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Enhancement of E1 strength in nuclei with the neutron skin and halo

The neutron skin and halo structures have attracted much attention from the experimental and theoretical point of view. The neutron skin thickness is supposed to have correlations with symmetry energy parameters in the nuclear equation of state, and thus a lot of studies on the skin thickness have been performed. On the other hand, the neutron halo is one of the most exotic structures in modern nuclear physics. The halo is due to the loosely-bound neutrons in and around the neutron-dripline nuclei, and halo nuclei have very large nuclear radius. Although shapes of the skin and halo are completely different from each other, enhancement of low-lying E1 strength can be seen for the both structures. While the enhancement of nuclei with neutron skin is called Pygmy Dipole Resonance (PDR), that of halo nuclei is called soft E1 excitation. The soft E1 excitation is solely related to the single-particle structure of the halo neutrons, and the E1 strength distribution can be well understood especially for one-neutron halo. On the other hand, the PDR is much complicated and the origin is still under debate. In this context, accumulating the experimental data on the PDR is desired. In this presentation, we will briefly review the study of halo structure in neutron-rich nucleus ^{37}Mg. And then, we will introduce a recent experimental study of the PDR of ^{208}Pb. We have measured angular differential cross sections for the ^{208}Pb(p, $p\gamma$) reaction at 80 MeV by using the clover detector array CAGRA and the Grand Raiden spectrometer at Research Center for Nuclear Physics (RCNP), Osaka University. The angular distribution is considered to be sensitive to the characteristics of the transition density, which allows us to elucidate the contribution of the PDR. The recent status of the data analysis and preliminary result will be presented.

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