

Abstract Submitted
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Limits on the Variation of ^{54}Mn and ^{137}Cs Nuclear Decay Parameters due to Nuclear Reactor on-off Cycling DAVID KOLTICK, SHIH-CHIEH LIU, Purdue Univ, JONATHAN NISTOR, JORDAN HEIM, TechSource Inc. — An experiment has been conducted to search for possible variation of the nuclear decay lifetime parameters in the electron capture decay of ^{54}Mn and the beta decay of ^{137}Cs due to an influence of the reactor $\bar{\nu}$ flux at the High Flux Isotope Reactor (HFIR) at Oak Ridge National Laboratory (ORNL). The samples were exposed to approximately equal, reactor-on periods of 28 days of anti-neutrino flux at $\sim 3 \times 10^{12} \bar{\nu} \text{ cm}^{-2} \text{ sec}^{-1}$ and reactor-off periods. The variation limits are set by comparing the decay rate parameters as a function of the HFIR on and off periods. Equivalent cross section limits are set on variations assuming a linear relationship between the flux exposure and the induced nuclear decay parameter variation. Measuring the decay rate requires both the detector and environment be stable over the full-time period of the experiment. A High Purity Germanium spectrometer, sensitive to radiation from 3-keV to over 3-MeV, has been built to measure radioactive decay constants to a level of $10^{-5} \sim 10^{-6}$ at a location only 6 meters from the HFIR core. Such accuracy requires an understanding of the background, signal-processing algorithms, and both the double and triple event pile-up in the observed spectrum.

David Koltick
Purdue Univ

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