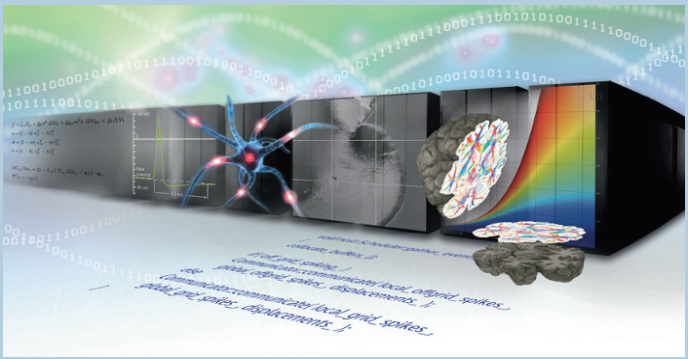
Helmholtz Portfolio Theme SMHB Supercomputing and Modeling for the Human Brain

JARA Jülich Aachen Research Alliance

National Bernstein Network Computational Neuroscience

JÜLICH FORSCHUNGSZENTRUM

Simulation Lab Neuroscience

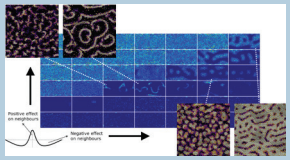


The Simulation Lab Neuroscience at the Jülich Supercomputing Centre supports the neuroscience community in solving problems with high scientific impact through the use of high-performance computing (HPC) resources. This includes

- Porting and optimizing user code for supercomputers
- Maintaining installations of widely used simulation and data processing tools
- Building models and databases of large-scale brain circuits
- Developing simulation, data analysis and visualisation methods for neuroscience
- Developing tutorials, courses and workshops
- Support in preparation of computing time proposals and for preparatory access projects

Modelling and Simulation

- nest:: @ High-Q Club
- Contribution to new versions & optimisation for HPC
- Development of new features & functionalities
- Support for simulation on neuromorphic hardware
- Models of structural plasticity in NEST
- Neural mass models
- Multi-compartment models of neural networks



Visualisation

- Visualisation tools and methods for neuroscience datasets
- Collaborations with RWTH Aachen University

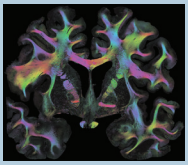
Infrastructure development

- Co-design with JSC's Technology Labs
- Requirements specification and user support for the Human Brain Project

Human Brain Project

Structure, function, connectivity

- 3D-PLI data processing and analysis on supercomputers
- BigBrain2: Brain atlas in collaboration with INM and McGill University
- Modelling of dynamic brain states using MRI technology



Supporting software

- Collaboration with Data Lifecycle Lab Neuroscience
- Data and workflow management support
- Software refactoring
- Support for provenance tracking
- Porting and support for evolving HPC technologies, GPUs and accelerators

Partners

Jülich institutes (INM), Helmholtz Zentrum München, DKFZ, RWTH Aachen University, McGill University Montreal, Institut de Neuroscience de la Timone, EPFL, Indiana University, Charité Berlin, FH Bielefeld, Human Brain Project

bfsd jülich

As Bernstein Facility for Simulation and Database Technology we contribute our expertise to the national Bernstein Network Computational Neuroscience.

JARA|HPC

As a JARA-HPC SimLab we combine neuroscience research with the HPC methods required for efficiently exploiting the existing Petascale machines.

Contact: slns@fz-juelich.de | **Website:** www.fz-juelich.de/ias/jsc/slns