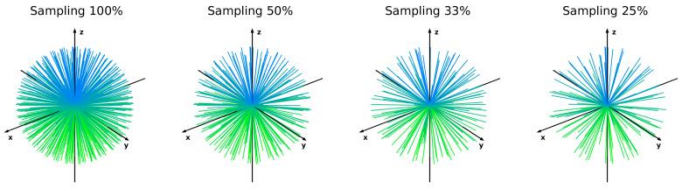
Master Thesis

„Accelerating Radial Ultra-Short Echo-Time MRI”

Project description

By using ultra-short echo-time (UTE) magnetic resonance imaging (MRI) tissues, which are otherwise not visible due to very short T_2* relaxation times, can be directly imaged. For example, tendons and ligaments as shown below appear typically black when using conventional MRI sequences (left), but can be made visible with the UTE technique (right).

UTE imaging sequences typically use a radial acquisition scheme (see Figure below) to achieve the shortest possible echo times. The aim of this project is to accelerate this radial data acquisition by deliberately under-sampling the measurements. For this purpose an existing image reconstruction pipeline has to be extended by implementing one (or several) of the acceleration algorithms that are well established in MRI research, such as Compressed Sensing, Sensitivity Encoding or Nonlinear Inversion Reconstruction.



Your profile

- B.Sc. degree in computer science, mathematics, physics, biomedical engineering or related fields
- Interest in medical imaging and image reconstruction, processing and analysis
- Strong MATLAB programming skills
- Ability to handle complex mathematical problems
- Ability to study scientific literature

Working environment

The Medical Physics Group at the Institute for Diagnostic and Interventional Radiology (IDIR) at the University Hospital Jena conducts interdisciplinary research in tomographic imaging methods, especially MRI. The group consists of a multidisciplinary team of ambitious young scientists from the fields of physics, engineering and biology. The aim of our research activities is the development and provision of new methods to qualitatively and, where possible, quantitatively assess morphologic and functional parameters and thereby contribute to improved diagnostics and therapy.

You will be working at our MRI research center with a state-of-the-art 3T whole-body clinical MRI system and our high performance computation system. All required image reconstruction and analysis will be performed with an in-house developed MATLAB software framework that contains all tools to jump start your work in the exciting field of magnetic resonance imaging.

Place of work

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