

Seminar series: Selected research topics in Biomedical Engineering

Location: Klinikum 2, Konferenzraum 1 in Radiology, Universitätsspital Basel

25. October 2018, 12:30-14:00, host Oliver Bieri:

Parallel Transmission for Whole-Body MR Imaging at Ultra-High Magnetic Fields

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Abstract: In the past three decades, magnetic resonance imaging (MRI) has become a vital tool for clinical diagnosis and life science research. An ongoing trend is the introduction of research magnets with more powerful static magnetic fields, including magnets for human use at 7 Tesla and higher. Advantages of higher magnetic fields include higher signal-to-noise ratios that enable improved spatial and temporal resolution, and unique tissue contrasts based on enhanced sensitivity to tissue susceptibility differences and other physical effects. Recently, 7 Tesla has been introduced for clinical use in the head and small joints. Nevertheless, many technical challenges remain, including interference and penetration effects affecting the radiofrequency field used to excite the tissue that make it difficult to image large cross-sections in the body. In this presentation we will take a look at the state-of-the-art of human biomedical imaging at 7 Tesla and examine the perspective for MRI at even higher magnetic fields, with an emphasis on the use of parallel transmission techniques to enable whole-body imaging.

Curriculum: Mark E. Ladd, Ph.D., is currently Professor of Medical Physics in Radiodiagnostics and Biophysics at Heidelberg University and Head of Medical Physics in Radiology at the German Cancer Research Center (DKFZ) in Heidelberg. He is also affiliated as a Principal Investigator of the Erwin L. Hahn Institute for MRI at the University of Duisburg-Essen, Germany. Mark grew up in the USA and studied electrical engineering at the University of Michigan, Ann Arbor, where he received a Bachelor of Science in 1989, and at Stanford University, where he received a Master of Science in electrical engineering in 1991. Starting in 1992, Mark was employed by General Electric, and as part of a research collaboration with the University Hospital Zurich, he worked in Switzerland between 1994 and 1999. During this time, he completed his PhD work at the Swiss Federal Institute of Technology (ETH Zurich), working on the visualization of interventional devices such as catheters

and guidewires during MR-guided procedures. In 1999, he moved to the University of Duisburg-Essen in Essen, Germany, where he was appointed professor in 2004. In 2013, he accepted a new appointment at Heidelberg University. He is author or co-author of more than 250 scientific articles involving the application and improvement of MR technology. He is president-elect of the German Society for Medical Physics. His current work focuses on MRI at 7 Tesla, with a particular focus on the manipulation and safety of radiofrequency fields using parallel transmission.