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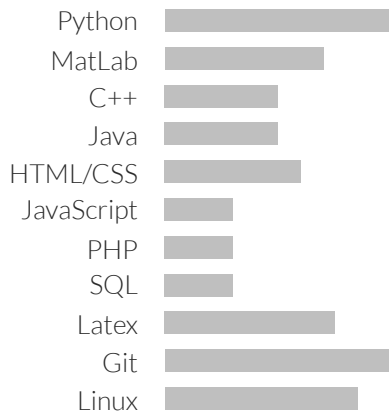
RESEARCH

INTERESTS

Neural Network Dynamics
 Visual Attention
 Model Simulation & Validation
 Statistical Testing
 Research Software Development
 Data Visualization
 Scientific Workflow Management

SKILLS

CODING



LANGUAGE



PERSONAL

INTERESTS

Woodworking & Pottery
 Foraging & Fermentation
 Poetry & Science Communication

PROFESSIONAL EXPERIENCE

NEW YORK UNIVERSITY

POSTDOCTORAL ASSOCIATE @ CENTER FOR DATA SCIENCE

Feb 2024 - today

Modeling dynamical visual perception in recurrent convolutional neural networks

RESEARCH CENTER JÜLICH

RESEARCHER @ INST. FOR COMPUTATIONAL AND SYSTEMS NEUROSCIENCE

Jan 2023 - Jan 2024

Analysis of travelling wave activity in macaque visual cortex & software development

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" (grade 1.0)

RWTH PHYSICS INSTITUTE

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

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

SCIENTIFIC SUPERVISION OF STUDENTS

2017, 2022/23, 2024 | Supervising Bachelor & Master Student Projects

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

CONTENT CURATOR

2019 - 2021 | Establishing IT infrastructure for reproducible research

ORGANIZER AND CHAIR FOR THE TEDXRWTHAACHEN CONFERENCE

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

ACADEMIC WORK

PEER-REVIEWED 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
"Using a modular and adaptable analysis pipeline to compare slow cerebral rhythms across heterogeneous datasets"
Cell Reports Methods. doi: 10.1016/j.crmeth.2023.100681
- 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. Trensche, 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. Trensche, **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

PUBLICATIONS IN PREPARATION

- J. Albers, A. Kurth, **R. Gutzen**, A. Morales-Gregorio, M. Denker, S. Grün, S. J. van Albada & M. Diesmann (2024)
"Singular Angles: Assessing the similarity of real matrices with identical shape" arXiv:2403.17687
- S. Krauß, **R. Gutzen**, A. Stella, S. Grün, M. Denker
"Synchronous spike patterns ride on cortical LFP waves"
- A. Morales-Gregorio, **R. Gutzen**, P. Dąbrowska, A. Yegenoglu, Sandra Diaz-Pier, S. Palmis, S. Paneri, A. René, P. Sapountzis, M. Diesmann, S. Grün, J. Senk, G. Gregoriou, B. Kilavik, S. van Albada
"Activity-driven microconnectome estimation of macaque visuomotor cortices"
- A. Stella, P. Bouss, S. Essink, **R. Gutzen**, A. Kleinjohann, S. Grün
"Modeled vs. real data: realistic spike train generation for benchmarking and education"

TALKS (*=INVITED)

- 2023 * Human Brain Project Concluding Event (Jülich)
"Exploring the diversity of cortical wave activity with a unifying workflow approach"
- 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"
- 2023 * Collective Neurogenesis Workshop (Bonn)
"From simplified neuron models to complex behavior"
- 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 (ANDA) Spring School (Barmen)

TEACHING, TUTORING, SUPERVISING

- 2024 Teaching and preparing lectures in the undergrad program 'Pathways to AI' (New York)
- 2024 Supervising a Master's project "Augmenting CNN with recurrency to evaluate spatio-temporal dynamics of visual processing"
- 2022/23 Supervising a Master's Thesis "Relating directions of cortical traveling waves to co-occurring synchronous spike patterns"
- 2022, 23 Tutoring the RWTH seminar 'Cortical Structure and Function' (Aachen)
- 2018-22 Tutoring the RWTH lecture 'Introduction to Computational Neuroscience' (Aachen)
- 2021 Tutoring EBRAINS Infrastructure Training on Model Validation
- 2020 Tutoring the Elephant User Workshop
- 2018, 19, 21 Tutoring the G-Node Advanced Neural Data Analysis (ANDA) Spring School (Barmen)

