

Stanford



Andreas Tolias

Professor of Ophthalmology

Bio

BIO

Andreas Tolias is a faculty member at Stanford University, where he co-leads the Enigma Project. His research lies at the interface of neuroscience and AI, combining large-scale neuroscience experiments with machine learning to uncover the principles of natural intelligence. By focusing on perceptual inference and decision-making, his lab integrates systems and computational neuroscience with AI to decipher the network-level principles of intelligence. Dr. Tolias's work aims to reverse-engineer these principles to create AI systems that are smarter, more robust, trustworthy, and efficient, while providing a powerful platform to test brain algorithms under complex natural tasks. He earned his B.A. and M.A. in Natural Sciences from the University of Cambridge, a Ph.D. in Systems and Computational Neuroscience from MIT, and completed postdoctoral training in Neuroscience and Machine Learning at the Max Planck Institute for Biological Cybernetics in Tübingen.

ACADEMIC APPOINTMENTS

- Professor, Ophthalmology
- Member, Bio-X
- Member, Wu Tsai Neurosciences Institute

ADMINISTRATIVE APPOINTMENTS

- Professor, Department of Electrical Engineering (by courtesy), (2024- present)

Teaching

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Shreyas Muralidharan, Ethan Trepka

Postdoctoral Faculty Sponsor

Yang Lin, Stelios Papadopoulos, Yongrong Qiu, Mahdi Ramadan, Imran Thobani

Doctoral Dissertation Advisor (AC)

Hasan Atakan Bedel, Liam Storan

Publications

PUBLICATIONS

- Heterogeneous orientation tuning in the primary visual cortex of mice diverges from Gabor-like receptive fields in primates. *Cell reports*

- Fu, J., Pierzchlewicz, P. A., Willeke, K. F., Bashiri, M., Muhammad, T., Diamantaki, M., Froudarakis, E., Restivo, K., Ponder, K., Denfield, G. H., Sinz, F., Tolias, A. S., Franke, et al
2024; 43 (8): 114639
- **The Dynamic Sensorium competition for predicting large-scale mouse visual cortex activity from videos.** *ArXiv*
Turishcheva, P., Fahey, P. G., Vystrčilová, M., Hansel, L., Froebe, R., Ponder, K., Qiu, Y., Willeke, K. F., Bashiri, M., Wang, E., Ding, Z., Tolias, A. S., Sinz, et al
2024
 - **Retrospective for the Dynamic Sensorium Competition for predicting large-scale mouse primary visual cortex activity from videos.** *ArXiv*
Turishcheva, P., Fahey, P. G., Vystrčilová, M., Hansel, L., Froebe, R., Ponder, K., Qiu, Y., Willeke, K. F., Bashiri, M., Baikulov, R., Zhu, Y., Ma, L., Yu, et al
2024
 - **Asymmetric distribution of color-opponent response types across mouse visual cortex supports superior color vision in the sky.** *bioRxiv : the preprint server for biology*
Franke, K., Cai, C., Ponder, K., Fu, J., Sokoloski, S., Berens, P., Tolias, A. S.
2024
 - **Grand Challenges at the Interface of Engineering and Medicine.** *IEEE open journal of engineering in medicine and biology*
Subramaniam, S., Akay, M., Anastasio, M. A., Bailey, V., Boas, D., Bonato, P., Chilkoti, A., Cochran, J. R., Colvin, V., Desai, T. A., Duncan, J. S., Epstein, F. H., Fraley, et al
2024; 5: 1-13
 - **Catalyzing next-generation Artificial Intelligence through NeuroAI.** *Nature communications*
Zador, A., Escola, S., Richards, B., Olveczky, B., Bengio, Y., Boahen, K., Botvinick, M., Chklovskii, D., Churchland, A., Clopath, C., DiCarlo, J., Ganguli, S., Hawkins, et al
2023; 14 (1): 1597
 - **Sustained deep-tissue voltage recording using a fast indicator evolved for two-photon microscopy.** *Cell*
Liu, Z., Lu, X., Villette, V., Gou, Y., Colbert, K. L., Lai, S., Guan, S., Land, M. A., Lee, J., Assefa, T., Zollinger, D. R., Korympidou, M. M., Vlasits, et al
2022
 - **Increased reliability of visually-evoked activity in area V1 of the MECP2-duplication mouse model of autism.** *The Journal of neuroscience : the official journal of the Society for Neuroscience*
Ash, R. T., Palagina, G., Fernandez-Leon, J. A., Park, J., Seilheimer, R., Lee, S., Sabharwal, J., Reyes, F., Wang, J., Lu, D., Sarfraz, M., Froudarakis, E., Tolias, et al
2022
 - **A multimodal cell census and atlas of the mammalian primary motor cortex** *NATURE*
Callaway, E. M., Dong, H., Ecker, J. R., Hawrylycz, M. J., Huang, Z., Lein, E. S., Ngai, J., Osten, P., Ren, B., Tolias, A., White, O., Zeng, H., Zhuang, et al
2021; 598 (7879): 86-102
 - **Author Correction: A community-based transcriptomics classification and nomenclature of neocortical cell types.** *Nature neuroscience*
Yuste, R., Hawrylycz, M., Aalling, N., Aguilar-Valles, A., Arendt, D., Armananzas, R., Ascoli, G. A., Bielza, C., Bokharaie, V., Bergmann, T. B., Bystron, I., Capogna, M., Chang, et al
2021
 - **Publisher Correction: A community-based transcriptomics classification and nomenclature of neocortical cell types.** *Nature neuroscience*
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2020
 - **Integrated Neurophotonic: Toward Dense Volumetric Interrogation of Brain Circuit Activity-at Depth and in Real Time.** *Neuron*
Moreaux, L. C., Yatsenko, D., Sacher, W. D., Choi, J., Lee, C., Kubat, N. J., Cotton, R. J., Boyden, E. S., Lin, M. Z., Tian, L., Tolias, A. S., Poon, J. K., Shepard, et al
2020; 108 (1): 66–92
 - **A community-based transcriptomics classification and nomenclature of neocortical cell types.** *Nature neuroscience*
Yuste, R., Hawrylycz, M., Aalling, N., Aguilar-Valles, A., Arendt, D., Arnedillo, R. A., Ascoli, G. A., Bielza, C., Bokharaie, V., Bergmann, T. B., Bystron, I., Capogna, M., Chang, et al

2020

- **Patterned photostimulation via visible-wavelength photonic probes for deep brain optogenetics.** *Neurophotonics*
Segev, E., Reimer, J., Moreaux, L. C., Fowler, T. M., Chi, D., Sacher, W. D., Lo, M., Deisseroth, K., Tolias, A. S., Faraon, A., Roukes, M. L.
2017; 4 (1): 011002-?
- **Highly Multiplexed Nanophotonic Probes With Independently Controllable Emitters for Optogenetic Brain Stimulation**
Segev, E., Moreaux, L. C., Reimer, J., Fowler, T. M., Chi, D., Sacher, W. D., Lo, M., Deisseroth, K., Tolias, A. S., Faraon, A., Roukes, M. L., IEEE
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- **Lack of long-term cortical reorganization after macaque retinal lesions** *NATURE*
Smirnakis, S. M., Brewer, A. A., Schmid, M. C., Tolias, A. S., Schuz, A., Augath, M., Inhoffen, W., Wandell, B. A., Logothetis, N. K.
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