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"Lighting Up" NMR and MRI

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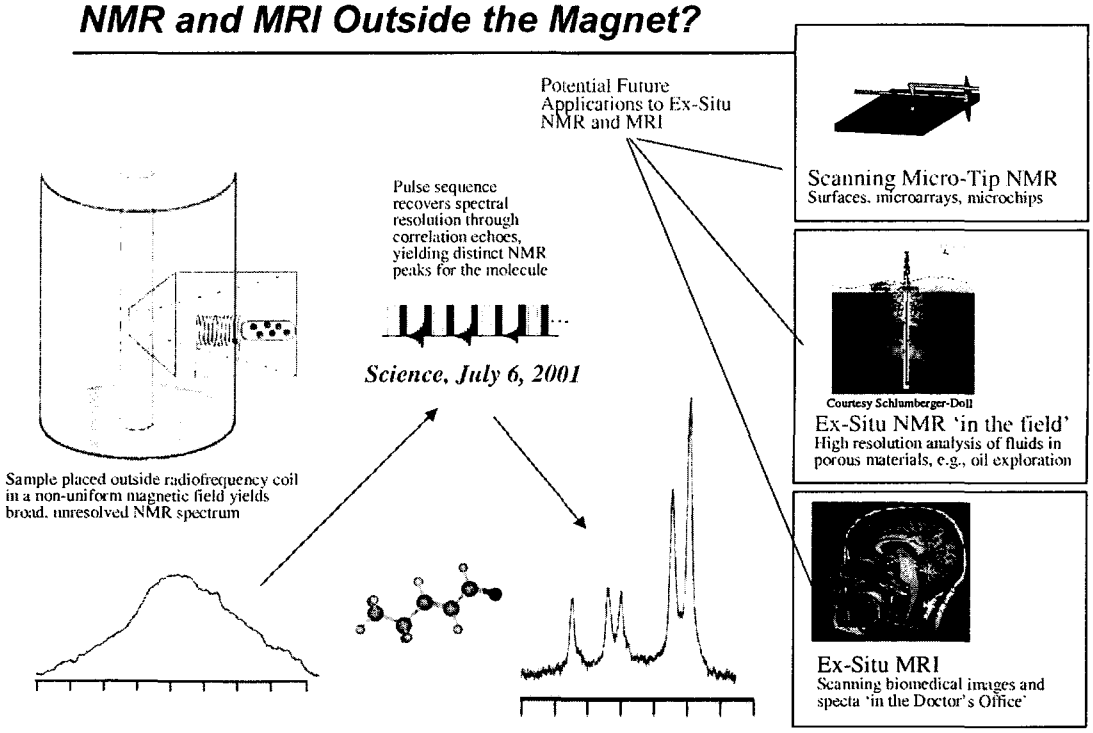
Over the past decades, developments in magnetic resonance such as multiple-pulse sequences, cross-polarization, time-reversal excitation, multiple-quantum coherence, multidimensional spectroscopy, sample rotation, zero-field resonance, ex-situ spectroscopy, and optical pumping, have enhanced our ability to study molecular structure and dynamics in chemistry, materials science and biomedicine. The present lecture will address recent activities in these areas, in particular ex-situ NMR and laser-polarized gases, together with examples of their applications over distance scales from nanometers to meters. NMR and MRI experiments are typically performed with samples immersed in a magnet shimmed to high homogeneity, in order to provide the greatest possible resolution. In many circumstances it is impractical or undesirable to transport or insert samples into the gap or bore of a high-field magnet. In such cases it might be useful if spectra could be obtained remotely, for example by means of a magnet scanned over an intact object or subject, in order to acquire magnetic resonance information with compact, portable spectrometers. Developments in this direction are being coupled with the sensitivity advantages of a laser-polarized xenon biosensor functionalized for molecular target recognition.

NMR and MRI Outside the Magnet?



NMR and MRI with Laser-Polarized Xenon?