Sacha Jennifer van Albada

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Personal

Born: 7 February 1981, Charlottesville, VA, USA
Citizenship: USA and the Netherlands

Education

2005–2008   PhD, School of Physics, The University of Sydney, NSW, Australia

Thesis title: *Mean-Field Analysis of Basal Ganglia and Thalamocortical Dynamics*
Advisors: Prof. Peter Robinson and Dr. Christopher Rennie
PhD awarded June 2009

2001–2003   MSc, Theoretical Physics, Utrecht University, the Netherlands
Thesis title: *Boundary Dynamics of Three-Dimensional Asymptotically Anti-de Sitter Space-Times*
Advisors: Prof. Bernard de Wit and Dr. Anton van de Ven

1998–2001   BSc (cum laude), University College Utrecht, the Netherlands
2000   Semester of study at the University of California at Berkeley, CA, USA

Professional experience

Since Dec 2019   **Junior Professor of Computational Neuroanatomy**
Institute of Zoology, University of Cologne, Germany
According to the 'Jülich model'

Since Mar 2017   **Leader of the group 'Theoretical Neuroanatomy'**
Jülich Research Centre, Germany
My group studies the architecture and connectivity of brain circuits as the basis for neural network models at the resolution of neurons and synapses that relate structure to dynamics. This includes developing multi-area spiking models of non-human primate and human cerebral cortex, which are simulated on supercomputers.

Aug 2011–Feb 2017	**Postdoctoral Fellow (Diesmann group)** Jülich Research Centre, Germany My research focused on the dynamics of cortical circuits, using simulations of simple spiking neurons as well as analytical theory. Furthermore, for several years I co-coordinated the Jülich contribution to BrainScaleS, a European project on 'brain-inspired multiscale computation in neuromorphic hybrid systems'.
2009–2011	**Postdoctoral Fellow (Tass group)** Jülich Research Centre, Germany Developed a model of the auditory cortex with the aim of furthering the understanding of tinnitus.
Jan–Jul 2009	**Postdoctoral Fellow (Robinson group)** The University of Sydney, NSW, Australia Research included the analysis of reproducibility of and age trends in EEG parameters derived by fitting spectra to a mean-field model of thalamocortical dynamics, and modeling of the basal ganglia-thalamocortical system in relation to Parkinson's disease.

International project coordination and leadership

2024–	**Task Leader** Leader of task on Digital Twins in EU grant 'EBRAINS 2.0' (involving 10 PIs)
2020–2023	**Task Leader and Deputy Work Package Leader** Deputy leader of the work package on cognitive architectures and leader of the task on biological visuomotor architectures implemented on neuromorphic hardware and in neurorobotics in the Human Brain Project (involving > 30 and 13 PIs, respectively)
2018–2020	**Co-Design Project Implementation Leader** Coordination of implementation of models of visuomotor integration in the Human Brain Project
2018–2020	**Task Leader** Task 4.2.3, "Multi-area multi-layer spiking cortical models" of the Human Brain Project
2014–2020	**Co-Coordinator** Coordinating Work Package 4.2 of the Human Brain Project, "Generic models of brain circuits," together with Markus Diesmann
2011–2014	**Co-Coordinator** Coordinated contribution of INM-6 to BrainScaleS together with Markus Diesmann

Research grants

2023	Award to nominate and hire three postdocs in the Henriette Herz Scouting Program of the Humboldt Foundation (one a year until 2026)
2023	EU HORIZON grant 'EBRAINS 2.0' with 59 partner institutions (my share €260k; task leader and contributor; 36 months)

2022	Computing time grant for the JUWELS supercomputer 'Structure-to-function relations in large-scale models of cortical circuits' with Jülich Supercomputing Centre, TU Graz, and the University of Sussex
2021	HBP Voucher AstroNeuronNets with Markus Diesmann (Jülich Research Centre) and Jugoslava Aćimović (Tampere University, Finland) (€93,704 for INM-6; 10 months)
2021	Cellular, connectional & molecular heterogeneity in a large-scale computational model of the human cerebral cortex. DFG continuation grant with Alexandros Goulas and Timo Dickscheid, priority program 'Computational Connectomics' (my share €291,850; 3 years)
2011–2021	Annual computing time grant extensions for the JUQUEEN, JURECA, and JURECA-DC supercomputers (Project JINB33) 'Brain-Scale Simulations' as part of a consortium with varying composition
2020	Computing time grant for the JUWELS supercomputer 'Leveraging GPUs for relating structure to function in large-scale models of neocortical neural networks' with Jülich Supercomputing Centre, TU Graz, and the University of Sussex
2020	Partner in Human Brain Project SGA3, work package 'Adaptive networks for cognitive architectures: from advanced learning to neurorobotics and neuromorphic applications' (my share €900,195; 3 years)
2020	'Neurons reunited: data and software to reconstruct long-range projection neurons from brain tissue, place them in a digital reference brain with high precision, and model their interactions' (FLAG-ERA 2019) with Paul Tiesinga, Francisco Clasca, Egidio d'Angelo, and Michele Giugliano
2020	'Layer-specific characterization and modeling of fronto-parietal dynamics in primate cortical networks (PrimCorNet)' (FLAG-ERA 2019) with Thomas Brochier & Georgia Gregoriou
2018	Computing time grant for the JUWELS supercomputer 'Learning to Learn on Spiking Neural Networks' (GCS/NIC project 14482) with TU Graz, Heidelberg University, the University of Sussex, and the University of Bern
2017	Integrating multi-scale connectivity and brain architecture in a large-scale computational model of the human cerebral cortex. DFG grant with Claus Hilgetag and Timo Dickscheid in the priority program 'Computational Connectomics' (my share €171,782; 3 years)
2017	Partner in Human Brain Project SGA2, task 'Multi-area multi-layer spiking cortical models' (my share €236,000; 3 years)
2017	From structure to function: sensory processing and decision making in full-scale cortical network models. UoC Forum grant with Martin Nawrot for hiring a postdoc at the University of Cologne (2 years)

Peer-reviewed articles

2024

Senk J, Hagen E, **van Albada SJ**, Diesmann M. Reconciliation of weak pairwise spike-train correlations and highly coherent local field potentials across space (in revision).

