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New laser spectroscopic method for the measurement of nuclear moments. TAKESHI FURUKAWA, Dept. of Physics, Osaka University, YUKARI MATSUO, The Institute of Physics and Chemical Research (RIKEN), ATSUSHI HATAKEYAMA, Institute of Physics, University of Tokyo, YOSHIMITSU FUKUYAMA, TOHRU KOBAYASHI, RIKEN, HIDEAKI IZUMI, TADASHI SHIMODA, Dept. of Physics, Osaka University — We propose here a versatile method to measure the nuclear moments of unstable nuclei through laser spectroscopic detection of atoms trapped in superfluid helium (He II). This method takes advantage of the optical pumping of atoms in He II and the "laser-microwave double resonance method." It enables us to determine the moments, hitherto difficult to be measured by other methods, of unstable nuclei far from the stability line. For the development of this method, we have been studying optical pumping of impurity atoms in He II. The electronic spin relaxation time of the atoms in He II is the key quantity for the success of optical pumping, but no result of the measurement has been reported so far. We have measured the spin relaxation time T_1 of Cs atoms in He II. This success is due to special care to cope with a serious decrease in the number of Cs atoms in the observation region caused by the large convection in introducing the atoms with laser sputtering technique. The measured relaxation time of T_1=2.24(19) s is extraordinary long, which encourages us to take advantage of He II as a suitable environment for trapping unstable nuclei and for performing laser spectroscopy for the measurement of nuclear moments.

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