**Nikolaos Karalis**

Friedrich Miescher Institute for Biomedical Research Website www.nikolaskaralis.gr

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**Current position**

**Research fellow**

2018 - now Friedrich Miescher Institute for Biomedical Research

Group leader: Andreas Lüthi

**Education**

**Ph.D. candidate in Neuroscience**

2013 - 2018 Faculty of Medicine, Ludwig-Maximilians University Munich

Thesis Mechanisms of memory consolidation across hippocampal and cortical 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 expressionRanking 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 **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, Khoder S, Rozeske R, Wurtz H, Bagur S,

Benchenane K, Sirota A, Courtin J, Herry C

1. 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

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

**Invited Talks**

**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**

**2013 – 2018 PhD candidate 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**

**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++

**Electronics** circuit design and implementation, electrophysiology and behavioral equipment setup, 3D printing

**Lab techniques** stereotaxic neurosurgeries, behavioral analysis, immunohistochemistry, microscopy, cell cultures

**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

**Travel grants**

**2018** Onassis Foundation nomination and grant to attend Lindau Nobel Laureate Meeting

**2017** BCCN travel grant to attend Bernstein Conference

Janelia Farm travel grant to attend Junior Scientist Workshop on Neural Circuits and Behavior

FENS travel grant to attend JNS Annual Meeting

Travel grant to attend EMBL Symposium on Neural Circuits

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)

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

Pacific Institute for the Mathematical Sciences (PIMS) grant

**2006** FORTH scholarship

Athens Information Technology (AIT)

National Science Foundation (NSF)

**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

**Scientific outreach**

**2016 – today** Administrator of Systems Neuroscience mailing list

**2016 – today** Peer reviewer

**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**

**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

**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

**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

**Conference abstracts**

**2018** Dynamic organization of limbic circuit dynamics by breathing

**Karalis N**, Sirota A [FENS forum 2018]

Oscillatory architecture of memory circuits

**Karalis N**, Sirota A [68th Lindau Nobel Laureate Meeting]]

**2017** Respiratory entrainment of memory circuits

**Karalis N**, Sirota A[Junior Scientist Workshop on Neural Circuits and Behavior]

Respiratory entrainment of memory circuits  
**Karalis N**, Sirota A[SfN Meeting 2017]

Neuronal synchrony and oscillatory coupling - Functional role and implementation

**Karalis N**, Sirota A[Coupling and Causality in Complex Systems Conference]

Respiratory entrainment of prefrontal circuits  
**Karalis N**, Sirota A[Bernstein Conference 2017]

Respiratory entrainment of prefrontal circuits  
**Karalis N**, Sirota A[40th Meeting of Japan Neuroscience Society]

Respiratory entrainment of prefrontal circuits  
**Karalis N**, Sirota A[Causation, Explanation, Conditionals workshop]

Respiratory entrainment of prefrontal circuits  
**Karalis N**, Sirota A[EMBL Symposium Neural Circuits in the Past, Present and Future]

Respiratory entrainment of prefrontal circuits  
**Karalis N**, Sirota A[37th Blankenese Conference on Synaptic plasticity & stability]

**2016** Manipulating and interpreting fast oscillatory dynamics using optogenetics  
**Karalis N**, Lu J, Sirota A[3rd Bordeaux Neurocampus Conference]

Manipulating and interpreting network dynamics using optogenetics

**Karalis N**, Lu J, Sirota A [Bernstein Retreat - 10th Sparks Workshop]

Oscillatory circuit organization during fear behavior

**Karalis N**, 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

**Karalis N**, Blanco-Hernandez E, Sirota A [11th Meeting of the German Neuroscience Society 2015]

Multichannel extracellular recordings in freely behaving rodents

Resnik E, **Karalis N**, Schwesig G, Sirota A [Center of Competence in Neuroengineering Meeting 2015]

**2014** Synchronized prefrontal-amygdala 4Hz oscillations mediate fear behavior

**Karalis N**, Courtin, J, Dejean C, Chaudun F, Rozeske R, Wurtz H, Herry C [SfN Meeting 2014]

Prefrontal circuits of contextual fear discrimination and generalization

**Rozeske R**, 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, **Karalis N**, Sirota A [Olfaction SPP 5th Annual Meeting].