Jiang H-J, Qi G, Duarte R, Feldmeyer D, **van Albada SJ**. A layered microcircuit model of somatosensory cortex with three interneuron types and cell-type-specific short-term plasticity (in revision).

Pronold J, van Meegen A, Vollenbröker H, Shimoura RO, Senden M, Hilgetag CC, Bakker R, **van Albada SJ**. Multi-scale spiking network model of human cerebral cortex (in revision).

Morales-Gregorio A, Kurth AC, Ito J, Kleinjohann A, Barthélemy FV, Brochier T, Grün S, **van Albada SJ**. Neural manifolds in V1 change with top-down signals from V4 targeting the foveal region (in revision).

Amunts K, Axer M, . . . , **van Albada SJ**, . . . , Walter F, Zaborsky L. The coming decade of digital brain research: A vision for neuroscience at the intersection of technology and computing (in revision).

Farisco M, Baldassarre G, Cartoni E, Leach A, Petrovici MA, Rosemann A, Salles A, Stahl B, **van Albada SJ**. A method for the ethical analysis of brain-inspired AI (in revision).

Rostami V, Rost T, Riehle A, **van Albada SJ**, Nawrot MP. Spiking neural network model of motor cortex with joint excitatory and inhibitory clusters reflects task uncertainty, reaction times, and variability dynamics (in revision).

2023
Senden M, **van Albada SJ**, Pezzulo G, Falotico E, Hashim I, Kroner A, Kurth AC, Lanillos P, Narayanan V, Pennartz C, Petrovici MA, Steffen L, Weidler T, Goebel R. Modular-Integrative Modeling: A New Framework for Building Brain Models that Blend Biological Realism and Functional Performance *National Science Review* nwad318 (accepted).

Morales-Gregorio A, van Meegen A, **van Albada SJ**. Ubiquitous lognormal distribution of neuron densities across mammalian cerebral cortex. *Cereb Cortex* 33(16): 9439–9449.

2022
Senk J, Kriener B, Djurfeldt M, Voges N, Jiang H-J, Schüttler L, Gramelsberger G, Diesmann M, Plesser HE, **van Albada SJ**. Connectivity concepts in neuronal network modeling. *PLoS Comput Biol* 18(9): e1010086.

Tiddia G, Golosio B, Albers J, Senk J, Simula F, Pronold J, Fanti V, Pastorelli E, Paolucci PS, **van Albada SJ**. Fast simulation of a multi-area spiking network model of macaque cortex on an MPI-GPU cluster. *Front Neuroinform* 16: 883333.

Korcsak-Gorzo A, Müller MG, Baumbach A, Leng L, Breitwieser OJ, **van Albada SJ**, Senn W, Meier K, Legenstein R, Petrovici MA. Cortical oscillations support sampling-based computations in spiking neural networks. *PLoS Comput Biol* 18(3): e1009753.

Chen X, Morales-Gregorio A, Kleinjohann A, Sridhar S, **van Albada SJ**, Grün S, Roelfsema PR. 1024-Channel electrophysiological recordings in macaque V1 and V4 during resting state. *Sci Data* 9: 77.

Nowotny T, **van Albada SJ**, Fellous J-M, Haas JS, Jolivet RB, Metzner C, Sharpee T. Editorial: Advances in Computational Neuroscience. *Front Comp Neurosci* 15: 824899.

2021
van Meegen A, **van Albada SJ**. Microscopic theory of intrinsic timescales in spiking neural networks. *Phys Rev Res* 3: 043077.

2020

Schmidt M, Bakker R, Hilgetag CC, Diesmann M, **van Albada SJ**. Correction to: Multi-scale account of the network structure of macaque visual cortex. *Brain Struct Func* 225: 1159–1162.

2019

Hilgetag CC, Beul SF, **van Albada SJ**, Goulas A. An architectonic type principle integrates macroscopic cortico-cortical connections with intrinsic cortical circuits of the primate brain. *Netw Neurosci* 3(4):905–923.

Gleeson P, Cantarelli M, Marin B, . . . **van Albada SJ**, van Geit W, Silver RA. Open Source Brain: a collaborative resource for visualizing, analyzing, simulating and developing standardized models of neurons and circuits. *Neuron* 3:395–411.

2018

Schmidt M, Bakker R, Shen K, Bezgin G, Diesmann M, **van Albada SJ**. A multi-scale layer-resolved spiking network model of resting-state dynamics in macaque visual cortical areas. *PLoS Comput Biol* 14:e1006359.

Maksimov A, Diesmann M, **van Albada SJ**. Criteria on balance, stability, and excitability in cortical networks for constraining computational models. *Front Comput Neurosci* 12:44.

Van Albada SJ, Rowley AG, Senk J, Hopkins M, Schmidt M, Stokes AB, Lester DR, Diesmann M, Furber SB. Performance comparison of the digital neuromorphic hardware SpiNNaker and the neural network simulation software NEST for a full-scale cortical microcircuit model. *Front Neurosci* 12:291.

Schmidt M, Bakker R, Hilgetag CC, Diesmann M, **van Albada SJ**. Multi-scale account of the network structure of macaque visual cortex. *Brain Struct Func* 223(3):1409–1435.

2017

Müller EJ, **van Albada SJ**, Kim J-W, Robinson PA. Unified neural field theory of brain dynamics in Parkinson's disease and generalized epilepsies. *J Theor Biol* 428:132–146.

Schuecker J, Schmidt M, **van Albada SJ**, Diesmann M, Helias M. Fundamental activity constraints lead to specific interpretations of the connectome. *PLoS Comput Biol* 13(2):e1005179.

2016

Hagen E, Dahmen D, Stavrinou ML, Lindén H, Tetzlaff T, **van Albada SJ**, Grün S, Diesmann M, Einevoll GT. Hybrid scheme for modeling local field potentials from point-neuron networks. *Cereb Cortex* 26(12):4461–4496.

Maksimov A, **van Albada SJ**, Diesmann M. [Re] Cellular and network mechanisms of slow oscillatory activity (<1 Hz) and wave propagations in a cortical network model. *ReScience* 2(1).

Wippler D, Wilks RG, Pieters BE, **Van Albada SJ**, Gerlach D, Hüpkes J, Bär M, Rau U. Pronounced surface band bending of thin-film silicon revealed by modeling core levels probed with hard X-rays. *ACS Applied Materials & Interfaces* 8(27): 17685–17693.

