

Dr. Charlie Fry

B.S. Chemistry and Physics, U AZ

Ph.D. in P Chem at Iowa State U: solid-state NMR studies of α -SiH, zeolites, coal

8 yrs at McDonnell Douglas: solid-state NMR of high-strength polymers and ceramics, and NMR imaging of aircraft parts

20 yrs at UW, liquids NMR supporting broad research

hobbies: NMR, programming, reading, kayaking, hiking, ...

Course Syllabus:

will change as we go, but should stay similar to posted

Grading:

HW (weekly submissions)	35%
lab demo attendance	15%
weekly practice attendance	20%
mid-term lab exam	10%
final lab exam	20%

Textbook:

Tim Claridge, High-Resolution NMR Tech in Org Chem, 2nd Ed. ISBN 0-08-054818-0.

Oliver Zerbe + Simon Jurt, Applied NMR Spectroscopy for Chemists and Life Scientists, ISBN 3-52-73277-46.

Course Objectives

Think! How can NMR assist in solving my research problems?

Many details will be left up to you, but major concepts will be tested.

e.g.: What affects resolution?

Is an experiment viable?

What is the right experiment?

Am I in the right place?

What do I need to learn? (what is my hypothesis?)

What to focus on to optimize the experiment? [HW, guides]

less: What is the underlying theory (spin physics)? [Clar, ZJ]

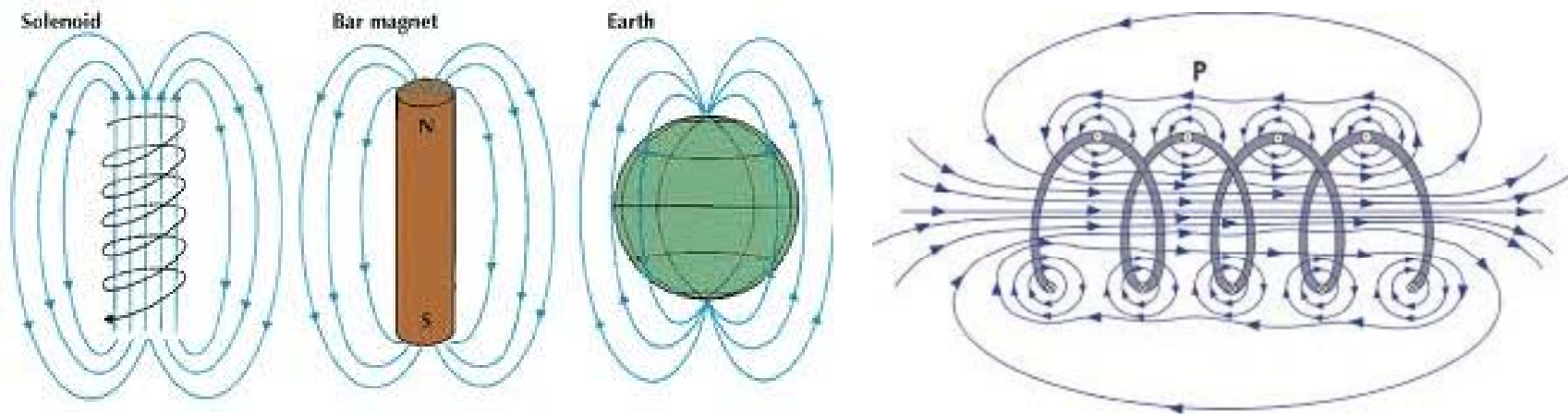
How does the pulse sequence work? [chem637, bioc 800]

not: Printer issues, layout problems, issues doc'd elsewhere...

Basics of High-Resolution NMR

magnetic field: permanent, electromagnet, superconducting

poles vs solenoid coil, Lorentz force



Clar Chap. 2; ZJ Chaps. 2 and 10

Basics of High-Resolution NMR

nuclear spins polarized in magnetic field (Clar pg 12+13)

Zeeman, Larmor freq (Clar eq 2.2), polarization (Clar eq 2.4)

NMR periodic table  google it!

I like Hebrew U's and Bruker's.

basic experiment: 90° flip of vector magnetization, or QM excitation

free-induction decays \longrightarrow spectrum

shims (top of guides section, and Clar fig 3.53; ZJ fig 10.4 is poor)

Basics of High-Resolution NMR

rotating frame

phase behavior of magnetization

phase of detection

phase cycling

nutations