

Emmanouil Froudarakis, Ph.D.

Assistant Professor of Physiology/Neurophysiology |

School of Medicine | University of Crete | Heraklion Greece

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short Bio

Emmanouil Froudarakis obtained his B.Sc. Degree in Biology at the National & Kapodistrian University of Athens. He continued his studies in Neuroscience in Utrecht University in the Netherlands and Baylor college of Medicine in Houston, USA where he got his Ph.D. in 2015 studying the neural representations of natural image statistics. He did his post-doctoral studies and worked as an Instructor of Neuroscience at Baylor College of Medicine. From 2019 he is a group leader at IMBB-FORTH and his lab investigates how cortical circuits across different brain areas interact to form representations that can guide behavior. In 2022 E. Froudarakis was elected Assistant Professor of Physiology-Neurophysiology at the Medical School, University of Crete. In 2022, he was awarded a Starting Grant from the European Research Council (ERC) to study the neural mechanisms for object recognition. He is currently a FENS-KAVLI Scholar.

skills

Research areas	Computational Neuroscience, Systems Neuroscience
Research tools	<i>Theoretical:</i> Computational modeling, Scientific programing, Signal processing, Population analysis, Image statistics • <i>Experimental:</i> 2P, 3P & confocal microscopy, Optics, Electrophysiology, Behavioral assays, Information technology, Synthesis & control of sensory stimuli, Intrinsic imaging, In-vivo single cell electroporation, Viral injections, Molecular tools
Writing	Scientific publications, Research grant proposals, Project report deliverables
Verbal	Lectures, Technical talks, Communicating to non-technical audiences, Science outreach
Management	Mentoring, Workshops and course and Conference organization
Service	Peer reviewer for journal and conferences
Programing	Matlab, Python, Labview
Spoken Languages	Greek (native), English (fluent), German (basic)

positions

Assistant Professor of Physiology/Neurophysiology	School of Medicine, University of Crete Heraklion, Greece 2022-Present
Collaborating Faculty Member	IMBB-FORTH Heraklion, Greece 2022-Present
Group Leader – Researcher C Lab direction: <i>How circuits across cortical hierarchy interact in order perform the necessary computations for object recognition</i>	IMBB-FORTH Heraklion, Greece 2019-2022
Instructor of Neuroscience Projects: <i>Object representation in neocortical circuits</i> • <i>Machine Intelligence from Cortical Networks</i> (MICrONS)	Baylor College of Medicine Houston TX, USA 2017-2019

Postdoctoral Associate – Project: *Mechanisms of continual learning in neocortical circuits*. Supervisor A.S. Tolias
• Ph.D. thesis: *Encoding of natural scene statistics in the visual cortex of the mouse*. Supervisor A.S. Tolias • Graduate project: *Audio-visual cue combination with Bayesian models comparison*. Supervisor: W.J. Ma • Research assistant - Project: *From Connectivity to Function: Analysis and Dissection of Neural Circuits in vivo*. Supervisor A.S. Tolias

Baylor College of Medicine
Houston TX, USA
2007-2017

Masters' research project: *The role of the endocannabinoid system in synaptic transmission in the ventral tegmental area*. Supervisor: G.M.J. Ramakers

University Medical Center Utrecht
Utrecht, the Netherlands
2006-2007

Research associate - Research project with subject: Distinct neuronal circuits mediate experience-dependent, non-associative osmotactic responses in *Drosophila* • Undergraduate thesis with subject: Protection from premature habituation requires functional mushroom bodies in *Drosophila*. Supervisor: E.M.C. Skoulakis

