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**Optical detection of NMR in liquids** IGOR SAVUKOV, SEUNG-KYUN LEE, MICHAEL ROMALIS, Princeton University — We will describe the first observation of optical rotation of visible light induced by nuclear spin polarization in a liquid. We have detected NMR signals in hyperpolarized liquid $^{129}$Xe and thermally-polarized water by monitoring the rotation of the plane of polarization of a laser beam transmitted through the liquid. Optical detection of NMR offers several intrinsic advantages, such as excellent real-time spatial resolution and relative immunity to RF fields. One possible application of this technique is direct high-resolution imaging of hyperpolarized $^{129}$Xe for studies of long-range dipolar interactions. While the angle of rotation is not very large, on the order of a microradian in hyperpolarized $^{129}$Xe, sufficient signal to noise ratio can be achieved using shot-noise limited polarimetry with high laser power, which does not perturb nuclear spin precession. The nuclear spin optical rotation effect has a universal nature and can be observed in many substances. The size of the effect is a sensitive probe of atomic and molecular structure.

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