

# Nikolaos Karalis

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## Current position

### Ph.D. candidate in Neuroscience

2013 - 2017 Faculty of Medicine, Ludwig-Maximilians University Munich  
Thesis Mechanisms of memory consolidation across hippocampal and cortical circuits  
Advisor Prof. Dr. Anton Sirota

## Education

### M.Sc. Neurasmus Joint Master in Neuroscience

2011-2012 Charité University Medicine, Berlin – Medical Neuroscience  
2012-2013 University Bordeaux II – Neuroscience and Neuropsychopharmacology  
Thesis Neuronal Signatures of Fear Memory  
Grade 18/20  
Ranking 1/5

### B.Sc. & M.Sc. School of Applied Mathematics and Physical Sciences

2004 – 2011 National Technical University of Athens (NTUA)  
Majors Computational Mathematics, Statistics  
Thesis EEG signal analysis for identification of meditative states  
Grade 7.42/10  
Grade 10/10

## Research methods

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

## Publications (Citations: 225 ; h-index: 5 ; \*: equal contribution)

1. Prefrontal neuronal assemblies temporally control fear behavior. **Nature, 2016**  
Dejean C\*, Courtin J\*, **Karalis N\***, Chaudun F, Wurtz H, Thomas Bienvenu, Herry C
2. 4 Hz oscillations synchronize prefrontal - amygdala circuits during fear behaviour. **Nature Neuroscience, 2016**  
**Karalis N**, Dejean C, Chaudun F, Khoder S, Rozeske R, Wurtz H, Bagur S, Benchenane K, Sirota A, Courtin J, Herry C
3. Prefrontal parvalbumin interneurons shape neuronal activity to drive fear expression. **Nature, 2013**  
Courtin J, Chaudun F, Rozeske R, **Karalis N**, Gonzalez-Campo C, Wurtz H, Abdi A, Baufreton J, Bienvenu T, Herry C
4. 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
5. Effects of Himalayan tradition meditation during a SSVEP study. **Neuroscience Letters, 2011**  
**Karalis N**, Karanasiou I, Uzunoglu N, & Braboszcz C
6. 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
7. Novel graph invariants for fast graph isomorphism identification. **Mitacs Proceedings, 2007**  
**Karalis N**, Aliaga R, Arnold R, Wu W
8. Combinatorial and statistical analysis of keno game. **CUMC Annual, 2007**  
**Karalis N**

## Invited Talks

2017	Neuronal synchrony and oscillatory coupling	Coupling & Causality in Complex Systems
2017	Neuronal correlates of breathing	Bernstein Conference PhD Symposium
2017	Respiratory entrainment of memory circuits	Harvard-LMU Young Scientists' Forum
2017	Respiratory entrainment of prefrontal circuits	Japan Neuroscience Society meeting
2017	Prefrontal oscillatory mechanisms of fear behavior	British Neuroscience Association meeting
2016	Oscillatory circuit organization during fear behavior	LMU lecture series
2016	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
2013	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
2007	Combinatorial and statistical analysis of keno game	Canadian Undergraduate Mathematics Conference

## Research Experience

2013 – now	<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	
2012 – 2013	<b>M.Sc. Thesis</b>	<b>Neurocenter Magendie, Bordeaux</b>	INSERM
	Neuronal signatures of fear memory		
	Supervisor	Dr. Cyril Herry	
2009 – 2011	<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	
2005 – 2009	<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

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

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

## Internships

- 2011 – 2012**      **Lab Rotations - Charité - Universitätsmedizin Berlin**  
“Comparison of cell counting techniques for the assessment of cell death in tissue slices”  
“Effects of PEDF on primary neuronal cells after oxygen-glucose deprivation”  
Departments of Experimental Neurosurgery & Experimental Neurology  
Supervisors: Dr. Ana Luisa Piña – Dr. Marietta Zille
- 2010**              **Summer research scholar - University of Pennsylvania**  
Department of Psychiatry, Supervisor: Dr. Ruben Gur
- 2009**              **M.Sc. Thesis - Université Paul Sabatier, Toulouse**  
Centre de Recherche Cerveau et Cognition (CERCO), Supervisor: Dr. Arnaud Delorme
- 2008**              **Internship on Biostatistics - Alfa Institute of Biomedical Sciences (AIBS)**  
Supervisors: Dr. Matthew E. Falagas - Dr. Dimitrios Matthaiou
- 2007**              **Graph theory research for MapleSoft – Simon Fraser University (SFU)**  
“Algorithmic graph isomorphism determination”  
Centre for Experimental and Constructive Mathematics (CECM)  
Supervisors: Dr. Michael Monagan - Mohammad Ghebleh

