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Polarization and Relaxation of Radon ERIC TARDIFF, TIMOTHY CHUPP, WOLFGANG LORENZON, SARAH NUSS-WARREN, University of Michigan Physics Department, JOHN BEHR, MATTHEW PEARSON, TRIUMF, KERIM GULYUZ, RICHARD LEFFERTS, NORBERT PIETRALLA, GEORGI RAINOVSKI, JERRY SELL, GENE SPROUSE, SUNY Stony Brook Department of Physics and Astronomy — The polarization and relaxation of ^{209}Rn collected in coated and uncoated glass optical pumping cells was studied at SUNY Stony Brook's Francium Lab. On the order of one million atoms per shot were collected and polarized by spin exchange with laser-polarized rubidium. Gamma-ray anisotropies were measured as a signal of the alignment (the second order moment of the polarization) resulting from the combination of polarization and quadrupole relaxation at the cell walls. The temperature dependence over the range 130°C to 220°C shows the anisotropies increasing with increasing temperature as the ratio of the spin exchange polarization rate to the wall relaxation rate increases faster than the rubidium polarization decreases. Subsequent rubidium fluorescence polarimetry studies determine the level of rubidium polarization in the cells under similar conditions. Polarization relaxation rates, promising for electric dipole moment measurements of octupole-deformed radon isotopes, have been extracted from the gamma-ray data, and improved limits on the multipole mixing ratios of some of the main gamma-ray transitions have been determined.

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