Abstract Submitted
for the DNP20 Meeting of
The American Physical Society

Progress Towards a Single Atom Microscope for Nuclear Astrophysics[1] ERIN WHITE, JAIDEEP SINGH, BEN LOSETH, ERIC DELGADO, JORDAN O'KRONLEY, JOSEPH NOONAN, PAYTON WALTON, ROY READY, GORDAN ARROWSMITH-KRON, Michigan State University — For nuclear astrophysics applications, the Single Atom Microscope (SAM) project sets out to measure certain rare, low-yield nuclear reactions more precisely than any other current method by capturing the product atoms in a cryogenically frozen noble gas solid. The product atoms embedded in the transparent solid could then be counted with single atom sensitivity through the utilization of laser-induced fluorescence and optical imaging. Due to the unique absorption and emission wavelengths of the product—enabled by the lattice of noble gas atoms—optical filters can distinguish between them to select the wavelength range of interest, making single-atom sensitivity viable. Making this possibility a reality is the current primary goal of the project. Once achieved, this technique would have the required efficiency, selectivity, and sensitivity to measure nuclear reactions in a way that is complementary to other methods. We will describe the prototype Single Atom Microscope's (pSAM) design and performance during beamline testing with Rb and Kr ion beams completed at the ReA3 facility in the National Superconducting Cyclotron Lab at Michigan State University.

[1]This project is supported by U.S. National Science Foundation under CAREER grant number 1654610.

Erin White
Michigan State University

Date submitted: 19 Jun 2020 Electronic form version 1.4