NUCLEAR STRUCTURE OF ^{6,8}He

VIA REACTION CROSS SECTION MEASUREMENTS

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The reaction cross section reflects the basic physical quantity nuclear size or density distribution that represents the structure of nuclei. We have developed a method to measure reaction cross sections of unstable nuclei systematically and to deduce density distributions from measured reaction cross sections.

^{6,8}He are neutron rich helium isotopes. They have solid cores of ^{4}He, so it is suggested that valence two neutrons of ^{6}He and four neutrons of ^{8}He compose developed neutron halo or neutron skin[1-4].

^{6}He is likely to have a two neutron halo structure because it is the Boromian nucleus with a solid core. Therefore, to investigate the density distribution near the surface of ^{6}He in detail are useful to elucidate the two neutron halo structure. Further, by obtaining detailed information of the two valence neutrons in ^{6}He, it is also expected to disclose more about the di-neutron correlation.

As the A/Z = 4 for ^{8}He, ^{8}He is the most neutron-rich nucleus in all nuclei. Therefore, it is intriguing to investigate this exotic nucleus. Results of interaction cross section measurements and proton elastic scattering claim that ^{8}He has a neutron skin structure. On the other hand, results of reaction cross section measurements has been pointed out a possibility for tail in the density distribution[5]. In this way, the definitive conclusion for the structure of ^{8}He is not out.

In addition, by examining the nuclear structure of ^{6}He and ^{8}He systematically, it is also expected to get aknowledge of the difference between the halo structure and skin structure.

In order to investigate the nuclear structure of ^{6,8}He, we accurately measured reaction cross sections for ^{6,8}He on nuclear targets and proton target in the intermediate energy region. The experiment was carried out at HIMAC[6]. By Glauber type calculation, we deduced the nucleon density distribution from the present reaction cross section data for nuclear target. The proton/neutron density distributions were also deduced by including the proton target data. In this presentation, we will discuss the obtained ^{6,8}He density distribution in the context of their nuclear structure.

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