2015

Van Albada SJ, Helias M, Diesmann M. Scalability of asynchronous networks is limited by one-to-one mapping between effective connectivity and correlations. *PLoS Comput Biol* 11(9):e1004490.

2013

Van Albada SJ, Robinson PA. Relationships between electroencephalographic spectral peaks across frequency bands. *Front Hum Neurosci* 7:56.

Kerr CC, **van Albada SJ**, Neymotin SA, Chadderdon GL, Robinson PA, Lytton WW. Cortical information flow in Parkinson's disease: a composite network/field model. *Front Comput Neurosci* 7:39.

Nowke C, Schmidt M, **van Albada SJ**, Eppler JM, Bakker R, Diesmann M, Hentschel B, Kuhlen T. VisNEST – interactive analysis of neural activity data. *IEEE BioVis*.

2012

Crook SM, Bednar JA, Berger S, Cannon R, Davison AP, Djurfeldt M, Eppler J, Kriener B, Furber S, Graham B, Plesser HE, Schwabe L, Smith L, Steuber V, **van Albada S**. Creating, documenting and sharing network models. *Network: Comp Neur Sys* 23:131–149.

2011

Chiang AK, Rennie CJ, Robinson PA, **van Albada SJ**, Kerr CC. Age trends and sex differences of alpha rhythms including split alpha peaks. *Clin Neurophysiol* 122:1505–1517.

2010

Kerr CC, **van Albada SJ**, Rennie CJ, Robinson PA. Age trends in auditory oddball evoked potentials via component scoring and deconvolution. *Clin Neurophysiol* 121:962–976.

Van Albada SJ, Kerr CC, Chiang AK, Rennie CJ, Robinson PA. Neurophysiological changes with age probed by inverse modeling of EEG spectra. *Clin Neurophysiol* 121:21–38.

2009

Van Albada SJ, Gray RT, Drysdale PM, Robinson PA. Mean-field modeling of the basal ganglia-thalamocortical system. II. Dynamics of parkinsonian oscillations. *J Theor Biol* 257:642–663.

Van Albada SJ, Robinson PA. Mean-field modeling of the basal ganglia-thalamocortical system. I. Firing rates in healthy and parkinsonian states. *J Theor Biol* 257: 664–688.

2007

Van Albada SJ, Rennie CJ, Robinson PA. Variability of model-free and model-based quantitative measures of EEG. *J Integ Neurosci* 6:279–307.

Van Albada SJ, Robinson PA. Transformation of arbitrary distributions to the normal distribution with application to EEG test-retest reliability. *J Neurosci Meth* 161: 205–211.

Book chapters

subm.   Korcsak-Gorzo A, Linssen C, Albers J, Dasbach S, Duarte R, Kunkel S, Morrison A, Senk J, Stapmanns J, Tetzlaff T, Diesmann M, **van Albada SJ**. Phenomenological modeling of diverse and heterogeneous synaptic dynamics at natural density. In: Rollenhagen A, Lübke J (Eds.), *New Aspects in Analyzing the Synaptic Organization of the Brain*, Springer.

2022   **Van Albada SJ**, Morales-Gregorio A, Bakker R, Palm G, Goulas A, Bludau S, Dickscheid T, Hilgetag CC, Diesmann M. Bringing anatomical information into neuronal network models. In: Giugliano M, Negrello M, Linaro D (Eds.), *Computational Modelling of the Brain*. Advances in Experimental Medicine and Biology, vol 1359 (pp. 201–234), Springer.

2021   **Van Albada SJ**, Pronold J, van Meegen A, Diesmann M. Usage and scaling of an open-source spiking multi-area model of monkey cortex. In: Amunts K, Grandinetti L, Lippert Th, Petkov N (Eds.) *Brain-Inspired Computing* (pp. 47–59), Springer.

2018   Schmidt M, Diesmann M, **van Albada SJ**. Necessity and feasibility of large-scale neuronal network simulations. In: *Lecture Notes of the 49th IFF Spring School "Physics of Life"*, Forschungszentrum Jülich.

2017   Senk J, Yegenoglu A, Amblet O, Brukau Y, Davison A, Lester D, Lührs A, Quaglio P, Rostami V, Rowley A, Schuller B, Stokes A, **van Albada SJ**, Zielasko D, Diesmann M, Weyers B, Denker M, Grün S. A Collaborative Simulation-Analysis Workflow for Computational Neuroscience Using HPC. In: Di Napoli E, Hermanns MA, Iliev H, Lintermann A, Peyser A (eds) *High-Performance Scientific Computing*. JHPCS 2016. Lecture Notes in Computer Science, vol 10164 (pp. 243–256), Springer, Cham, DOI: 10.1007/978-3-319-53862-4_21.

2014   **Van Albada SJ**, Kunkel S, Morrison A, Diesmann M. Integrating brain structure and dynamics on supercomputers. In: Grandinetti L, Lippert Th, Petkov N (Eds.), *Brain-Inspired Computing* (pp. 22–32), Springer.

Outreach

2023   Guest in Gaute Einevoll's podcast "Theoretical Neuroscience", episode to be published on https://theoreticalneuroscience.no/

2023   Video "HBP Focus Area - Brain-Inspired Cognitive Architectures" (with Rainer Goebel), available at https://www.youtube.com/watch?v=Tz1wXL7rA5E and https://www.humanbrainproject.eu/en/science-development/focus-areas/brain-inspired-cognitive-architectures/

2023   Press release "Human Brain Project researchers identify mathematical rule behind the distribution of neurons in our brains", taken up by various news outlets

2023   "Connectivity concepts in neuronal network modeling" (with Hans Ekkehard Plesser, Johanna Senk, Mikael Djurfeldt, and Birgit Kriener), HBP Brain Matters Webinar, available at https://youtu.be/Qi7221A9YZk

2022   HBP scientists propose guidelines for describing network connectivity, https://www.humanbrainproject.eu/en/follow-hbp/news/2022/09/15/hbp-scientists-propose-guidelines-describing-network-connectivity; also posted on LinkedIn, Twitter, and the Jülich Research Center website.

