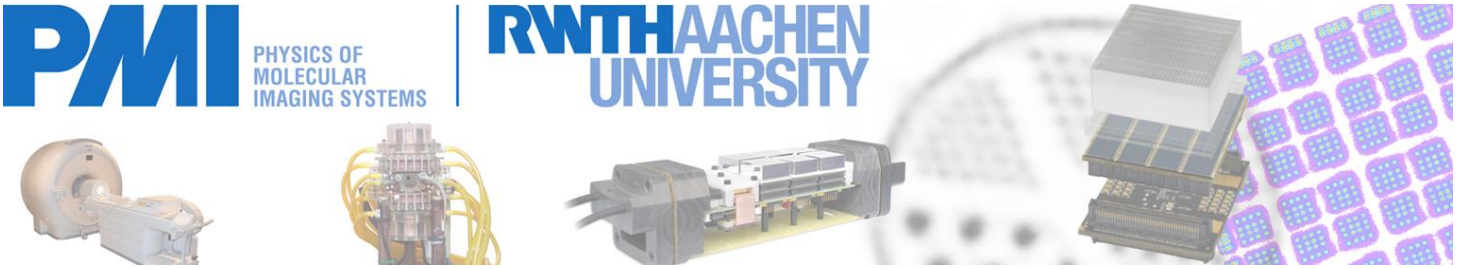
PMI PHYSICS OF MOLECULAR IMAGING SYSTEMS | RWTH AACHEN UNIVERSITY



Research focus of the department of "Physics of Molecular Imaging Systems" (**PMI**) is on exploring the physical limits of current and future molecular imaging technologies. These areas range from simulations of new detector concepts, hardware prototypes, high speed data processing, image reconstruction algorithms and applications using our research imaging prototypes. Our group consists of students and researchers from different disciplines: physics, engineering, computer science and medicine. PMI is part of a large international network with a close link to industry, especially Philips Research.

PhD and Postdoc Positions for Magnetic Particle Imaging (MPI)

In 2005, the novel tomographic imaging technique **magnetic particle imaging (MPI)** has been published. It allows to quantitatively measure the spatial distribution of **superparamagnetic nanoparticles (SPIOs)** at very high sensitivity and spatial resolution. The fundamental idea is based on the nonlinear response of the SPIOs during magnetic excitation, see Figure 1. The majority of the received signal is generated from SPIOs at a dynamically moved field free point (FFP). The predicted high sensitivity, high spatial resolution, and the fact that MPI does not involve ionizing (harmful) radiation makes MPI a very promising candidate for long-term applications such as early detection of cancer, and for the development of novel cell-based therapies.

Scope of the project is the development of a novel preclinical MPI device optimized for cell tracking applications. The device aims at a sensitivity in the sub-nanogram range at a spatial resolution of about 0.1 mm which allows to track a few labelled cells in vivo. For the first time a multi-frequency projection excitation will be developed. By in-line hybridization with a 7-T MRI, multi-parametric imaging will be enabled in two ways: quantitative measurement of SPIO distribution and relaxation/motion parameters; secondly, by integrating anatomical and functional information from MRI.

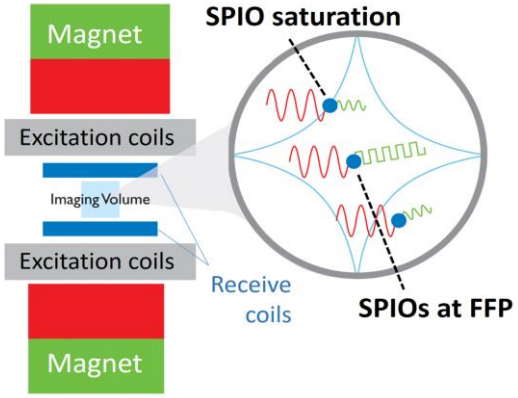


***Figure 1**: Principal of MPI spatial encoding.*

New group members should be highly motivated and creative, show an exceptional track record, and have a strong background in electrical engineering, physics, or related fields, and be interested in working in an interdisciplinary environment at the interface of imaging physics and medicine. In particular, you should have an interest in MPI physics, electromagnetic fields, real time data acquisition, MPI instrumentation and MRI physics. You will work in a project team of 7 very experienced scientists at PMI with close cooperation to leading industry and the Institute of Experimental Molecular Imaging of the University clinic RWTH Aachen towards a novel preclinical MPI/MRI device.

The positions are fully funded (100% employment). In order to apply, please submit a complete application, consisting of a cover letter, your CV, university transcripts, and the coordinates of at least two referees as a single PDF file via email to Prof. Dr.-Ing. Volkmar Schulz (schulz@pmi.rwth-aachen.de) with "[pmi-application: MPI]" in the subject line. The preferred starting date for these positions is the first half of 2017.

For more information: Physics of Molecular Imaging Systems (Univ.-Prof. Dr.-Ing. Volkmar Schulz)
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