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All-order core polarization for shell-model effective interactions

JASON D. HOLT, JEREMY HOLT, T.T.S. KUO, G.E. BROWN, State University of New York at Stony Brook, SCOTT BOGNER, Ohio State University — Although core polarization, calculated to second-order in perturbation theory, has been successful in describing a range of nuclear observables, the effect of high-order diagrams has been a long-standing issue. In this talk we present an all-order summation of a large class of core polarization diagrams using the low-momentum NN interaction V_{low-k} . Our calculation, based on the elegant formalism of Kirson and Babu-Brown, involves solving a set of coupled non-linear equations in which the vertex functions are generated self-consistently. By using V_{low-k} , which is energy independent, and true Green functions in the particle-particle and particle-hole channels, we can simplify the solution and include a class of diagrams whose calculation has been previously intractable. We apply this procedure to the *sd*-shell effective interactions and find that the all-order calculation serves to mildly suppress the second order results, typically by less than 10%.

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