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## **EDUCATION**

- Ph.D. Massachusetts Institute of Technology, Brain and Cognitive Sciences, 2006  
(Advisor: Elly Nedivi)
- S.B. California Institute of Technology, Chemical Engineering, 1998
- A.B. Bowdoin College, Biochemistry and Government, Minor in Physics, 1998

## **POSITIONS**

- 2023-present: Associate Professor of Neurology and Neurobiology  
Boston Children's Hospital & Harvard Medical School
- 2017-2023: Assistant Professor of Neurology  
Boston Children's Hospital & Harvard Medical School
- 2012-2017: Instructor  
Harvard Medical School, Neurobiology  
(Advisors: R. Clay Reid & Rachel Wilson)
- 2007-2012: Postdoctoral Fellow  
Harvard Medical School, Neurobiology  
(Advisor: R. Clay Reid)
- 2006-2007: Postdoctoral Associate  
Massachusetts Institute of Technology, Picower Institute for Learning and Memory  
(Advisor: Elly Nedivi)

## **AWARDS & FELLOWSHIPS**

- Jennifer N. Bourne Prize in Brain Ultrastructure, Society for Neuroscience  
Lefler Foundation Postdoctoral Fellow, Harvard Medical School  
Ruth L. Kirschstein National Research Service Award, National Institutes of Health  
Elli Lilly Graduate Student Travel Award, Society for Neuroscience  
Poitras Predoctoral Fellow, MIT

## **PUBLICATIONS**

### ***Selected Peer-Reviewed Research Articles:***

1. Nguyen T\*, Thomas LA\*, Rhoades JL, Ricchi I, Yuan XC, Sheridan A, Hildebrand DGC, Funke J, Regehr WG, Lee WCA. Structured connectivity in the cerebellum enables resilient pattern separation. **Nature** 2023 Jan;613(7944):543-549. PMID: [PMC10324966](https://pubmed.ncbi.nlm.nih.gov/39812496/).
2. Phelps JT\*, Hildebrand DGC\*, Graham BJ\*, Kuan AT, Thomas LA, Nguyen T, Buhmann J, Azevedo AW, Shanny BL, Funke J, Tuthill JC, Lee WCA. Reconstruction of motor control circuits in adult *Drosophila* using automated transmission electron microscopy. **Cell**. 2021 Feb 4;184(3):759-774.e18. PMID: [PMC8312698](https://pubmed.ncbi.nlm.nih.gov/3312698/).
3. Kuan AT\*, Phelps JS\*, Thomas LA, Nguyen TM, Han J, Chen CL, Azevedo AW, Tuthill JC, Funke J, Cloetens P, Pacureanu A<sup>†</sup>, Lee WCA<sup>†</sup>. Dense neuronal reconstruction through X-ray holographic nano-tomography. **Nat Neurosci**. 2020 Dec;23(12):1637-1643. PMID: [PMC8354006](https://pubmed.ncbi.nlm.nih.gov/3354006/).
4. Tobin WF, Wilson RI<sup>†</sup>, Lee WCA<sup>†</sup>. Wiring variations that enable and constrain neural computation in a sensory microcircuit. **eLife**. 2017 May 22;6:e24838. PMID: [PMC5440167](https://pubmed.ncbi.nlm.nih.gov/27440167/).
5. Lee WCA, Bonin V, Reed M, Graham BJ, Hood G, Glatfelter K, Reid RC. Anatomy and function of an excitatory network in the visual cortex. **Nature**. 2016 Apr. 21; 532(7599): 370-4. PMID: [PMC4844839](https://pubmed.ncbi.nlm.nih.gov/26444839/).

