

From Ions to Electrons - Physical Models of Brain Circuits

Prof. Dr. Karlheinz Meier

Kirchhoff-Institut für Physik, Universität Heidelberg

The brain is a universe of 100 billion cells interacting through a constantly changing network of 1000 trillion synaptic connections. It runs on a power budget of 20 Watts and represents a rather complete model of our physical world. Understanding fundamental principles of the brain is among the key challenges for science. Traditional simulation approaches are mostly hindered by a huge energy gap of 14 orders of magnitude between supercomputer simulations and biological reality. In the lecture we will discuss our approach to build physical models of the brain as a tool for experimental tests of theories that attempt to describe the storage and processing of information in the brain.