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Nuclear spin polarization of $^{37,41}K$ by optical pumping BENJAMIN FENKER, Texas A&M University — Precision measurements of observables in nuclear β-decay are capable of imposing meaningful constraints on physics beyond the standard model complementary to those obtained at high-energy collider experiments. In particular, measuring the β-asymmetry parameter (A_β) in the β^+-decay of spin-polarized ^{37}K constrains the possible admixture of a hypothetical $V+A$ current in the weak interaction. At TRINAT (TRIUMF's Neutral Atom Trap), atoms are confined and cooled in a magneto-optical trap and highly spin-polarized by optical pumping. I will show that we have determined the average nuclear polarization of optically pumped ^{41}K to be $\langle P\rangle = 98.8(6)\%$. Furthermore, I will present a comparison of optical pumping models as it pertains to our application, demonstrating that a quantum mechanical approach based on the density matrix formalism is necessary to accurately account for the various depolarizing mechanisms.

Benjamin Fenker
Texas A&M University

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