BSRC Alexander Fleming
Athens, Greece
2004-2006

education

Post-doc in Neuroscience

BAYLOR COLLEGE OF
MEDICINE

Houston TX, USA
2015-2017

Ph.D. in Neuroscience

BAYLOR COLLEGE OF
MEDICINE

Houston TX, USA
2009-2015

Master program - Neuroscience & Cognition

UTRECHT UNIVERSITY, *attendance for two semesters

Utrecht, The Netherlands
2006-2007

B.Sc. in Biology

NATIONAL & KAPODISTRIAN UNIVERSITY OF
ATHENS

Athens, Greece
2001-2005

publications

Google Scholar: <https://scholar.google.com/citations?user=peGMCr8AAAAJ&hl>

A. Peer-reviewed articles

- Consortium, Mic., Bae, J. A.; Baptiste, M.; Bodor, A. L.; Brittain, D.; Buchanan, J.; Bumbarger, D. J.; Castro, M. A.; Celii, B.; Cobos, E.; Collman, F.; Costa, N. M. da; Dorkenwald, S.; Elabbady, L.; Fahey, P. G.; Fliss, T.; **Froudarakis, E.**; Gager, J.; Gamlin, C.; Halageri, A.; Hebditch, J.; Jia, Z.; Jordan, C.; Kapner, D.; Kemnitz, N.; Kinn, S.; Koolman, S.; Kuehner, K.; Lee, K.; Li, K.; Lu, R.; Macrina, T.; Mahalingam, G.; McReynolds, S.; Miranda, E.; Mitchell, E.; Mondal, S. S.; Moore, M.; Mu, S.; Muhammad, T.; Nehoran, B.; Ogedengbe, O.; Papadopoulos, C.; Papadopoulos, S.; Patel, S.; Pitkow, X.; Popovich, S.; Ramos, A.; Reid, R. C.; Reimer, J.; Schneider-Mizell, C. M.; Seung, H. S.; Silverman, B.; Silversmith, W.; Sterling, A.; Sinz, F. H.; Smith, C. L.; Suckow, S.; Takeno, M.; Tan, Z. H.; Tolias, A. S.; Torres, R.; Turner, N. L.; Walker, E. Y.; Wang, T.; Williams, G.; Williams, S.; Willie, K.; Willie, R.; Wong, W.; Wu, J.; Xu, C.; Yang, R.; Yatsenko, D.; Ye, F.; Yin, W.; Yu, S (2025). Functional connectomics spanning multiple areas of mouse visual cortex. **Nature** 640, 435–447.
- Celii, B., Papadopoulos, S., Ding, Z., Fahey, P.G., Wang, E., Papadopoulos, C., Kunin, A.B., Patel, S., Bae, J.A., Bodor, A.L., Brittain, D., Buchanan, J., Bumbarger, D.J., Castro, M.A., Cobos, E., Dorkenwald, S., Elabbady, L., Halageri, A., Jia, Z., Jordan, C., Kapner, D., Kemnitz, N., Kinn, S., Lee, K., Li, K., Lu, R., Macrina, T., Mahalingam, G., Mitchell, E., Mondal, S.S., Mu, S., Nehoran, B., Popovich, S., Schneider-Mizell, C.M., Silversmith, W., Takeno, M., Torres, R., Turner, N.L., Wong, W., Wu, J., Yu, S.-C., Yin, W., Xenos, D., Kitchell, L.M., Rivlin, P.K., Rose, V.A., Bishop, C.A., Wester, B., **Froudarakis, E.**, Walker, E.Y., Sinz, F., Seung, H.S., Collman, F., da Costa, N.M., Reid, R.C., Pitkow, X., Tolias, A.S., Reimer, J. (2025). NEURD offers automated proofreading and feature extraction for connectomics. **Nature** 640, 487–496.
- Ding, Z., Fahey, P.G., Papadopoulos, S., Wang, E.Y., Celii, B., Papadopoulos, C., Chang, A., Kunin, A.B., Tran, D., Fu, J., Ding, Zhiwei, Patel, S., Ntanavara, L., Froebe, R., Ponder, K., Muhammad, T., Bae, J.A., Bodor, A.L., Brittain, D., Buchanan, J., Bumbarger, D.J., Castro, M.A., Cobos, E., Dorkenwald, S., Elabbady, L., Halageri, A., Jia, Z., Jordan, C., Kapner, D., Kemnitz, N., Kinn, S., Lee, K., Li, K., Lu, R., Macrina, T., Mahalingam, G., Mitchell, E., Mondal, S.S., Mu, S., Nehoran, B., Popovich, S., Schneider-Mizell, C.M., Silversmith, W., Takeno, M., Torres, R., Turner, N.L., Wong, W., Wu, J., Yin, W., Yu, S.-C., Yatsenko, D., **Froudarakis, E.**, Sinz, F., Josić, K., Rosenbaum, R., Seung, H.S., Collman, F., da Costa, N.M., Reid, R.C., Walker, E.Y., Pitkow, X., Reimer, J., Tolias, A.S. (2025). Functional connectomics reveals general wiring rule in mouse visual cortex. **Nature** 640, 459–469.
- Allam, A., Allam, V., Reddy, S., Rohren, E.M., Sheth, S.A., **Froudarakis, E.**, Papageorgiou, T.D. (2024). Individualized functional magnetic resonance imaging neuromodulation enhances visuospatial perception: a proof-of-concept study. **Philos Trans R Soc Lond B Biol Sci** 379, 20230083.