2019   **Van Albada SJ**, Korcsak-Gorzo A, Yegenoglu A, Klijn W, van Meegen A, Peyser A. Spiking neural networks that learn to learn/Gepulste Neuronale Netze lernen zu lernen. Bernstein Feature 2019.

2018   **Van Albada SJ**, Diesmann M. One step closer to brain-like computing. TheScienceBreaker, 10 December 2018, https://doi.org/10.25250/thescbr.brk160.

2018   Breakthrough in construction of computers for mimicking the human brain. Press release, Frontiers, 11 July 2018. Taken up by various outlets, including ScienceDaily, Top 500, Science Node, DNA India, Express, and radio show Science Friday.

2017	Schmidt M, Schuecker J, **Van Albada SJ**, Diesmann M, Helias M. Stability confinement of the brain connectome. *InSiDE (Innovatives Supercomputing in Deutschland)*, Spring 2017.
2015	Small models of the brain distort contact intensity between neurons. Press release, Jülich, 8 September 2015.
2014	**Van Albada SJ**, Diesmann M, Eppler JM, Hentschel B, Kuhlen T, Nowke C, Reske M, Schmidt M. Modellierung und 3D-Visualisierung neuronaler Netzwerke in der Größenordnung des Gehirns. *RWTH Themen* 2:52–57.

Research group and student supervision

Current

Dr. Renan Shimoura (postdoc)

Dr. Rembrandt Bakker (postdoc, 0.2 FTE)

Dr. Aitor Morales-Gregorio (postdoc)

Agnes Korcsak-Gorzo (PhD student)

Han-Jia Jiang (PhD student)

Didi Hou (Master's student)

Anno Kurth (PhD student supervised jointly with Markus Diesmann)

Jasper Albers (PhD student supervised jointly with Markus Diesmann)

Gaurav Sapkal (pre-MSc internship)

Alumni

Dr. Alexander van Meegen (PhD)

Dr. Maximilian Schmidt (PhD)

Dr. Andrei Maksimov (PhD)

Dr. Aitor Morales-Gregorio (PhD)

Dr. Jari Pronold (PhD)

Hannah Vollenbröker (Master's project and lab rotation)

Daniel Mingers (Master's project)

Eva Schneider (Master's laboratory module)

Robin Lammerz (internship)

Dr. Renan Shimoura (PhD exchange)

Jan Kasper (internship)

Daniel Biermann (student assistantship)

Thorben Greve (Bachelor project)

Gina Schumacher (Master's project)

Rajat Chandra Mishra (post-MSc internship student)

Dr. Johanna Senk (PhD supervised jointly with Markus Diesmann)

Offers and Awards

2023	Alexander van Meegen won the Excellence Prize of Jülich Research Center, endowed with 5000 euros, for his PhD performed under the joint supervision of Moritz Helias and myself
2017	Offered permanent position as Senior Lecturer in Computer Science at the University of Hertfordshire, UK (declined)
2015	Travel grant for CNS*2015 (USD 400)
2011	Offered postdoc position at the University of Sydney School of Medicine (declined)
2009	CISRA Postgraduate Physics Prize, awarded annually for the best refereed publication by a postgraduate student in the University of Sydney School of Physics (AUD 2000). This was out of around 100 postgraduate research students at the School.
2009	Swartz Cosyne Fellowship (USD 500) for attending Cosyne 2009

2005–2008	Endeavour International Postgraduate Research Scholarship and International Postgraduate Award: full scholarship (stipend and tuition) for doctoral study
2008	Postgraduate Research Support Scheme assistance (AUD 1000) for presenting research findings at the University of San Diego, USA
2006	Postgraduate Research Support Scheme assistance (AUD 1000) for attending the Society of Applied Neuroscience conference, University of Wales, Swansea, UK
2006	Denison travel grant (AUD 1000) for attending the Society of Applied Neuroscience conference, University of Wales, Swansea, UK
2005	Offered PhD positions at Cornell University, Politechnic University of Milan, Chemnitz University of Technology, and Utrecht University (declined)
2000	Trajectum travel grant and exemption from tuition fees for semester abroad at the University of California at Berkeley, CA, USA

Software

Contributed to multi-area spiking network model of all vision-related areas of macaque cortex, https://inm-6.github.io/multi-area-model.

Contributed to the simulation software NEST,
Eppler JM, Pauli R, Peyser A, Ippen T, Morrison A, Senk J, . . . **van Albada SJ** . . . Plesser HE. (2015). NEST 2.8.0. Zenodo. http://doi.org/10.5281/zenodo.32969.

Contributed to the simulator-independent description language PyNN, especially with a PyNN version of the cortical microcircuit model of Potjans and Diesmann (2014).

I also helped create SLI and PyNEST versions of this model, now included as examples in NEST, and I curate the model as provided on Open Source Brain: http://opensourcebrain.org/projects/potjansdiesmann2014.

Teaching

WS 2023/24	**Organismic Physiology, University of Cologne**
	BSc Quantitative Biology
	Quadruple lecture on neurons and synapses
WS 2023/24	**Simulation and Modeling I, University of Cologne**
	MSc Computational Sciences
	Introductory project on neural network simulation
SS 2023	**Bioinformatik, University of Cologne**
	BSc Biologie
	Two lectures and a tutorial on neuroinformatics and computational neuroscience
WS 2021/22 &	**Ringvorlesung: Die Welt im Computer, University of Cologne**
WS 2022/23	Lecture 'Affen- und Menschengehirne im Computer: Von Neuroanatomie zu
WS 2023/24	Simulationen der Gehirnaktivität'

