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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

[1] P. Maris, J. P. Vary, A. M. Shirokov, Phys. Rev. C. **79**, 014308 (2009)
[2] S. A. Coon, M. I. Avetian, M. K. G. Kruse, U. van Kolck, P. Maris, and J. P. Vary, Phys. Rev. C. **86**, 054002 (2012)
[3] R. J. Furnstahl, G. Hagen and T. Papenbrock, Phys. Rev. C. **86**, 031301(R) (2012)
[4] G. A. Negoita *et al*, arXiv:1803.03215 [physics.comp-ph], (2018)
[5] A. M. Shirokov, A. I. Mazur, I. A. Mazur and J. P. Vary,
Phys. Rev. C **94**, 064320 (2016).
[6] Yu. A. Lurie, A. M. Shirokov, Ann. Phys. (NY), **312**, 284 (2004)

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