Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

An Integrated Portable 2D Magneto-optical Trap System for the Production of a Cold Cesium Beam[1] JONATHAN YANG, KAIYUE WANG, ERIC MULERO-FLORES, CAMERON CALIGAN, MATTHEW DITTRICH, COLIN PARKER, Georgia Inst of Tech — The production of a sample of trapped cold atoms using a magneto-optical trap (MOT) is the basis for a plethora of studies on ultracold atomic systems. In pursuit of a compact system that can provide a continuous cold beam of cesium (Cs) atoms, we designed and constructed a detachable 2D MOT platform. The detachable system allows for a single laser source to be split five ways, with each beam being reflected into both the horizontal and vertical directions with the correct polarization and power ratio. Our design is a single self-contained and orientable apparatus, with all external connections coming from optical fibers and electrical cables. The collimated beam then enters a 3D MOT test chamber where we measured and optimized the loading rate based off multiple 2D MOT parameters including beam intensity, cooling light detuning, and magnetic field etc. Thus, we characterize the effectiveness of the 2D loading rate. The modular design is intended to facilitate moving the source to another chamber where lithium (Li) atoms are also available. In the future we plan to investigate the properties of a combined ultracold system of Li and Cs.

[1]We acknowledge support and funding from the Air Force Office of Scientific Research, Young Investigator Program, through Grant No. FA9550-18-1-0047 and the NSF REU program (Award no. 1560165)

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Date submitted: 30 Jan 2020 Electronic form version 1.4