WS 2022/23 WS 2023/24	**Tutorial Neuroscience, University of Cologne** MSc Neuroscience Tutorial on interaction and causality measures
WS 2020/21 & WS 2021/22 & WS 2022/23 & WS 2023/24	**Seminar Neuroscience, University of Cologne** MSc Biological Sciences Supervising students on the topic of Computational Neuroscience together with Martin Nawrot
WS 2020/21 & WS 2021/22 & WS 2022/23 WS 2023/24	**Lecture Neuroscience, University of Cologne** MSc Biological Sciences Five resp. six lectures with the topics: simulation of biological neural networks and its anatomical underpinnings, the perceptron, and convolutional neural networks
SS 2021 & SS 2022 SS 2023	**Computational Neuroscience, University of Cologne** MSc Biology/Neuroscience/Physics Course organized together with Martin Nawrot, Silvia Daun, and Vahid Rostami. Contributed seven double lectures with the topics: introduction to computational neu- roscience, point neuron models, anatomy of cerebral cortex, graph theory, the neural network simulator NEST, and the balanced random network model
2018–2023	**EITN Spring & Fall Schools, Paris, France** Lecture on large-scale neural network modeling
Jul 2022	**9th Baltic-Nordic Summer School on Neuroinformatics, Kraków, Poland** Lecture 'Simulating the resting-state activity of monkey and human cortices at cellu- lar resolution'
2014, 2018, 2020	**Latin American School on Computational Neuroscience (LASCON), Brazil** 4 NEST tutorials (2014), 5 lectures on single-neuron and network models (all years)
2018, 2019	**Simulation Sciences Seminar, RWTH Aachen University** "Simulation of brain-scale neuronal networks"
Jul 2018	**CSN*2018, Seattle, USA** Whole-day tutorial "Simulation of large-scale neural networks" (with Philipp Weidel)
2012–2018	**Introduction to Computational Neuroscience, RWTH Aachen University** As part of a group of tutors and lecturers
Nov–Dec 2017	**5th HBP School – Future Medicine, Obergurgl, Austria** Lecture on large-scale network models and NEST tutorial
Jul 2017	**CNS*2017, Antwerp, Belgium** Whole-day tutorial "Simulation of large-scale neural networks" (with Jonas Stap- manns)
Dec 2016	**1st NeuroMat HPC Course on Parallel and GPU Programming for Neuroscience, Brazil** Introduction to NEST, creating models with NESTML, parallel simulations with NEST

| Jun 2015 | **OIST Computational Neuroscience Course (OCNC), Japan** |
| | Supervised five student projects and provided NEST support |

| Jul–Aug 2013 | **Advanced Course in Computational Neuroscience (ACCN), Poland** |
| | Supervised five student projects and provided NEST support |

| 2006–2007 | **Matrix Education, Strathfield, NSW, Australia** |
| | Corrected homework and tests, and developed materials for the final two years of the high-school physics curriculum |

| 2006 | **The University of Sydney, NSW, Australia** |
| | Assisted in first-year physics workshops and laboratory |

2004	**C.F. Andrews English High School, Bangalore, India**
	Science teacher (voluntary work)
	Taught 10th grade computer science, 9th grade physics, 8th grade biology, and various other years and subjects

Recent invited talks

2023 "Primate brains in silico: Large-scale neural network simulations of macaque and human cortices," Donders Institute, Nijmegen, the Netherlands

2023 "Large-scale spiking neural network simulations of human and non-human primate cortices," In2PrimateBrains, Heraklion, Greece

2023 "Large-scale spiking simulations of cortical resting-state activity," SMHB General Assembly, Jülich, Germany

2023 "From structure to activity and back in spiking cortical models," IHP workshop 'Networks of spiking neurons', Paris

2023 "Simulating monkey and human cortices at cellular resolution," M-BIC Lecture, Maastricht

2023 "Unifying the spiking and large-scale dynamics of cortex through simulation," Atelier Neurosciences Computationnelles Aviesan, Paris

2022 "Cellular-resolution simulations of macaque and human cortices: What can we learn from modeling the resting state?" Workshop "Large-scale cortical networks: from dynamics to cognition," Bernstein Conference, Berlin

2022 "Implementing the modular and long-tailed structure of cortex in large spiking models," Neuromorphic Algorithms 2022, Volpriehausen, Germany

2022 "A career between continents," Women in Neuroscience Symposium, online

2022 "Multi-area full-density spiking network models of monkey and human cortices: from anatomy to resting-state dynamics," EBRAINS Workshop "Brain Activity across Scales and Species: Analysis of Experiments and Simulations (BASSES)", Rome

2022 "Large-scale simulations of monkey and human cortices at cellular resolution: from anatomy to resting-state activity," CRC1451 Scientific Lecture Series, University of Cologne

2022   "Large-scale simulations of macaque and human cortices: from population-specific connectivity to resting-state activity," Neurophysics hMRI Meeting, Max Planck Institute for Human Cognitive and Brain Sciences, online

2022   "Multi-scale modelling of resting-state activity in human and non-human primate cortices," keynote lecture, 6th HBP Student Conference on Interdisciplinary Brain Research, online

2021   "Large-scale neural network simulations of cerebral cortex," University of Cologne Biology Department Retreat, Xanten, Germany

2021   "Call for submissions – Diversity in Research Paper Award (DIRPA)" (with B Weyers and K Grasenick), Human Brain Project Summit, online

2021   "Models of spiking neuronal networks," Decoding the Research Field Information: A Crowd Learning Event, short video presented online

2021   "Large-scale data-based network simulations," Helmholtz PoF IV Topic 3 kick-off meeting, online

2020   "The harmonics of the EEG," Workshop "Neural Coding in High-Dimensional Nonlinear Systems", online

2020   "Large-scale simulations of primate cortex," Cologne Evolution Colloquium, online

2020   "Bringing together anatomy and dynamics in large-scale spiking models of primate cortex," Allen Institute Modeling Workshop, online

2020   "Large-scale spiking neural network models of resting-state dynamics in primate cortex," Fourth BigBrain Workshop, online

2020   "Large-scale network models of cerebral cortex linking structure to dynamics," Seminars in Neuroscience, University of Cologne, Germany

2020   "Point neuron network modeling in the HBP," Human Brain Project & Dutch Neuroscience: Shaping Collaborations, Amsterdam, the Netherlands

2020   "Bringing biological realism into visuo-motor models," HBP Summit, Athens, Greece

2019   "Use case: cortical multi-area model in NEST," Workshop 'Brain circuit insight', Bernstein Conference, Berlin, Germany

2019   "Large-scale spiking neural network modeling of primate cerebral cortex," Open Source Brain Workshop, Alghero, Italy

2019   "How can modeling of the human brain network provide insight into mental illness?" ECNP Congress, Copenhagen, Denmark

2019   "Large-scale spiking neural network modeling of primate cortical dynamics" ESI Systems Neuroscience Conference, Frankfurt, Germany