### Other Peer-Reviewed Research Articles:

6. Handler A, Zhang Q, Pang S, Nguyen TM, Iskols M, Nolan-Tamariz M, Cattel S, Plumb R, Sanchez B, Ashjian K, Shotland A, Brown B, Kabeer M, Turecek J, Rankin G, Xiang W, Pavarino EC, Africawala N, Santiago C, [Lee WCA](#), Xu CS, Ginty DD. Three-dimensional reconstructions of mechanosensory end organs suggest a unifying mechanism underlying dynamic, light touch. **Neuron**. 2023. Sep 13;S0896-6273(23)00634-7. PMID: [37725982](#). PMCID: *In progress*.
7. Terauchi A, Yee P, Johnson-Venkatesh EM, Seiglie MP, Kim L, Pitino JC, Kritzer E, Zhang Q, Zhou J, Li Y, Ginty DD, [Lee WCA](#), Umemori H. The projection-specific signals that establish functionally segregated dopaminergic synapses. **Cell**. 2023 Aug 31;186(18):3845-3861.e24. PMID: [37591240](#). PMCID: *In progress*.
8. Mamiya A, Sustar A, Siwanowicz I, Qi Y, Lu TC, Gurung P, Chen C, Phelps JS, Kuan AT, Pacureanu A, [Lee WCA](#), Li H, Mhatre N, Tuthill JC. Biomechanical origins of proprioceptive maps in the *Drosophila* leg. **Neuron**. 2023 Aug 4;S0896-6273(23)00542-1. PMID: [37562405](#). PMCID: *In progress*.
9. Sheridan A, Nguyen T, Deb D, [Lee WCA](#), Saalfeld S, Turaga S, Funke J. Local Shape Descriptors for Neuron Segmentation. **Nat Methods**. 2023 Feb;20(2):295-303. PMCID: [PMC9911350](#).
10. Osorno T, Rudolph S, Nguyen T, Kozareva V, Nadaf N, Macosko EZ, [Lee WCA](#), Regehr WG. Candelabrum cells are molecularly distinct, ubiquitous interneurons of the cerebellar cortex with specialized circuit properties. **Nat Neurosci**. 2022 Jun;25(6):702-713. PMCID: [PMC9548381](#).
11. Xie Y, Kuan AT, Wang W, Herbert ZT, Mosto O, Olukoya O, Adam M, Vu S, Kim M, Gómez N, Tran D, Charpentier C, Sorour I, Tolstorukov MY, Sabatini BL, [Lee WCA](#), Harwell CC. Astrocyte-neuron crosstalk through Hedgehog signaling mediates cortical circuit assembly. **Cell Rep**. 2022 Feb 22;38(8):110416. PMCID: [PMC8962654](#).
12. Chen C, Agrawal S, Mark B, Mamiya A, Sustar A, Phelps JS, [Lee WCA](#), Dickson BJ, Card GM, Tuthill JC. Functional architecture of neural circuits for leg proprioception in *Drosophila*. **Curr Biol**. 2021 Dec 6;31(23):5163-5175.e7. PMCID: [PMC8665017](#).
13. Buhmann J, Sheridan A, Gerhard S, Krause R, Nguyen T, Heinrich L, Schlegel P, [Lee WCA](#), Wilson RI, Saalfeld S, Jefferis G, Bock D, Turaga S, Cook M, Funke J. Automatic Detection of Synaptic Partners in a Whole-Brain *Drosophila* EM Dataset. **Nat Methods**. 2021 Jul;18(7):771-774. PMCID: [PMC7611460](#).
14. Yin W, Brittain D, Borseth J, Scott ME, Williams D, Perkins J, Own C, Murfitt M, Torres RM, Kapner D, Bleckert A, Castelli D, Reid D, [Lee WCA](#), Graham BJ, Takeno M, Bumbarger DJ, Farrell C, Reid RC, da Costa NM. A Petascale Automated Imaging Pipeline for Mapping Neuronal Circuits with High-throughput Transmission Electron Microscopy. **Nat Commun**. 2020 Oct 2;11(1):4949. PMCID: [PMC7532165](#).
15. Cheadle L, Rivera SA, Phelps JS, Ennis KA, Stevens B, Burkly LC, [Lee WCA](#), Greenberg ME. Sensory Experience Engages Microglia to Shape Neural Connectivity through a Non-Phagocytic Mechanism. **Neuron**. 2020 Sep 3;S0896-6273(20)30609-7. PMCID: [PMC7666095](#).
16. Zhang Q, [Lee WCA](#), Paul DL, Ginty DD. Multiplexed peroxidase-mediated electron microscopy labeling in the mammalian nervous system. **Nat Neurosci**. 2019 May; 22(5):828-839. PubMed Central PMCID: [PMC6555422](#).
17. Coulter ME, Dorobantu CM, Lodewijk GA, Delalande F, Cianferani S, Ganesh VS, Smith RS, Lim ET, Xu CS, Pang S, Wong ET, Lidov HGW, Calicchio ML, Yang E, Gonzalez DM, Schlaeger TM, Mochida GH, Hess H, [Lee WCA](#), Lehtinen MK, Kirchhausen T, Haussler D, Jacobs FMJ, Gaudin R, Walsh CA. The ESCRT-III Protein CHMP1A Mediates Secretion of Sonic Hedgehog on a Distinctive Subtype of Extracellular Vesicles. **Cell Rep**. 2018 Jul 24; 24(4):973-986.e8. PMCID: [PMC6178983](#).
18. Hildebrand DGC, Cicconet M, Torres RM, Choi W, Quan TM, Moon J, Wetzel AW, Scott Champion A, Graham BJ, Randlett O, Plummer GS, Portugues R, Bianco IH, Saalfeld S, Baden AD, Lillaney K, Burns R, Vogelstein JT, Schier AF, [Lee WCA](#), Jeong WK, Lichtman JW, Engert F. Whole-brain serial-section electron microscopy in larval zebrafish. **Nature**. 2017 May 18; 545(7654):345-349. PMCID: [PMC5594570](#).
19. Chen JL, Flanders G, [Lee WCA](#), Lin W, Nedivi E. Inhibitory dendrite dynamics as a general feature of the adult cortical microcircuit. **J Neurosci**. 2011 Aug. 31; 31(35): 12437-12443. PMCID: [PMC3180878](#).