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 [4th Congress for Electr. Engin. Students]

**2006** Grid Computing [TEE Research and Technology Days]

**Languages**

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

**Soft skills courses**

**2017** Patent and IP workshop, Center for Nanoscience, Munich

**2015** Project management workshop, LMU Graduate School, Munich

**2015** Grant writing workshop, LMU Graduate School, Munich

**2015** Academic presentation workshop, LMU Graduate School, Munich

**2014** Educational course on manuscript and grant writing, Milan

**Professional memberships**

**2017 – today** Japan Neuroscience Association

**2014 – today** Society for Neuroscience

**2013 – today** Bernstein Center for Computational Neuroscience

**2013 – today** Neurasmus Alumni Association

**2012 – today** Neuroscience in Bordeaux Association

**2012 – today** Federation of European Neuroscience Societies

**2012 – today** [Hellenic Society for Neurosciences](http://www.hsfn.gr)

**2011 – today** “School of Applied Mathematics and Physics” Alumni Association

2**004 – today** [Hellenic Mathematical Society](http://www.hms.gr)

**Volunteering work**

**2011** Volunteering for [EDASA (Forest Wildfire Protection)](http://www.edasa.gr/), Athens

**2010** [JeffHOPE](http://www.jefferson.edu/jeffhope/) student-run free clinics, Philadelphia, PA

**2010** [Books Through Bars](booksthroughbars.org), Philadelphia, PA

**2009 – 2012** [Photographer](http://www.nikolaskaralis.gr/portfolio/) in various artistic events

**2007** Teaching computer skills to immigrants at the [Underground Free University](http://ufu.gr/), Athens

**2005** European Youth Week 2005, Athens

**Non-academic work experience**

**2011 – 2012** Civic Consulting (Research assistance), Berlin, Germany

**2011** Greek Population Census

**2010 – 2012** Founder of tutoring and career counseling organization

**2009 – 2011** Photographer (freelance, Demotix agency)

**2007 – 2011** Animateur

**2004 – 2012** Web development **(**PHP, HTML, CSS, Javascript, LaTeX, SQL**)**

**2010** Hellenic Post

**2004** Hellenic Telecommunications Organization (OTE)

**2004** [Athens Urban Transportation Organization (OASA)](http://www.oasa.gr)

**Conference participation**

**2018** 68th Lindau Nobel Laureate Meeting in Physiology & Medicine

11thFENS forum, Berlin

**2017** 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

**2016** Probing neuronal circuits during behavior, Bordeaux

Neurizons, Göttingen

Bernstein Retreat and Multichannel Electrophysiology Workshop, Tutzing

**2015** Bernstein Conference, Heidelberg

Cutting Edge Technologies, Munich

Bernstein Retreat and Virtual Reality Workshop, Tutzing

11th Meeting of the German Neuroscience Society, Göttingen

Center of Competence on Neuroengineering Meeting, Technical University of Munich

**2014** Society for Neuroscience Meeting, Washington, DC

9th FENS Forum of Neuroscience, Milan

**2013** Bernstein Conference, Tübingen

1st European Neuroscience Conference by Doctoral Students, Bordeaux

European Neuroscience Campus Annual Meeting, Bordeaux

**2012** 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

**2011** Berlin Brain Days

22nd European Students Conference on Regenerative Medicine, Berlin

Society of Applied Neuroscience meeting, Thessaloniki

Breaking Convention, University of Kent

34th European Conference on Visual Perception, Toulouse

25th Annual Hellenic Congress of Neurosurgery, Athens

25th Annual Hellenic Congress of Neurology, Athens

**2010** 4th Congress for Electrical Engineering Students, Patras

**2009** The Brain: Function, Imaging and Repair, Athens

**2007** Canadian Undergraduate Mathematics Conference, Simon Fraser University, Vancouver

**2006** Which mathematics for biology?, FORTH, University of Crete

**References**

**Anton Sirota, Ph.D.**

Professor, Chair for Cognition and Neural Plasticity

Department Biology II

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