Stanford



Andreas Tolias

Professor of Ophthalmology and, by courtesy, of Electrical Engineering

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
- Professor (By courtesy), Electrical Engineering
- Member, Bio-X
- Member, Wu Tsai Neurosciences Institute

ADMINISTRATIVE APPOINTMENTS

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

Teaching

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Yang Lin, Stelios Papadopoulos, Mahdi Ramadan, Imran Thobani

Doctoral Dissertation Advisor (AC)

Hasan Atakan Bedel, Liam Storan, Qiqi Xian

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

- **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
- **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
- **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*
  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
- **Integrated Neurophotonics: 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
  IEEE.2016
- **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.
  2005; 435 (7040): 300-307