Abstract Submitted
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Preliminary Analysis of Magnetic Field Data from the UCNτ Experiment KEEGAN HOFFMAN, Tennessee Technological University — The free neutron lifetime τ_n is a physical constant that is associated with a variety of experimental tests for new physics. For example, if τ_n is known to within 0.01% (an error of about $\pm$0.1 s) it can be combined with other β-decay observables to test the Standard Model. The UCNτ experiment has the ultimate goal of measuring the free neutron lifetime with this precision. The experiment uses a trap composed of a bowl-shaped Halbach array of permanent magnets inside of a vacuum jacket surrounded by field coils to contain polarized, ultracold neutrons (UCN), which are allowed to decay inside the trap. The magnetic array, in conjunction with gravity, keeps the UCN from escaping while the field coils prevent the UCN from depolarizing. However, there will be a systematic error if UCN leave the trap for a reason other than decay. This could occur if UCN become depolarized by interacting with magnetic field zeroes or if some surface region of the array has a magnetic field insufficient to repel trapped UCN. To check for this, a magnetic mapper was deployed to make a preliminary examination of the field in the UCNτ trap. We will describe the repeatability and precision of the magnetic mapper and present analysis of the magnetic field maps recorded.

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