

Abstract Submitted  
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**Designing Magnetic Coils From the Inside Out**<sup>1</sup> DANIEL WAGNER, University of Kentucky — Traditionally the design cycle for magnetic fields involves guessing at a reasonable conductor and magnetic material configuration, using finite element analysis (FEA) software to calculate the resulting field, modifying the configuration, and iterating to produce the desired results. We take the opposite approach of specifying the required magnetic field, imposing it as a boundary condition on the region of interest, and then solving the Laplace equation to determine the field outside that region. The exact conductor configuration along the boundaries is extracted from the magnetic scalar potential in a trivial manner. This method is being applied to design a coils for the neutron EDM experiment, and an RF waveguide in a new design of a neutron resonant spin flipper for the n-3He experiment. Both experiments will run at the Spallation Neutron Source (SNS) at Oak Ridge National Laboratory.

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