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## Extrapolation of bound state energies obtained in the oscillator basis

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An extrapolation of *ab initio* results to get more accurate observables became a trend in nuclear physics [1-4]. We consider calculations of binding energies in oscillator basis, which depend on two basis parameters, the oscillator frequency,  $\hbar\Omega$ , and the oscillator quanta,  $N$ . We study general convergence patterns of these calculations. We use the SS-HORSE (single-state harmonic-oscillator representation of scattering equations) approach [5], extended to the case of bound states. Within this method, we extract the  $S$ -matrix from the results obtained in oscillator basis, and locate  $S$ -matrix poles associated with bound states. The respective binding energies improve the variational results obtained by the pure diagonalization in oscillator basis [6]. In this way we can extrapolate binding energies to the infinite basis and eliminate the dependence on basis parameters. By calculating the  $S$ -matrix pole, we can also calculate the asymptotic normalization constant. Till now we use a two-particle model problem with known exact solution to verify our method with an idea to apply it later to many-body shell-model afterwards. We compare also our method with approaches of Ref. [1-3].

### References

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