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Iterative Variational Ansatz for the Hubbard Model J.D. MANCINI, Kingsborough Community College of CUNY, V. FESSATIDIS, Fordham University, R.K. MURAWSKI, Drew University, S.P. BOWEN, Chicago State University — A number of years ago Eichenberger and Baeriswyl [Phys. Rev. B **76**, 180504(R) (2007)] (EB) introduced a novel variational ansatz for the study of the (repulsive) Hubbard model on a square lattice. Taking the Hubbard Hamiltonian to be $\hat{H} = t\hat{T} + U\hat{D}$ (where $\hat{T}$ and $\hat{D}$ are the usual Hubbard hopping and Coulomb terms, respectively), EB chose their variational trial function to be $|\psi\rangle = e^{-h\hat{T}}e^{-g\hat{D}}|\psi_0\rangle$ where h and g are variational parameters. In this work we will consider moments of the Hamiltonian $h_n = \langle\psi_0| H^n |\psi_0\rangle = \langle 0| e^{-\alpha\hat{\Gamma}} H^n e^{-\alpha\hat{\Gamma}} |0\rangle \approx \langle 0| \left(1 - \alpha\hat{\Gamma}\right) H^n \left(1 - \alpha\hat{\Gamma}\right) |0\rangle$, where α is a real parameter. Following EB we choose $\hat{\Gamma} = \hat{T} + \hat{D}$. Sequentially we minimize h_n with respect to α for increasing values of n in order to optimize the Hamiltonian moments. Preliminary results are given.

Vassilios Fessatidis
Fordham University, Bronx, NY

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