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Correlation of halo neutrons studied via Coulomb breakup of ¹¹Li TAKASHI NAKAMURA, Tokyo Institute of Technology

Strong E1 excitation to the low-lying continuum is one of the manifestations of nuclear halo phenomena. This excitation, which has been observed in the Coulomb breakup, is now well understood for one-neutron halo nuclei as in the case of 11 Be [1]. On the other hand, the case of two neutron halo nucleus such as 11 Li is still in the controversial situation. For instance, there have been discrepancies among three experimental results obtained on the Coulomb breakup of 11 Li at MSU [2], RIKEN [3], and GSI [4]. The understanding of Coulomb breakup of halo nuclei is of great importance since it should have information on the three-body properties such as two-neutron correlations in the Borromean system. We have thus studied the Coulomb dissociation of 11 Li on a Pb target at 70 MeV/nucleon at the ratioactive beam facility RIPS at RIKEN, with much higher statistics and much less ambiguities caused by cross talk events in detecting two neutrons. The momentum vectors of incident 11 Li as well as outoging 9 Li, and two neutrons, and γ rays were all measured in coincdence. Hence, we could obtain the excitation energy spectrum in combination with the angular distribution of 11 Li. In addition, relative energies between two neutrons as well as those of 9 Li-n 10 Li were extracted. In the excitation energy spectrum of 11 Li, we have observed a strong peak at the relative energy $E_{\rm rel} \sim 0.3$ MeV. The corresponding B(E1) strength has been extracted to be $1.6 \pm 0.1 \ e^2 \ fm^2$ using the conventional equivalent photon method. The non-energy weighted E1 cluster sum rule is applied to extract the neutron-neutron correlation in the ground state. Spectra of 9 Li-n, and n-n relative energies are also shown to discuss the two-body correlations in 11 Li.

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