PRECISION LASER SPECTROSCOPY FOR LASER-COOLED RADIOACTIVE BERYLLIUM ISOTOPES

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Isotope shifts of optical transition frequencies (field shift) and hyperfine structures (hyperfine anomaly) provide information on nuclear charge radii and nuclear magnetization radii, respectively. We have been working on precision laser spectroscopy of trapped and laser-cooled radioactive Be isotope ions including the one-neutron halo nucleus Be-11 aiming at the identification of the extended single neutron halo of ^{11}Be through a purely electromagnetic interaction. We have developed an online trap facility at the SLOWRI prototype capable of using the highly energetic Be isotope ions provided by the RIKEN projectile fragment separator RIPS with a kinetic energy of 1 GeV. After the fragment separator the ion energy is reduced in a degrader and a gas cell and cooled down to <10 mK temperatures. We performed laser spectroscopy for trapped, laser-cooled, singly charged Be isotope ions to determine the absolute frequency of $2s_{1/2}$-$2p_{3/2}$ transition for ^{7,10,11}Be using a weak probe laser alternatively irradiated with a cooling laser, and hyperfine structure constants of ^{7,11}Be using laser-microwave double-resonance method. In order to determine hyperfine anomaly for Be-11, we need a precise value of the nuclear magnetic moment independently measured from the hyperfine constant. We plan to perform laser-microwave double-resonance and laser-microwave-rf triple-resonance spectroscopy at SLOWRI facility at RIKEN RIBF under a strong magnetic field in the Paschen-Back region for the atomic ground state $2s_{1/2}$ of Be ions. A new laser system for laser cooling of Be ions and a linear Paul trap are under preparation. The current status will be reported.