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Short-range (pairing) versus long-range (collective) correlations in multi-particle transfer reactions.

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It is shown that the pairing correlation is very important for the two-neutron transfer reactions, for reaction induced by 84 MeV ^{18}O on several targets with low collectivity in its ground state (spherical), proceeding through the one-step process (concerning to transfer process). For the transition to lower excited states, the one-step process also dominated, for the final nuclei having also low collectivity. On the contrary, if the collectivity of these states is considerable, the two-neutron transfer reaction is dominated by a two-step process through an intermediate partition. We present our results for $^{12,13}\text{C}(^{18}\text{O},^{16}\text{O})^{12,13}\text{C}$ [1,2], $^{16}\text{O}(^{18}\text{O},^{16}\text{O})^{18}\text{O}$ [3,4], $^{64}\text{Ni}(^{18}\text{O},^{16}\text{O})^{66}\text{Ni}$ [5] and $^{28}\text{Si}(^{18}\text{O},^{16}\text{O})^{30}\text{Si}$ [6] by analysing the two-neutron transfer angular distributions. We compare our results with similar results for the $^{206}\text{Pb}(^{18}\text{O},^{16}\text{O})^{208}\text{Pb}$ [7] and $^7\text{Be}(^9\text{Be},^7\text{Be})^9\text{Be}$ [8] reactions, and with the analysis of the quasi-elastic barrier distributions for the $^{63}\text{Cu}+^{18}\text{O}$ system [9]. We also show the evidences recently found for the observations of Giant Pairing Vibrations in the $^{12,13}\text{C}(^{18}\text{O},^{16}\text{O})^{12,13}\text{C}$ reactions [10]. Some preliminary results of the effect of pairing correlations in two-protons transfer reactions are also shown. Our ability to describe microscopically multi-nucleon transfer reactions that compete with the double-charge exchange reactions within the NUMEN project [11] will be also discussed.

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