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Press Release

1.2 million euros funding for new imaging technology in brain research

Professor Klaus Scheffler wants to test new methods in magnetic resonance imaging

Tübingen, 12 January 2017. **The Tübingen-based physicist Professor Klaus Scheffler aims to improve functional magnetic resonance imaging (fMRI) with the support of the German Research Foundation (DFG), so that it can provide detailed information on brain and nerve activity. Scheffler works at the Max Planck Institute for Biological Cybernetics and the Werner Reichardt Centre for Integrative Neuroscience at the University. The DFG is funding the project within the scope of its Koselleck projects in the coming 5 years with a total of 1.2 million euros.**

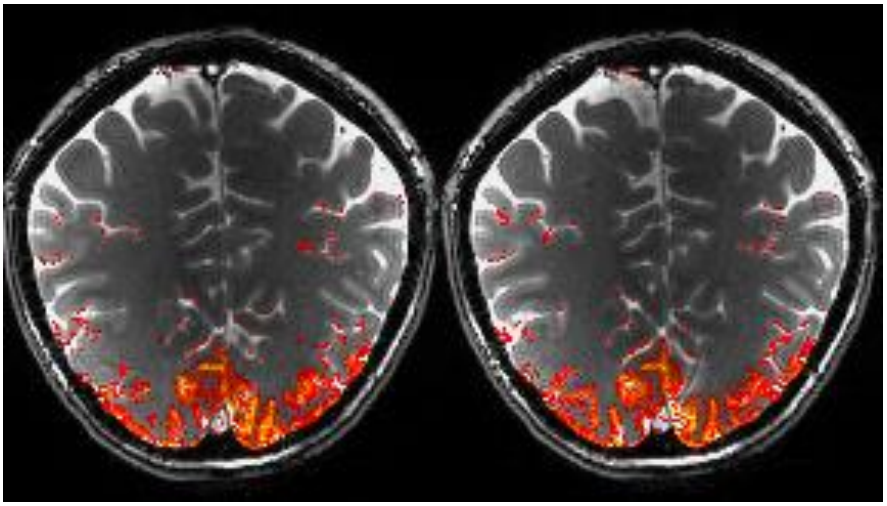
"Currently, signal processing in the brain can be measured by various methods," Scheffler explains. The so-called electrophysiology, for example, allows a very detailed recording of local events, because nerve cells in the brain communicate with each other by means of electrical signals. To measure this activity, a hairy microelectrode is placed in the cerebral cortex or deeper brain structures. Thus the signal of a small number or even a single nerve cell can be observed. Electrophysiology is often used in neurosciences in animal experiments, but also in medicine, for example during brain surgeries.

Magnetic resonance imaging, on the other hand, is a non-invasive method with a very high spatial resolution in the millimeter range and the possibility of detecting the entire brain in humans or animals. Magnetic resonance is often presented as an alternative method to invasive methods, but unlike electrophysiological recordings it cannot directly measure neuronal activity. Research is therefore done with a methodical detour: Magnetic resonance imaging allows to detect local changes in the blood oxygen content in the brain, which in turn is modulated by the neuronal activity.

"This so-called neurovascular coupling is not fully understood at this time," Scheffler says, "a prediction of the underlying neuronal activity of the brain based on functional MRI data is therefore very difficult if not impossible." The newly approved Koselleck project therefore has its goal to better understand the relationship between vascular and neural signals. In this project, novel magnetic resonance methods are being investigated with the aim of obtaining more detailed information on the underlying neuronal activities. For this purpose, it is

important to know the exact anatomy of the neural vascular system, which is measured by experiments with high-resolution MicroCT. All in all, the approved Koselleck project aims to provide a more accurate picture of the neuronal interactions of the entire brain as a system.

Koselleck projects of the DFG represent particularly innovative and, in the positive sense, risk-related research. Scientists, who have shown special scientific achievements, are given the opportunity to carry out highly innovative and positively risky projects. The funding line is named after Reinhart Koselleck, who died in 2006, one of the most important German historians of the 20th century, one of the founders of modern social history.



Caption: Activation of the visual cortex by presentation of a changing checkerboard pattern in humans measured at 9.4T. The red-labeled activation is based on a new approach (balanced steady state free precession) which allows an improved detection of the vascular response of cortical micro vessels.

Photo: Max Planck Institute for Biological Cybernetics

Printable images can be obtained at the Public Relations Office. Please send a proof upon publication.

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Max Planck Institute for Biological Cybernetics
The Max Planck Institute for Biological Cybernetics works in the elucidation of cognitive processes. It employs about 300 people from more than 40 countries and is located at the Max Planck Campus in Tübingen, Germany. The Max Planck Institute for Biological Cybernetics is one of 80 research institutes that the Max Planck Society for the Advancement of Science maintains in Germany and abroad.

University of Tübingen
The University of Tübingen is one of the eleven German universities that have been awarded an excellent award. In the life sciences, it offers top research in the field of neurosciences, translational immunology and cancer research, microbiology and infection research as well as molecular biology. Other research areas include geosciences and environmental research, archeology and anthropology, language and cognition as well as education and media. More than 28,400 students from all over the world are currently registered at the University of Tübingen. An offer of around 300 courses is available - from Egyptology to the Cellular Neurosciences.

Werner Reichardt Centre for Integrative Neuroscience (CIN)
The Werner Reichardt Centre for Integrative Neuroscience (CIN) is an interdisciplinary institution at the Eberhard Karls University of Tübingen, financed by the German Research Association within the framework of the Excellence Initiative of the Federal Government and its countries. The aim of the CIN is to contribute to a deeper understanding of brain performance and to clarify how diseases affect these services. The CIN is guided by the conviction that this effort can only be successful if an inclusive approach is chosen.