

Specialty area: Instrumentation

Lecture title: NMR & MRI in Rotating Magnetic Fields

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Target audience: Students, Physicists / Engineers, Sequence developers

Outcome objectives:

- Essentials of NMR and MRI solid-state methodology
- Examples of high-resolution spectra of biopsies
- Examples of MRI in rotating samples
- Ultra slow spinning Methodology
- Hardware for Rotating Field MRI devices

Purpose:

To provide the essential knowledge about the current state of the art of anisotropic (solid-state) NMR theory and practice, and propose a novel approach towards rotating field MRI.

Methods:

Line-Broadening Issues in Magnetic Resonance Spectroscopy (MRS). Heterogeneity and magnetic susceptibility. Metabolic profiling in ex-vivo biopsies. Standard anisotropic spin interactions. Coherent Hamiltonian Manipulation. Spatial and Spin averaging. Magic Angle Sample Spinning. High-resolution MAS. Magic Angle Field Spinning. Permanent Magnets. Spherical Harmonic Expansion. Stream Function Theory.

Results:

Magnet, sequence and coil design. Requirements for efficient averaging, field uniformity and stability. High-resolution localized spectroscopy on static subjects. Demonstration study.

- Conclusion

We have the tools to make rotating field MRI devices offering high resolution MRS on static small animals.