2019   "Large-scale spiking neural network simulations of macaque vision-related cortex," HBP SP3 Annual Meeting, Liège, Belgium

2019   "How the connectivity of macaque vision-related cortex shapes its resting-state dynamics," Workshop "Roles and Mechanisms of Cortico-Cortical Feedback", EITN, Paris, France

2019   "Bringing together cortical structure and dynamics in large-scale spiking network models," Workshop "Integrative Theories of Cortical Function", CNS*2019, Barcelona, Spain

2019   "Simulations of primate cortex from local neuronal networks to the brain scale," Workshop on Brain-Inspired Computing, Cetraro, Italy

2019   "Local and large-scale cortical models (to be) ported to neuromorphic hardware," HBP SP9 meeting, TU Graz, Austria

2019   "Large-scale neural network simulations to learn about the primate brain," Institute for Advanced Study, Amsterdam, the Netherlands

Recent other talks

2023   "Cellular, connectional and molecular heterogeneity in a large-scale computational model of the human cerebral cortex," (with T Dickscheid), SPP 2041 status meeting, Frankfurt, Germany

2022   "PrimCorNet: layer-specific characterization and modeling of fronto-parieto-visual dynamics in primate cortical networks," (with B Kilavik), HBP Partnering Projects Meeting, Berg en Dal, Netherlands

2022   "Unified descriptions and depictions of network connectivity," NEST Conference, online

2022   "Cellular, connectional and molecular heterogeneity in a large-scale computational model of the human cerebral cortex," (with T Dickscheid), SPP 2041 status meeting, online

2022   "WP3: Adaptive Networks for Cognitive Architectures," (with R Goebel, M Petrovici, and C Summerfield), Human Brain Project SGA3 M21 Review, online

2022   "Data-driven modeling for relating brain structure to dynamics", INM-6 Lab Focus, online

2021   "Cellular, connectional & molecular heterogeneity in a large-scale computational model of the human cerebral cortex" (with T Dickscheid and A Goulas), SPP 2041 kick-off meeting, online

2021   "WP3: Adaptive Networks for Cognitive Architectures," (with R Goebel and M Senden), Human Brain Project SGA3 M10 Review, online

2019   "Integrating multi-scale connectivity and brain architecture in a large-scale computational model of the human cerebral cortex" (with S Bludau and A Goulas), SPP2041 project meeting, Frankfurt, Germany

Recent posters

2023   Morales-Gregorio A, Kurth AC, Kleinjohann A, Barthélemy F, Brochier T, Grün S, **van Albada SJ**, "Neural manifolds and dimensionality in V1 change with top-down signals from V4," 2nd Cologne Neuroscience Day, University of Cologne, Germany

2023   Mishra RC, van Albada GD, **van Albada SJ**, "Wiring optimisation as an explanation for motor cortical maps," 2nd Cologne Neuroscience Day, University of Cologne, Germany

2023   Hou D, Morales-Gregorio A, Bakker R, **van Albada SJ**, "Collation of connectivity between thalamus and cortex in macaque," INM Retreat, Jülich, Germany

2023   Albers J, Kurth AC, Diesmann M, **van Albada SJ**, "Organizational principles of spatial connectivity in macaque primary visual cortex," CNS*2023, Leipzig, Germany

2023   Aćimović J, Jiang H-J, Manninen T, Stapmanns J, Lehtimäki M, Linne M-L, Diesmann M, **van Albada SJ**, "The NEST module for computational modeling and simulation of neuron-astrocyte networks," CNS*2023, Leipzig, Germany

2023   Pronold J, van Meegen A, Vollenbröker H, Shimoura R, Senden M, Goulas A, Hilgetag CC, Bakker R, **van Albada SJ**, "Multi-scale spiking network model of human cerebral cortex," CNS*2023, Leipzig, Germany

2023   Shimoura RO, Roque AC, **van Albada SJ**, "Visual alpha generators in a full-density spiking thalamocortical model," CNS*2023, Leipzig, Germany

2023   Morales-Gregorio A, Kurth AC, Kleinjohann A, Barthélemy F, Brochier T, Grün S, **van Albada SJ**, "Topology of activity in macaque V1 is closely related to bottom-up and top-down signals," CNS*2023, Leipzig, Germany

2023   Korcsak-Gorzo A, Stapmanns J, Espinoza Valverde J, Dahmen D, **van Albada SJ**, Bolten M, Diesmann M. "Event-driven eligibility propagation in large-scale spiking neural networks," SMHB General Assembly, Jülich, Germany

2023   Pronold J, van Meegen A, Vollenbröker H, Shimoura R, Senden M, Goulas A, Hilgetag CC, Bakker R, **van Albada SJ**, "Multi-scale spiking network model of human cerebral cortex," SMHB General Assembly, Jülich, Germany

2023   Kurth AC, Albers J, Diesmann M, **van Albada SJ**. "A spatially resolved spiking neural network model of macaque primary visual cortex," SMHB General Assembly, Jülich, Germany

2023   Senk J, Kriener B, Djurfeldt M, Voges N, Jiang H-J, Schüttler L, Gramelsberger G, Diesmann M, Plesser HE, **van Albada SJ**. "Concepts for reproducible network connectivity," HBP Summit, Marseille, France

2023   Aćimović J, Jiang H-J, Manninen T, Stapmanns J, Lehtimäki M, Linne M-L, Diesmann M, **van Albada SJ**. "Computational modeling of neuron-astrocyte interactions using the NEST simulator (AstroNeuronNets)," HBP Summit, Marseille, France

2023   Morales-Gregorio A, Gutzen R, Dabrowska P, Yegenoglu A, Diaz-Pier S, Palmis S, Paneri S, René A, Sapountzis P, Diesmann M, Grün S, Senk J, Gregoriou GG, Kilavik B, **van Albada SJ**. "Estimation of microscale connectivity from spiking activity of macaque visuomotor cortices," HBP Student Conference, Madrid, Spain

2023   Shimoura RO, Jiang H-J, Timonidis N, Bakker R, Rubio-Teves M, Clascá F, **van Albada SJ**. "Integrating axonal morphologies into a somatosensory thalamocortical circuit model for generating rhythmic oscillations," HBP Student Conference, Madrid, Spain