SERVICE

- Contributing to open source software: NetworkUnit, Cobrawap, Elephant, SciUnit, Neo
- 2021 Presenting a workshop at the Human Brain Project Student Conference (online)
- 2018-2024 Peer review for Frontiers of Neuroinformatics, ReScience, Journal of Cognition

AWARDS

- 2020 2nd place in the John Hunter Excellence in Plotting Contest (750\$)
- 2019 INCF Neuroinformatics poster price (1500€)

POSTER PRESENTATIONS

- 2024 CNS, Rio Grande do Norte
J. Albers, A. C. Kurth, **R. Gutzen**, A. Morales-Gregorio, M. Denker, S. Grün, S. J. van Albada, M. Diesmann
"Quantifying shared structure between real matrices of arbitrary shape"
- 2024 FENS, Vienna
A. Morales-Gregorio, **R. Gutzen**, S. Palmis, S. Paneri, P. Sapountzis, A. Kleinjohann, S. Grün, T. Brochier, G. G. Gregoriou, B. E. Kilavik, S. J. van Albada
"Hierarchical organization of multivariate spiking statistics across cortical areas"
- 2023 Bernstein Conference, Berlin
R. Gutzen, T. Brochier, A. Riehle, S. Grün, M. Denker
"Cortical wave dynamics across visual areas of the macaque monkey during an instructed, free-viewing, visuomotor task"
- 2023 Bernstein Conference, Berlin
S. Krauß, **R. Gutzen**, A. Stella, T. Brochier, A. Riehle, S. Grün, M. Denker
"Elephant and NetworkUnit: Frameworks for analysis and validation of neural network models in NEST and neuromorphic systems"
- 2023 CNS, Leipzig
J. Ito, **R. Gutzen**, S. Krauß, M. Denker, S. Grün
"Towards classification of spatio-temporal wave patterns based on principal component analysis"
- 2023 CNS, Leipzig
I. Bernava, C. Lupo, **R. Gutzen**, M. V. Sanchez-Vives, M. Mattia, S. Gruen, A. Davison, P. S. Paolucci, M. Denker, G. De Bonis, E. Pastorelli, C. Capone, C. De Luca, A.L. Allegra Mascaró, F. Resta, A. Manasanch, S. Karvounari, E. Mathioulaki, F. S. Pavone
"Towards an EBRAINS service for brain wave analysis: Cobrawap"
- 2023 HBP Summit, Marseille
R. Gutzen, G. De Bonis, C. De Luca, E. Pastorelli, C. Capone, C. Lupo, I. Bernava, A.L. Allegra Mascaró, 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 Neuromorphic Computing Day, Jülich
M. Kern, **R. Gutzen**, S. Grün, M. Denker
"Relating the orientation of cortical traveling waves and co-occurring spike patterns"
- 2023 Meeting of the German Neuroscience Society, Göttingen
S. Krauß, **R. Gutzen**, A. Stella, T. Brochier, A. Riehle, S. Grün, M. Denker
"Elephant and NetworkUnit: Frameworks for analysis and validation of neural network models in NEST and neuromorphic systems"

- 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"
- 2020 **Human Brain Project Summit, Athens**
G. De Bonis, E. Pastorelli, C. Capone, **R. Gutzen**, A. Camassa, A. Manasanch Berengué, F. Resta, A. Letizia Allegra Mascar, A. Paziènti, A. Pigorini, T. Nieus, A. Arena, J. Frederik Storm, M. Massimini, F. Saverio Pavone, M. V. Sanchez-Vives, M. Mattia, A. Davison, M. Denker, P. Stanislaw Paolucci "Multi-scale, multi-species, multi-methodology experiments, analysis tools and simulation models of Brain States and Complexity in SP3-UseCase002"
- 2019 **INCF Neuroinformatics Conference, Warsaw**
R. Gutzen, M. von Papen, G. Trenschi, P. Quaglio, S. Grün, M. Denker
"Evaluating neural network models within a formal validation framework"
- 2019 **Meeting of the German Neuroscience Society, Göttingen**
R. Gutzen, M. von Papen, G. Trenschi, 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. Trenschi, 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"