20. Bock DD, [Lee WCA](#), Kerlin AM, Andermann ML, Hood G, Wetzel AW, Yurgenson S, Soucy ER, Kim HS, Reid RC. Network anatomy and *in vivo* physiology from a group of visual cortical neurons. **Nature**. 2011 Mar. 10; 471(7337): 177-82. PMCID: [PMC3095821](#).
21. Holtmaat A, Bonhoeffer T, Chow D, Chuckowree J, De Paola V, Hofer S, Hubener M, Keck T, Knott G, [Lee WCA](#), Mostany R, Mrcsic-Flogel T, Nedivi E, Portera-Cailliau C, Svoboda K, Trachtenberg J, Wilbrecht L. Long-term, high-resolution imaging in the mouse neocortex through a chronic cranial window. **Nat Protoc**. 2009 Jul. 16; 4(8): 1128-44. PMCID: [PMC3072839](#).
22. [Lee WCA](#), Chen JL, Huang H, Leslie JH, Amitai Y, So PT, Nedivi E. A dynamic zone defines interneuron remodeling in the adult neocortex. **PNAS**. 2008 Dec. 16; 105(50): 19968-73. PMCID: [PMC2604980](#).
23. Kim KH, Buehler C, Bahlmann K, Ragan T, [Lee WCA](#), Heffer E, Fantini S, Nedivi E, So PT. Multifocal multiphoton microscopy based on multi-anode photomultiplier tubes. **Opt Express**. 2007 Sep. 3; 15(18): 11658-78. PMCID: [PMC3060709](#).
24. [Lee WCA](#), Huang H, Feng G, Sanes JR, Brown EN, So PT, Nedivi E. Dynamic remodeling of dendritic arbors in GABAergic interneurons of adult visual cortex. **PLoS Biol**. 2006 Feb.; 4(2): e29. PMCID: [PMC1318477](#).
25. Fujino T, [Lee WCA](#), and Nedivi E. Regulation of *cpg15* by signaling pathways that mediate synaptic plasticity. **Mol Cell Neurosci**. 2003 Nov.; 24(3): 538-54. PMCID: [PMC3065975](#).
26. [Lee WCA](#) and Nedivi E. Extended plasticity of visual cortex in dark-reared animals may result from prolonged expression of *cpg15*-like genes. **J Neurosci**. 2002 Mar. 1; 22(5): 1807-15. PMCID: [PMC3062906](#).

