Abstract Submitted
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Supersymmetric Quantum Mechanics For Atomic Electronic Systems[1] THOMAS MARKOVICH, MASON BIAMONTE, DON KOURI, University of Houston — We employ our new approach to non-relativistic supersymmetric quantum mechanics (SUSY-QM), (J. Phys. Chem. A 114, 8202(2010)) for any number of dimensions and distinguishable particles, to treat the hydrogen atom in full three-dimensional detail. In contrast to the standard one-dimensional radial equation SUSY-QM treatment of the hydrogen atom, where the superpotential is a scalar, in a full three-dimensional treatment, it is a vector which is independent of the angular momentum quantum number. The original scalar Schrödinger Hamiltonian operator is factored into vector "charge" operators: $\vec{Q}$ and $\vec{Q}^\dagger$. Using these operators, the first sector Hamiltonian is written as $H_1 = \vec{Q}^\dagger \cdot \vec{Q} + E_0^1$. The second sector Hamiltonian is a tensor given by $H_2 = \vec{Q}\vec{Q}^\dagger + E_0^1 1$ and is isospectral with H_1. The second sector ground state, $\vec{\psi}_0^{(2)}$, can be used to obtain the excited state wave functions of the first sector by application of the adjoint charge operator. We then adapt the aufbau principle to show this approach can be applied to treat the helium atom.

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