Nikolaos Karalis

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Current position

Research fellow
2018 - now Friedrich Miescher Institute for Biomedical Research
Project: *Neuromodulatory organization of amygdala circuits*
Group leader: Dr. Andreas Lüthi

Education

Ph.D. in Neuroscience
2013 - 2018 Faculty of Medicine, Ludwig-Maximilians University Munich
Thesis: *Oscillatory architecture of memory circuits*
Advisor: Prof. Dr. Anton Sirota

M.Sc. **Neurasmus Joint Master in Neuroscience**
2011-2012 Charité University Medicine, Berlin – Medical Neuroscience
2012-2013 University Bordeaux II – Neuroscience and Neuropsychopharmacology Grade 18/20
Thesis: *Neuronal signatures of fear memory* Ranking 1/5

B.Sc. & M.Sc. **School of Applied Mathematics and Physical Sciences**
2004 – 2011 National Technical University of Athens (NTUA) Grade 7.42/10
Majors: Computational Mathematics, Statistics
Thesis: *EEG signal analysis methods for characterization of meditative states* Grade 10/10

Research methods

- large-scale *in vivo* electrophysiology
- high-dimensional data analysis
- silicon-probe recordings
- closed-loop optogenetics
- fiber photometry

Selected Publications (Citations: 595; h-index: 6) ORCID: 0000-0002-1804-9756

1. Breathing coordinates limbic network dynamics underlying memory consolidation **bioRxiv, 2018**
   Karalis N, Sirota A
2. Re-thinking the etiological framework of neurodegeneration **Front. in Neuroscience, 2019**
   Castillo X, …, **Karalis N**, ..., Villringer A, Winek K, Zille M
3. IgSF9b regulates anxiety behaviors through centromedial amygdala inhibitory synapses **Nature Communications, 2018**
   Babaev O, Cruces-Solis H, …, **Karalis N**, …, Brose N, Krueger-Burg D
4. Prefrontal-periaqueductal gray-projecting neurons mediate context fear discrimination **Neuron, 2018**
   Rozeske R, Jercog D, **Karalis N**, Chaudun F, Khoder S, Girard D, Winke N, Herry C
5. Prefrontal neuronal assemblies temporally control fear behavior. **Nature, 2016**
   Dejean C*, Courtin J*, **Karalis N***, Chaudun F, Wurtz H, Thomas Bienvenu, Herry C
6. 4 Hz oscillations synchronize prefrontal - amygdala circuits during fear behaviour. **Nature Neuroscience, 2016**
   Karalis N*, Dejean C*, Chaudun F*, …, Benchenane K, Sirota A, Courtin J, Herry C
7. Prefrontal parvalbumin interneurons shape neuronal activity to drive fear expression. **Nature, 2013**
   Courtin J, Chaudun F, Rozeske R, **Karalis N**, …, Bienvenu T, Herry C
8. Persistence of amygdala gamma oscillations during extinction learning predicts spontaneous fear recovery. **Neurobiology of Learning and Memory, 2013**
   Courtin J, **Karalis N**, Gonzalez-Campo C, Wurtz H, Herry C
9. Effects of Himalayan tradition meditation during a SSVEP study. **Neuroscience Letters, 2011**
   Karalis N, Karanasiou I, Uzunoglu N, & Braboszcz C

*: equal contribution

Invited Talks

2019	Internal clocks for circuit organization	FENS-Hertie Winter School
2017	Neuronal synchrony and oscillatory coupling	Coupling & Causality in Complex Systems
	Neuronal correlates of breathing	Bernstein Conference PhD Symposium
	Respiratory entrainment of memory circuits	Harvard-LMU Young Scientists' Forum
	Respiratory entrainment of prefrontal circuits	Japan Neuroscience Society meeting
	Prefrontal oscillatory mechanisms of fear behavior	British Neuroscience Association meeting
2016	Oscillatory circuit organization during fear behavior	LMU lecture series
	Neuronal signatures of fear behavior	Neurizons – Young Investigator Talks
2015	High-density characterization of network activity	German Neuroscience Society
2014	Neurophysiological correlates of rodent communication	Animal Communication Workshop
2013	Neuronal signatures of fear memory	Neurasmus Workshop
	Neuronal signatures of fear memory	Neurasmus Orientation Week
2011	SSVEP effects of Himalayan tradition meditation	Breaking Convention
2007	Novel graph invariants for fast graph isomorphism	Mitacs Industrial Math Summer School
	Combinatorial and statistical analysis of keno game	Canadian Undergraduate Mathematics Conference

Research Experience

2019 – today **Research Fellow** **Friedrich Miescher Institue for Biomedical Research**
Project: *Neuromodulatory organization of amygdala circuits*
Group leader: Dr. Andreas Lüthi

2013 – 2018 **Ph.D. Thesis** **Ludwig-Maximilians-Universität München** Faculty of Medicine
Mechanisms of memory consolidation across hippocampal and cortical circuits
Advisor: Prof. Dr. Anton Sirota

2012 – 2013 **M.Sc. Thesis** **Neurocenter Magendie, Bordeaux** INSERM
Neuronal signatures of fear memory
Supervisor: Dr. Cyril Herry

2009 – 2011 **M.Sc. Thesis** **National Technical University of Athens** Electrical Engineering Dept.
EEG Analysis of the neurophysiological effects of meditation on visual evoked potentials
Supervisors: Dr. Irene Karanasiou & Dr. Nikolaos Uzunoglou

2005 – 2009 **Research assistance** **National Technical University of Athens** High Energy Physics Dept.
CERN Grid Computing infrastructure - Network development and administration

