Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Addressing heat transfer and uniformity of flow in the *Muon g-2* tracker design[1] NICHOLAS A. POHLMAN, GUANRONG LUO, ANDREW BEHNKE, Northern Illinois University — Recent experiments in high energy physics found a possible deviation in the predicted value in the magnetic dipole moment of the muon particle within the standard model. To explore this term with higher precision, the *Muon g-2* experiment (E989) is being built with an integrated tracker system inside the vacuum chamber where typical conductive and convective heat transfer methods are not available. The placement and packing of mylar straws and electronics filled with an argon gas mixture are designed to maximize the resolution for tracking decaying orbits. Using the space and magnetic field constraints, simulations in heat transfer and gas flow are presented to demonstrate the feasibility of the design to maintain temperature of electronic circuits and uniformity of gas replenishment in the tracker straw tubes. Results will show that initial estimates of using argon gas for electronics cooling is insufficient therefore requiring concentric-tube liquid cooling. Additionally, the impedance paths of the gas through the straw end pieces is dependent on features of both the radial and axial orientation. Preliminary data of prototype performance during a Summer 2015 beam test experiment will also be reported.

[1]Funding provided by FermiLab and the Department of Energy

Nicholas Pohlman
Northern Illinois University

Date submitted: 23 Jul 2015 Electronic form version 1.4