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From three- to six-body systems within a properly symmetrized hyperspherical harmonics approach

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We develop a new numerical method to construct an orthonormal basis of properly symmetrized hyperspherical harmonic functions [1]. Refined algorithms for calculating the transformation coefficients between hyperspherical harmonics based on different sets of Jacobi coordinates are described. A method to extract a maximal set of linearly independent hyperspherical states from a highly redundant set of symmetric ones (in case of bosonic systems) or antisymmetric ones (in case of few-nucleon systems) is also presented. Based on these properly symmetrized hyperspherical harmonics basis, the spectra of helium clusters with up to six atoms are studied variationally using soft-core potentials. The obtained results are compared with literature ones [2]. Preliminary results on few-nucleon systems are also presented.

[1] J. Dohet-Eraly, M. Viviani, in preparation.

[2] M. Gattobigio, A. Kievsky, and M. Viviani, Phys. Rev A 84 (2011) 052503.

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