- 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, K. (2024). Heterogeneous orientation tuning in the primary visual cortex of mice diverges from Gabor-like receptive fields in primates. **Cell Rep** 43, 114639.
 - Genzel, L., **Froudarakis, E.**, Rapti, G. (2024). Openness and transparency in animal research: Why and how. **Eur J Neurosci** 60, 6866–6873.
 - 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, A.L., Pang, M.M., Su, S., Cai, C., **Froudarakis, E.**, Zhou, N., Patel, S.S., Smith, C.L., Ayon, A., Bizouard, P., Bradley, J., Franke, K., Clandinin, T.R., Giovannucci, A., Tolias, A.S., Reimer, J., Dieudonné, S., St-Pierre, F. (2022). Sustained deep-tissue voltage recording using a fast indicator evolved for two-photon microscopy. **Cell** S0092-8674(22)00916–3.
 - 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, A.S., Wu, S.M., Smirnakis, S.M. (2022). Increased Reliability of Visually-Evoked Activity in Area V1 of the MECP2-Duplication Mouse Model of Autism. **J Neurosci** 42, 6469–6482.
 - Franke, K., Willeke, K.F., Ponder, K., Galdamez, M., Zhou, N., Muhammad, T., Patel, S., **Froudarakis, E.**, Reimer, J., Sinz, F.H., Tolias, A.S. (2022). State-dependent pupil dilation rapidly shifts visual feature selectivity. **Nature** 610, 128–134.
 - Turner, N.L., Macrina, T., Bae, J.A., Yang, R., Wilson, A.M., Schneider-Mizell, C., Lee, K., Lu, R., Wu, J., Bodor, A.L., Bleckert, A.A., Brittain, D., **Froudarakis, E.**, Dorkenwald, S., Collman, F., Kemnitz, N., Ih, D., Silversmith, W.M., Zung, J., Zlateski, A., Tartavull, I., Yu, S.-C., Popovych, S., Mu, S., Wong, W., Jordan, C.S., Castro, M., Buchanan, J., Bumbarger, D.J., Takeno, M., Torres, R., Mahalingam, G., Elabbady, L., Li, Y., Cobos, E., Zhou, P., Suckow, S., Becker, L., Paninski, L., Polleux, F., Reimer, J., Tolias, A.S., Reid, R.C., da Costa, N.M., Seung, H.S. (2022). Reconstruction of neocortex: Organelles, compartments, cells, circuits, and activity. **Cell** 185, 1082-1100.e24.
- ===== Assistant Professor election =====
- Dorkenwald, S., Turner, N.L., Macrina, T., Lee, K., Lu, R., Wu, J., Bodor, A.L., Bleckert, A.A., Brittain, D., Kemnitz, N., Silversmith, W.M., Ih, D., Zung, J., Zlateski, A., Tartavull, I., Yu, S.-C., Popovych, S., Wong, W., Castro, M., Jordan, C.S., Wilson, A.M., **Froudarakis, E.**, Buchanan, J., Takeno, M.M., Torres, R., Mahalingam, G., Collman, F., Schneider-Mizell, C.M., Bumbarger, D.J., Li, Y., Becker, L., Suckow, S., Reimer, J., Tolias, A.S., Macarico da Costa, N., Reid, R.C., Seung, H.S. (2022). Binary and analog variation of synapses between cortical pyramidal neurons. **Elife** 11, e76120.
 - Schneider-Mizell, C.M., Bodor, A.L., Collman, F., Brittain, D., Bleckert, A., Dorkenwald, S., Turner, N.L., Macrina, T., Lee, K., Lu, R., Wu, J., Zhuang, J., Nandi, A., Hu, B., Buchanan, J., Takeno, M.M., Torres, R., Mahalingam, G., Bumbarger, D.J., Li, Y., Chartrand, T., Kemnitz, N., Silversmith, W.M., Ih, D., Zung, J., Zlateski, A., Tartavull, I., Popovych, S., Wong, W., Castro, M., Jordan, C.S., **Froudarakis, E.**, Becker, L., Suckow, S., Reimer, J., Tolias, A.S., Anastassiou, C.A., Seung, H.S., Reid, R.C., Costa, N.M. da (2021). Structure and function of axo-axonic inhibition. **Elife** 10, e73783.
 - Tehovnik, E.J., **Froudarakis, E.**, Scala, F., Smirnakis, S.M., Patel, S.S., and Tolias, A.T. (2021). Visuomotor Control in Mice and Primates. **Neurosci Biobehav Rev** S0149-7634(21)00352-3.
 - Baker, C., **Froudarakis, E.**, Yatsenko, D., Tolias, A.S., and Rosenbaum, R. (2020). *Inference of synaptic connectivity and external variability in neural microcircuits*. **J Comput Neurosci** 48, 123–147.
 - Cheng, J.X., Scala, F., Blanco, F.A., Niu, S., Firozi, K., Keehan, L., Mulherkar, S., **Froudarakis, E.**, Li, L., Duman, J.G., Jiang, X., Tolias, K.F., (2020). *The Rac-GEF Tiam1 Promotes Dendrite and Synapse Stabilization of Dentate Granule Cells and Restricts Hippocampal-Dependent Memory Functions*. **J. Neurosci.** 41, 1191–1206.
 - **Froudarakis, E.**, Fahey, P.G., Reimer, J., Smirnakis, S.M., Tehovnik, E.J., and Tolias, A.S. (2019). *The Visual Cortex in Context*. **Annual Review of Vision Science** 5, 317–339 (2019)
 - Liu, G.* , **Froudarakis, E.*** , Patel, J.M., Kochukov, M.Y., Pekarek, B., Hunt, P.J., Patel, M., Ung, K., Fu, C.-H., Jo, J., et al. (2019). *Target specific functions of EPL interneurons in olfactory circuits*. **Nature Communications** 10, 1–14.
 - Scala, F., Kobak, D., Shan, S., Bernaerts, Y., Laturnus, S., Cadwell, C.R., Hartmanis, L., **Froudarakis, E.**, Castro, J.R., Tan, Z.H., et al. (2019). *Layer 4 of mouse neocortex differs in cell types and circuit organization between sensory areas*. **Nat Commun** 10, 1–12.
 - Walker, E.Y., Sinz, F.H., Cobos, E., Muhammad, T., **Froudarakis, E.**, Fahey, P.G., Ecker, A.S., Reimer, J., Pitkow, X., and Tolias, A.S. (2019). *Inception loops discover what excites neurons most using deep predictive models*. **Nat. Neurosci.** 22, 2060–2065.
 - Berens, P., Freeman, J., Deneux, T., Chenkov, N., McColgan, T., Speiser, A., Macke, J.H., Turaga, S.C., Mineault, P., Rupprecht, P., Gerhard, S., Friedrich, R.W., Friedrich, J., Paninski, L., Pachitariu, M., Harris, K.D., Bolte, B., Machado, T.A., Ringach, D., Stone, J., Rogerson, L.E., Sofroniew, N.J., Reimer, J., **Froudarakis, E.**, Euler, T., Rosón, M.R., Theis, L., Tolias, A.S., Bethge, M., (2018). *Community-based benchmarking improves spike rate inference from two-photon calcium imaging data*. **PLOS Computational Biology** 14, e1006157
 - Quast, K.B., Ung, K., **Froudarakis, E.**, Huang, L., Herman, I., Addison, A.P., Ortiz-Guzman, J., Cordiner, K., Saggau, P., Tolias, A.S., et al. (2017). *Developmental broadening of inhibitory sensory maps*. **Nat. Neurosci.** 20, 189–199.
 - Theis, L., Berens, P., **Froudarakis, E.**, Reimer, J., Román Rosón, M., Baden, T., Euler, T., Tolias, A.S., and Bethge, M. (2016). *Benchmarking Spike Rate Inference in Population Calcium Imaging*. **Neuron** 90, 471–482.
 - Jiang, X., Shen, S., Sinz, F., Reimer, J., Cadwell, C.R., Berens, P., Ecker, A.S., Patel, S., Denfield, G.H., **Froudarakis, E.**, et al. (2016). *Response to Comment on “Principles of connectivity among morphologically defined cell types in adult neocortex.”* **Science** 353, 1108–1108.

