








# Robin Gutzen

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## RESEARCH

## INTERESTS

Neural Network Dynamics  
Simulation & Validation  
Statistical Testing  
Signal Processing  
Research Software Development  
Data Visualization  
Data Management

## SKILLS

### CODING

Python	<div></div>
MatLab	<div></div>
C++	<div></div>
Java	<div></div>
HTML/CSS	<div></div>
JavaScript	<div></div>
PHP	<div></div>
SQL	<div></div>
Latex	<div></div>
Git	<div></div>
Linux	<div></div>

### LANGUAGE

German	<div></div>
English	<div></div>
French	<div></div>

## NON-RESEARCH

## INTERESTS

Woodworking & Pottery  
Cooking & Fermentation  
Writing & Reading

## PROFESSIONAL EXPERIENCE

### RESEARCH CENTER JÜLICH

RESEARCHER @ INST. FOR COMPUTATIONAL AND SYSTEMS NEUROSCIENCE  
Jan 2023 - today

### PHD @ INST. FOR COMPUTATIONAL AND SYSTEMS NEUROSCIENCE

Jul 2018 - Dec 2022

Dissertation on "Analysis and quantitative comparison of neural network dynamics on a neuron-wise and population level"

### RWTH INSTITUTE 1A

RESEARCH ASSISTANT @ BIOPHYSICS LAB

Mar 2014 - Aug 2014

Literature research about novel materials for neuromorphic computing

## EDUCATION

### RWTH AACHEN UNIVERSITY

MASTER PHYSICS

Oct 2015 - Mar 2018

Major in Nanoelectronics, Minor in Biophysics

Thesis on validation of neural network simulations (final grade 1.2)

### UNIVERSITÉ MONTPELLIER II

ERASMUS EXCHANGE

Sep 2013 - Jun 2014 | Montpellier, France

Semester paper on anomalous diffusion

### RWTH AACHEN UNIVERSITY

BACHELOR PHYSICS

Oct 2011 - Sep 2015

Thesis on detection and analysis of dissolved fluorescent molecules

## EXTRACURRICULAR ACTIVITY

ORGANISER AND MANAGER OF THE OHBM BRAINART EXHIBITION

2022, 2023 | Handling exhibition curation and logistics at the OHBM Conferences

REPRESENTATIVE IN THE EBRAINS DATA GOVERNANCE WORKING GROUP

2020 - 2023 | Discussing data access and protection issues

SERVING ON THE SCIENTIFIC AND TECHNICAL COUNCIL

2020 - 2022 | Representing the institute in an advisory council

SCIENTIFIC SUPERVISION OF STUDENTS

2017, 2022 - today | Supervising a Master thesis in Data Science

CONTENT CURATOR

2019 - 2021 | Establishing IT infrastructure for reproducible research

SERVING ON ADMISSION COMMITTEES

2018, 2019 | Evaluating the fit of PhD applicants for the group

ORGANISER AND CHAIR FOR THE TEDxRWTHAACHEN CONFERENCE

2016, 2017 | Working with a team setting up full day events

# ACADEMIC WORK

## PUBLICATIONS

- 2023 **R. Gutzen**, G. De Bonis, C. De Luca, E. Pastorelli, C. Capone, A.L. Allegra Mascaro, F. Resta, A. Manasanch, F.S. Pavone, M.V. Sanchez-Vives, M. Mattia, S. Grün, P.S. Paolucci, M. Denker "Comparing apples to apples - Using a modular and adaptable analysis pipeline to compare slow cerebral rhythms across heterogeneous datasets" Under Review in Cell Reports Methods. doi: 10.48550/arXiv.2211.08527
- 2023 C. Capone, C. De Luca, G. De Bonis, **R. Gutzen**, I. Bernava, E. Pastorelli, F. Simula, C. Lupo, L. Tonielli, A.L. Allegra Mascaro, F. Resta, F. Pavone, M. Denker, P.S. Paolucci "Simulations Approaching Data: Cortical Slow Waves in Inferred Models of the Whole Hemisphere of Mouse" Communications Biology. doi: 10.1038/s42003-023-04580-0
- 2022 **R. Gutzen**, S. Grün, M. Denker "Evaluating the statistical similarity of neural network activity and connectivity via eigenvector angles" BioSystems. doi: 10.1016/j.biosystems.2022.104813
- 2018 **R. Gutzen**, M. von Papen, G. Trench, P. Quaglio, S. Grün, M. Denker "Reproducible neural network simulations: statistical methods for model validation on the level of network activity data" Frontiers in Neuroinformatics. doi:10.3389/fninf.2018.00090
- 2018 G. Trench, **R. Gutzen**, I. Blundell, M. Denker, A. Morrison "Rigorous neural network simulations: a model substantiation methodology for increasing the correctness of simulation results in the absence of experimental validation data" Frontiers in Neuroinformatics. doi:10.3389/fninf.2018.00081

