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Precision Magnet Design Using the Magnetic Scalar Potential¹ KEVIN ROYAL, BENJAMIN RILEY, ANDREW MULLINS, HUNTER BLAN-TON, BENJAMIN KISTLER, CHRISTOPHER CRAWFORD, University of Kentucky — As more stringent constraints of new physics are set, the search for physics beyond the standard model requires an unprecedented level of precision. An experiment is being planned at the ORNL SNS to measure the electric dipole moment of the neutron with two orders of magnitude higher precision. An important component of this experiment is precision spin transport electromagnetic coils to guide the spin of polarized neutrons and Helium-3 atoms into the spin-precession measurement cell. To design such coils, we use the magnetic scalar potential and numerically solve for the wire paths needed to produce highly uniform magnetic fields. Once the magnetic geometry is known, the coil frame is printed using stereolithography and then hand wound with magnet wire. We will present measurements of field uniformity while driving the coil with a low-frequency AC current to filter out the earth's background fields.

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