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Laser-detected Magnetic Resonance Imaging[1] SHOUJUN XU, Lawrence Berkeley National Laboratory, MARCUS DONALDSON, CHARLES CRAWFORD, SIMON ROCHESTER, University of California Berkeley, VALERIY YASHCHUK, Lawrence Berkeley National Laboratory, DMITRY BUDKER, ALEXANDER PINES, University of California Berkeley and Lawrence Berkeley National Laboratory — Magnetic resonance imaging is often performed in the presence of a superconducting magnet for high polarization and sensitive detection. However the cost and immobility of the system impose some restrictions on its applications. To overcome these limiting factors, we present an alternative detection technique: laser-based atomic magnetometry. This technique detects nuclear magnetization at virtually room temperature with an excellent sensitivity at low fields, eliminating the necessity of cryogenics and a homogenous high magnetic field. We show the characteristics of a gradiometer based on two atomic magnetometers and its coupling to a low-field encoding setup. Various flow images are obtained, with spatial resolution reaching sub-millimeter regime. Additional applications and future developments are discussed.

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