

# IBBM Project Proposal: Master thesis

## Deep Learning Approach for Water-Fat Quantification of Bone Marrow MR Spectroscopy



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### Keywords

CNN; Magnetic Resonance Spectroscopy; MRS; SVS; Quantification; Water-Fat MRI; PDFF

### Abstract

MRS data is composed of 1D spectra that can quantitatively characterize the tissue composition of *in-vivo*. This is especially useful because reaching the tissue is no longer a concern and it is non-destructive and non-invasive. The challenges come when the data needs to be analyzed.

The quantified PDFF is used to evaluate osteoporosis, metabolic diseases, and bone-/bone marrow-based cancers. Because of the nature of water and triglycerides, the spectral resolution is especially low. Their respective peaks are poorly resolved and overlapping. This presents challenges for accurate quantification. Therefore, we would like to explore the use of CNNs for automating this quantification, especially for the case of low resolution and noisy data.

### Required Skills

- Proficient with PyTorch
- Experience with Computer Vision, Medical Imaging

### What we expect from you

We are looking for a **highly-motivated student** with an above-average academic track record. You should have a technical background including data analysis and machine learning, good problem solving skills, and **be able to work independently**.

### What we offer you

You will receive **strong support** to make your thesis a success. You will gain experience working with a unique, specialized data type from a highly interdisciplinary collaboration. Successful completion of this project will give you a good chance at **co-authorship** on a high-profile **journal publication**.

**Collaboration:** Experimental Magnetic Resonance Imaging Group

If you are interested, please send a CV, transcript, and letter of motivation to [jlamaste@gmail.com](mailto:jlamaste@gmail.com).

