

Measurement of proton elastic scattering from ^{132}Sn at 200 MeV/nucleon

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This paper reports on the data analysis of the NP1512-RIBF79R1 experiment. In this experiment, we have successfully performed the proton elastic scattering from ^{132}Sn at 200 MeV/nucleon in inverse kinematics in order to deduce the neutron skin thickness of ^{132}Sn . We aim to constrain parameters of the symmetry energy of the nuclear-matter equation of state from the skin thickness. The details of the experiment are described in the previous paper.¹⁾

The secondary beam including ^{132}Sn was produced by irradiating a ^{238}U beam at 345 MeV/nucleon on the ^9Be target. The ToF- $B\rho$ - ΔE method could not be used for particle identification (PID) owing to the high-intensity beam required for the precise measurement of the skin thickness. Thus, we performed PID using the ToF- $B\rho$ - $B\rho$ method²⁾ with multi-wire drift chambers (MWDCs) and diamond detectors. The kinetic energy of the secondary beam was determined by measuring its position at the F5 focal plane.

The secondary beam was transported to the F12 area, and its trajectory was tracked by the two MWDCs installed before the solid hydrogen target (SHT).³⁾ The recoil proton spectrometer, which consists of the MWDC, plastic scintillator, and NaI (TI) calorimeters, was used to measure the angles and kinetic energies of the recoil protons from the SHT. The energies were determined in two different ways using the time of flight (ToF), or NaI (TI) calorimeters. The elastic events were identified by the correlation between the energies and angles of the recoil protons (red arrow), as shown in Fig. 1. Figure 2 shows the angular distribution of the yield of the elastic events. We can clearly see the diffraction pattern of the angular dis-

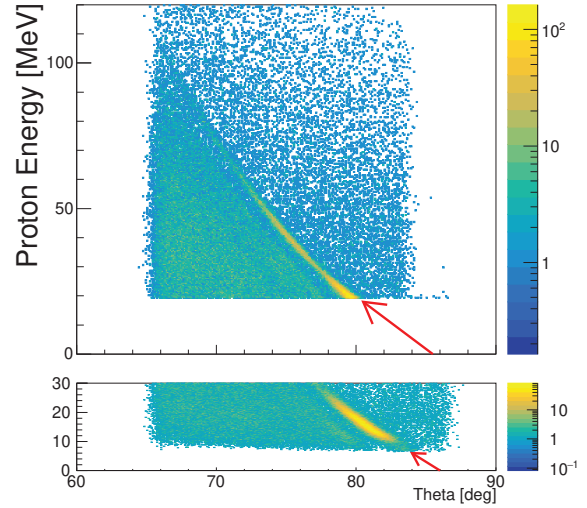


Fig. 1. Correlation between the recoil angles and proton energy determined by the ToF (bottom) and NaI (TI) calorimeters (top).

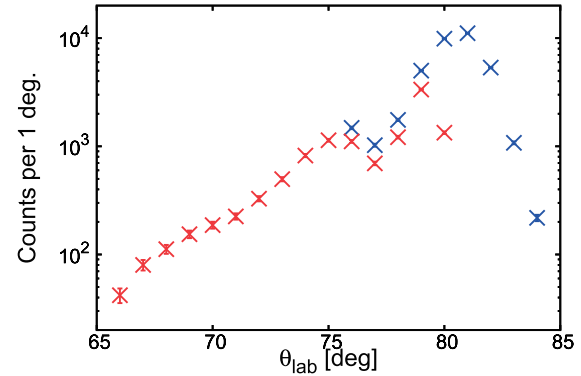


Fig. 2. Angular distribution of the elastic-scattering events using the ToF (blue) and NaI (TI) calorimeters (red) for the recoil-proton energy.

tribution. We are currently deducing the differential cross section and density distribution of ^{132}Sn .

References

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