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A New Gravito-Magnetic Trap for Measuring the Neutron Lifetime using Ultracold Neutrons KEVIN HICKERSON, Caltech, UCN LIFETIME COLLABORATION — Presently, there is a significant discrepancy between the previous most precise measurements of the neutron lifetime. To help resolve this, a new lifetime experiment is underway at the Los Alamos Neutron Science Center (LANSCE) using ultracold neutrons (UCN). Polarized UCN will be trapped by gravity in an asymmetric compound toroidal magnetic trap. The trap will be made of permanent magnets arranged in a high field gradient configuration called a Halbach array. The compound toroid combined with the rippled multipole field will quickly reduce the fraction of phase space of the trap that is quasi-bound, decreasing the probability that UCN escape or have material interactions during the lifetime measuring period. Removing these marginally trapped UCN addresses an important systematic effect in previous measurements.

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