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Polarization Measurement in an Optical DipoleTrap FANG FANG,
Los Alamos National Lab, DAVID VIEIRA, XINXIN ZHAO, LANL — Optical trapping of radioactive atoms has a great potential in precision measurements for testing fundamental physics such as electric dipole moment (EDM), atomic parity non-conservation (PNC) and parity violating beta-decay correlation coefficients. One challenge that remains is to polarize the atoms to a high degree and to measure the polarization of the sample and its evolution over time. We report on the polarization study of Rb atoms in a yttrium-aluminum-garnett (YAG) laser optical dipole trap using resolved Zeeman spectroscopy techniques. We have prepared a cold cloud of polarized atoms to 97% by optical pumping in the YAG dipole trap. The spin polarization is further purified to 99% and maintained when the two-body collision loss rate between atoms in mixed spin states is greater than the one-body trap loss. These advancements are an important step towards a new generation of precision measurement with polarized trapped atoms.

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