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Toward contrast-enhanced, optically-detected NMR spectroscopy[1] CARLOS MERILES, DANIELA PAGLIERO, Department of Physics, City College of New York - CUNY — Optical detection of Nuclear Magnetic Resonance (NMR) takes place via a two-step process that relies on the interaction between optical photons and electrons on the one hand, and the hyperfine coupling between electrons and nuclear spins on the other. The latter depends on the material system under consideration while the former is dominated by the difference between the illumination and optical transition wavelengths. Here we use optical Faraday rotation to monitor nuclear spins in real time after resonant radio-frequency excitation at high-magnetic field. Comparison between inductively and optically detected NMR spectra in model sample fluids indicates that each of these mechanisms can lead to alternate forms of spectral contrast. Extension of these findings may find application in solvent suppression protocols, sensitivity-enhanced NMR of metalloproteins, or the characterization of molecular orbitals in diamagnetic systems.

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