- Yatsenko, D., Josić, K., Ecker, A.S., **Froudarakis, E.**, Cotton, R.J., and Tolias, A.S. (2015). *Improved Estimation and Interpretation of Correlations in Neural Circuits*. **PLOS Comput. Biol.** 11, e1004083.
- Reimer, J., **Froudarakis, E.**, Cadwell, C.R., Yatsenko, D., Denfield, G.H., and Tolias, A.S. (2014). *Pupil Fluctuations Track Fast Switching of Cortical States during Quiet Wakefulness*. **Neuron** 84, 355–362.
- **Froudarakis, E.**, Berens, P., Ecker, A.S., Cotton, R.J., Sinz, F.H., Yatsenko, D., Saggau, P., Bethge, M., and Tolias, A.S. (2014). *Population code in mouse V1 facilitates readout of natural scenes through increased sparseness*. **Nat. Neurosci.** 17, 851–857.
- Cotton, R.J., **Froudarakis, E.**, Storer, P., Saggau, P., and Tolias, A.S. (2013). *Three-dimensional mapping of microcircuit correlation structure*. *Front. Neural Circuits* 7.
- Acevedo, S.F.*, **Froudarakis, E.I.***, Kanellopoulos, A.*, and Skoulakis, E.M.C. (2007). *Protection from premature habituation requires functional mushroom bodies in Drosophila*. **Learn. Mem. Cold Spring Harb.** N 14, 376–384.
- Acevedo, S.F., **Froudarakis, E.I.**, Tsiarva, A.-A., and Skoulakis, E.M.C. (2007). *Distinct neuronal circuits mediate experience-dependent, non-associative osmotactic responses in Drosophila*. **Mol. Cell. Neurosci.** 34, 378–389.