## Student supervision

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

## Scientific outreach

<b>2016 – today</b>	Administrator of Systems Neuroscience mailing list
<b>2016 – today</b>	Peer reviewer
<b>2015 – today</b>	Organizer of Neurophysiology Nights seminar series, LMU
<b>2012 – 2015</b>	Writer & editorial board of the “CNS Charité Neuroscience Newsletter”
<b>2012 – 2013</b>	Neurasmus course representative at the Erasmus Mundus Association (EMA)
<b>2012 – today</b>	Scholarpedia Assistant Editor
<b>2011 – 2014</b>	TED talks translator
<b>2008 – 2010</b>	American Mathematical Society's (AMS) poster series “Mathematical Moments” translator
<b>2004 – 2006</b>	Organizer and invigilator - National mathematical competitions - Hellenic Mathematical Society (HMS)
<b>2004</b>	Coordinator, guide and invigilator at the International Mathematical Olympiad (IMO) 2004
<b>2004</b>	Coordinator, guide and invigilator at the International Informatics Olympiad (IOI) 2004

## Teaching experience

<b>2017</b>	Assistance at Miniscope Workshop Munich
<b>2015 - 2017</b>	Student supervision
<b>2015</b>	Tutor at the 7th G-Node Winter Course in Neural Data Analysis
<b>2012</b>	“Speaking to the public” (M.Sc. course), Charité University Hospital, Berlin
<b>2004 – 2012</b>	Private and group tutor (university and high school students), Athens

## References

### **Anton Sirota, Ph.D.**

Professor, Chair for Cognition and Neural Plasticity  
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### **Cyril Herry, Ph.D.**

Researcher CR1  
INSERM U862  
Neurocentre Magendie  
146 rue Léo Saignat  
33077 Bordeaux Cedex, France  
Email: [cyril.herry@inserm.fr](mailto:cyril.herry@inserm.fr)  
Tel: (+33) 0557573726

### **Irene Karanasiou, Dr.-Ing.**

Associate Professor  
Hellenic Military University  
National Technical University of Athens  
School of Electrical & Computer Engineering  
Microwave & Fiber Optics Laboratory  
Iroon Polytechniou 9,  
157 73 Zografou Campus, Athens, Greece  
Email: [ikaran@esd.ece.ntua.gr](mailto:ikaran@esd.ece.ntua.gr)  
Tel: (+30) 2107722289

## Travel grants

2017	BCCN travel grant to attend Bernstein Conference
2017	Janelia Farm travel grant to attend Junior Scientist Workshop on Neural Circuits and Behavior
2017	FENS travel grant to attend JNS Annual Meeting
2017	Travel grant to attend EMBL Symposium on Neural Circuits
2017	Travel grant to attend 37th Blankenese Conference
2015	University of Tartu – INCF travel grant
2014	British Neuroscience Association travel grant
2013	Hellenic Pasteur Institute travel grant
2011	Thomaideio grant (NTUA) for active participation in conference.
2010	COST Grant (5th International Summer School on Emerging Technologies in Biomedicine)
2010	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)
2008	University of Crete
2008	Pacific Institute for the Mathematical Sciences (PIMS) grant
2006	FORTH scholarship
2006	Athens Information Technology (AIT)
2006	National Science Foundation (NSF)

