

# **Mirror Mirror: Neutron Oscillations**

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One force in the Standard Model of particle physics, the weak nuclear interaction, can be probed precisely by using neutrons. The weak nuclear interaction only acts on left-handed particles. The theory of “mirror matter” hypothesizes a hidden copy of the Standard Model and all its particles, but with a right-handed weak interaction to restore parity. This mirror sector would be a potential dark matter candidate. Transformations from neutrons into either their mirror counterparts or antineutrons could help explain the abundance of matter over antimatter in the universe. Measurements of the neutron lifetime disagree between either counting surviving neutrons or counting their decay products. If neutrons can transition into mirror neutrons, this could explain the lifetime discrepancy. An experiment at Oak Ridge National Lab probed this theory by searching for the reappearance of neutrons passing through an absorber inside a varying magnetic field. This talk presents the results of this experiment, excluding mirror matter as an explanation for the neutron lifetime discrepancy. We will also discuss further searches for neutrons oscillating into both dark matter and antimatter.