Abstract Submitted
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Development of High Reflector Pellicle Mirrors for Polarized ^{37}K Beta Decay Asymmetry Studies[1] JAMES MCNEIL, Department of Physics and Astronomy, UBC, 2329 West Mall, Vancouver, BC V6T 1Z4, Canada, ALEXANDRE GORELOV, BEN SHELDAN, MELISSA ANHOLM, LIAM LAWRENCE, JOHN BEHR, TRIUMF, 4004 Wesbrook Mall Vancouver, BC V6T 2A3, Canada, TRINAT COLLABORATION — Precision low energy β-decay experiments utilize the maximal parity violating standard model property of its charged weak couplings in powerful decay asymmetry studies to probe for new physics up to several TeV in mass scale. The TRIUMF Neutral Atom Trap (TRINAT) investigates the decay asymmetries in optically cooled, polarized ^{37}K. Following trapping using a magneto-optic trap, optical pumping of ^{37}K produces highly polarized initial nuclear spin states along the z-axis from which β^+ decay takes place. Thin 12 μm high reflector pellicle mirrors are developed for our in-vacuum mirror system along the z-axis to simultaneously supply circularly polarized light to optically pump the cooled ^{37}K, while minimizing the MeV β-scattering and energy loss as it punches through the mirrors before detection. The goal of using the pellicles is to reduce the threshold energy on our event selection to increase statistics at low energy in our β-asymmetry measurement where possible new physics could exist, while simultaneously improving our momentum resolution. Improved momentum resolution on the β^+ will aid in constraining our recoil ion detector response function for an eventual measurement of the recoil asymmetry in polarized ^{37}K.

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