

Abstract Submitted
for the NWS14 Meeting of
The American Physical Society

Stress Induced Birefringence in Atom Trap Viewports CLAIRE WARNER, University of Waterloo, ALEXANDRE GORELOV, JOHN BEHR, TRIUMF — At TRIUMF Neutral Atom Trap (TRINAT), the current goal is a measurement of the angular asymmetry of beta particles with respect to the nuclear spin, A_β , from the beta decay of ^{37}K nuclei. Trapped atoms are spin-polarized by optically pumping with circularly polarized light. We characterize the degree of circular polarization of the light with the Stokes parameter S_3 ; with an S_3 value of 0.999 required to spin polarize the atoms to a proportional degree of accuracy of 10^{-3} . One major difficulty we have encountered is stress induced birefringence on the viewports of the atom trap, which alters the S_3 value. Fully annealed copper gaskets consistently achieved S_3 values of over 0.999 with reproducibility down to 0.9986 and a strong dependence on the torque applied to the bolts sealing the CF flange. Using elastomer o-rings to seal the viewports, we achieved S_3 values of over 0.9999, corresponding to a birefringence of $\Delta n = 3 \times 10^{-6}$ [see Solmeyer, Rev. Sci. Instrum. 82 (2011) 066105]. The drawbacks of this method are outgassing and permeation. We achieved 3×10^{-8} Torr with Viton and Kalrez o-rings, and we are testing Neoflon. In this talk methods of producing and quantifying circularly polarized light will be discussed, as well as techniques for reducing stress-induced birefringence.

Claire Warner
University of Waterloo

Date submitted: 20 Mar 2014

Electronic form version 1.4