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Effective production of spin polarization of atoms in superfluid helium using pulsed lasers MIKI HAYASAKA, Tokyo Gakugei University, TAKESHI FURUKAWA, Tokyo Metropolitan University, HIDEKI TOMITA, TAKAHIDE TAKAMATSU, Nagoya University, KEI IMAMURA, RIKEN/Meiji University, TOMOMI FUJITA, Osaka University, TOHRU KOBAYASHI, RIKEN, HARUKO UEMATSU, Tokyo Gakugei University, HIDEKI UENO, RIKEN, YUKARI MATSUO, Hosei University — We are developing a new laser spectroscopic technique "OROCHI" to determine nuclear spins and moments of RI atoms. In this technique, superfluid helium (He II) is used as a trapping material of short-lived RI atoms. We utilize optical pumping to produce atomic spin polarization, and laser-radio frequency/microwave double resonance method to determine both Zeeman and hyperfine splittings, respectively. In He II spin polarization can be maintained for a long time (>2 s in the case of Cs), which enables us to produce high degree of spin polarization. As for optical pumping, CW lasers are generally used to produce spin polarization. However, high repetition rate pulsed lasers can be superior in producing spin polarization because of high pumping rate. Using the pulsed lasers, we expect to produce spin polarization efficiently for various atomic species which have not yet been spin-polarized. In this study, a tunable pulsed Ti:Sapphire laser operated at 1 kHz was constructed and applied to the optical pumping of Rb atoms with stable nuclei. The efficiency of the spin polarization by the pulsed laser pumping will be reported.

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