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Quasi-deuteron clusters in the ^{12}C and short-range NN correlations in the reaction ^{12}C+p$\longrightarrow^{10}$A+ pp+N

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Short-range correlated (SRC) NN pairs play an important role in structure of atomic nuclei and are studied using mainly electron beams [1]. A new step was done at BM@N in JINR [2] where the reaction 12C+p⟶10A+pp+N is studied using the ^{12}C beam at energy of 4 GeV/nucleon in inverse kinematics providing interaction with the hydrogen target to probe the SRC pairs in the ^{12}C. In theoretical analysis [3] of the SRC effects in this reaction is used a properly modified approach developed earlier (see Ref. [4] and references therein) to describe the quasi-elastic knock-out of fast deuterons from the light nuclei ^{12}C and ^{7,6}Li by protons in the reactions (p,pd) and (p,nd) [5]. Elementary sub-processes in the (p,Nd) were the backward quasi-elastic scattering of the proton on the two-nucleon clusters p{pn}⟶pd and p{nn}⟶nd at the proton beam energy 670 MeV. As in Ref. [4], the spectroscopic amplitudes for NN-pairs in the ground state of the 12C nucleus are calculated here within the translation-invariant shell model (TISM) with mixing configurations. Factorization of the two-nucleon momentum distribution over the internal n_{rel} (q_{rel}) and the c.m.s. ncm ($k_{c.m.}$) momenta is assumed and for nrel (q_{rel}) the squared deuteron (or singlet deuteron) wave function the CD Bonn NN-interaction potential is used. Relativistic effects in the sub-process p+{NN}⊠p+N+N of quasi-elastic knockout of nucleon from the SRC pair are taken into account in the light-front dynamics. We found that the c.m. distribution of the deuteron clusters obtained within the TISM and used in [4], [5] to describe the (p,Nd) data [4] has to be modified considerably [6] to describe the kc.m. distribution of the SCR NN pairs measured in the electron data [6]. The ratio of the spin-singlet to spin-triplet pairs $\{pp\}_s/\{pn\}_t$ is calculated [7] and found to be in agreement with existing data. Here the initial and final state interaction effects are estimated within the eikonal approximation using the Glauber model for the N^{10}A scattering [8]. The one-loop approximation with elastic N^{10}A rescatterings is applied and the effect is found to be moderate.
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1. O.Hen et al., Rev. Mod. Phys. 89, 045002 (2017) .
2. M. Patsyuk et al., Nature Phys. 17, 693 (2021); arXiv:2102.02626 [nucl-ex].
3. Yu.N. Uzikov, Phys. Part. Nucl. 52 , № 4, 652 (2021).
4. M.A. Zhusupov, Yu.N. Uzikov, Fiz. El. Chast. At. Yadr. 18, 323 (1987).
5. J. Ero et al., Nucl. Phys. A 372, 317 (1981); D. Albrecht et al., Nucl. Phys. A 322, 512(1979).
6. E.O. Cohen et al., Phys. Rev. Lett. 121, 092501 (2018).
7. Yu. Uzikov, A. Uvarov. Phys. Part. Nucl. 53 , №2, 426 (2022).
8. Yu. Uzikov, Acta Phys. Pol. B Proc. Suppl. 14 , № 4, (2021) 793.

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