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Optimization of a rubidium magnetometer based on nonlinear optical rotation LOK FAI CHAN, L.R. JACOME, SRIKANTH GUTTIKONDA, ERIC BAHR, DEREK KIMBALL, California State University - East Bay — Atomic spin polarization of alkali atoms in the ground state can survive thousands of collisions with paraffin-coated cell walls. The resulting long spin-relaxation times achieved in evacuated, paraffin-coated cells enable precise measurement of atomic spin precession and energy shifts of ground-state Zeeman sublevels. In the present work, nonlinear magneto-optical rotation with frequency-modulated light (FM NMOR) is used to measure magnetic-field-induced spin precession for rubidium atoms contained in a paraffin-coated cell. We discuss optimization of the shot-noise-projected magnetometer sensitivity and practical implementation of the Rb magnetometer. The magnetometer will be applied to searches for anomalous spin-dependent interactions of the proton.

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