

Dr. Nico Adelhoefer

Towards action control in dreams via neuromodulation & sleep physiology

Donders Institute, Radboud University Nijmegen | nico.adelhoefer@ru.nl | github.com/dreamstimlab

Publications	Neuron • NeuroImage • eLife • Physiological Reviews
Interventions	tDCS • low-intensity ultrasound • neurofeedback • neuropharmacology
Analysis	hdEEG • source-level • aperiodic activity • polysomnography • simulations

Academic Background

2021 - now	<i>Postdoc</i>	Donders Institute, Nijmegen Project: Transcranial ultrasound to modulate sleep experience
2020 - 2021	<i>Postdoc</i>	Action Lab Dresden
2017 - 2020	<i>PhD</i>	Action Lab Dresden Thesis: The role of neural gain in managing cognitive conflicts (magna cum laude)
2013 - 2016	<i>MSc in Psychology</i>	Otto-von-Guericke University Magdeburg Focus: Cognitive Neuroscience Thesis: Spectral indices of sleep and dream lucidity (top grade)
2010 - 2013	<i>BSc in Psychology</i>	Otto-von-Guericke University Magdeburg

Grants

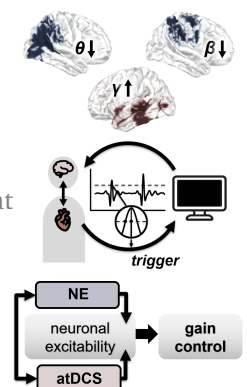
2022 - 2026	<i>Long-Term Fellowship</i>	Human Frontier Science Program Funding: ~200k €
2021 - 2024	<i>Postdoctoral Fellowship</i>	Radboud Excellence Initiative Funding: ~150k €
2020 - 2023	<i>Early-Career Project</i>	Else Kröner-Fresenius Foundation Funding: ~250k €

Talks (Selection)

2024	<i>Summer School</i>	Donders Institute, Nijmegen Title: Neural Correlates of Lucid Dreaming
2023	<i>World Sleep Congress</i>	Rio de Janeiro Title: Towards a Robust Neuroscience of Lucid Dreaming
2022	<i>DGSM Conference</i>	Berlin Title: Neurophysiology of the Lucid Dream

Key Work

2025	<i>Dream state decoding</i>	J Neurosci Reproducible cortical activity patterns associated with lucid dreaming
2020	<i>Cardiac phase selection</i>	NeuroImage Cardiac phase modulates response selection at low cognitive-emotional control demands
2019	<i>Neuromodulation control</i>	Brain Struct Funct During response inhibition, atDCS locally modulates the norepinephrine \leftrightarrow θ link



Teaching

2024 & 2025	<i>Tutoring</i>	Donders Institute Nijmegen Advanced MEG/EEG toolkit
2023 & 2024	<i>Lecturing</i>	Radboud University Nijmegen Course: Neuroscience of Sleep; Lecture: Sleep EEG Analyses Course: Functional Imaging; Lecture: Electrophysiology
2019 & 2020	<i>Seminars</i>	Technical University Dresden NIBS • Neuroplasticity • Atypical neurodevelopment

Publications

Senior authorships (shared)

- 2025** Electrophysiological Correlates of Lucid Dreaming: Sensor and Source Level Signatures
Demirel, Ç., ... [Adelhöfer, N.](#), Dresler, M., *J. Neurosci.*
Aperiodic neural activity distinguishes between phasic and tonic REM sleep
Rosenblum, Y., ... [Adelhöfer, N.](#), Simor, P., Dresler, M., *Journal of Sleep Research*

First authorships (incl. shared)

