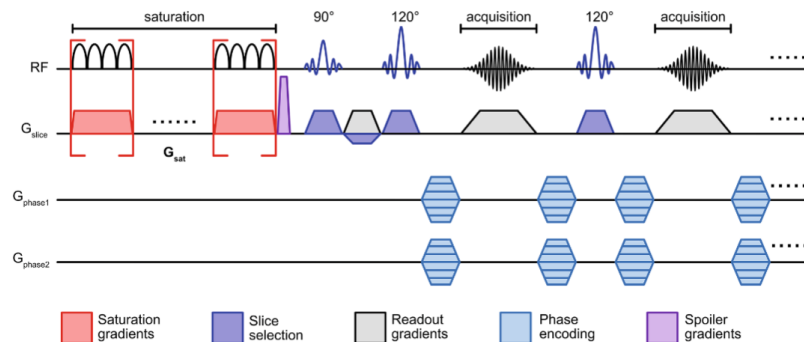


Master Thesis:

Implementation of a Ultrafast Z-spectroscopic imaging sequence using pulseseq-cest



Overview:

CEST MRI (Chemical Exchange Saturation Transfer Magnetic Resonance Imaging) is a powerful imaging technique that allows the detection of metabolites in tissues by exploiting their chemical exchange properties. In CEST MRI, a radiofrequency pulse is used to saturate the protons of a specific chemical group (e.g., amide or hydroxyl) in the metabolites of interest. This saturation then transfers to the water protons in the surrounding tissue via chemical exchange, resulting in a reduction in the signal intensity of the water protons in the MRI image. This allows for the detection and quantification of metabolites that are otherwise difficult to image using traditional methods. Recently a new fast method to acquire CEST images was published.

The aim of this thesis is to implement the proposed sequence called Ultrafast Z-spectroscopic imaging using through-slice spectral encoding (TS-UFZ) using the pulseseq-cest framework and evaluate its performance.

Bie, C, van Zijl, PCM, Mao, D, Yadav, NN. Ultrafast Z-spectroscopic imaging in vivo at 3T using through-slice spectral encoding (TS-UFZ). *Magn Reson Med*. 2023; 89: 1429- 1440. doi:[10.1002/mrm.29532](https://doi.org/10.1002/mrm.29532)

K. Herz et al., "Pulseseq-CEST: Towards multi-site multi-vendor compatibility and reproducibility of CEST experiments using an open-source sequence standard," *Magn. Reson. Med.*, vol. 86, no. 4, pp. 1845–1858, Oct. 2021, doi: [10.1002/mrm.28825](https://doi.org/10.1002/mrm.28825).

Specific tasks:

- Implementing the TS-UFZ Sequence
- Phantom and in vivo MRI measurements and quantification
- Reconstruction of acquired data

Recommended Knowledge:

- Matlab or Python Programming
- MR Sequence Basics
- Interest in sequence programming
- Basic git workflow

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