MULTILEVEL HUMAN BRAIN MAPPING AND ATLAS AS A TOOL CONNECTING MICRO AND MACROSTRUCTURES

Organisators
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The symposium offers the opportunity to deepen the possibilities of an advanced brain atlas: "JULICH BRAIN" – a multimodal 3D atlas of cortical and subcortical areas. It is based on the analysis of histological sections of 10 postmortem brains to capture the intersubject variability. The cytoarchitectonic maps serve as a reference for integrating data from different spatial scales and various aspects of brain organization (e.g. connectivity, molecular and genetic maps) and other optical techniques, like 3D Polarized Light Imaging to study the brain's fibre architecture, and ultra-high resolution X-ray phase contrast imaging, such as light sheet imaging or two-photon imaging down to the nanometer scale, into a coherent system.

The BigBrain modality, which represents 3D-reconstructed histological datasets with a spatial resolution of 20 micrometers, enables the spatial alignment of Julich Brain data and is openly accessible via the EBRAINS research infrastructure to connect atlas information with a wide range of other data, tools and services using the siibra toolkit.

Our speakers:

Prof. Katrin Amunts
C.&O. Vogt-Institut für Hirnforschung
Heinrich-Heine-Universität
Düsseldorf

Prof. Timo Dickscheid
Institut für Neurowissenschaften
und Medizin (INM-1)
Forschungszentrum Jülich

Prof. Tim Salditt
Institut für Röntgenphysik
Georg-August-Universität
Göttingen

MARCH 28, 2025
14:30 – 16:30 PM

Event Agenda

Symposium S25: March 28, 2025 14:30 – 16:30 PM

Georg-August-Universität, Platz der Göttinger Sieben, 537073 Göttingen

14:30	Brain architecture – from cells to organ	Katrin AMUNTS
14:50	Q&A	
15:00	Bridging different levels of brain organization using the siibra toolsuite	Timo DICKSCHEID
15:20	Q&A	
15:30	3D Pathohistology of neurodegenerative diseases by X-ray Phase Contrast Imaging methods	Tim SALDITT
15:50	Q&A	
16:00	High resolution 3D mapping of the human hypothalamus and its subdivisions	Alexey CHERVONNYY
16:07	Q&A	
16:10	High resolution 3D mapping within areas 44 and 45 – new cytoarchitectonic subdivisions in Broca's region	Nataliia FEDORCHENKO
16:17	Q&A	
16:20	Summary & Discussion	ALL SPEAKERS

SCAN TO VISIT THE NWG MEETING WEBSITE

SCAN TO OPEN SIIBRA EXPLORER

Our speakers

Prof. Katrin Amunts

is well known for her work in human brain mapping. In order to better understand the organizational principles of the human brain, she and her team have created the cytoarchitectonic Julich Brain Atlas. She is a full professor of Brain Research, and director of the C.&O. Vogt-Institute of Brain Research at Heinrich-Heine-University Düsseldorf and director of the Institute of Neuroscience and Medicine (INM-1) at Research Center Jülich. Since 2023, she is the Joint Chief Executive Officer of EBRAINS AISBL, Brussels, Belgium. From 2016 until 2023 Katrin Amuntswas the Scientific Research Director of the EU flagship project "The Human Brain Project (HBP)".

Prof. Timo Dickscheid

is contributing to the development of a high-resolution, openly accessible human brain atlas, focusing on the intersection of Computer Vision, Big Data Analytics, and Neuroinformatics. His research group extracts information from microscopic images and reconstruct 3D brain models at the cellular level. They develop Machine Learning methods for analyzing large-scale image data streams and address the data lifecycle, from distributed data management to high-performance computing and web services. Timo Dickscheid leads the working group "Big Data Analytics" at the Institute of Neuroscience and Medicine (INM-1) at Research Center Jülich and is a Professor at Heinrich-Heine-University Düsseldorf.

Prof. Tim Salditt

is a professor of Experimental Physics at the Institute for X-ray Physics at Georg-August-University Göttingen. His research explores the structural analysis of soft matter, biomolecular assemblies, and the biophysics of membranes, utilizing advanced techniques like X-ray scattering, coherent X-ray optics, and ptychography. A major focus of his work is lensless X-ray microscopy and near-field holography, which allows detailed imaging of biological tissues at the molecular level. His work has broad applications in understanding biomolecular structures and interactions, including synaptic vesicles and membrane dynamics.

