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Studies of the Magnetic Field Interference in the UCNτ Experiment GRIFFIN PACE, CHEN-YU LIU, ADAM HOLLEY, None, UCNTAU COLLABORATION TEAM — The mean lifetime of free neutrons undergoing beta decay is an important parameter in the Standard Model of particle physics and nuclear-astrophysics. The UCNτ experiment is designed to measure the neutron lifetime to a better precision than the existing world average value, hoping to resolve the puzzle of large discrepancies between measurements using different methods. In the UCNτ apparatus, ultracold neutrons (UCNs) are trapped by gravity from the top and reflected by the magnetic force from an array of permanent magnets. However, this magneto-gravitational trap is located in close proximity of the high magnetic field (7 T) created in the adjacent UCNA experiment. Because the magnetic field within the neutron trap is integral to storing the neutrons, any interference potentially creates a serious systematic effect. In particular, cancellations of the fields could lead to depolarization that shortens the neutron storage time. Measurements of the field from UCNA were used to construct magnetic field simulations that when combined with similar simulations of the UCNτ field allow the effects from UCNA on UCNτ to be studied. We report the results of these simulations and the methods used to perform them, and discuss means of mitigating the magnetic interference.

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None

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