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Magnetic shielding design for the ARIADNE axion experiment HARRY FOSBINDER-ELKINS, Univ of Nevada - Reno, ARIADNE COLLABO-RATION — ARIADNE (or the Axion Resonant InterAction Detection Experiment) seeks to detect minute spin-dependent forces using NMR techniques. Crucial to the success of the experiment is to screen the 3He sample from ordinary magnetic fields which can fluctuate at the nuclear Larmor precession frequency. The solution involves cryogenic superconducting shielding, which poses additional challenges associated with magnetic field gradients throughout the sample volume. These gradients are problematic for experiments like ARIADNE since they create a spatial gradient in the Larmor frequency. We describe a magnetic shielding strategy for suppressing such gradients and the resulting inhomogeneous broadening by over two orders of magnitude, potentially enabling long transverse coherence times and operation near the ideal design sensitivity. This method could be employed in future precision experiments requiring similar magnetically shielded environments.

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