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Experimental limits on an excited neutron state as an explanation of the beam-bottle neutron lifetime discrepancy.

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Koch and Hummel[1] suggest a new solution to the neutron lifetime enigma[2]. The neutron lifetime enigma arises from the 4.4 standard deviation difference between the lifetime measured for bottled neutrons[3] and measurements of lifetime from a beam of cold neutrons[4]. Koch and Hummel point out the beam experiments measure the decay rate of neutrons very close in time to their source whereas the bottle measurement use neutrons ˜1000 s after their production. They postulate the existence of an excited state of the neutron, n*, that has a longer β-decay lifetime than the ground state, n, and that a transition could occur between these two states by γ-ray emission with a decay time shorter than the holding time used for bottle lifetime measurements. Here, we will present an analysis of the UCN$_\tau$ data aimed a searching for an explanation of this difference using the model proposed by Koch and Hummel

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