#### **Peer-Reviewed Conference Proceedings:**

27. Rhoades JF, Sheridan A, Narwani M, Reicher B, Larson M, Xie S, Nguyen T, Kuan AT, Pacureanu A, [Lee WCA](#)<sup>†</sup>, Funke J<sup>†</sup>. Unpaired image enhancement for neurite segmentation in X-ray tomography. **2023 IEEE International Symposium on Biomedical Imaging**, Cartagena de Inias, Columbia, 2023.
28. Nguyen T, Narwani M, Larson M, Li Y, Pfister H, Wei D, Shavit N, Mi L, Pacureanu A<sup>†</sup>, [Lee WCA](#)<sup>†</sup>, Kuan AT<sup>†</sup>. XPRESS: X-ray projectomic reconstruction – extracting segmentation with skeletons. **2023 IEEE International Symposium on Biomedical Imaging**, Cartagena de Inias, Columbia, 2023. doi: [10.48550/arXiv.2302.03819](#).
29. Li Y, Meirovitch Y, Kuan AT, Phelps JS, [Lee WCA](#), Shavit N, Mi L. X-ray2EM: Uncertainty-aware cross-modality image reconstruction from X-ray to electron microscopy in connectomics. **2023 IEEE International Symposium on Biomedical Imaging**, Cartagena de Inias, Columbia, 2023. PMCID: [PMC10002775](#).
30. Nguyen-Duc T, Yoo I, Thomas LA, Kuan AT, [Lee WCA](#), Jeong WK. Weakly Supervised Learning in Deformable EM Image Registration Using Slice Interpolation, **2019 IEEE International Symposium on Biomedical Imaging**, Venice, Italy, 2019, pp. 670-673, doi: [10.1109/ISBI.2019.8759290](#).
31. Quan TM, Hildebrand DGC, Lee K, Thomas LA, Kuan AT, [Lee WCA](#), Jeong WK. Removing Imaging Artifacts in Electron Microscopy using an Asymmetrically Cyclic Adversarial Network without Paired Training Data. In Proceedings of the **IEEE International Conference on Computer Vision Workshops 2019**. ([link](#)).
32. Yoo I, Hildebrand DGC, Tobin WF, [Lee WCA](#), Jeong WK. ssEMnet: Serial-section Electron Microscopy Image Registration using a Spatial Transformer Network with Learned Features. In Deep Learning in Medical Image Analysis and Multimodal Learning for Clinical Decision Support (Springer), **MICCAI**. 2017. pp. 249-257. doi: [10.1007/978-3-319-67558-9\\_29](#).

#### **Reviews:**

33. Kleinfeld D, Blinder P, Bock DD, Briggman KL, Chklovskii DB, Denk W, Helmstaedter M, Kaufold JP, [Lee WCA](#), Meyer H-S, Micheva KD, Oberlaender M, Prohaska S, Reid RC, Smith SJ, Tsai PS and Sakmann B. Large-scale automated histology in the pursuit of connectomes. **J Neurosci**. 2011 Nov. 9; 31(43): 16125-

34. [Lee WCA](#) and Reid RC. Specificity and randomness: structure–function relationships in neural circuits. *Curr Opin Neurobiol*. 2011. Oct.; 21(5): 801-807. PMCID: [PMC3223317](https://pubmed.ncbi.nlm.nih.gov/16138/).