B. Conference Proceedings (peer reviewed)

- Ustyuzhaninov, I., Cadena, S.A., **Froudarakis, E.**, Fahey, P.G., Walker, E.Y., Cobos, E., Reimer, J., Sinz, F.H., Tolias, A.S., Bethge, M., and Ecker, A.S. (2020). Rotation-invariant clustering of neuronal responses in primary visual cortex. **Eighth International Conference on Learning Representations 2020**
- Cadena, S.A., Sinz, F.H., Muhammad, T., **Froudarakis, E.**, Cobos, E., Walker, E.Y., Reimer, J., Bethge, M., Tolias, A., and Ecker, A.S. (2019). *How well do deep neural networks trained on object recognition characterize the mouse visual system?* In **NeurIPS Neuro AI Workshop**.
- Sinz, H. F., Ecker, A., Fahey, G. P., Walker, Y. E., Cobos, E., **Froudarakis, E.**, Yatsenko, D., Pitkow, X., Reimer, J., Tolias, A.S. (2018). *Stimulus domain transfer in recurrent models for large scale cortical population prediction on video*. **Neural Information Processing Systems**

C. Preprints (not peer-reviewed)

- Franke, K., Karantzas, N., Willeke, K., Diamantaki, M., Ramakrishnan, K., Elumalai, P., Restivo, K., Fahey, P., Nealley, C., Shinn, T., Garcia, G., Patel, S., Ecker, A., Walker, E.Y., **Froudarakis, E.**, Sanborn, S., Sinz, F.H., Tolias, A. (2025). Dual-feature selectivity enables bidirectional coding in visual cortical neurons. **bioRxiv** 2025.07.16.665209.
- Papageorgiou, T.D., Webb, J., Allam, A., Rohren, E.M., Sturgis, E.M., Hutcheson, K., Heilbronner, S.R., **Froudarakis, E.** (2025). Individualized fMRI neuromodulation enhances swallow and tongue motor and sensory control: an intervention targeted for radiation-induced cranial neuropathy following head and neck cancer. **bioRxiv** 2025.04.30.651533.