2022   Kurth AC, Morales-Gregorio A, Ito J, Kleinjohann A, Barthélemy F, Brochier T, Grün S, **van Albada SJ**. "Modulation of population activity and dimensionality in macaque V1," Minds in Mainz: Brain Dynamics and Information Processing, Germany

2022   Jiang H-J, Aćimović J, Manninen T, Stapmanns J, Lehtimäki M, Linne M-L, Diesmann M, **van Albada SJ**. "Computational modeling of neuron-astrocyte interactions in the NEST simulator," INM-IBI Retreat, Jülich, Germany

2022   Morales-Gregorio A, Kleinjohann A, Albers J, Fischer K, Ito J, Grün S, **van Albada SJ**. "Oscillating neural activity could save energy via reduced Na$^+$ ion flux," INM-IBI Retreat, Jülich, Germany

2022   Korcsak-Gorzo A, Stapmanns J, Espinoza Valverde J, Dahmen D, **van Albada SJ**, Bolten M, Diesmann M. "Eligibility propagation in large-scale neural networks," NIC Symposium, Jülich, Germany

2022   Morales-Gregorio A, Kurth AC, Ito J, Kleinjohann A, Barthélemy FV, Brochier T, Grün S, **van Albada SJ**. "Feedback modulates neural manifolds in macaque V1 during resting state," Bernstein Conference, Berlin, Germany

2022   Morales-Gregorio A, van Meegen A, **van Albada SJ**. "Lognormal neuron densities in mammalian neocortex," Bernstein Conference, Berlin, Germany

2022   Shimoura R, Roque AC, **van Albada SJ**. "Alpha rhythm generators in a full-density spiking thalamocortical microcircuit model," Bernstein Conference, Berlin, Germany

2022   Korcsak-Gorzo A, Müller MG, Baumbach A, Leng L, Breitwieser OJ, **van Albada SJ**, Senn W, Meier K, Legenstein R, Petrovici MA. "Neural oscillations implement tempering in spiking neural networks," Bernstein Conference, Berlin, Germany

2022   Aćimović J, Jiang H-J, Manninen T, Stapmanns J, Lehtimäki M, Linne M-L, Diesmann M, **van Albada SJ**. "Computational modeling of neuron-astrocyte interactions in large neural populations using the NEST simulator," CNS*2022, Melbourne, Australia

2022   Jiang H-J, Aćimović J, Manninen T, Stapmanns J, Lehtimäki M, Linne M-L, Diesmann M, **van Albada SJ**. "Modeling spiking networks with neuron-glia interactions in NEST," NEST Conference (online)

2021   Kurth A, Albers J, Diesmann M, **van Albada SJ**. "A spatially resolved model of visual cortical areas V1, V2, and V4 of the macaque monkey," INM & IBI Retreat (online)

2021   Morales-Gregorio A, Bakker R, **van Albada SJ**. "Analysis of a 3D macaque neocortex reconstructed from histological slices," INM & IBI Retreat (online)

2021   Pronold J, van Meegen A, Vollenbröker H, Bakker R, **van Albada SJ**. "Is our current knowledge on structural connectivity of human cortex compatible with measured activity?," INM & IBI Retreat (online)

2021   Senk J, Kriener B, Djurfeldt M, Voges N, Jiang H-J, Schüttler L, Gramelsberger G, Diesmann M, Plesser HE, **van Albada SJ**. "Which connectivity concepts does neuroscientific modeling need?," INM & IBI Retreat (online)

2021   Pronold J, van Meegen A, Bakker R, Vollenbröker H, **van Albada SJ**. "Multi-scale spiking network model of human cortex," CNS*2021 (online)

2021   Jiang H-J, **van Albada SJ**. "A multi-layer microcircuit model of somatosensory cortex with multiple interneuron classes," HBP Student Conference (online)

2021   Korcsak-Gorzo A, Stapmanns J, Dahmen D, **van Albada SJ**, Diesmann M, Helias M, Bolten M, Hahne J. "Event-driven updates of voltage-based learning rules," Helmholtz PoF IV Kick-Off (online)

2020   Senk J, Kriener B, Schüttler L, Gramelsberger G, Plesser HE, Diesmann M, **van Albada SJ**. "Systematic textual and graphical description of connectivity," Bernstein Conference (online)

2020   Essink S, Helin R, Shimoura R, Senk J, Tetzlaff T, **van Albada SJ**, Helias M, Grün S, Plesser HE, Diesmann M. "Ultra-high frequency spectrum of neuronal activity," Bernstein Conference (online)

2020   Morales-Gregorio A, Dabrowska P, Gutzen R, Yegenoglu A, Diaz S, Palmis S, Paneri S, Rene A, Sapountzis P, Diesmann M, Grün S, Senk J, Gregoriou G, Kilavik B, **van Albada SJ**. "Estimation of the cortical microconnectome from in vivo spiking activity in the macaque monkey," CNS*2020 (online)

2020   **van Albada SJ**, Morales-Gregorio A, van Meegen A, Pronold J, Korcsak-Gorzo A, Vollenbröker H, Bakker R, Vennemo SB, Mørk HB, Albers J, Plesser HE, Diesmann M. "Large-scale spiking network models of primate cortex as research platforms," CNS*2020 (online)

2020   Pronold J, van Meegen A, Vollenbröker H, Bakker R, Diesmann M, **van Albada SJ**. "Modeling and simulating multi-area spiking cortical network models," NIC Symposium, Jülich, Germany

2020   Senk J, Schüttler L, Kriener B, Bos H, Plesser HE, Gewaltig M-O, Djurfeldt M, Voges N, **van Albada SJ**, Diesmann M, Gramelsberger G. "NeuroModelingTalk (NMT): Approaching the complexity barrier in neuroscientific modeling," RWTH Transparent, Aachen, Germany

2020   Kurth A, Morales-Gregorio A, van Meegen A, Pronold J, Korcsak-Gorzo A, Vollenbröker H, Bakker R, Diesmann M, **van Albada SJ**. "Multi-area model of macaque cortex as a scaffold model and workflow testcase," HBP Summit, Athens, Greece

2020   van Meegen A, **van Albada SJ**, Helias M. "On the path integral approach to random neural networks," Quantum Thermodynamics for Young Scientists, Bad Honnef, Germany

