Updated November 10, 2026

Kenneth Kay

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Dept. Brain and Cognitive Sciences

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Education

Ph.D. in Bioengineering, UC Berkeley/UCSF, San Francisco, CA	2010–2016
Medical Scientist Training Program (M.D./Ph.D. program), UCSF, San Francisco, CA	2008–2016
B.S. in Physics, Johns Hopkins University, Baltimore, MD	2002–2006

Positions

Assistant Professor, Dept. Brain and Cognitive Sciences, University of Rochester	Starting 2027
Visiting Scholar, Dept. Computer Science, NYU Tandon School of Engineering	2026–present
Guest Researcher, Center for Computational Neuroscience, Flatiron Institute	2025–2026
Research Scientist, Howard Hughes Medical Institute, UCSF	2024–2026
Visiting Researcher, NYU Medical Center, Neuroscience Institute (Host: György Buzsáki)	2023–2024
Postdoctoral Scientist, Zuckerman Institute, Columbia University (Advisor: Larry Abbott)	2018–2024
Postdoctoral Scientist, Howard Hughes Medical Institute, UCSF (Advisor: Loren Frank)	2016–2018
Graduate Student, UCSF (Advisor: Loren Frank)	2010–2016
Research Assistant, Stanford University (Advisor: Karl Deisseroth)	2006–2008

Publications

Levine D, van Dijk D, **Kay K** (2026) AutoHebb: Self-Modifying Neural Networks that Zero-Shot Infer and Continually Learn. **arXiv**. (**link**)

Triplett MA, **Kay K** (2026) Emergent neural representations of graphical structure in mechanistic neural models of causal judgment. ***NeurIPS 2026*** (accepted). (**pre-print link**)

Lee KH, Adenekan P, Gao F, Zhou J, Hernandez J, Yorita A, Haque R, **Kay K**, Scanziani M, Frank LM (2026) A cognitive representation in primary visual cortex modulated by vision. **bioRxiv**. (**link**)

Gu S, Liu C, Gillespie AK, Nevers R, Denovellis EL, Coulter ME, **Kay K**, Frank LM (2026) Naturalistic behavior and self-generated neural activity predictive of self-correction. **bioRxiv**. (**link**)

*Miconi T, ***Kay K** (2025) Neural mechanisms of relational learning and fast knowledge reassembly in plastic neural networks. ***Nature Neuroscience***. (**link**)

Lippl S, **Kay K**, Jensen G, Ferrera VP, Abbott LF (2024) A mathematical theory of relational generalization in transitive inference. ***PNAS***. (**link**)

Kay K, Biderman N, Khajeh R, Beiran M, Cueva C, Shohamy D, Jensen G, Wei X, Ferrera VP, Abbott LF (2024) Emergent neural dynamics and geometry for generalization in a transitive inference task. ***PLOS Comput. Biol.*** (**link**)

Comrie A, Frank LM, **Kay K** (2022) Imagination as a fundamental function of the hippocampus. ***Phil. Trans. R. Soc. B***. (**link**)

Kay K, Chung JE, Sosa M, Schor J, Karlsson MP, Larkin MC, Liu DF, Frank LM (2020) Constant sub-second cycling between representations of possible futures in the hippocampus. ***Cell***. (**link**)

Kay K, Frank LM (2018) Three brain states in the hippocampus and cortex. ***Hippocampus***. (**link**)

Yu JY, **Kay K**, Liu D, Grossrubatscher I, Loback A, Sosa M, Chung JE, Karlsson MP, Larkin MC, Frank LM (2017) Distinct hippocampal-cortical memory representations for experiences during immobility. ***eLife***. (**link**)

Gillespie AK, Jones EA, Lin YH, Karlsson MP, **Kay K**, Yoon SY, Tong LM, Nova P, Carr JS, Frank LM, Huang Y (2016) Apolipoprotein E4 causes age-dependent disruption of slow gamma oscillations during hippocampal sharp-wave ripples. ***Neuron***. (**link**)

Kay K, Sosa M, Chung JE, Karlsson MP, Larkin MC, Frank LM (2016) A hippocampal network for spatial coding during immobility and sleep. ***Nature***. (**link**)

Deng X, Liu DF, **Kay K**, Frank LM, Eden UT (2015) Clusterless decoding of position from multiunit activity using a marked point process filter. ***Neural Computation***. (**link**)

