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The ratio of the neutron yield to the proton yield in 12C(d; n)13N and 12C(d; p)13C from 0.6 MeV to 3 MeV

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The neutron yield and the proton one in ^{12}C(d,n)^{13}N and $^{12}C(d,p)^{13}$C have been measured respectively from 0.6 MeV to 3 MeV using a 4-MeV electro static accelerator to generate deuteron beam to bombard the thick carbon target. The neutrons are detected at 0 degree, 24 degree, 48 degree and the protons at 135 degree in the lab frame. The ratios of the neutron yield to the proton one have been calculated and can be used as an effective probe to pin down the resonances. The resonances are found at 1.4 MeV, 1.7 MeV, 2.5 MeV in $^{12}C(d,p)^{13}$C and at 1.6 MeV, 2.7 MeV in ^{12}C(d,n)^{13}N. This method provides a way to reduce the systematic uncertainty and helps to confirm more resonances in compound nuclei.

Summary

By performing and studying of the bombardment of deuteron on thick carbon target, the resonance of the two reaction in the bombardment, $^{12}C(d,n)^{13}$N and $^{12}C(d,p)^{13}$C, is observed. The resonances when the incident deuteron energies are 1.4 MeV, 1.7 MeV and 2.5 MeV in the $^{12}C(d,p)^{13}$C reaction are affirmed. The resonances when the incident deuteron energies are 1.6 MeV and 2.7 MeV in the $^{12}C(d,n)^{13}$N reaction are affirmed.

We suggest the ratio of neutron yield to proton one as a new way to study the resonances in the $^{12}C(d,n)^{13}$N reaction and $^{12}C(d,p)^{13}$C reaction.

Abstract Type

Poster

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