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Commissioning of a collinear resonance ionization laser spectroscopy setup

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The fundamental properties of unstable nuclei are highly related to the nuclear structure and nucleon-nucleon interaction, which can thus be used to study various exotic structures of the unstable nuclei [1]. Laser spectroscopy technique is one of the powerful tools to study the nuclear properties (i.e. spins, moments and radii) by probing the hyperfine structure (HFS) and isotope shift of the corresponding atoms or ions [1].

To study the unstable nuclei at the radioactive ion beam facilities in China, our research group has developed a collinear resonance ionization laser spectroscopy setup [2] together with a compact Radio-frequency Quadrupole cooler and buncher (RFQ) [3]. The whole system has recently been commissioned successfully with stable Rb isotopes, demonstrating its ability for high-resolution and high-efficiency laser spectroscopy measurement of unstable nuclei with production yield lower than 1 k cps. The entire system will soon be applied to the Beijing Radioactive Ion-beam Facility (BRIF) [4] for the nuclear properties' studies of neutron-rich Rb isotopes, produced from a UCx target.

In this talk, the technical details and the offline commissioning results of the collinear resonance ionization laser spectroscopy and the RFQ [4] will be presented, together with the anticipated results from the first online experiment on neutron-rich Rb isotopes planed at BRIF.

References:

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