

## State-of-the-Art in Magnetic Resonance:

## Methods and Clinical Applications

International lecture series organized by the Translational Imaging Center @ sitem-insel in Bern on recent progress and current applications of MR imaging and spectroscopy at standard and ultrahigh fields

# Asymmetries in the Brain: A Methodological Exploration of bSSFP MRI in Neuroimaging at 3 T and 9.4 T

Dr. Rahel Heule

[Dr. Rahel Heule | Max-Planck-Institut für biologische Kybernetik Tübingen \(mpg.de\)](https://www.mpg.de)

[Heule Rahel | Kinderspital Zürich \(uzh.ch\)](https://www.uzh.ch)

Center for MR Research, University Children's Hospital, Zurich, Switzerland & High Field Magnetic Resonance, Max Planck Institute for Biological Cybernetics, Tübingen, Germany

The balanced steady-state free precession (bSSFP) signal carries rich multi-parametric information about various tissue properties, most prominently about longitudinal ( $T_1$ ) and transverse ( $T_2$ ) relaxation times, but it also reflects tissue microarchitecture and composition on a microscopic subvoxel level. The bSSFP frequency response sampled by a series of phase-cycled scans with varying radiofrequency phase increments becomes asymmetric in tissues if the underlying intravoxel frequency content is asymmetric. Pronounced asymmetries are observed especially in anisotropic tissue microenvironments, e.g., in white matter structures in the brain, and are known to correlate with diffusion tensor imaging (DTI) metrics. Asymmetries in the bSSFP frequency profile indicate the presence of molecular species with different chemical or susceptibility shifts (e.g., myelin, iron-bearing molecules, deoxyhemoglobin, or lipids). This talk covers a discussion about the potential origin of bSSFP profile asymmetries in brain tissues, confounding effects in bSSFP relaxometry and possibilities to leverage the microstructural information entangled in those asymmetries for multi-parametric neuroimaging at high to ultra-high field strength with the aid of deep learning.

**Wednesday, May 17 2023, 16:00**

The lecture will be held as in-person meeting at sitem-insel (Room O2.211), Freiburgstr. 3 in Bern (followed by an apero to continue discussions) and in addition broadcast via zoom @:

<https://unibe-ch.zoom.us/j/66256483922?pwd=aE1kTFg5aUZza1JmW5EJxZDVsdnV5dz09>

and **do spread the word** to anybody potentially interested. (for further info: [karin.zwygart@insel.ch](mailto:karin.zwygart@insel.ch))