- 2024** The neuroscience of lucid dreaming: Past, present, future
Zerr, P., [Adelhöfer, N.](#), Dresler, M., *Neuron*
- 2023** Methodologische Empfehlungen zur Neurowissenschaft des luziden Träumens
[Adelhöfer, N.](#), *Somnologie*
- 2021** The dynamics of theta-related pro-active control and response inhibition processes in AD(H)D
[Adelhöfer, N.](#), ... Beste, C., *NeuroImage: Clinical*
Increased scale-free and aperiodic neural activity during sensorimotor integration—a novel facet in Tourette syndrome
[Adelhöfer, N.](#), ... Beste, C., *Brain Communications*
Anodal tDCS modulates specific processing codes during conflict monitoring associated with superior and middle frontal cortices
[Adelhöfer, N.](#), Stock, A.-K., Beste, C., *Brain Struct Funct*
- 2020** EEG Signal Decomposition Evidence for a Role of Perceptual Processes during Conflict-related Behavioral Adjustments in Middle Frontal Regions
[Adelhöfer, N.](#), Beste, C., *Journal of Cognitive Neuroscience*
Pre-trial theta band activity in the ventromedial prefrontal cortex correlates with inhibition-related theta band activity in the right inferior frontal cortex
[Adelhöfer, N.](#), Beste, C., *NeuroImage*
Cardiac cycle gated cognitive-emotional control in superior frontal cortices
[Adelhöfer, N.](#), Schreiter, M. L., Beste, C., *NeuroImage*
- 2019** Validity expectancies shape the interplay of cueing and task demands during inhibitory control associated with right inferior frontal regions
[Adelhöfer, N.](#), Beste, C., *Brain Struct Funct*
How perceptual ambiguity affects response inhibition processes
[Adelhöfer, N.](#), Chmielewski, W. X., Beste, C., *Journal of Neurophysiology*
Lateral prefrontal anodal transcranial direct current stimulation augments resolution of auditory perceptual-attentional conflicts
[Adelhöfer, N.](#), ... Li, S.-C., *NeuroImage*
Anodal tDCS affects neuromodulatory effects of the norepinephrine system on superior frontal theta activity during response inhibition
[Adelhöfer, N.](#), ... Beste, C., *Brain Struct Funct*
- 2018** The system-neurophysiological basis for how methylphenidate modulates perceptual-attentional conflicts during auditory processing
[Adelhöfer, N.](#), ... Beste, C., *Human Brain Mapping*
Dopamine Modulates the Efficiency of Sensory Evidence Accumulation During Perceptual Decision Making
Beste, C., [Adelhöfer, N.](#), ... Li, S.-C., *International Journal of Neuropsychopharmacology*

Supervisions	1 PhD (co) • 3 MSc • 1 BSc • 1 Research Assistant
Tools	Python (MNE, fastai) • Matlab (fieldtrip, kWave) • JavaScript • \LaTeX
Media	Arte TV • NPO Radio • Vice

Co-authorships (selection)

- 2025** Hacking the functions of sleep: Non-invasive approaches to stimulate sleep neurophysiology
 Krugliakova, E., Breuer, F., [Adelhöfer, N.](#), ... Dresler, M., *Physiological Reviews*
 Fractal cycles of sleep, a new aperiodic activity-based definition of sleep cycles
 Rosenblum, Y., Jafarzadeh Esfahani, M., [Adelhöfer, N.](#), ... Dresler, M., *eLife*
 Targeting Sleep Physiology to Modulate Glymphatic Brain Clearance
 Van Hatten, T., ... [Adelhöfer, N.](#), ... Rosenblum, Y., *Physiology*
- 2023** TRACK—a new algorithm and open-source tool for the analysis of pursuit-tracking sensorimotor integration processes
 Böttcher, A., [Adelhöfer, N.](#), ... Beste, C., *Behav Res*
 A dissociable functional relevance of theta- and beta-band activities during complex sensorimotor integration
 Böttcher, A., Wilken, S., [Adelhöfer, N.](#), ... Beste, C., *Cerebral Cortex*
 The neurophysiology of continuous action monitoring
 Wilken, S., Böttcher, A., [Adelhöfer, N.](#), ... Beste, C., *iScience*
- 2016** A studyforrest extension, simultaneous fMRI and eye gaze recordings during prolonged natural stimulation
 Hanke, M., [Adelhöfer, N.](#), ... Stadler, J., *Sci Data*