

Abstract Submitted  
for the DPP06 Meeting of  
The American Physical Society

**Fluctuation-induced Magnetic Fields in the Madison Dynamo Experiment** CARLOS PARADA, ERIK SPENCE, MARK NORBERG, CRAIG JACOBSON, ROCH KENDRICK, CARY FOREST, University of Wisconsin-Madison — The Madison Dynamo Experiment is designed to function as a simply-connected, homogeneous dynamo. A turbulent flow of liquid sodium is driven by two counter-rotating impellers in a one-meter-diameter sphere. A model of the mean velocity field is constructed from measurements made in an identical-scale water experiment. This model is used to predict the mean induced magnetic fields when exposed to an external magnetic field. The magnetic field is measured by arrays of both internal and external hall probes. The predicted and measured magnetic fields are then compared to determine the effects of turbulence on the mean field. An external dipole moment is measured which cannot be generated by the mean axisymmetric velocity field. The measured toroidal and poloidal induced magnetic fields within the sphere are significantly weaker than predicted. These effects are attributed to a turbulent electromotive force.

Carlos Parada  
University of Wisconsin,-Madison

Date submitted: 21 Jul 2006

Electronic form version 1.4