Abstract Submitted
for the HAW05 Meeting of
The American Physical Society

Double-Beta Decay Studies of ^{100}Mo to Excited 0^+ States in ^{100}Ru[1] R.C. REMINGTON, Oglethorpe Univ., J.H. ESTERLINE, M.F. KIDD, W. TORNOW, Duke Univ. and TUNL — We are in the process of analyzing 1 kg x year of two-neutrino double-beta ($2\nu\beta\beta$) decay data recently obtained at TUNL for ^{100}Mo. Transitions to excited 0^+ states in ^{100}Ru have half-life times which are at least one order of magnitude larger than those to the ground state of ^{100}Ru. Our experiment features a 1kg sample of ^{100}Mo placed between two HPGe detectors with a surrounding NaI annulus to veto background events. Passive shielding and coincidence techniques were used to minimize BG events. As the ^{100}Mo nucleus double-beta decays to the first excited 0^+ ^{100}Ru*, two gamma rays of 590.8 keV and 539.5 keV are subsequently emitted and detected in coincidence in our two HPGe detectors. We identified 15 ($2\nu\beta\beta$) events for this transition, therefore, improving the statistical accuracy of the previously reported results of $T_{1/2}= 5.9^{+1.7}_{-1.1}x10^{20}$ yrs of DeBraekeleer et al[2]. We also give improved limits on $T_{1/2}$ for the transitions to the 2^{nd} and 3^{rd}excited 0^+ states in ^{100}Ru.

Referenced: L. DeBraekeleer et al., Phys. Rev. Lett. 86, 3510 (2001)

[1]Supported in part by DOE grant # DE-FG02-97ER41033 and by NSF grant # NSF-PHY-02-43776

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Date submitted: 18 Aug 2005 Electronic form version 1.4