Quantum Simulation in First Quantization

In recent years quantum computing has advanced by leaps and bounds towards being able to provide practical solutions to the electronic structure problem in molecules. However, despite this the scaling with the number of orbitals means that simulations beyond a few hundred orbitals may be out of reach. In this presentation I will show recent advances in first quantized simulation that alleviate these issues and make quantum simulation practical while providing the best asymptotic scaling currently known with respect to the number of electrons in the system. I will then discuss future directions and discuss further developments that will be needed to realize the dream of simulation of large scale biochemical simulations.