

**Faculty of Psychology and Neuroscience**  
(founded in 1995)



# Brain research

## Kamil Ugurbil

Professor in the department of Radiology, Neurosciences and Medicine, and holder of the McKnight Presidential Endowed Chair of Radiology at the University of Minnesota

“All my research is aimed at understanding the human brain, with the ultimate goal that the knowledge and methods of investigation we develop in the process will ultimately aid the study of brain diseases such as Alzheimer’s and schizophrenia. My research group was one of the first to simultaneously and independently demonstrate the ability to obtain MR images of neuronal activity in the human brain. We were also the first to present images of intracellular chemicals with Magnetic Resonance Spectroscopy (MRS), today one of the most valuable tools for the study of neurochemistry in vivo.

“In addition, we pioneered non invasive imaging techniques, especially Magnetic Resonance Imaging (MRI) at high field strengths. Starting with a 4 Tesla instrument in 1990, a plethora of human and animal experiments established the feasibility of MRI and MRS at high fields and demonstrated the clear advantages for fMRI and spectroscopy. These studies justified further exploration of higher fields, and in 1999 my team in Minnesota assembled and built the first 7 Tesla and in 2005 the first 9.4 Tesla MR systems for human studies. This was

accompanied by the development of new methodologies and instrumentation for high-field MRI and MRS, ultimately leading to high-specificity and high-resolution mapping of human and animal brain function at the level of the fundamental computational units of the brain, and to various applications of these techniques in basic and clinical neurosciences. Because of this work, integrated 7 Tesla instruments are today offered by manufacturers of clinical MR systems, and are becoming the platform for cutting-edge biomedical research. At the moment we are developing another ultrahigh field MRI system, this time the first 10.5 system.

“The best, and ultimately the only way an individual is ‘taught’ to become a researcher is by participating in research activity under a mentor’s supervision. My ‘teaching’ is extensive in this capacity. I have many graduate students and postdoctoral fellows in my laboratory and many of my former students and fellows occupy prominent positions in research, leading important research groups of their own.”

### *Honorary supervisor Rainer Goebel, professor of Cognitive Neurosciences*

*“Professor Ugurbil was one of the pioneers who developed functional MRI (fMRI) using the blood-oxygen-level dependent (BOLD) technique. A method that we use to measure our brain cells in action: feeling, thinking, problem solving, deciding etc. In the future, brain imaging will contribute more and more to our understanding of human behaviour and brain-related diseases. Imaging methods are undergoing rapid and dynamic technological development. This means it’s important to work in a cross-disciplinary manner, such that technological*

*development is inspired by the needs of psychological and medical scientists, and vice versa.*

*“One such example is our collaboration with Kamil Ugurbil’s group. For years there has been intensive collaboration and exchange with our M-BIC group; under the Brains Unlimited project this collaboration will be intensified even more, especially when it comes to the further development of 9.4 Tesla neuroimaging.*

*“Along with being an exceptional researcher, he is also an inspiring colleague and teacher. So I’m really proud to have been able to nominate him for this honorary doctorate.”*