Abstract Submitted
for the APR18 Meeting of
The American Physical Society

Modeling Magnetic Fields using Helical Solutions to Maxwell's Equations BRIAN POLLACK, Northwestern Univ, RYAN PELLICO, Trinity College, MICHAEL SCHMITT, Northwestern Univ — The current generation of HEP experiments require precise knowledge of the magnetic fields that permeate detector hardware. After a solenoid is constructed, the field produced will always differ from simulations due to unavoidable real-world limitations and tolerances. We explore a novel method in which one can accurately and precisely model a solenoidal field from a sparse series of field measurements, using a series solution to Maxwell's Equations. In order to model the small but non-negligible axial asymmetry due to the winding of a solenoid, we use a helical coordinate system in which to solve said equations. Using this method, one can obtain a full three dimensional vector field that is reliable to over 4 orders of magnitude, and guarantees a physically sound result that cannot be obtained through interpolation methods.

Brian Pollack
Northwestern Univ

Date submitted: 12 Jan 2018 Electronic form version 1.4