Abstract Submitted
for the HAW09 Meeting of
The American Physical Society

Double-Beta Decay of ^{150}Nd to Excited Final States MARY KIDD, JAMES ESTERLINE, WERNER TORNOW, TUNL/Duke University — Determining the half life of two neutrino double-beta decay ($2\nu\beta\beta$) is important not only because it will be a background consideration for large-scale neutrinoless double-beta ($0\nu\beta\beta$) decay experiments, but also it is a valuable check for theoretical models. Models such as QRPA and the nuclear shell model can be used to calculate the nuclear matrix elements for $0\nu\beta\beta$ decay, which would be necessary to obtain the effective electron neutrino mass from $0\nu\beta\beta$ decay data. In QRPA models, the calculated matrix elements for transitions to the ground state and excited states depend in a different way on the so-called g_{pp} parameter. Therefore, $2\nu\beta\beta$ decay data to excited states are of special interest. Because SNO+ plans to use ^{150}Nd as a nuclide in searches for $0\nu\beta\beta$ decay, our goal is to measure the $2\nu\beta\beta$ decay of ^{150}Nd to the first excited 0^+ state in ^{150}Sm. We search for this particular decay by detecting the 334 keV and 406.5 keV deexcitation gamma rays in coincidence. After 155 days of counting using a 50 g enriched $^{150}Nd_2O_3$ (43 g ^{150}Nd) sample placed between two high-purity germanium detectors, we obtained a half-life of $T_{1/2}=0.83^{+0.75}_{-0.27}$*(stat)*$\pm 0.04$*(syst)*$\times 10^{20}$ years. Here we update that result after collecting data for 12 months. Our apparatus is located at the Kimballton Underground Research Facility (KURF). This work was supported by the U.S. Department of Energy, Office of Nuclear Physics under grant number DE–FG02–97ER41033.

Mary Kidd
TUNL/Duke University

Date submitted: 28 Jun 2009 Electronic form version 1.4