

Scalar, Axial and Tensor Matrix elements in light nuclei

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I will discuss recent calculations of the matrix elements of scalar, axial and tensor quark bilinear operators in light nuclei at unphysically heavy values of the quark masses. Axial matrix elements control the Gamow-Teller decays of nuclei and have potential for precision tests of the Standard Model. Tensor matrix elements determine the quark chromo-electric dipole moment and are important in the context of proposed experiments to measure nuclear EDMs. Scalar matrix elements are important for interpretation of dark matter direct detection experiments. Our calculations provide a full flavour decomposition of the matrix elements in $A=1,2,3$ nucleon system. Nuclear effects are resolved in most channels, with axial and tensor matrix elements modified at the percent level from naive expectations. In contrast, the scalar matrix elements in the nuclei differ at the 10% level from scaling those of the nucleon. If these effects persist at the physical quark masses and for larger, experimentally practical nuclei, their phenomenological impact would be significant.

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