## TALKS

- 2023 International Forum on Neural Engineering & Brain Technologies, Berlin  
"Adaptable workflows for neural activity analysis in an open-source environment"
- 2023 HBP Fundraising Bootcamp, Brussels  
"Collaborative Brain Wave Analysis Pipeline"
- 2022 BASSES workshop, Rome  
"Blocks instead of puzzles pieces - analyzing cortical wave activity across scales in an adaptable framework"
- 2022 Helmholtz PoF Topic 3 Talk series, Jülich  
"Rigorous comparison and validation of network activity data"
- 2022 BrainMatters webinar, online  
"An adaptable analysis pipeline makes cortical wave phenomena comparable across heterogeneous datasets"
- 2021 Neural Coding, online  
"Eigenangles: evaluating the statistical similarity of neural network simulations via eigenvector angles"
- 2020 Human Brain Project Summit, Athens  
"Developing pipelines for multi- scale/species/method analysis"
- 2019 INCF Neuroinformatics Conference, Warsaw  
"Evaluating neural network models within a formal validation framework"
- 2019 Brain Twitter Conference, online  
"How much do you trust a model? - Rigor in neuroscientific modeling and simulation through validation"
- 2019 Human Brain Project SP4 meeting, Paris  
"Comparing activity dynamics of models and living brains"

## WORKSHOPS & SCHOOLS

- 2023 System Vision Science Summer School, Tübingen
- 2022 Brain Activity across Scales and Species: Analysis of Experiments and Simulations (BASSES), Rome
- 2021 Neuromatch Academy Deep Learning Summer School, online
- 2020 Young Entrepreneurs in Science: From PhD to Innovator, online
- 2019 3 week lab visit @ INFN, Rome
- 2018, 19 Data Analysis Methods (DAME) Workshop, Karlsruhe, Hamburg
- 2017 Data Science Summer School, Paris
- 2017 HBP Brain Simulation Platform Hackathon, Geneva
- 2017 G-Node Advanced Neural Data Analysis Course, Barmen

## SERVICE

- Contributing to open source software: NetworkUnit, Cobrawap, Elephant, SciUnit, Neo
- 2020, 21 Tutoring the Elephant User Workshop & the EBRAINS Infrastructure Training on Model Validation
- 2018, 19, 21 Tutoring the G-Node Advanced Neural Data Analysis Course, Barmen
- 2021 Presenting a workshop at the Human Brain Project Student Conference, online
- 2018-22 Tutoring the RWTH lecture 'Introduction to Computational Neuroscience' Aachen
- 2022, 23 Tutoring the RWTH seminar 'Cortical Structure and Function' Aachen
- 2018-2021 Peer review for Frontiers of Neuroinformatics and ReScience

## AWARDS

2020 2nd place in the John Hunter Excellence in Plotting Contest (750\$)

2019 INCF Neuroinformatics poster prize (sponsored by De Gruyter, 1500€)

## POSTER PRESENTATIONS

2023 HBP Summit, Marseille

**R. Gutzen**, G. De Bonis, C. De Luca, E. Pastorelli, C. Capone, C. Lupo, I. Bernava, A.L. Allegra Mascaro, F. Resta, A. Manasanch, F.S. Pavone, M.V. Sanchez-Vives, M. Mattia, S. Grün, A. Davison, P.S. Paolucci, M. Denker  
*"Structuring cortical wave analysis with Cobrawap: a modular and adaptable pipeline for heterogeneous datasets"*

2023 Meeting of the German Neuroscience Society, Göttingen

S. Krauß, **R. Gutzen**, A. Stella, T. Brochier, A. Riehle, S. Grün, M. Denker  
*"Relating the orientation of cortical traveling waves and co-occurring spike patterns"*

2023 HBP Student Conference, Madrid

A. Morales-Gregorio, **R. Gutzen**, P. Dąbrowska, A. Yegenoglu, S. Diaz-Pier, S. Palmis, S. Paneri, A. René, P. Sapountzis, M. Diesmann, S. Grün, J. Senk, G. Gregoriou, B. Kilavik, S. van Albada  
*"Estimation of microscale connectivity from spiking activity of macaque visuomotor cortices"*

