

Studienarbeitsthemen Computational Neuroscience (ICNS)	Betreuer	Kontakt	Optional: Einstiegsreferenzen
Large-scale structure of information propagation in the human cerebral cortex	Dr. Arnaud Messé / Dr. Fatemeh Hadaeghi / Prof. Claus Hilgetag	a.messe@uke.de	1. http://dx.doi.org/10.1038/s42003-020-0794-7 2. https://academic.oup.com/brain/article-lookup/doi/10.1093/brain/121.6.1013 3. https://www.science.org/doi/10.1126/science.271.5250.776 4. https://elifesciences.org/reviewed-preprints/101780
Paradoxical lesion effects as a symptom of higher-order brain interactions	Prof. Claus Hilgetag / Dr. Kayson Fakhar	c.hilgetag@uke.de	1. https://academic.oup.com/brain/advance-article/doi/10.1093/brain/awz343/5640486 2. http://dx.doi.org/10.1098/rstb.2000.0555
Incorporating biologically plausible inhibition into reservoir computing	Dr. Fatemeh Hadaeghi / Prof. Claus Hilgetag	f.hadaeghi@uke.de	
Patient-customized ECG monitoring with RNNs/transformers	Dr. Fatemeh Hadaeghi / Prof. Claus Hilgetag	f.hadaeghi@uke.de	https://arxiv.org/pdf/1907.09504
Actigraphy data classification using sequence modelling techniques	Dr. Fatemeh Hadaeghi / Prof. Claus Hilgetag	f.hadaeghi@uke.de	
A sensor foundation model pretrained on continuous actigraphy data for circadian rhythm management	Dr. Fatemeh Hadaeghi / Prof. Claus Hilgetag	f.hadaeghi@uke.de	
Reciprocity, asymmetry, and dynamic states in complex networks	Dr. Fatemeh Hadaeghi / Prof. Claus Hilgetag	f.hadaeghi@uke.de	
Textmining of brain connectivity data with LLMs	Prof. Claus Hilgetag	c.hilgetag@uke.de	https://pubmed.ncbi.nlm.nih.gov/27242503/
Ground-truth simulations of brain lesions and treatment interventions	Prof. Claus Hilgetag / Dr. Kayson Fakhar	c.hilgetag@uke.de	https://pubmed.ncbi.nlm.nih.gov/39291162/
Using vibrotactile coordinated reset and smartwatch monitoring for treating Parkinson's Disease: various projects, e.g. app development, glove design, and trial support	Dr. Fatemeh Sadeghi / Dr. Mariia Popova / Prof. Claus Hilgetag	f.sadeghi@uke.de	https://pmc.ncbi.nlm.nih.gov/articles/PMC8771098/
A structured, LLM-supported review of essential features of the human connectome	Prof. Claus Hilgetag	c.hilgetag@uke.de	https://pubmed.ncbi.nlm.nih.gov/?term=%22human+connectome%22
Large-scale simulation of epileptic spreading using a basic excitable (SER) model	Dr. Mariia Popova / Dr. Arnaud Messé / Prof. Claus Hilgetag	m.popova@uke.de	https://academic.oup.com/cercor/article/34/10/bbae409/7826014#488449459
Analyzing dynamical landscapes of small empirical connectomes (SER model) and their perturbation	Dr. Mariia Popova / Dr. Arnaud Messé / Prof. Claus Hilgetag	m.popova@uke.de	https://journals.aps.org/pre/abstract/10.1103/PhysRevE.110.054406
Analyzing dynamical landscapes with regards to the underlying topology (SER model). How graph theoretical measures relate to triangles/devices?	Dr. Mariia Popova / Dr. Arnaud Messé / Prof. Claus Hilgetag	m.popova@uke.de	https://journals.aps.org/pre/abstract/10.1103/PhysRevE.110.054407
Including limbic networks in the simulation of Freezing of Gait in Parkinson's Disease	Dr. Mariia Popova / Prof. Claus Hilgetag	m.popova@uke.de	
Effects of random changes in the human connectome explored with an SER model	Dr. Arnaud Messé / Dr. Mariia Popova / Prof. Claus Hilgetag	a.messe@uke.de	https://journals.aps.org/pre/abstract/10.1103/PhysRevE.110.054406
Comparing the perspectives of lesion inference and network modeling for the phenomenon of Freezing of Gait in Parkinson's Disease	Dr. Kayson Fakhar / Dr. Mariia Popova / Prof. Claus Hilgetag	m.popova@uke.de	https://direct.mit.edu/netn/article/8/3/926/120695/The-effect-of-deep-brain-stimulation-on-cortico
Functional synergy from the perspective of lesion inference versus information theory	Dr. Kayson Fakhar / Dr. Mariia Popova / Prof. Claus Hilgetag	kayson.fakhar@gmail.com	https://direct.mit.edu/netn/article/8/3/926/120695/The-effect-of-deep-brain-stimulation-on-cortico
A review of human brainstem pathways (connections of LC and others with basal ganglia and cortex)	Dr. Mariia Popova / Prof. Claus Hilgetag	m.popova@uke.de	
Integrating a small model of the basal ganglia into TheVirtualBrain	Dr. Mariia Popova / Prof. Claus Hilgetag	m.popova@uke.de	
A review of sparse brain connectivity and activity	Dr. Arnaud Messé / Prof. Claus Hilgetag	a.messe@uke.de	https://www.frontiersin.org/journals/neuroinformatics/articles/10.3389/fninf.2023.1170337/full
Using a basic excitable (SER) model to simulate empirical brain connectivity data	Dr. Arnaud Messé / Prof. Claus Hilgetag	a.messe@uke.de	
Review and compare model-based effective connectivity	Dr. Arnaud Messé/ Dr. Kayson Fakhar / Prof. Claus Hilgetag	a.messe@uke.de	https://onlinelibrary.wiley.com/doi/10.1002/hbm.460020107
Relations of structural and functional connectivity including the subcortex	Dr. Arnaud Messé / Prof. Claus Hilgetag	a.messe@uke.de	https://www.nature.com/articles/s41593-024-01787-0