Alexey Chervonnyy

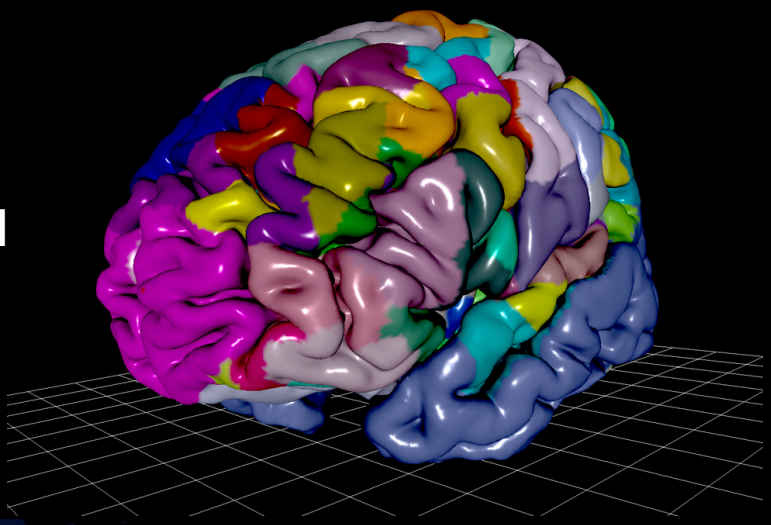
is a doctoral student at the C.&O. Vogt-Institute of Brain Research at Heinrich-Heine-University Düsseldorf, and a young doctoral researcher at the Hector Fellow Academy. His research focuses on developing high-resolution, probabilistic cytoarchitectonic maps of the human hypothalamus to address intersubject variability and provide a comprehensive 3D reference for neuroimaging studies.

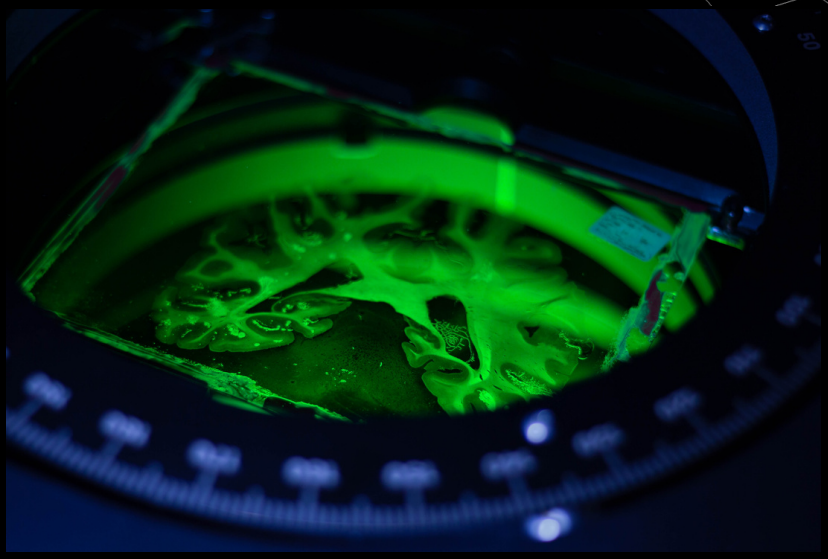
Nataliia Fedorchenko

is an associate doctoral student at the Max Planck School of Cognition, and a doctoral student at the C.&O. Vogt-Institute of Brain Research at Heinrich-Heine-University Düsseldorf. Her current research focusses on developing an anatomo-functional model of Broca's region based on cytoarchitecture, connectivity and language function.

JULICH-BRAIN ATLAS

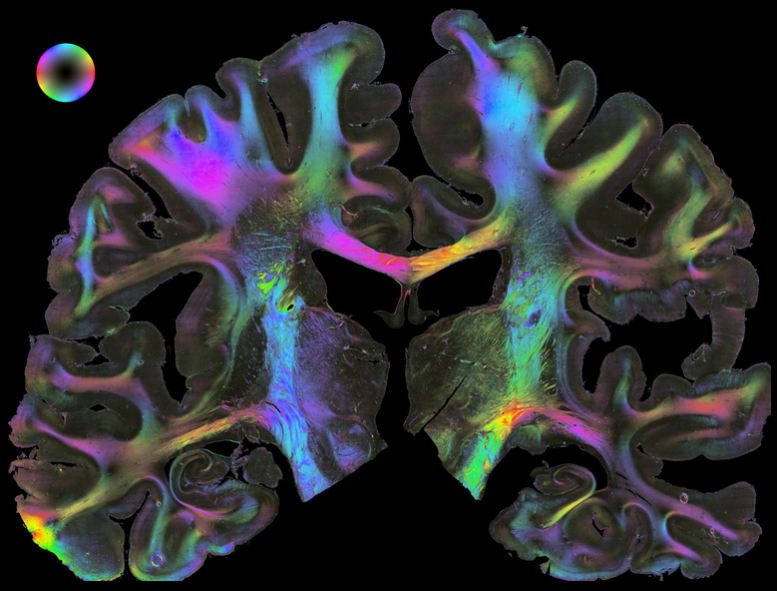
The Julich-Brain Atlas has mapped 227 regions, shows the cellular architecture of the brain in a three-dimensional space and captures the variability between individual brains.





The atlas displays microstructure, connectivity and function, enabling researchers to collaboratively decode the brain, and clinicians to improve tretment of patients suffering from neurological disease.

The atlas is freely available online on EBRAINS platform, where new data is constantly integrated.



Access the JULICH-BRAIN!