Scholarships and Grants

2019 – 2021	Marie Curie Individual Fellowship	(191.000 EUR)
2019 – 2021	EMBO Long-Term Fellowship	(130.000 CHF)
2014 – 2017	Ludwig-Maximilians-Universität München	
2013 – 2014	Centre for Integrative Neuroscience (CIN) - University of Tübingen	
2011 – 2013	Erasmus Mundus scholarship for the Neurasmus Joint Master degree program in Neuroscience	
2010	University of Pennsylvania Grant	
2009	Erasmus scholarship (Research exchange)	
2007	MITACS scholarship	

Awards

2010 "*Thomaideio Award"* for conference presentation from National Technical University of Athens for the presentation "Short term effects of Vipassanā meditation in a single subject SSVEP study"

2008 "*Thomaideio Award"* for best journal publication from National Technical University of Athens for the publication "Effect of meteorological variables on the incidence of lower urinary tract infections"

Experimental Techniques

Electrophysiology	*in vivo* extracellular recordings (tetrodes, silicon probes, ECoG) in freely behaving & head-fixed rodents, high-dimensional neural data analysis, human EEG recordings
Imaging	calcium imaging in freely-behaving mice (miniscope), fiber photometry
Circuit manipulation	closed-loop optogenetics, pharmacogenetics & pharmacology
Programming	Matlab, Python, Julia, Java, C++, PHP, HTML, SQLite
Electronics	circuit design and implementation, electrophysiology and behavioral equipment setup, 3D printing
Lab techniques	stereotaxic neurosurgeries, behavioral analysis, immunohistochemistry, microscopy, cell cultures

Student supervision

2016 – 2017	Jialiang Lu	M.Sc. Thesis	Currently: Graduate student at Caltech
2017	Auguste Schulz	Research Internship	Currently: M.Sc. student at TUM
2016	Sandra Reinert	Research Internship	Currently: Graduate student at LMU
2015 – 2016	Elena Itzcovich	Research Internship	Currently: Graduate student at LMU
2015 – 2016	Amar Roy	M.Sc. Thesis	Currently: Industry
2015 – 2016	Felix Brechtmann	Research Internship	Currently: Industry

Academic service & outreach

2020	FENS 2020 Twitter Ambassador
2019 – today	Peer reviewer, Cosyne conference
2016 – today	Administrator of Systems Neuroscience mailing list
2016 – today	Peer reviewer (PLOS, Front. Comp. Neuro, Neurocomputing, Neuroscience Letters, CODY, Cosyne)
2015 – today	Organizer of Neurophysiology Nights seminar series, LMU
2012 – 2015	Writer & editorial board of the "CNS Charité Neuroscience Newsletter"
2012 – 2013	Neurasmus course representative at the Erasmus Mundus Association (EMA)
2012 – today	Scholarpedia Assistant Editor
2011 – 2014	TED talks translator
2008 – 2010	American Mathematical Society's (AMS) poster series "Mathematical Moments" translator
2004 – 2006	Organizer and invigilator - National mathematical competitions - Hellenic Mathematical Society (HMS)
2004	Coordinator, guide and invigilator at the International Mathematical Olympiad (IMO) 2004
2004	Coordinator, guide and invigilator at the International Informatics Olympiad (IOI) 2004

Teaching experience

2019	Tutoring at FENS CAJAL course - Biosensors and actuators for cellular and systems neuroscience, Bordeaux
2017	Assistance at Miniscope Workshop Munich
2015 - 2017	Student supervision
2015	Tutor at the 7th G-Node Winter Course in Neural Data Analysis
2012	"Speaking to the public" (M.Sc. course), Charité University Hospital, Berlin
2004 – 2012	Private and group tutor (university and high school students), Athens

Patents

WO/2017/021542 Method and device for modulating fear and/or anxiety

Other publications

10. Combinatorial and statistical analysis of keno game. **CUMC Annual, 2007**
    Karalis N
11. Effect of meteorological variables on the incidence of lower urinary tract infections. **European Journal of Clinical Microbiology and Infectious Diseases, 2009**
    Falagas ME, Peppas G, Matthaiou DK, Karageorgopoulos DE, **Karalis N**, Theocharis G
12. Novel graph invariants for fast graph isomorphism identification. **Mitacs Proceedings, 2007**
    Karalis N, Aliaga R, Arnold R, Wu W

Selected Travel grants

2020	Molecules to Behavior Underlying Interoception, Janelia
2019	Neuromodulation of Neural Microcircuits conference
	Computation and Systems Neuroscience (Cosyne) conference
2018	Onassis Foundation nomination and grant to attend Lindau Nobel Laureate Meeting
	FENS-IBRO/PERC travel grant to attend FENS Forum 2018
2017	BCCN travel grant to attend Bernstein Conference
	Junior Scientist Workshop on Neural Circuits and Behavior, Janelia
	FENS travel grant to attend JNS Annual Meeting
	EMBL Symposium on Neural Circuits
	37th Blankenese Conference
2015	University of Tartu – INCF
2014	British Neuroscience Association
2013	Hellenic Pasteur Institute
2011	Thomaideio grant (NTUA) for active participation in conference.
2010	COST Grant (5th International Summer School on Emerging Technologies in Biomedicine)
	Centrum Wiskunde & Informatica (CWI) (Study group Mathematics with Industry)
2009	Centre de Recherche Cerveau et Cognition
2008	Danish Center for Applied Mathematics and Mechanics (DCAMM)
	University of Crete travel grant
	Pacific Institute for the Mathematical Sciences (PIMS) grant