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Design and Construction of a Dual Anti-Helmholtz Magnet System for a Side-by-Side MOT FRANK NARDUCCI, EO Sensors Division, Naval Air Station, Patuxent River Maryland, REBECCA PRASHER, CHARLES ADLER, Physics Department, St. Mary's College of Maryland, St. Mary's City, MD — The design of a cold-atom interferometric gradient magnetometer [1] requires two side-by-side identical atom clouds separated by approximately 1 cm for noise reduction purposes. The first step in building this system is a side-by-side MOT to capture the atoms; however, the design of a coil system to provide two zero field crossings with high field gradients separated by a small distance with low power consumption can be challenging. These three requirements are not easy to satisfy simultaneously, but there is a large "state space" in which we can evolve different designs. In this poster we analyze the requirements for such a system and discuss our design consisting of coils with wires wrapped on a truncated cone; this type of design has been made possible by recent advances in 3D printers, and we will go over the issues involved in printing the coil supports, building the coils and comparison of our measurements of the magnetic field to theory. We also discuss the possibility of optimizing coil design using state space searches like the Metropolis algorithm, and how these designs can be realized using 3D printing technology.

[1] Davis, J. P. and Narducci, F. A.(2008) "A proposal for a gradient magnetometer atom interferometer," Journal of Modern Optics,55:19,3173 — 3185

Charles Adler
St. Mary's College of Maryland

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