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Exact diagonalization analysis of the Anderson-Hubbard model and comparison to real-space self-consistent Hartree-Fock solutions XI CHEN, Dept. of Physics, Queens University, PAKWO LEUNG, Dept. of Physics, Hong Kong University of Science and Technology, ROBERT GOODING, Dept. of Physics, Queens University — We have obtained the exact ground state wave functions of the Anderson-Hubbard model for different electron fillings on a 4x4 lattice with periodic boundary conditions. When compared to the uncorrelated ground states (Hubbard interaction set to zero) we have found evidence of very effective screening, producing smaller charge inhomogeneities due to the Hubbard interaction, particularly at 1/2 filling, and have successfully modelled these local charge densities with non-interacting electrons that experience a static screening of the impurity potentials. Further, we have compared such wave functions to self-consistent real-space unrestricted Hartree-Fock solutions and have found that these approximate ground state wave functions are very successful at reproducing the local charge densities, and may indicate the role of dipolar backflow in producing a novel metallic state in two dimensions.

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