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Mass and isospin dependence of short range correlations in nuclei

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The nuclear momentum distribution (NMD) is often quoted as being composed of two separate parts. Below the Fermi momentum (250 MeV/c) single nucleons move as independent particles in a mean field created by their mutual interactions. Above the Fermi momentum nucleons predominantly belong to short-range correlated (SRC) pairs with high relative and low center-of-mass momenta, where high and low are relative to the Fermi momentum. In addition to its intrinsic interest, the NMD is relevant to two-component Fermi systems, neutrino physics, and the symmetry energy of nuclear matter. The nuclear mass dependence of the number of SRC proton-proton (pp) and proton-neutron (pn) pairs in nuclei is a sensitive probe of the dynamics of short-range pairs in atomic nuclei. The amount of the number of SRC pairs in a nucleus can be investigated with electroinduced two nucleon knockout reactions (A(e,e'NN) in brief). Thereby, a nucleon and its correlated partner are knocked out. We present an analysis of (e,e'pp) and (e,e'p) data on 12C, 27Al, 56Fe, and 208Pb in kinematics dominated by scattering off SRC pairs and compare the results with theoretical models. The nuclear mass dependence of the extracted number of pp- and pn-SRC pairs is very soft. Final state interactions of the outgoing nucleons with the A-2 nucleus play a significant role. The two dominant contributions are (1) attenuation trough elastic and soft inelastic rescattering and (2) charge exchange reactions, changing the isospin projections of the outgoing nucleons.

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