# MRS Workshop 28-29 November 2017 – Programme outline*

## DAY 1

**9.00** - Welcome

**9.05 – 10:30** ***MRS Basics I*** Magnetic resonance – standard magnetic induction vs quantum mechanics models, excitation, resonance, receiver reference and offset frequency

**1030-10.50** Morning tea

**10:50 – 11:40** ***MRS Basics II*** – relaxation, T1 and T2 and T2*, linewidths, lineshapes, integrals

**11:50 – 12:30** ***Introduction to Spectroscopy***: chemical shift and frequency, coupling (strong and weak coupling), phase, pulse angles and spectra, acquisition parameters.

**12: 30 – 1:00** ***The Basic Spectroscopy experiment***: pulse-acquire, spin-echo.

**1:-00: 1:30**. Lunch

**1:30-2:20** ***Introduction to imaging concepts***: Gradients, slice selection, frequency and phase encoding. Introduction to RF: pulse-shapes, SAR.

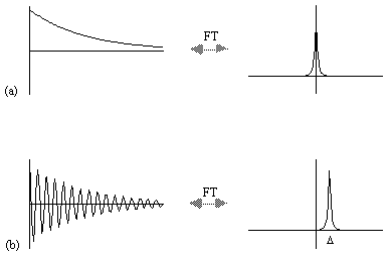
**2:20- 3:00** ***Introduction to localization***. Why localize? Introduction to pulse-sequences. Single voxel MRS, PRESS, STEAM. The effect of varying TE. Outer volume suppression, crusher gradients

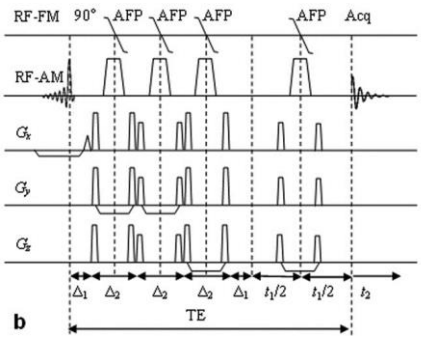
**3:00-3:20** Afternoon tea

**3:20 – 4:00** ***Introduction to Acquisition***: What makes a good spectrum? Water Suppression, Field homogeneity and what affects it, introduction to shimming. Shimming routines.

**4:00- 4:30** ***Artefacts and how to recognize them***: Eddy currents, bad shimming, RF interference, movement, T2*, switching spikes, etc.

**4: 30** ***Q&A and recap***



## DAY 2

**9:00** Welcome

**9:05- 9:30** ***Further considerations*** Chemical shift displacement, tissue segmentation

**9: 30 – 10:00** ***Selective spectroscopy***: Introduction to spectral editing (including MEGA, POCE etc)

**10:00 – 10:40** ***Advanced RF*** – adiabatic and FM pulses. Advanced slice selection.

**10:40 – 11: 00** Morning tea

**11:00 – 11:40** ***More advanced MRS sequences***: Why use them? How are they better? LASER, sLASER, SPECIAL, MEGA-s-LASER .

**11:40 – 12:10** ***Brief introduction to higher dimensional methods*** (J-resolved, CSI, L-COSY. TOCSY etc.)

**12:10 – 13:00** ***Applications***: Brain, MSK, Liver, prostate. Choice of sequence and echo-times, voxel placement, voxel dimensions

**13:00- 13:30** Lunch

**13:30 – 14:-20** ***Analysis***: Brief introduction to analysis methods, jMRUI, LCModel, Tarquin, Gannet. To segment or not? To adjust for relaxation or not? Use of standards.

**14:20 – 15:30** ***Multinuclear spectroscopy***. 31P, surface coils, ISIS, $^{13}C$, nuclear Overhauser effect, decoupling, SAR revisited.

**15:30 – 15:40** Afternoon tea

**15:40 – 16:30** ***Interpretation:*** understanding complexity and biochemistry. Seeing the whole board…

**16:30** – ***Q&A and recap***

* Programme information is provided as a guide and may be subject to change as needed