2022 OHBM Conference, Glasgow

**R. Gutzen**, G. De Bonis, E. Pastorelli, C. Capone, C. De Luca, G. Mattheisen, A.L. Allegra Mascaro, F. Resta, F.S. Pavone, M.V. Sanchez-Vives, M. Mattia, S. Grün, A. Davison, P.S. Paolucci, M. Denker  
*"Cobrawap: a modular cortical wave analysis pipeline for heterogeneous data"*

2021 Sfn Conference, online

**R. Gutzen**, G. De Bonis, E. Pastorelli, C. Capone, C. De Luca, G. Mattheisen, A.L. Allegra Mascaro, F. Resta, F.S. Pavone, M.V. Sanchez-Vives, M. Mattia, S. Grün, A. Davison, P.S. Paolucci, M. Denker  
*"An adaptable analysis pipeline makes cortical wave phenomena comparable across heterogeneous datasets"*

2021 Human Brain Project Student Conference, online

**R. Gutzen**, G. De Bonis, E. Pastorelli, C. Capone, C. De Luca, G. Mattheisen, A.L. Allegra Mascaro, F. Resta, F.S. Pavone, M.V. Sanchez-Vives, M. Mattia, S. Grün, A. Davison, P.S. Paolucci, M. Denker  
*"Relating slow waves from different measurement techniques through an adaptable pipeline"*

2020 Bernstein Conference, online

**R. Gutzen**, G. De Bonis, E. Pastorelli, C. Capone, C. De Luca, G. Mattheisen, A.L. Allegra Mascaro, F. Resta, F.S. Pavone, M.V. Sanchez-Vives, M. Mattia, S. Grün, A. Davison, P.S. Paolucci, M. Denker  
*"Building adaptable and reusable pipelines for investigating the features of slow cortical rhythms across scales, methods, and species"*

2020 CNS, online

A. Morales-Gregorio, P. Dąbrowska, **R. Gutzen**, A. Yegenoglu, S. Diaz-Pier, S. Palmis, S. Paneri, A. René, P. Sapountzis, M. Diesmann, S. Grün, J. Senk, G.G. Gregoriou, B. Kilavik, S. van Albada  
*"Estimation of the cortical microconnectome from in vivo spiking activity in the macaque monkey"*

2020 Human Brain Project Summit, Athens

D. Ulianych, **R. Gutzen**, J. Sprenger, E. Pastorelli, G. De Bonis, P.S. Paolucci, A. Davison, S. Grün, M. Denker  
*"Designing reproducible analysis workflows for experimental and simulated activity using Elephant"*

2019 INCF Neuroinformatics Conference, Warsaw

**R. Gutzen**, M. von Papen, G. Trensche, P. Quaglio, S. Grün, M. Denker  
*"Evaluating neural network models within a formal validation framework"*

2019 INM ICS Retreat, Jülich

**R. Gutzen**, S. Grün, M. Denker  
*"A statistical test of eigenvector angles to evaluate the similarity of neural network simulations"*

2019 Meeting of the German Neuroscience Society, Göttingen

**R. Gutzen**, M. von Papen, G. Trensche, P. Quaglio, S. Grün, M. Denker  
*"Reproducible neural network simulations: model validation on the level of network activity data"*

2018 Bernstein Conference, Berlin

**R. Gutzen**, M. von Papen, G. Trensche, P. Quaglio, S. Grün, M. Denker  
*"Reproducible neural network simulations: model validation on the level of network activity data"*

2018 Human Brain Project Summit, Maastricht

A. Yegenoglu, **R. Gutzen**, M. Denker, S. Grün  
*"Utilizing the Elephant and NetworkUnit frameworks within the Collaboratory for an HPC enabled workflow"*

2017 Human Brain Project Summit, Glasgow

M. von Papen, N. Voges, P. Dabrowska, **R. Gutzen**, M. Denker, D. Dahmen, M. Helias, J. Senk, E. Hagen, M. Diesmann, L. Sharma, S. Appukutan, A. Davison, S. Grün  
*"Towards automation of experiment-driven building and validation of a mesocircuit model"*

2017 Data Science Summer School, Paris

**R. Gutzen**, S. Grün, M. Denker  
*"Validation Methods for Neural Network Simulations"*