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Compact wavefunctions from compressed imaginary time evolution JARROD MCCLEAN, ALAN ASPURU-GUZIK, Harvard University — Simulation of quantum systems promises to deliver physical and chemical predictions for the frontiers of technology. The success of approximation methods for quantum systems has hinged on the relative simplicity of physical systems with respect to the exponentially complex worst case. Exploiting this relative simplicity has required detailed knowledge of the physical system under study. In this talk, I will introduce a general and efficient black box method for many-body quantum systems that utilizes technology from compressed sensing to find the most compact wavefunction possible without detailed knowledge of the system. It is a Multicomponent Adaptive Greedy Iterative Compression (MAGIC) scheme. No knowledge is assumed in the structure of the problem other than correct particle statistics. This method can be applied to many quantum systems such as spins, qubits, oscillators, or electronic systems. I will show the relation of this approach to matrix product states and discuss the implications. As a practical application, I use this technique to compute the ground state electronic wavefunction of hydrogen fluoride and recover 98

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