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Construction of the Nuclear Effective Interaction from Energy Eigenstates and Boundary Conditions[1] KENNETH MCELVAIN, WICK HAXTON, Univ of California - Berkeley, Lawerence Berkeley National Laboratory — The original Harmonic Oscillator Based Effective Theory (HOBET) work by Haxton and Luu reduced $H = T + V_{NN}$, with V_{NN} a realistic potential, to H^{eff} in a small basis defined by projection operator P while correctly including all scattering by H through an excluded space Q. Scattering by T is analytically included to all orders, leaving the ET expansion focused on the short range V_{NN}. Results do not depend on the size P as the effect of scattering through Q is fully included, also distinguishing HOBET from other methods. In this talk we abandon V_{NN} and determine the LECs of the ET expansion from energy levels and boundary conditions. In the infinite volume continuum case every energy is an eigenvalue of H with an associated scattering state. In the LQCD context boundary conditions are periodic. In either case the ET LECs can be determined from energy, boundary condition pairs. We show that the Cartesian HO ET LECs can be expressed in terms of the spherical ones, giving a spherical, infinite volume ET, bypassing the use of Luscher's method. The approach cleanly isolates operator mixing induced by the finite box, sequestering effects that vanish in the continuum limit in a Green's function constrained to match the boundary conditions.

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