

Emmanouil Froudarakis

Group Leader | SYSTEMS & COMPUTATIONAL NEUROSCIENCE

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Experience

- 09/2019 – Present Group Leader (Assistant Professor Grade) Institute of Molecular Biology and Biotechnology (IMBB), Foundation of Research and Technology-Hellas (FORTH), Heraklion, Crete, Greece
- 12/2017 – 9/2019 Instructor - Research project with subject: “Object representation in neocortical circuits”. Baylor College of Medicine, Department of Neuroscience, Houston TX, USA.
- 12/2017 – 9/2019 Instructor - Research project with subject: “Machine Intelligence from Cortical Networks (MICrONS)”. Baylor College of Medicine, Department of Neuroscience, Houston TX, USA.
- 3/2015 – 11/2017 Postdoctoral Associate - Research project with subject: “Mechanisms of continual learning in neocortical circuits”. Baylor College of Medicine, Department of Neuroscience, Houston TX, USA. Supervisor: Andreas S. Tolias
- 9/2009 - 3/2015 Ph.D. thesis project with subject: “Study of the representation multidimensional information in the mouse visual cortex” Baylor College of Medicine, Department of Neuroscience, Houston TX, USA. Supervisor: Andreas S. Tolias
- 1/2010 - 3/2010 Graduate research project with subject: “Audio-visual cue combination with Bayesian models comparison” Baylor College of Medicine, Department of Neuroscience, Houston TX, USA. Supervisor: Wei Ji Ma
- 11/2007 - 8/2009 Research assistant - Research project with subject: “From Connectivity to Function: Analysis and Dissection of Neural Circuits in vivo” Baylor College of Medicine, Department of Neuroscience, Houston TX, USA. Supervisor: Andreas S. Tolias
- 12/2006 - 10/2007 Masters’ research project with subject: “The role of the endocannabinoid system in synaptic transmission in the ventral tegmental area” Rudolf Magnus Institute of Neuroscience, Department of Pharmacology and Anatomy, University Medical Center Utrecht, Utrecht, the Netherlands. Supervisor: Geert M.J. Ramakers
- 8/2005 - 6/2006 Research associate - Research project with subject: Distinct neuronal circuits mediate experience-dependent, non-associative osmotactic responses in Drosophila. Institute of Molecular Biology and Genetics BSRC “Alexander Fleming”, Athens, Greece. Supervisor: Efthimios M.C. Skoulakis
- 9/2004 - 8/2005 Undergraduate thesis research with subject: Protection from premature habituation requires functional mushroom bodies in Drosophila. Institute of Molecular Biology and Genetics BSRC “Alexander Fleming”, Athens, Greece. Supervisor: Efthimios M.C. Skoulakis

Education

Postoc in Neuroscience

BAYLOR COLLEGE OF MEDICINE

Houston TX, USA

2015-17

Ph.D. in Neuroscience

BAYLOR COLLEGE OF MEDICINE

Houston TX, USA

2009-15

Master program - Neuroscience & Cognition

UTRECHT UNIVERSITY, attendance for two semesters

Utrecht, The Netherlands

2006-07

B.SC. in Biology

NATIONAL & KAPODISTRIAN UNIVERSITY OF ATHENS

Athens, Greece

2001-05

Publications

- **Froudarakis, E.**, Fahey, P.G., Reimer, J., Smirnakis, S.M., Tehovnik, E.J., and Tolias, A.S. *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. *Target specific functions of EPL interneurons in olfactory circuits*. Nature Communications 10, 1–14. (2019)
- 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. *Layer 4 of mouse neocortex differs in cell types and circuit organization between sensory areas*. Nat Commun 10, 1–12. (2019)
- Baker, C., **Froudarakis, E.**, Yatsenko, D., Tolia, A.S., and Rosenbaum, R. *Inference of Synaptic Connectivity and External Variability in Neural Microcircuits*. BioRxiv 650069. (2019)
- Walker E.Y., Sinz F.H., **Froudarakis E.**, Fahey P.G., Muhammad T., Ecker A.S., Cobos E., Reimer J., Pitkow X., Tolia A.S. *Inception in visual cortex: in vivo-silico loops reveal most exciting images* bioRxiv:506956 (2018)
- Walker E.Y., Sinz F.H., **Froudarakis E.**, Fahey P.G., Muhammad T., Ecker A.S., Cobos E., Reimer J., Pitkow X., Tolia A.S. *Inception in visual cortex: in vivo-silico loops reveal most exciting images* bioRxiv:506956 (2018)
- Sinz, H. F., Ecker, A., Fahey, G. P., Walker, Y. E., Cobos, E., **Froudarakis, E.**, Yatsenko, D., Pitkow, X., Reimer, J., Tolia, A.S. (2018). *Stimulus domain transfer in recurrent models for large scale cortical population prediction on video*. Neural Information Processing Systems
- Ecker A.S., Sinz F.H., **Froudarakis E.**, Fahey P.G., Cadena S.A., Walker E.Y., Cobos E., Reimer J., Tolia A.S., Bethge M. *A rotation-equivariant convolutional neural network model of primary visual cortex* ArXiv:1809.10504 (2018)
- 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., Roson M.R, Theis L., Tolia A.S., Bethge M. (2018). *Community-based benchmarking improves spike rate inference from two-photon calcium imaging data*. PLOS Comput. Biol. 14, e1006157.
- Quast, K.B., Ung, K., **Froudarakis, E.**, Huang, L., Herman, I., Addison, A.P., Ortiz-Guzman, J., Cordiner, K., Saggau, P., Tolia, 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., Tolia, 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 Tolia, 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 Tolia, 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 Tolia, 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 Tolia, 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. (2007b). *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.**, Tsiorka, A.-A., and Skoulakis, E.M.C. (2007a). *Distinct neuronal circuits mediate experience-dependent, non-associative osmotactic responses in Drosophila*. Mol. Cell. Neurosci. 34, 378–389.

Selected manuscripts

- **Froudarakis E.**, Walker E., Reimer J., Berens, P., Tolia A.S. *Object representations in the mouse visual system*. (In preparation)
- **Froudarakis E.**, Patel S., Tolia A.S., *A high throughput training method for investigating visual object recognition in mice*. (In preparation)