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QUASI-ELASTIC KNCKOUT OF NUCLEON FROM THE SHORT-RANGE NN CORRELATION AND RESCATTERINGS IN THE REACTION 12C+p→10A+ 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 $^{12}C+p\rightarrow^{10}A+pp+N$ 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 ^{12}C 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. n_{cm} ($k_{c.m.}$) momenta is assumed and for n_{rel} (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 [6]. 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 [7]. The ratio of the spin-singlet to spin-triplet pairs {pp}s/{pn}t is calculated 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. The one-loop approximation with elastic N-^{10}A rescatterings is applied and the effect is found to be moderate.

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