===== Assistant Professor election =====

- Macrina, T., Lee, K., Lu, R., Turner, N.L., Wu, J., Popovych, S., Silversmith, W., Kemnitz, N., Bae, J.A., Castro, M.A., Dorkenwald, S., Halageri, A., Jia, Z., Jordan, C., Li, K., Mitchell, E., Mondal, S.S., Mu, S., Nehoran, B., Wong, W., Yu, S., Bodor, A.L., Brittain, D., Buchanan, J., Bumbarger, D.J., Cobos, E., Collman, F., Elabbady, L., Fahey, P.G., **Froudarakis, E.**, Kapner, D., Kinn, S., Mahalingam, G., Papadopoulos, S., Patel, S., Schneider-Mizell, C.M., Sinz, F.H., Takeno, M., Torres, R., Yin, W., Pitkow, X., Reimer, J., Tolias, A.S., Reid, R.C., Costa, N.M. da, and Seung, H.S. (2021). Petascale neural circuit reconstruction: automated methods. **bioRxiv** 2021.08.04.455162.
- **Froudarakis, E.**, Cohen, U., Diamantaki, M., Walker, E.Y., Reimer, J., Berens, P., Sompolinsky, H., and Tolias, A.S. (2020). *Object manifold geometry across the mouse cortical visual hierarchy*. **bioRxiv**, 2020.08.20.258798.
- Zhou, P., Reimer, J., Zhou, D., Pasarkar, A., Kinsella, I., **Froudarakis, E.**, Yatsenko, D.V., Fahey, P.G., Bodor, A., Buchanan, J., et al. (2020). *EASE: EM-Assiste Source Extraction from calcium imaging data*. **bioRxiv**, 2020.03.25.007468.
- Fahey, P.G., Muhammad, T., Smith, C., **Froudarakis, E.**, Cobos, E., Fu, J., Walker, E.Y., Yatsenko, D., Sinz, F.H., Reimer, J., et al. (2019). *A global map of orientation tuning in mouse visual cortex*. **bioRxiv**, 745323.
- Ecker A.S., Sinz F.H., **Froudarakis E.**, Fahey P.G., Cadena S.A., Walker E.Y., Cobos E., Reimer J., Tolias A.S., Bethge M. *A rotation-equivariant convolutional neural network model of primary visual cortex* **ArXiv**:1809.10504 (2018)

selected presentations of research

- Invited talk: Object recognition in real and virtual mice. COSYNE conference, Salt Lake City UT, April 2025
- Invited talk: Closed-loop systems in Neuroscience. 4th Panhellenic Neuroanatomy Conference, Heraklion, October 2024
- Invited talk: Using object recognition in mice as a model for studying cortical computations. University of Geneva, Switzerland, April 2024
- Invited talk: From neuronal activity to perception and action. Using object recognition as a model for studying cortical function and dysfunction. 3rd CV Emmanouil Froudarakis. Ph.D. Page 4 of 8

Panhellenic Neuroanatomy Conference, Heraklion, October 2023

- Invited talk: Using object recognition in mice as a model for studying cortical function. TINS-NEUROTWIN Meeting, Heraklion, October 2023
- Invited talk: From neural activity to behavior and back. Using mice to dissect cortical computations for object recognition. Fleming, Athens 2022
- Poster: Froudarakis E., Walker E., Reimer J., Tolias A.S. *Object representations in the mouse visual system*. AREADNE conference, Santorini, Greece, June 2018.
- Poster: Froudarakis E., Walker E., Patel S., Tolias A.S. *A high throughput training method for investigating visual object recognition in mice*. AREADNE conference, Santorini Greece, June 2016.
- Poster: Froudarakis E., Berens P., Cotton J.R., Ecker A.S., Sinz F., Yatsenko D., Saggau P., Bethge M., Tolias A.S. *Population code in mouse V1 facilitates readout of natural scenes through increased sparseness*. AREADNE conference, Santorini Greece, June 2014.
- Poster: Froudarakis E., Berens P., Cotton J.R., Ecker A.S., Sinz F., Yatsenko D., Saggau P., Bethge M., Tolias A.S. *Higher-order stimulus correlations drive a sparse representation in mouse V1 well-suited for discrimination of natural scenes*. COSYNE conference, Salt Lake City UT, February 2014.
- Poster: Froudarakis E., Berens P., Cotton J.R., Ecker A.S., Saggau P., Bethge M., Tolias A.S. *Encoding of natural scene statistics in the primary visual cortex of the mouse*. COSYNE conference, Salt Lake City UT, February 28 - March 3 2013.
- Poster: Froudarakis E., R. J. Cotton, P. Berens, A. S. Ecker, P. Saggau, A. S. Tolias. *Three-dimensional in vivo Mapping of Spatio-Temporal Cortical Network Dynamics*. FENS-IBRO-Hertie Winter School, Obergurgl, Austria 2012.

