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Correlation Energy of A Model Problem MAURICIO CAMPUZANO, VASSILIOS FESSATIDIS, Fordham University, JAY D. MANCINI, Kingsborough College of CUNY, SAMUEL P. BOWEN, Chicago State University —

The search for new analytic methods of calculating details of the energy spectrum of strongly interacting systems has long been the vocation of both theoretical chemists and physicists. In particular, the accurate calculation of both the ground-state and correlation energies are important in settling issues relating to the exact nature of the ground-state and low-lying excited states. Furthermore there exist a number of physically relevant systems that cannot be treated by perturbation theory or in which other approximation schemes yield completely erroneous results. Exact diagonalization studies are well known to suffer from size effects, while the neglection of correlations in fluctuations in mean-field theories, although calculationally tractable, leave much to be desired. Here we wish to apply a recently developed Generalized Moments Expansion (GMX) [1] to the problem of N coupled one dimensional harmonic oscillators given by the Hamiltonian: $H = \frac{1}{2}\sum_{j=1}^{N}\left(-\frac{d^2}{dx_j^2} + \omega^2 x_j^2\right) + g^2 \sum_{ij}^{N} x_{ij}$. Comparisons are then made with other methods such as a Lanczos tridiagonalization scheme as well as a Canonical Sequence Method approach.

[1] V. Fessatidis, J.D. Mancini, R. Murawski and S.P. Bowen, Phys. Lett. A.

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