**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**

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

**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

1. Re-thinking the etiological framework of neurodegeneration **Front. in Neuroscience, 2019**

Castillo X, …, **Karalis N**, ..., Villringer A, Winek K, Zille M

1. IgSF9b regulates anxiety behaviors through centromedial amygdala inhibitory synapses **Nature Communications, 2018**Babaev O, Cruces-Solis H, …, **Karalis N**, …, Brose N, Krueger-Burg D
2. 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

1. Prefrontal neuronal assemblies temporally control fear behavior. **Nature, 2016**

Dejean C\*, Courtin J**\***, **Karalis N\***, Chaudun F, Wurtz H, Thomas Bienvenu, Herry C

1. 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
2. Prefrontal parvalbumin interneurons shape neuronal activity to drive fear expression. **Nature, 2013**

Courtin J, Chaudun F, Rozeske R, **Karalis N**, …, Bienvenu T, Herry C

1. Persistence of amygdala gamma oscillations during extinction learning **Neurobiology of Learning**

predicts spontaneous fear recovery. **and Memory, 2013**

Courtin J, **Karalis N**, Gonzalez-Campo C, Wurtz H, Herry C

1. 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 behaviorLMU 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](http://www.medical-neurosciences.de/en/about_us/newsletter/)”

**2012 – 2013** Neurasmus course representative at the [Erasmus Mundus Association (EMA)](http://www.em-a.eu/)

**2012 – today** Scholarpedia Assistant Editor

**2011 – 2014** [TED](http://www.ted.com) talks translator

**2008 – 2010** American Mathematical Society's (AMS) poster series “[Mathematical Moments](http://www.ams.org/samplings/mathmoments/browsemoments?lang=greek)” translator

**2004 – 2006** Organizer and invigilator - National mathematical competitions - [Hellenic Mathematical Society (HMS)](http://www.hms.gr)

**2004** Coordinator, guide and invigilator at the International Mathematical Olympiad (IMO) 2004

**2004** Coordinator, guide and invigilator at the [International Informatics Olympiad (IOI) 2004](http://www.epy.gr/ioi2004/)

**Teaching experience**

**2019** Tutoring at FENS CAJAL course - Biosensors and actuators for cellular and systems neuroscience, Bordeaux

**2017** Assistance atMiniscope Workshop Munich

**2015 - 2017** Student supervision

**2015** Tutor at the7th 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**

1. Combinatorial and statistical analysis of keno game. **CUMC Annual, 2007**

**Karalis N**

1. Effect of meteorological variables on the incidence of lower urinary tract infections. **European Journal of Clinical**

Falagas ME, Peppas G, Matthaiou DK, Karageorgopoulos DE, **Microbiology and Infectious**

**Karalis N**, Theocharis G **Diseases, 2009**

1. 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