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Design of a Prototype Single Atom Microscope for Nuclear Astrophysics DANIEL COULTER, JAIDEEP SINGH, National Superconducting Cyclotron Laboratory (NSCL) — We are designing and building a prototype Single Atom Microscope (pSAM) in order to demonstrate optical single atom detection in thin films of solid neon. Once our single atom detection technique has been demonstrated, the prototype will be upgraded to SAM, which will be designed for nuclear physics measurements. Specifically, SAM will be coupled with a recoil separator to discriminate between isotopes and to reduce the heat load on the neon, with a long term goal of measuring the ^{22}Ne(α,n)^{25}Mg reaction, an important source of neutrons for the s-process. This technique has the potential to capture and detect every product atom with near unity efficiency. In order to achieve this goal, pSAM has been designed to freeze neon at 4.2 K, maximize the light collection efficiency, minimize impurities in the vacuum, and provide repeatable measurements. I will describe the pSAM setup in more detail, focusing on how we addressed these technical challenges in the design. This work is supported by Michigan State University, the Director's Research Scholars Program at the National Superconducting Cyclotron Laboratory, and U.S. National Science Foundation under grant number #1654610.

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