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Towards optical pumping of ytterbium nuclei embedded in a solid neon matrix CHEN-YU XU, Argonne National Laboratory and University of Chicago, JAIDEEP SINGH, KEVIN BAILEY, Argonne National Laboratory, ZHENG-TIAN LU, Argonne National Laboratory and University of Chicago, PETER MUELLER, THOMAS O'CONNOR, Argonne National Laboratory — We have studied the optical excitation and decay dynamics of neutral ytterbium atoms embedded in a cryogenic solid neon matrix. Matrix isolated atoms qualitatively retain the energy level structure of atoms in the gas phase. The transitions are typically blue shifted and significantly broadened to a few hundred cm^{-1}, independent of temperature from 2.6 K to 4.2 K. The transition width is found to be homogeneous but not lifetime broadened. We will report our results on spectroscopy, lifetimes, and our attempt to polarize nuclear spins by optical pumping. Applications of such a technique include studies of rare isotopes and tests of fundamental symmetries. This work is supported by DOE, Office of Nuclear Physics, under contract DEAC02-06CH11357.

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