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Convergence of the Born Series with Low-Momentum Potentials SUNETHRA RAMANAN, SCOTT K. BOGNER, RICHARD J. FURNSTAHL, The Ohio State University, ACHIM SCHWENK, University of Washington — The nonperturbative nature of nucleon-nucleon potentials as a function of a momentum cutoff is studied using Weinberg eigenvalues as a diagnostic. This investigation extends an earlier investigation into the convergence of the Born series for scattering to partial waves beyond the  ${}^{3}S_{1}-{}^{3}D_{1}$  channel and to positive energies. As the cutoff is lowered using renormalization-group or model-space techniques, the evolution of nonperturbative features at higher cutoffs from strong short-range repulsion and the iterated tensor interaction are monitored via the complex Weinberg eigenvalues. When these eigenvalues all lie within the unit circle, the T-matrix expansion in terms of the potential V is perturbative, with the magnitude of the largest eigenvalues setting the rate of convergence. Major decreases in the magnitudes of repulsive eigenvalues are observed as the Argonne  $v_{18}$  potential is evolved to low momentum, even though two-body observables are unchanged. The efficacy of separable approximations to the potential derived from the Weinberg analysis is studied as a function of cutoff.

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