## Conference abstracts

2017	Respiratory entrainment of memory circuits <b>Karalis N</b> , Sirota A [Junior Scientist Workshop on Neural Circuits and Behavior] Neuronal synchrony and oscillatory coupling - Functional role and implementation <b>Karalis N</b> , Sirota A [Coupling and Causality in Complex Systems Conference] Respiratory entrainment of memory circuits <b>Karalis N</b> , Sirota A [SfN Meeting 2017] Respiratory entrainment of prefrontal circuits <b>Karalis N</b> , Sirota A [Bernstein Conference 2017] Respiratory entrainment of prefrontal circuits <b>Karalis N</b> , Sirota A [40th Meeting of Japan Neuroscience Society] Respiratory entrainment of prefrontal circuits <b>Karalis N</b> , Sirota A [Causation, Explanation, Conditionals workshop] Respiratory entrainment of prefrontal circuits <b>Karalis N</b> , Sirota A [EMBL Symposium Neural Circuits in the Past, Present and Future] Respiratory entrainment of prefrontal circuits <b>Karalis N</b> , Sirota A [37th Blankenese Conference on Synaptic plasticity & stability]
2016	Manipulating and interpreting fast oscillatory dynamics using optogenetics <b>Karalis N</b> , Lu J, Sirota A [3rd Bordeaux Neurocampus Conference] Manipulating and interpreting network dynamics using optogenetics <b>Karalis N</b> , Lu J, Sirota A [Bernstein Retreat - 10th Sparks Workshop] Oscillatory circuit organization during fear behavior <b>Karalis N</b> , Courtin, J, Dejean C, Chaudun F, Rozeske R, Wurtz H, Herry C [Neurizons]
2015	High-density electrophysiological characterization of the hippocampal and cortical network activity <b>Karalis N</b> , Blanco-Hernandez E, Sirota A [11th Meeting of the German Neuroscience Society 2015] Multichannel extracellular recordings in freely behaving rodents Resnik E, <b>Karalis N</b> , Schwesig G, Sirota A [Center of Competence in Neuroengineering Meeting 2015]
2014	Synchronized prefrontal-amygdala 4Hz oscillations mediate fear behavior <b>Karalis N</b> , Courtin, J, Dejean C, Chaudun F, Rozeske R, Wurtz H, Herry C [SfN Meeting 2014] Prefrontal circuits of contextual fear discrimination and generalization <b>Rozeske R</b> , Khoder S, Chaudun F, Karalis N, Wurtz H, Herry C [SfN Meeting 2014] Towards the dissection of the olfactory sampling strategies during exploratory activity Blanco-Hernandez E, Graboski J, <b>Karalis N</b> , Sirota A [Olfaction SPP 5th Annual Meeting].

- 2014** Long-range synchronization of prefrontal-amygdala neuronal circuits during fear behavior  
**Karalis N**, Courtin, J, Dejean C, Chaudun F, Rozeske R, Wurtz H, Herry C [FENS Meeting 2014]  
 Prefrontal Circuits of Contextual Fear Discrimination  
 Rozeske R, Chaudun F, Khoder S, **Karalis N**, Wurtz H, Herry C [FENS Meeting 2014]  
 Medial prefrontal cortex neuronal ensembles encode conditioned fear behavior  
 Dejean C, Courtin, J, **Karalis N**, Wurtz H, Herry C [FENS Meeting 2014]  
 Synchronized prefrontal-amygdala 4Hz oscillations mediate fear behavior  
**Karalis N**, Courtin, J, Dejean C, Chaudun F, Rozeske R, Wurtz H, Herry C [NIN Interneurons Summer School]
- 2013** Increased prelimbic neuronal activity is associated with contextual fear discrimination  
 Rozeske R, **Karalis N**, Khoder S, Herry C [4th GDR Congress]
- 2011** Effects of Himalayan tradition meditation during a SSVEP study  
**Karalis N**, Karanasiou I, Uzunoglu N [Meeting of the Society of Applied Neurosciences 2011]
- 2010** Short term effects of Vipassanā meditation in a single subject SSVEP study  
**Karalis N**, Karanasiou I, Uzunoglu N [4<sup>th</sup> Congress for Electr. Engin. Students]
- 2006** Grid Computing [TEE Research and Technology Days]

