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Polarization and Hyperfine Transitions of Metastable ^{129}Xe in Discharge Cells[1] TIAN XIA, STEVEN MORGAN, Princeton University, YUAN-YU JAU, Sandia National Lab, WILLIAM HAPPER, Princeton University — The polarization and relaxation rates of metastable ^{129}Xe atoms are measured with magnetic resonance spectroscopy, at both microwave frequencies, where $\Delta F = 1$ transitions are induced between the sublevels, and at radiofrequencies, corresponding to $\Delta F = 0$ transitions. The nuclear spin polarization of the resonant velocity group is measured to be $22 \pm 2\%$. However, the relaxation rate of spin polarization is much larger than the velocity changing rate, the narrow line pumping laser produces spin polarization only for atoms with resonant velocity. The relaxation of metastable xenon atoms is dominated by depolarizing collisions with ground state atoms, with lesser contributions from metastability exchange collisions. We also measure the pressure broadening coefficient of the relaxation rate by varying the temperature of the cryogenic part of the cell.

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Tian Xia
Princeton University

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