Analysis of ^{48}Cr(p,n) reaction in inverse kinematics

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In this paper, we report on the progress in the data analysis of the SAMURAI11 experiment performed at the RI Beam Factory (RIBF) of RIKEN Nishina Center in spring, 2019. This experiment was conducted to measure the (p,n) reaction on $N=Z$ unstable nuclei, namely, ^{48}Cr and ^{64}Ge. Previously, in Refs. 1) and 2), we reported on the experimental setup and the particle identification (PID) analysis of the reaction residues with the SAMURAI spectrometer,[3] respectively. In Ref. 4), we reported on the observation of a kinetic curve in the recoil-neutron data produced in the ^{48}Cr$(p,n)^{48}$Mn reaction, under the condition that the reaction residues ^{47}Cr were selected through PID analysis.

Figure 1 shows a plot of neutron kinetic energy vs. neutron scattering angle in the laboratory frame for those events in which the reaction residues ^{46}V were selected through PID analysis. The ^{46}V residues were populated through the two-proton decay from the ^{48}Mn. There was no clear locus along the calculated kinetic curves in ^{48}Mn, above the two-proton separation energy at 6.828 MeV. The plot contains events due to the background in a low neutron-kinetic-energy region below 500 keV.

A further analysis is ongoing to substract the background. We are working on the background evaluation by using the reaction channels where the (p,n) reaction does not occur, following the method utilized in a prior study.[5]

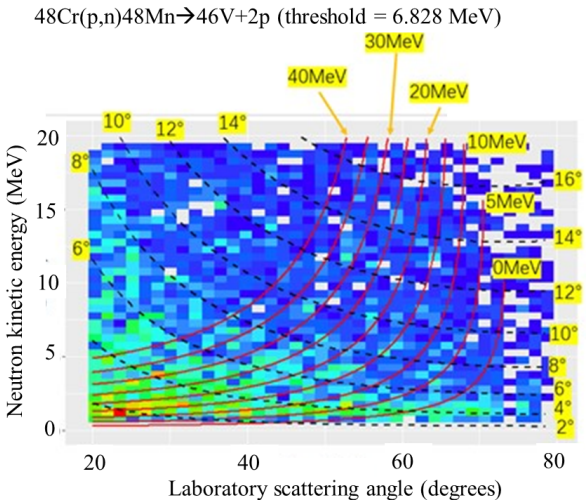

Fig. 1. A two-dimensional plot of neutron kinetic energy vs. neutron scattering angle in the laboratory frame. The reaction residues ^{46}V were selected through the PID analysis. The solid and dashed curves represent calculated kinetic curves for excitation energies and scattering angles in the center-of-mass system of the ^{48}Cr(p,n) reaction, respectively.

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References

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