neuronal Circuits Meeting, Cold Spring Harbor, NY: Brainwide organization and sensorimotor convergence of neuronal activity in behaving zebrafish, April 2018.

Max-Planck / HHMI Annual Connectomics Meeting, Ashburn, VA: Large-scale EM reconstruction of microcircuits supporting sequential activity in parietal cortex, May 2018

Max-Planck / HHMI Annual Connectomics Meeting, Berlin, Germany: Connectivity underlying sequential activity in association cortex, April 2017

American Physical Society March Meeting, Denver, CO: Graphene Trans-Electrode Membranes, March 2014

Harvard Horizons Symposium, Cambridge, MA: Graphene Nanopores for Single-Molecule DNA sequencing, May 2013

DC-Area FIB-SEM User Group Meeting, Cambridge MA: FIB-SEM techniques for solid-state nanopore characterization, Mar. 2013

POSTER:

Max-Planck / HHMI Annual Connectomics Meeting, Berlin, Germany: Serial-section electron tomography for whole-brain mammalian connectomics, May 2022

Cold Spring Harbor Laboratory Neuronal Circuits Meeting, Cold Spring Harbor, NY: Choice-selective synaptic wiring motifs in posterior parietal cortex, Mar. 2022

Society for Neuroscience Annual Meeting, Chicago IL (virtual): Choice-selective synaptic wiring motifs in posterior parietal cortex, Nov. 2021

Biophysical Society Annual Meeting, San Diego, CA: Dense neuronal reconstruction through X-ray holographic nano-tomography, Feb. 2020.

Society for Neuroscience Annual Meeting, San Diego, CA: Large-scale EM reconstruction of a microcircuit supporting sequential activity in parietal cortex, Nov. 2018.

Biophysical Society Meeting, Baltimore, MD: In-situ electrical pulse fabrication of graphene nanopores, Feb 2015.

Materials Research Society Fall Meeting, Boston, MA: In-situ electrical pulse fabrication of graphene nanopores, Nov. 2014.

National Human genome Research Institute Advanced DNA Sequencing Technology Development Grantee Meeting, San Diego, CA: Graphene Nanopores for Single-Molecule DNA Sequencing. Apr. 2013

REFERENCES

Wei-Chung Allen Lee, Ph.D., Assistant Professor of Neurology, Harvard Medical School, Associate Scientific Research Staff, Kirby Center, Boston Children's Hospital.
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