2019   Korcsak-Gorzo A, van Meegen A, Scherr F, Subramoney A, Maass W, **van Albada SJ**. "Learning-to-learn in data-based columnar models of visual cortex," Bernstein Conference, Berlin, Germany

2019   Jiang H-J, **van Albada SJ**. "A cortical microcircuit model with three critical interneuron groups," Bernstein Conference, Berlin, Germany

2019   Morales-Gregorio A, Dabrowska P, Kilavik B, Gregoriou G, Brochier T, Diesmann M, Grün S, Senk J, **van Albada SJ**. "Activity-constrained full-scale cortical microcircuit models of macaque higher-order cortices," Bernstein Conference, Berlin, Germany

2019   Aćimović J, Manninen T, Teppola H, **van Albada SJ**, Diesmann M, Linne M-L. "Modeling the influence of neuron-astrocyte interactions on signal transmission in neuronal networks," Bernstein Conference, Berlin, Germany

2019   Shimoura RO, Roque AC, Diesmann M, **van Albada SJ**. "Visual alpha generators in a spiking thalamocortical microcircuit model," CNS*2019, Barcelona, Spain

2019   van Meegen A, **van Albada SJ**. "A theoretical approach to intrinsic timescales in spiking neural networks," CNS*2019, Barcelona, Spain

2019   Pronold J, van Meegen A, Bakker R, Morales-Gregori A, **van Albada SJ**. "Multi-area spiking network models of macaque and human cortices," NEST Conference 2019, Ås, Norway

2019   van Meegen A, **van Albada SJ**. "Theory of neuronal timescales in balanced random networks," Workshop on Advanced Methods in Theoretical Neuroscience, Göttingen, Germany

Meeting organization

2018–2023 Co-organizer of EITN Spring & Fall Schools in Computational Neuroscience, Paris

2022–2023 Organizer of CSN (Computational and Systems Neuroscience) seminar series, INM-6, Jülich Research Centre

2022   Workshop 'Knowledge transfer, commercialization, and IPR: ethics and governance challenges in the transition to a post-HBP future' (with A Rosemann, S Vermeulen, R Goebel, and B Stahl), online, 7 Nov 2022

Since 2021 Co-organizer of the seminar series Cologne Theoretical Neuroscience Forum (CTNF; with M Nawrot, S Daun, and M Tittgemeyer)

2021   Brain Simulation break-out session (with Susanne Kunkel), HBP Summit, online, 14 Oct 2021

2020   Workshop 'Visuomotor coordination: From physiology to control systems' (with Egidio d'Angelo), Bernstein Conference, online, 29 Sep 2020

2018   Co-organizer of HBP CDP4 (visuomotor integration) workshop, Jülich, Sep 2018

2018   HBP workshop 'Cortical Codes', EITN, Paris, Feb 2018

2018   Co-organizer of HBP workshop 'Analytical approaches to network dynamics: mean-field and beyond', EITN, Paris (Jan 2018)

2016   Workshop 'Multi-area models of cortex', CNS*2016

2013   BrainScaleS Jülich-UPF workshop (Jan 2013)

2012   Co-organizer of a FACETS-ITN course (19 March 2012) and the second BrainScaleS plenary meeting (22–23 March 2012)

Community service and administrative responsibilities

2023   PhD Examination Committee member for Jules Bouté (Université Paris-Saclay).

2023   Deputy member of Master examination committee, Faculty of Mathematics and Natural Sciences, University of Cologne.

2022–2023 PhD Thesis Advisory Committee member for Polina Zhigulina (Computational Biology, University of Cologne).

2022   Second reviewer for Bachelor thesis of Pierre Hofmann (Neuroscience, University of Cologne).

Since 2021 Member of Expert Team of Collaborative Research Centre (CRC) 1451 (Key mechanisms of motor control in health and disease; coordinated by the University of Cologne) project INF (Data Management for Computational Modelling).

Since 2021 Review Editor for Integrative Systems Neuroscience (specialty section of Frontiers in Systems Biology)

Since 2019 Member of INCF Working Group 'Standardised Representations of Network Structures'

Since 2019 Mentor in the HBP mentoring program

Since 2018 Member of HBP Gender Advisory/Diversity and Equal Opportunities Committee

2020–2023 Member of a PhD steering committee (Tampere University, Finland)

2018, 2022 NetSci Program Committee member

Since 2017 Member of ten PhD steering committees (Jülich INM-6; 7 own students, 3 other)

Since 2015 Member of five professorial appointment committees

Since 2013 Review Editor for Frontiers in Systems Neuroscience

2021 Member of a PhD examination committee (Radboud University Nijmegen, the Netherlands)

2019–2021 Co-editor of Frontiers Research Topic 'Advances in Computational Neuroscience'

2018–2020 CNS Program Committee member

2019 Guest Associate Editor for PLoS Computational Biology

2018 Member of a PhD examination committee (KTH, Sweden)

2011–2016 Organization of the INM-6 library

2012–2013 Representative of INM-6 on the council of scientific and technical staff of Jülich Research Centre

2010, 2011 Program committee member and reviewer for the International Conference on Computational Science: Simulation of Multiphysics Multiscale Systems workshop (2010, 2011), main track (2011)

Ad hoc reviewer for national and international science foundations, academic institutions, conferences, and a large number of journals

Training and development

2023 Training "Inverted Classroom in der Hochschule: Konzept und Praxistipps", University of Cologne (online)

2023 Workshop "Didaktische Reduktion", Zentrum für Hochschuldidaktik, University of Cologne (online)

2021 Praxistraining Personalentwicklungsgespräche, University of Cologne (online)

2021 Seminar "Professional Leadership", University of Cologne (online)

2021 Next Level Leadership: Learning Nugget Feedback, University of Cologne (online)

2016 Participant in the development program for group leaders, Jülich Research Centre

2011–2013 Participant in the TANDEMplus career development and mentoring program for women in engineering and the natural sciences

2010 Advanced Course in Computational Neuroscience, Bernstein Center for Computational Neuroscience, Freiburg, Germany

Languages

Dutch (native), English (near-native), German (fluent), French (high intermediate), Norwegian (low intermediate), Spanish (elementary), Hindi (beginner), Tunisian/Arabic (beginner)