**Preprints:**

35. Lackey EP\*, Moreira L\*, Norton A\*, Hemelt ME, Osorno T, Nguyen TM, Macosko EZ, [Lee WCA](#), Hull CA, Regehr WG. Cerebellar circuits for disinhibition and synchronous inhibition. *bioRxiv* preprint doi: [10.1101/2023.09.15.557934](https://doi.org/10.1101/2023.09.15.557934). (In Review)
36. Cheong HSJ\*, Boone KN\*, Bennett MM\*, Salman F, Ralston JD, Hatch K, Allen RF, Phelps AM, Cook AP, Phelps JS, Erginkaya M, [Lee WCA](#), Card GM, Daly KC, Dacks AM. Organization of an Ascending Circuit that Conveys Flight Motor State. *bioRxiv* preprint doi: [10.1101/2023.06.07.544074](https://doi.org/10.1101/2023.06.07.544074). (In Review)
37. Lesser E\*, Azevedo AW\*, Phelps JS, Elabbady L, Cook A, Mark B, Kuroda S, Sustar AE, Moussa AJ, Dallmann CJ, Agrawal S, Lee SYJ, Pratt BG, Skutt-Kakari K, Gerhard S, Lu R, Kemnitz N, Lee K, Halageri A, Castro M, Ih D, Gager J, Tammam M, Dorkenwald S, Collman FC, Schneider-Mizell CM, Brittain D, Jordan CS, Dickinson MH, Seung HS, Macrina T, [Lee WCA](#)<sup>†</sup>, Tuthill JC<sup>†</sup>. Synaptic architecture of leg and wing motor control networks in *Drosophila*. *bioRxiv* preprint doi: [10.1101/2023.05.30.542725](https://doi.org/10.1101/2023.05.30.542725). (In Revision)
38. Azevedo AW\*, Lesser E\*, Mark B\*, Phelps JS\*, Elabbady L, Kuroda S, Sustar AE, Moussa AJ, Kandelwal A, Dallmann CJ, Agrawal S, Lee SYJ, Pratt BG, Cook A, Skutt-Kakari K, Gerhard S, Lu R, Kemnitz N, Lee K, Halageri A, Castro M, Ih D, Gager J, Tammam M, Dorkenwald S, Collman FC, Schneider-Mizell CM, Brittain D, Jordan CS, Dickinson MH, Pacureanu A, Seung HS, Macrina T, [Lee WCA](#)<sup>†</sup>, Tuthill JC<sup>†</sup>. Tools for comprehensive reconstruction and analysis of *Drosophila* motor circuits. *bioRxiv* preprint doi: [10.1101/2022.12.15.520299](https://doi.org/10.1101/2022.12.15.520299). (In Revision)
39. Kuan AT, Bondanelli G, Driscoll LN, Han J, Kim M, Hildebrand DGC, Graham BJ, Thomas LA, Panzeri S, Harvey CD, [Lee WCA](#). Synaptic wiring motifs in posterior parietal cortex support decision-making. *bioRxiv* preprint doi: [10.1101/2022.04.13.488176](https://doi.org/10.1101/2022.04.13.488176). (In Review)
40. Pfau SJ, Langen UH, Fisher TM, Prakash I, Nagpurwala F, Lozoya RA, [Lee WCA](#), Wu Z, Gu C. Vascular and perivascular cell profiling reveals the molecular and cellular bases of blood-brain barrier heterogeneity. *bioRxiv* preprint doi: [10.1101/2021.04.26.441465](https://doi.org/10.1101/2021.04.26.441465). (In Revision)

## **PATENT APPLICATIONS**

*GridTape: for fast nanoscale imaging*

[U.S. Provisional Application No. 62/325,747, filed April 21, 2016](#) / Harvard Case No.: HU 6290

We developed a transmission electron microscopy (TEM) compatible continuous collection substrate that allows automated TEM sample collection and handling.

