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Spin Polarization Diagnostics for Magneto-optical Trapped β^+-Decaying Atoms A. GAUDIN, C. HÖHR, D.G. ROBERGE, J.R.A. PITCAIRN, M.R. PEARSON, J.A. BEHR, TRIUMF, Vancouver, British Columbia, Canada — To test the degree of parity violation in β decay, the spin polarization of the decaying atoms must be known. In the TRIUMF Neutral Atom Trap project, the polarization of decaying atoms is achieved through optical pumping, which is a random walk through atomic spin states, biased to higher angular momenta with circularly polarized light. This poster presents work on spin polarization diagnostics for trapped ^{41}K. ^{41}K serves as a stable test base for β^+-decaying ^{37}K and ^{80}Rb, due to its similar hyperfine structure. Experimental techniques for measuring the fluorescence produced during the optical pumping are detailed. As the atom population is pumped to higher polarization states the atoms are excited less frequently and produce less fluorescence. Experimental tests precisely comparing measurements of the fluorescence and the excited state population, as determined by photoionization, will be shown; only the latter can be measured due to the small number of atoms. The circular polarization of the fluorescence also varies with atomic polarization. In addition, two computational models of the pumping process, used to fit to the data to obtain polarization values, will be presented. Determination of the atomic polarization to 5% would be helpful for β^+-decay experiments.

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