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Density Matrix Evaluation of nn' Oscillations and the Neutron Lifetime Anomaly JAMES TERNULLO, Graduate Student University of Tennessee Knoxville — The neutron () lifetime "anomaly" is an unexplained difference in measurements of the neutron lifetime between two precision measurements. The cold neutron (CN) beam experiment, from NIST in 2013, measured a 888.7 s. This value is higher than the lifetime measured using ultracold neutrons (UCN) by the UCNAτ experiment in Los Alamos, 879.4 s. As an explanation for this difference, Z. Berezhiani proposed that in the beam experiment could oscillate into *sterile* (mirror) neutrons which belong to a parallel, hidden, dark, mirror sector. The would then decay through an invisible mirror channel within the dark sector, artificially increasing the apparent , thus providing an explanation for the apparently missing decays in the NIST experiment. Berezhiani has shown that transformations in magnetic field can be amplified due to Landau-Zener transitions, where a small mass splitting between and is compensated by the applied magnetic field. To explain the anomalous 1% difference in , Berezhiani predicted a range of possible mixing angles of the system, and plotted them vs in the range . In this study we reproduce the results of these previously published calculations and extend them to the region of using the density matrix evolution technique. This produces an extended limit for transformation in terms of and parameters that can be challenged by a new search being performed with a cold neutron beam at ORNL.

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