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Harmonic-Oscillator-Based Effective Theory (HOBET): Effective Interactions without a Potential SATORU INOUE, WICK HAXTON, CORY SCHILLACI, University of California, Berkeley — HOBET is a treatment of the few-body nuclear problem in which an expansion around an intermediate momentum scale – defined by the oscillator parameter and the number of shells in the P space – provides the separation of scales necessary for a successful effective theory. This leads to a bound-state theory with both infrared and ultraviolet corrections: the former depends sensitively on binding energy and can be summed to all orders by a Green's function technique, while the latter can be replaced by a rapidly converging contact-gradient expansion with energy-independent strong-interaction coefficients. Here we demonstrate that the scattering (Lippmann-Schwinger) equation can be reorganized in precisely the same way, so that these coefficients (the effective interaction) can be determined directly from phase shifts, eliminating the need for a Q-space potential.

Satoru Inoue
University of California, Berkeley

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