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Magnetic Characterization of Target Plates for an Experiment to search for Z' Boson Axial Vector Couplings to the Neutron[1] LUKAS CAVAR, Indiana Univ - Bloomington, NSR COLLABORATION — We plan to conduct a slow neutron spin rotation experiment to search for possible weakly-coupled Z' bosons to the neutron via an interaction of the form $V_5 = \frac{g_A^2}{4\pi m}\frac{e^{-m_0 r}}{r}(\frac{1}{r} + \frac{1}{\lambda_c})\vec{\sigma} \cdot (\vec{v} \times \hat{r})$. A previous experiment [1] reported $\phi < 4 * 10^{-6}\ rad/m$ for the neutron spin rotation angle accumulated by polarized neutrons passing very close to a set of 1/2 m copper plates [2], and we anticipate magnetic impurities may be our dominant source of systematic error. We discuss a B-field mapping apparatus our group has constructed consisting of a QuSpin Zero-Field Magnetometer and Parker motors to search for magnetic impurities embedded in the target plates. The data analysis must see fields near the limit of the probe noise (∼pT) in the presence of slowly-varying background magnetic fields (∼nT). We discuss our results for maps of glass, copper, and tungsten plates from implementing ABBA data measurement patterns [3] and low-degree polynomial drift subtraction of time-dependent effects.

[1] C. Haddock et al., Phys. Lett. B 783 (2018)
[2] C. Haddock et al., Nucl. Inst. Meth. A 885 (2018)
[3] H.E. Swanson and S. Schlamminger, Meas. Sci. Technol. 21 , 115104 (2010)

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