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Progress Towards Optical Single Atom Detection for Nuclear Astrophysics[1] JAIDEEP SINGH, National Superconducting Cyclotron Laboratory/Michigan State University, JENNIFER WENZL, National Superconducting Cyclotron Laboratory, DUSTIN FRISBIE, KRISTEN PARZUCHOWSKI, MAEGAN JOHNSON, National Superconducting Cyclotron Laboratory/Michigan State University — We are developing the technique of optically detecting individual atoms embedded in thin films of cryogenically frozen solids. Noble gas solids such as frozen neon are an attractive medium because they are optically transparent and provide efficient, pure, stable, & chemically inert confinement for a wide variety of atomic and molecular species. We propose to couple this new detection technique to a recoil separator with the goal of measuring rare nuclear reactions relevant for nuclear astrophysics. Because of the additional selectivity provided by the atomic transitions of the captured atom, this detection scheme would help loosen the often demanding beam rejection requirements imposed on recoil separators. Our initial focus is the ^{22}Ne(α,n)^{25}Mg reaction, which is an important source of neutrons for the s-process. We will describe our measurements of the atomic & optical parameters needed to optimize the optical layout as well as a promising design for a prototype detector.

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