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Optical excitation and decay dynamics of ytterbium atoms embedded in solid neon matrix CHEN-YU XU, Argonne National Laboratory, SHUIMING HU, KEVIN BAILEY, ZHENG-TIAN LU, PETER MUELLER, THOMAS O'CONNOR, JAIDEEP SINGH — We have studied the optical excitation and decay dynamics of neutral ytterbium atoms embedded in cryogenic solid neon. The embedded atoms qualitatively retain the structure and transition property of free atoms in the gas phase. The transitions are shifted by and broadened to typically a few hundred cm^{-1}. The broadening mechanism is found to be homogeneous. Atomic population can be transferred among the internal levels via resonant optical excitation and spontaneous decay. The rates of intercombination transitions between spin-singlet and spin-triplet levels are vastly enhanced, probably due to strong Stark-induced mixing. However, the 6s6p 3P0 level is found to remain metastable, with its lifetime determined to be 14 s for the odd isotopes and a few minutes for the even isotopes. This work is supported by DOE, Office of Nuclear Physics, under contract DEAC02-06CH11357.

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