DENSITY DISTRIBUTIONS OF ^{11}Li DEDUCED FROM REACTION CROSS-SECTION MEASUREMENTS

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The density distribution is the one of the most important topics of the unstable nuclear study. The reaction cross section allows us to deduce the nucleon density distribution and the nuclear radii with the Glauber model analysis. In the present work, we focused on the isospin dependence of the nucleon-nucleon total cross section to extract the information of the neutron density distribution from the nuclear density. We measured the reaction cross sections of the two-neutron halo nucleus ^{11}Li with solid hydrogen and carbon targets at around 31 and 41 MeV/nucleon. The neutron density distribution of ^{11}Li was deduced for the first time by the Glauber model calculation based on the optical limit approximation. The uncertainty of the matter density of ^{11}Li was improved, compared with earlier measurements. The present root-mean-square radius of the proton distribution agrees with the previous one derived from an optical isotope shift measurement. The present root-mean-square radii reproduce theoretical calculations by the tensor optimized shell model by assuming core excitation. This consistency suggests the possibility that ^{9}Li in ^{11}Li is excited and the disappearance of the N = 8 shell gap of ^{11}Li is caused by correlations originating from the nucleon force, such as the tensor and the pairing.