

## Asymptotic normalization coefficients from the $^{14}\text{C}(\text{d}, \text{p})^{15}\text{C}$ reaction

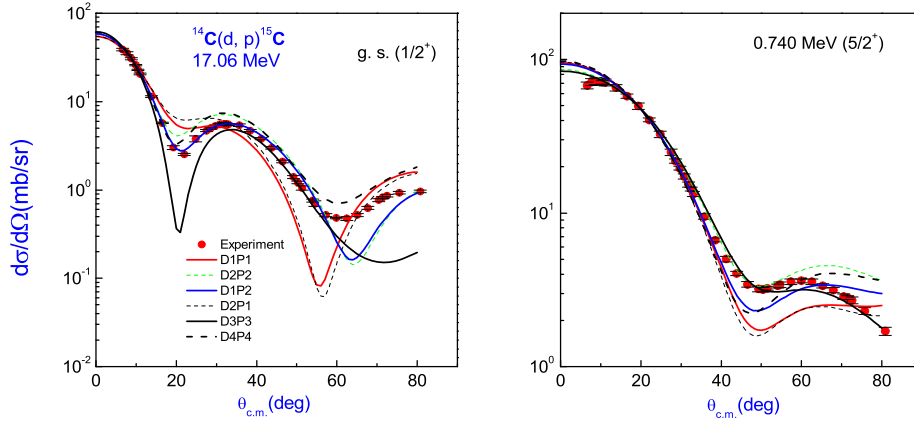
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The  $^{14}\text{C}(\text{d}, \text{p})^{15}\text{C}$  reaction plays an important role in inhomogeneous big bang models. In [1] it was shown that the  $^{14}\text{C}(\text{n}, \gamma)^{15}\text{C}$  radiative capture at astrophysically relevant energies is peripheral, that is the overall normalization of its cross section is determined by the asymptotic normalization coefficient (ANC) for  $^{15}\text{C} \rightarrow ^{14}\text{C} + \text{n}$ . Here we present new measurements of the  $^{14}\text{C}(\text{d}, \text{p})^{15}\text{C}$  differential cross sections at the deuteron incident energy of 17.06 MeV and the analysis to determine the ANCs for neutron removal from the ground and first excited states of  $^{15}\text{C}$ . The measurement of the differential cross section of the  $^{14}\text{C}(\text{d}, \text{p})^{15}\text{C}$  reaction was carried out at the U-120M cyclotron isochronous cyclotron at the Nuclear Physics Institute of the Czech Academy of Sciences. The deuteron beam with the energy of 17.06 MeV was led into a target chamber with  $^{14}\text{C}$  and mylar targets. Reaction products were measured by four  $\Delta E - E$  telescopes assembled from thin surface barrier silicon and thick Si(Li) detectors with thickness about 200  $\mu\text{m}$  and 4 mm respectively

The angular distributions of deuterons from the reaction  $^{14}\text{C}(\text{d}, \text{p})^{15}\text{C}$  corresponding to the two bound states in  $^{15}\text{C}$  calculated using adiabatic wave Born approximation, which is the simplified version of the CDCC and determined ANCs compared with existing data. The paper has been published in [2].



**FIG. 1.** Angular distributions from the  $^{14}\text{C}(\text{d}, \text{p})^{15}\text{C}$  reaction for the transitions leading to the ground and 0.740 MeV states in  $^{15}\text{C}$ . DWBA calculations were made with optical model parameter sets given in [2].

- [1] N.K. Timofeyuk, D. Baye, P. Descouvemont, R. Kamouni, and I.J. Thompson, Phys. Rev. Lett. **96**, 162501 (2006).
- [2] A.M. Mukhamedzhanov *et al.*, Phys. Rev. C **84**, 024616 (2011).