

4th International Conference on

ATOMIC AND NUCLEAR PHYSICS

October 26-27, 2018 | Boston, USA

Pseudopotential for many-electron atoms

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Atoms form the basic building blocks of molecules and condensed matter. Other than hydrogen atom, all the others have more than one electron which interact with each other besides interacting with the nucleus. Electron-electron correlation forms the basis of difficulties encountered in many-body problems. Accurate treatment of the correlation problem is likely to unravel some nice physical properties of matter embedded in this correlation. In an effort to tackle this many-body problem, two complementary parameter-free pseudopotentials for n-electron atoms and ions are suggested in this study. Using one of the pseudopotentials, near-exact values of the ground state ionization energies of helium, lithium and beryllium atoms have been calculated. The other pseudopotential also proves to be capable of yielding reasonable and reliable quantum physical observables within the non-relativistic quantum mechanics.

Biography

Dr. Eric Ouma Jobunga holds a Doctorate degree in Theoretical Physics from Humboldt University of Berlin, a Master's of Science degree in Atomic Physics and a Bachelor of Education (Science) degree with specialization in Mathematics and Physics from Kenyatta University. He is currently a Physics lecturer and a Chairman of Mathematics and Physics department at the Technical University of Mombasa. His research interests span investigation of the structure of matter and field-matter interaction processes.

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