## Workshops and summer schools

- 2017** Junior Scientist Workshop on Neural Circuits and Behavior, Janelia Farm, Washington
- 2015** Mechanisms of Memory Consolidation, Reconsolidation and Extinction, Lausanne  
 Why trust a theory? – Modern Physics Scientific Methodology, LMU  
 3rd Baltic-Nordic Summer School on Neuroinformatics, University of Tartu  
 Optogenetics Workshop SPP1665, Ruhr University Bochum  
 7th G-Node Winter Course in Neural Data Analysis, LMU
- 2014** NIN Interneuron Summer School, Amsterdam  
 Understanding Sleep: Novel Perspectives in Neurosciences, European Sleep Research Society, Milan  
 Optogenetics: controlling the brain with light, University of Oxford  
 International Course on Animal Communication, University of Tübingen  
 Practical course optical imaging in Neuroscience, University of Tübingen
- 2013** Models of Synaptic Plasticity Doctoral Course, University of Tübingen  
 1st Live Cell Imaging and Electrophysiology Workshop, Pasteur Institute, Athens  
 11th Summer Course on Computational Neuroscience, Göttingen  
 Neurasmus Workshop, Coimbra  
 5th G-Node Winter Course in Neural Data Analysis, LMU  
 Brain-Computer Interface workshop and hands-on seminar, INRIA, Bordeaux
- 2012** Super Resolution Imaging Techniques Workshop, Bordeaux Imaging Center  
 Neurasmus Workshop, Barcelona  
 Mathematical Cell Biology Graduate Summer Course, University of British Columbia, Vancouver  
 Cerebral Ischemia: in vivo and in vitro models (Methods Course), Dept. Of Exp. Neurology, Charité, Berlin  
 FELASA category B training (License for experimentation on living animals), Charité, Berlin
- 2010** 5th International Summer School on Emerging Technologies in Biomedicine, Patras  
 Summer Program in Computational Neuroscience, University of Pennsylvania, Philadelphia  
 Study Group Mathematics with Industry, Amsterdam
- 2009** 8th EEGLAB Workshop, Aspet
- 2008** Modern Methods in Industrial Mathematics Ph.D. Course, Technical University of Denmark, Copenhagen  
 66th European Study Group with Industry, Technical University of Denmark, Copenhagen  
 Mathematics Summer School, University of Crete  
 Graduate Industrial Mathematics Modeling Camp, University of Regina  
 Industrial Problem Solving Workshop, University of Regina  
 2nd Workshop for Drug Design, National Hellenic Research Foundation, Athens
- 2007** MITACS Industrial Math Summer School, Simon Fraser University, Vancouver
- 2006** Arizona Winter School “Computational Aspects of Algebra and Arithmetic”, Tucson, Arizona  
 Introduction to Grid Computing, Athens  
 Next Generation Computing Systems - AIT Summer School, Athens  
 BEST Robotics Summer School, Athens
- 2001 – 2004** Participation in national mathematical competitions

## Languages

Language	Level		Certification
Greek	First language		
English	Fluent	C2	Cambridge First Certificate in English (2001)
German	Intermediate	C1	Zentrale Mittelstufenprüfung (2002) Zertifikat Deutsch als Fremdsprache (2000)
Spanish	Intermediate	B2	
French	Intermediate	B2	

## Soft skills courses

<b>2017</b>	Patent and IP workshop, Center for Nanoscience, Munich
<b>2015</b>	Project management workshop, LMU Graduate School, Munich
<b>2015</b>	Grant writing workshop, LMU Graduate School, Munich
<b>2015</b>	Academic presentation workshop, LMU Graduate School, Munich
<b>2014</b>	Educational course on manuscript and grant writing, Milan

## Professional memberships

<b>2017 – today</b>	Japan Neuroscience Association
<b>2014 – today</b>	Society for Neuroscience
<b>2013 – today</b>	Bernstein Center for Computational Neuroscience
<b>2013 – today</b>	Neurasmus Alumni Association
<b>2012 – today</b>	Neuroscience in Bordeaux Association
<b>2012 – today</b>	Federation of European Neuroscience Societies
<b>2012 – today</b>	Hellenic Society for Neurosciences
<b>2011 – today</b>	“School of Applied Mathematics and Physics” Alumni Association
<b>2004 – today</b>	Hellenic Mathematical Society