Kravitz AV, Freeze BS, Parker PR, **Kay K**, Thwin MT, Deisseroth K, Kreitzer AC (2010) Regulation of parkinsonian motor behaviors by optogenetic control of basal ganglia circuitry. ***Nature***. (**link**)

Gradinaru V, Thompson KR, Zhang F, Mogri M, **Kay K**, Schneider MB, Deisseroth K (2007) Targeting and readout strategies for fast optical neural control *in vitro* and *in vivo*. ***J. Neurosci.*** (**link**)

Zhang F, Wang LP, Brauner M, Liewald JF, **Kay K**, Watzke N, Wood PH, Bamberg E, Nagel G, Gottschalk A, Deisseroth K (2007) Multimodal fast optical interrogation of neural circuitry. ***Nature***. (**link**)

Funding & Awards

K99 Pathway to Independence Award (NIMH)	2021–2023
Course scholarship, Methods in Computational Neuroscience (MBL Woods Hole)	2019
F30 Ruth L. Kirschstein National Research Service Award (NIMH)	2012–2014
Phi Beta Kappa	2006
Barry M. Goldwater Scholar	2005–2006
Rockefeller Summer Undergraduate Research Fellowship	2005
Johns Hopkins Provost Undergraduate Research Award	2004
Johns Hopkins Woodrow Wilson Undergraduate Research Fellowship	2003–2006
Howard Hughes Medical Institute Summer Research Fellowship	2003
National Merit Scholarship	2002–2006

Selected Presentations

University of Texas at Austin, Depts. of Computer Science and Neuroscience (invited talk)	Austin, TX, 2026
University of Rochester, Department of Brain and Cognitive Sciences (invited talk)	Rochester, NY, 2026
University of Cincinnati, Department of Biology (invited talk)	Cincinnati, OH, 2026
Bernstein Conference, Satellite Workshop (invited talk)	Frankfurt, Germany, 2025
Humboldt University of Berlin, Larkum Lab (lab seminar)	Berlin, Germany, 2025
University of Tübingen (invited talk)	Tübingen, Germany, 2025
COSYNE (poster)	Montreal, Canada, 2025
Northwestern University School of Medicine, Department of Neuroscience (invited talk)	Chicago, IL, 2023
Columbia University, Department of Psychology Seminar (invited talk)	New York, NY, 2023
New York University, Buzsáki Lab (invited talk)	New York, NY, 2023
Zuckerman Institute Postdoctoral Seminar (ZIPS) (invited talk)	New York, NY, 2023
University of Texas at Austin (invited talk, remote)	Austin, TX, 2021
COSYNE (poster)	Denver, CO, 2018
Society for Neuroscience (poster)	San Diego, CA, 2018
Society for Neuroscience (poster)	Washington, DC, 2017
UCL Institute of Behavioural Science (invited talk)	London, UK, 2016
Rice University (invited talk)	Houston, TX, 2016
Brandeis University (invited talk)	Waltham, MA, 2016
Big Questions in Neuroscience (poster)	San Diego, CA, 2016

HHMI Workshop, Janelia (poster) — Ashburn, VA, 2015
Society for Neuroscience (poster) — Chicago, IL, 2015
Society for Neuroscience (poster) — Washington, DC, 2014

Teaching

Guest Lecturer, Neuro-AI: Neuroscience meets Artificial Intelligence (University of Florida) — 2021
Lecturer, Advanced Theoretical Neuroscience (Columbia University) — 2021
Guest Lecturer, Computation and the Brain (Columbia University) — 2019
Teaching Assistant, Brain, Mind, and Behavior (UCSF Medical School) — 2015

Service

Co-organizer, Center for Theoretical Neuroscience Seminar Series (Columbia University) — 2018–2019
Co-organizer, Systems Neuroscience Research In Progress Seminar Series (UCSF) — 2014–2016

Mentorship in Research

Kyu Hyun Lee, Postdoctoral researcher (UCSF) — 2024–present
Shijie Gu, PhD student (UCSF) — 2024–2026
Sam Lippl, PhD student (Columbia) — 2022
Alison Comrie, PhD student (UCSF) — 2021–2022
Rayhan Zirvi, High school student (River Hill High School) — 2020–2022
Jason Chung, PhD student (UCSF) — 2014
Marielena Sosa, PhD student (UCSF) — 2012

Science Outreach

Volunteer, Biobus (school and community outreach in biology), New York City — 2022–2024
Volunteer, Columbia University Neuroscience Outreach (CUNO) — 2022–2024
Mentor, Black Undergraduate Mentorship Program, Columbia/Barnard — 2021–2025