knowledge transfer

Conference general talk: <i>Navigating in the scientific spectrum, a retrospective view</i>	Athens, Greece
14th Conference of the Union of Hellenic Bioscientists	2024
Public talk: <i>Exploring the intersection of artificial intelligence and the human brain</i>	Heraklion, Greece
The Friends of FORTH Meeting: « Artificial Intelligence, Happiness or Curse? »	2024
Conference general talk: <i>Neuroaesthetics and sound saturation</i>	Vienna, Austria
SIE FENS 2024 "Art of the Mind: Using Neuroscience Data to Create Immersive Worlds"	2024
Public talk: <i>From neuronal activity to perception and action</i>	Rethymnon, Greece
Brain Awareness Week 2023	2023
Public talk: <i>Reality as representations in the brain</i>	Heraklion, Greece
Night of Ideas (Institute Francais), Museum of Natural Science	2020
Patent: <i>MRI-Compatible tongue measurement devices, and methods for treating dysarthria, swallowing, and mastication disorders associated with CNS or PNS lesions.</i> (US2021085209A1, Papageorgiou – Froudarakis)	Houston, TX USA
	2019

other training

FELASA training: <i>Care and use of laboratory animals (mouse, rat and zebrafish)</i>	2022
FENS-IBRO-Hertie Winter School: " <i>Neural Coding in Sensory Systems</i> ", Obergurgl, Austria	2012
" <i>Modern light microscopy techniques in biomedical research</i> " seminar series at the University of Crete	2005

honors & memberships

General Secretary and President-elect of Hellenic Society for Neuroscience	2024-Present
FENS-KAVLI Scholar	2023-Present
Member of Federation of European Neuroscience Societies	2021-Present
Member of Hellenic Society for Neuroscience	2021-Present

Member of International Brain Research Organization	2021-Present
Member of Eu-Life Recruitment & Training Group	2020-2024
Best talk award, Rush Record, Galveston TX	2014 & 2018
Best proposal award, FENS-IBRO, Neural Coding in sensory systems workshop, Obergurgl Austria	2013
Poster award, Annual Gulf Coast Consortium Conference for Theoretical and Computational Neuroscience, Houston, TX USA	2012
Member of Society for Neuroscience	2011-2012
Scholarship awarded from Hellenic Professional Society of Texas	2011

master programs participation

Graduate program in Molecular Biology and Biomedicine School of Medicine, University of Crete	2022-Present
Brain & Mind sciences, Interdisciplinary graduate program School of Medicine, University of Crete	2020-Present
Graduate program in Neurosciences School of Medicine, University of Crete	2020-Present

reviewing activities

Atip-Avenir program - Inserm	2025
Scientific Reports	2025
H.F.R.I	2024
ERC Consolidator	2023
Plos ONE	2022
Neural Information Processing Systems	2021-Present
Journal of Biophotonics	2019

teaching experience

<i>Introduction to Experimental Methods in Neuroscience</i> Graduate Course, E&N-239 (Coordinator)	Medical School, University of Crete Heraklion, Greece 2023-Present
<i>Principles and methods for the study of the Nervous System</i> Graduate Course, Neuro-103 (Coordinator)	Medical School, University of Crete Heraklion, Greece 2023-Present
<i>Introduction to Systems Neuroscience I. Perception</i> Graduate Course, E&N-102	Medical School, University of Crete Heraklion, Greece 2022-Present
<i>Physiology A</i> Undergraduate Course, IΣ 2.4, School of Medicine, UoC	Medical School, University of Crete Heraklion, Greece 2022-Present

Anaylsis and Modeling of Brain Circuits
Graduate Course, HY-590.21

University of Crete
Heraklion, Greece
2019-2022

Multicellular Organization of Life – Functional Maps
Graduate Course, BIO-1405

School of Medicine, University of Crete
Heraklion, Greece
2019-Present

Neural Computation
Graduate Course, NEUR 416

Rice University
Houston TX, USA
2018

Introduction to Neuroscience Methods
Graduate Course

Baylor College of Medicine
Houston TX, USA
2013

Advanced Neurosciences
Undergraduate Course, BMW30605 (TA)

Faculty of Medicine, Utrecht University
Utrecht, The Netherlands
2008

student supervision & examination

Postdocs:

- Georgelou C., Since 2023
- Diamantaki M. Since 2020

Supervision
Systems Neuroscience Lab
Heraklion Greece
2020-Present

PhD Sudents

- Paschalidis C., “*Understanding the neural systems and structures of the visual system through modern computational methods.*”
- Aliprantis S., “*Deciphering neural dynamics and information exchange in the visual system during object recognition using modern computational techniques.*”
- Mantouka I., “*Investigation of the mechanisms of partial and global processing of visual stimuli: a behavioral and neuronal approach in muscle models*”
- Michael A., “*Cortical network plasticity and visual learning in Alzheimer's disease: A behavioral, electrophysiological, network connectivity, and spatial transcriptomic analysis in the primary visual cortex of the 5xFAD rat model*”

Master Thesis

Neuroscience graduate program: D. Varvouti, A. Gratsakis, O. Raos, A. Vavoulis S. Morou
Graduate program in Molecular Biology and Biomedicine: A. Goniotaki

Undergraduate Thesis

Biology Dep.: Z. Drakaki, L. Ntavarara, M. Kallipoliti, Z. Dogani, E. Petsalaki

A. Sifaki, M. Tampakaki, M. Protopapa
School of Medicine, University of Crete, Heraklion Greece

PhD 3-member committee
2022-Present

E. Troulinou, K. Petousakis, A. Velli, S. Paneri, M. Pagkalos, I. Pandi
School of Medicine, University of Crete, Heraklion Greece

PhD 7-member Defence committee
2022-Present

Brain & Mind sciences, Interdisciplinary graduate program: K. Chatzimichail
Neuroscience graduate program: C. Kaneen, M. Velissariou, Z. Drakaki, S. Skarvelaki
Graduate program in Molecular Biology and Biomedicine: N. Falalakis, C. Iordanidou
Biomedical Engineering graduate program: E. Kapetanou

Master thesis 3-member committee
2020-Present

D. Papadogianni, V. Arsenopoulos, C. Paschalidis, E. Kantidenou, S. Aliprantis, D. Pantazopoulou,
N. Chatziris, T. Steirou, E. Dimaki, R. Latsi
Brain & Mind sciences, Interdisciplinary graduate program, Heraklion Greece

Master Qualification Examination
2020-Present

research support

“Theodore Papazoglou” FORTH Synergy Grants: “Advancing Personalized Neuromodulation: Integrating NeuroAI into Real-Time Adaptive Brain Stimulation” PIs: Gregoriou, Froudarakis, Budget: 40.000 €	2025-2027
H.F.R.I-2023 <i>TiCLe: Time Continuity and Learning for shaping object representations in the brain.</i> PI: Froudarakis, ID# 16552, Budget: 207.000 €	2024 - 2025
ERC-2023 STG <i>NEURACT: Untangling population representations of objects. A closed loop approach to link neural activity to mouse behavior.</i> PI: Froudarakis, DOI: 10.3030/101076710 , Budget: 1.900.000 €	2023 – 2027
H.F.R.I-2021 <i>INSIGHT: From population representations to perception and action. A closed loop framework to study object recognition in mice.</i> PI: Froudarakis, ID# 4049, Budget: 200.000 €	2022 - 2025
H2020- MSCA-IF- 2020 <i>Neuroception: Neural Pathways from Recognition to Perception.</i> Funding for Post-Doc M. Diamantaki PI: Froudarakis, DOI: 10.3030/101025482 , Budget: 260.000 €	2021 – 2024
H2020- MSCA-RISE- 2020 <i>neuronsXnets: Network Analysis in Neocortex during Passive and Active Learning.</i> Funding for travel expenses. Primary coordinator: Papadopoulou, DOI: 10.3030/101007926 , Budget: 892.400 €	2021 - 2025

collaborators

Andreas S. Tolias , Professor Systems & Computational Neuroscience	Stanford University School of Medicine, CA, US
Fabian Sinz , Professor Neuronal Intelligence	University of Göttingen, Germany
Georgia Gregoriou , Professor Visual attention and working memory	School of Medicine, UoC, Heraklion, Greece
Sami El-Boustani , Assistant Professor Cognitive Neurobiology	University of Geneva, Switzerland
George Papagiannakis , Associate Professor Computer Graphics	Department of Computer Science, UoC, Heraklion, Greece
Stelios M. Smirnakis , Professor Neural circuit function and malfunction in disease,	Brigham and Women’s Hospital, Boston MA USA
Dorina Papageorgiou , Assistant Professor, Investigational Targeted Brain Neurotherapeutics	Baylor College of Medicine, Houston TX USA