

# Nikolaos Karalis

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## Current position

### Research fellow

2018 - now Friedrich Miescher Institute for Biomedical Research  
Group leader: Dr. Andreas Lüthi

## Education

### Ph.D. candidate 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 - Oscillatory synchronization underlying fear memory expression 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

*in vivo* electrophysiology, high-dimensional data analysis, closed-loop optogenetics

## Selected Publications (Citations: 315 ; h-index: 5 ; \*: equal contribution)

ORCID: 0000-0002-1804-9756

1. Prefrontal-Periaqueductal Gray-Projecting Neurons Mediate Context Fear Discrimination  
Rozeske R, Jercog D, **Karalis N**, Chaudun F, Khoder S, Girard D, Winke N, Herry C **Neuron, 2018**
2. Prefrontal neuronal assemblies temporally control fear behavior.  
Dejean C\*, Courtin J\*, **Karalis N\***, Chaudun F, Wurtz H, Thomas Bienvenu, Herry C **Nature, 2016**
3. 4 Hz oscillations synchronize prefrontal - amygdala circuits during fear behaviour.  
**Karalis N**, Dejean C, Chaudun F, Khoder S, Rozeske R, Wurtz H, Bagur S, Benchenane K, Sirota A, Courtin J, Herry C **Nature Neuroscience, 2016**
4. Prefrontal parvalbumin interneurons shape neuronal activity to drive fear expression.  
Courtin J, Chaudun F, Rozeske R, **Karalis N**, Gonzalez-Campo C, Wurtz H, Abdi A, Baufreton J, Bienvenu T, Herry C **Nature, 2013**
5. Persistence of amygdala gamma oscillations during extinction learning predicts spontaneous fear recovery.  
Courtin J, **Karalis N**, Gonzalez-Campo C, Wurtz H, Herry C **Neurobiology of Learning and Memory, 2013**
6. Effects of Himalayan tradition meditation during a SSVEP study.  
**Karalis N**, Karanasiou I, Uzunoglu N, & Braboszcz C **Neuroscience Letters, 2011**

## Invited Talks

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

## Research Experience

<b>2013 – 2018</b>	<b>PhD candidate</b>	<b>Ludwig-Maximilians-Universität München</b>	Faculty of Medicine Mechanisms of memory consolidation across hippocampal and cortical circuits Advisor: Prof. Dr. Anton Sirota
<b>2012 – 2013</b>	<b>M.Sc. Thesis</b>	<b>Neurocenter Magendie, Bordeaux</b>	INSERM Neuronal signatures of fear memory Supervisor: Dr. Cyril Herry
<b>2009 – 2011</b>	<b>M.Sc. Thesis</b>	<b>National Technical University of Athens</b>	Electrical Engineering Dept. EEG Analysis of the neurophysiological effects of meditation on visual evoked potentials Supervisors: Dr. Irene Karanasiou & Dr. Nikolaos Uzunoglou
<b>2005 – 2009</b>	<b>Research assistance</b>	<b>National Technical University of Athens</b>	High Energy Physics Dept. CERN Grid Computing infrastructure - Network development and administration

## Scholarships and Grants

<b>2014 – 2017</b>	Ludwig-Maximilians-Universität München
<b>2013 – 2014</b>	Centre for Integrative Neuroscience (CIN) - University of Tübingen
<b>2011 – 2013</b>	Erasmus Mundus scholarship for the Neurasmus Joint Master degree program in Neuroscience
<b>2010</b>	University of Pennsylvania Grant
<b>2009</b>	Erasmus scholarship (Research exchange)
<b>2007</b>	MITACS scholarship

## Awards

<b>2010</b>	“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”
<b>2008</b>	“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

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

## Other publications

7. Combinatorial and statistical analysis of keno game. **CUMC Annual, 2007**  
**Karalis N**
8. 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
9. Novel graph invariants for fast graph isomorphism identification. **Mitacs Proceedings, 2007**  
**Karalis N**, Aliaga R, Arnold R, Wu W

## Selected conferences and summer schools

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| <b>2018</b> | 68 <sup>th</sup> Lindau Nobel Laureate Meeting in Physiology & Medicine<br>11 <sup>th</sup> FENS forum, Berlin   |
| <b>2017</b> | Junior Scientist Workshop on Neural Circuits and Behavior, Janelia Farm, Washington<br>Society for Neuroscience Meeting, Washington, DC<br>Bernstein Conference, Göttingen<br>Harvard-LMU Young Scientists' Forum, Munich<br>Japan Neuroscience Society annual meeting, Tokyo<br>EMBL Symposium Neural Circuits in the Past, Present and Future, Heidelberg<br>37th Blankenese Conference on Synaptic plasticity & stability, Hamburg<br>British Neuroscience Association festival, Birmingham |
| <b>2016</b> | Probing neuronal circuits during behavior, Bordeaux<br>Neurizons, Göttingen  |
| <b>2015</b> | Mechanisms of Memory Consolidation, Reconsolidation and Extinction, Lausanne<br>3rd Baltic-Nordic Summer School on Neuroinformatics, University of Tartu<br>Optogenetics Workshop SPP1665, Ruhr University Bochum<br>7th G-Node Winter Course in Neural Data Analysis, LMU<br>Bernstein Conference, Heidelberg<br>11 <sup>th</sup> Meeting of the German Neuroscience Society, Göttingen   |
| <b>2014</b> | NIN Interneuron Summer School, Amsterdam<br>Optogenetics: controlling the brain with light, University of Oxford<br>Society for Neuroscience Meeting, Washington, DC<br>9 <sup>th</sup> FENS Forum of Neuroscience, Milan  |
| <b>2013</b> | 1st Live Cell Imaging and Electrophysiology Workshop, Pasteur Institute, Athens<br>11th Summer Course on Computational Neuroscience, Göttingen<br>5th G-Node Winter Course in Neural Data Analysis, LMU<br>Bernstein Conference, Tübingen  |
| <b>2012</b> | Super Resolution Imaging Techniques Workshop, Bordeaux Imaging Center<br>Mathematical Cell Biology Graduate Summer Course, University of British Columbia, Vancouver<br>8 <sup>th</sup> FENS Forum of Neuroscience, Barcelona<br>7 <sup>th</sup> International Symposium on Neuroprotection and Neurorepair, Potsdam   |
| <b>2011</b> | Society of Applied Neuroscience meeting, Thessaloniki<br>Breaking Convention, University of Kent   |
| <b>2010</b> | 5th International Summer School on Emerging Technologies in Biomedicine, Patras<br>Summer Program in Computational Neuroscience, University of Pennsylvania, Philadelphia  |

## Travel grants

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