Abstract Submitted
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A new generalization of supersymmetric quantum mechanics to arbitrary dimensionality or number of distinguishable particles THOMAS MARKOVICH, University of Houston — We present here a new approach to generalize supersymmetric quantum mechanics to treat multiparticle and multi-dimensional systems. We do this by introducing a *vector* superpotential in an orthogonal hyperspace. In the case of N distinguishable particles in three dimensions this results in a vector superpotential with $3N$ orthogonal components. The original scalar Schrödinger operator can be factored into vector "charge" operators: $\vec{Q}_1$ and $\vec{Q}_1^\dagger$. Using these operators, we can write the original (scalar) Hamiltonian as $H_1 = \vec{Q}_1^\dagger \cdot \vec{Q}_1 + E_0^{(1)}$. The second sector Hamiltonian is a tensor given by $H_2 = \vec{Q}_1 \vec{Q}_1^\dagger + E_0^{(1)}$ and is isospectral with H_1. The vector ground state of sector two, $\vec{\psi}_0^{(2)}$, can be used with the charge operator $\vec{Q}_1^\dagger$ to obtain the excited state wave functions of the first sector. This can be used with the sector Hamiltonians alternating between scalar and tensor forms accommodating both variational and Monte Carlo methods to obtain approximate solutions to both scalar and tensor sectors. We demonstrate the approach with examples of a pair of separable 1D harmonic oscillators and the example of a non-separable 2D anharmonic oscillator (or equivalently a pair of coupled 1D oscillators).

Thomas Markovich
University of Houston

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