Highly Compact Exponentially Correlated Wavefunctions for Three and Four-Body Systems

Victor V. Albert, John R. Sabin, and Frank E. Harris
Quantum Theory Project, University of Florida

Compact wavefunctions can prove to be extremely valuable tools for understanding fundamental quantum mechanical systems and have been shown to be both highly accurate and computationally efficient. We present methods that have been used with the three- and four-body problem including Hylleeraas and exponentially correlated (EC) wavefunctions. EC functions have been constructed to depend only on the inter-particle distances. Applications of these methods to the He isoelectronic series are reviewed in addition to preliminary results of work on a four-body problem, the Li atom.