## Volunteering work

<b>2011</b>	Volunteering for EDASA (Forest Wildfire Protection), Athens
<b>2010</b>	JeffHOPE student-run free clinics, Philadelphia, PA
<b>2010</b>	Books Through Bars, Philadelphia, PA
<b>2009 – 2012</b>	Photographer in various artistic events
<b>2007</b>	Teaching computer skills to immigrants at the Underground Free University, Athens
<b>2005</b>	European Youth Week 2005, Athens

## Non-academic work experience

<b>2011 – 2012</b>	Civic Consulting (Research assistance), Berlin, Germany
<b>2011</b>	Greek Population Census
<b>2010 – 2012</b>	Founder of tutoring and career counseling organization
<b>2009 – 2011</b>	Photographer (freelance, Demotix agency)
<b>2007 – 2011</b>	Animateur
<b>2004 – 2012</b>	Web development (PHP, HTML, CSS, Javascript, LaTeX, SQL)
<b>2010</b>	Hellenic Post
<b>2004</b>	Hellenic Telecommunications Organization (OTE)
<b>2004</b>	Athens Urban Transportation Organization (OASA)

## Conference participation

<b>2017</b>	Society for Neuroscience Meeting, Washington, DC
	Bernstein Conference 2017, Göttingen
	Coupling & Causality in Complex Systems, Cologne
	Harvard-LMU Young Scientists' Forum, Munich
	Japan Neuroscience Society annual meeting, Tokyo
	Bernstein Retreat and Causation, Explanation, Conditionals Workshop, Tutzing
	EMBL Symposium Neural Circuits in the Past, Present and Future, Heidelberg
	37th Blankenese Conference on Synaptic plasticity & stability, Hamburg
	British Neuroscience Association festival, Birmingham
	Swiss Society for Neuroscience annual Meeting, Basel
<b>2016</b>	Probing neuronal circuits during behavior, Bordeaux
	Neurizons, Göttingen
<b>2015</b>	Bernstein Retreat and Multichannel Electrophysiology Workshop, Tutzing
	Bernstein Conference, Heidelberg
	Cutting Edge Technologies, Munich
	Bernstein Retreat and Virtual Reality Workshop, Tutzing
	11th Meeting of the German Neuroscience Society, Göttingen
<b>2014</b>	Center of Competence on Neuroengineering Meeting, Technical University of Munich
	Society for Neuroscience Meeting, Washington, DC
	9th FENS Forum of Neuroscience, Milan
<b>2013</b>	Bernstein Conference, Tübingen
	1st European Neuroscience Conference by Doctoral Students, Bordeaux
	European Neuroscience Campus Annual Meeting, Bordeaux
<b>2012</b>	8th FENS Forum of Neuroscience, Barcelona
	ENC Network Annual Joint Meeting, Barcelona
	Erasmus Mundus Association General Assembly, Prague
	7th International Symposium on Neuroprotection and Neurorepair, Potsdam
<b>2011</b>	Berlin Brain Days
	22 <sup>nd</sup> European Students Conference on Regenerative Medicine, Berlin
	Society of Applied Neuroscience meeting, Thessaloniki
	Breaking Convention, University of Kent
	34 <sup>th</sup> European Conference on Visual Perception, Toulouse
	25 <sup>th</sup> Annual Hellenic Congress of Neurosurgery, Athens
<b>2010</b>	25 <sup>th</sup> Annual Hellenic Congress of Neurology, Athens
	4 <sup>th</sup> Congress for Electrical Engineering Students, Patras
<b>2009</b>	The Brain: Function, Imaging and Repair, Athens
<b>2007</b>	Canadian Undergraduate Mathematics Conference, Simon Fraser University, Vancouver
<b>2006</b>	Which mathematics for biology?, FORTH, University of Crete