*GridTape imaging stage*

[U.S. Provisional Application No. 62/420,550, filed November 10, 2016](#) / Harvard Case No.: HU 6331

We developed an in-column transmission electron microscopy (TEM) stage that allows automated TEM imaging of thin samples collected onto GridTape.

## **SEMINARS, TALKS, & CONFERENCES**

- 2024 Mathematical Approaches for Connectome Analysis, UCLA. Los Angeles, CA (*anticipated*)
- 2023 Center for Mind, Brain, and Behavior Neuroscience Seminar Series. Rockefeller University. New York, NY
- 2023 Neurobiology of *Drosophila* Meeting. Cold Spring Harbor, NY (session chair)
- 2023 Beyond the Connectome Meeting, Janelia Research Campus. Ashburn, VA
- 2023 Gordon Conference, Tissue Microstructure Imaging. Eaton, MA (session chair)
- 2023 CSHL *Drosophila* Neurobiology Course, Lecture
- 2023 Gordon Conference, Dendrites. Lucca, Italy
- 2022 CSHL *Drosophila* Neurobiology Course, Lecture
- 2022 NIH BRAIN Initiative Investigators Meeting, Symposium Talk (virtual)
- 2022 Max Planck/HHMI Connectomics Meeting, Berlin, Germany
- 2022 Korean Society for Brain and Neural Sciences Meeting, Symposium, Incheon, Korea (virtual)
- 2022 MIT, Molecular and Cellular Neuroscience Program, Seminar, Cambridge, MA
- 2022 Harvard University, Center for Brain Science, Seminar, Cambridge, MA
- 2021 MIT Picower Institute Dendrites Symposium Talk (virtual)
- 2021 Microscopy & Microanalysis Meeting, Symposium Talk (virtual)
- 2021 Japan Neuroscience Society Meeting, Symposium Talk (virtual)
- 2021 NIH BRAIN Initiative and US DOE, Brain Connectivity Workshop Series Talk (virtual)
- 2020 International Neural Microcircuit Conference, Yudanaka, Japan
- 2019 NIH BRAIN Initiative Investigators Meeting, Symposium Talk, Washington, DC
- 2019 Max Planck/HHMI Connectomics Meeting, Berlin, Germany
- 2018 Schloss Dagstuhl: High Throughput Connectomics Meeting, Wadern, Germany
- 2018 Vanderbilt University School of Medicine, Seminar, Nashville, TN
- 2017 Max Planck/HHMI Connectomics Meeting, Berlin, Germany
- 2016 Brown University, Seminar, Providence, RI
- 2016 Stanford University, Course Lecture, Stanford, CA
- 2016 Janelia Research Campus Meeting, High-Resolution Circuit Reconstruction, Ashburn, VA
- 2016 Carnegie Mellon University, Seminar, Pittsburgh, PA
- 2016 University of Arizona, Seminar, Tucson, AZ
- 2016 Neuro-Electronics Research Flanders, Seminar, Leuven, Belgium
- 2016 Imaging@VIB (Vlaanderen Institute of Biotechnology), Symposium Talk, Leuven, Belgium
- 2015 Boston Children's Hospital, Seminar, Boston, MA
- 2015 Janelia Research Campus, Seminar, Ashburn, VA
- 2015 University of California, Santa Barbara, Symposium Talk, Santa Barbara, CA
- 2014 Cold Spring Harbor Laboratory Meeting, Neuronal Circuits
- 2014 Sainsbury Wellcome Centre, Seminar, London, United Kingdom
- 2014 National Institutes of Health, Seminar, Bethesda, MD
- 2014 Northeastern University, Seminar, Boston, MA
- 2012 Allen Institute for Brain Science, Seminar, Seattle, WA
- 2012 Salk Institute for Biological Studies, Seminar, La Jolla, CA
- 2011 Society for Neuroscience Meeting, Short Course Lecture, Washington, DC
- 2010 Cold Spring Harbor Laboratory Meeting, Neuronal Circuits
- 2006 Cold Spring Harbor Laboratory Meeting, The GABAergic System