

Using Qubit Noise in a Quantum Algorithm for Material Physics

Corentin Bertrand

Eviden

The bottleneck of the numerical resolution of Dynamical Mean Field Theory (DMFT) is the solution of the impurity model, which becomes exponentially difficult with the number of correlated orbitals. Hybrid quantum classical methods have been proposed that set out to solve this problem on ever-improving quantum processors. Yet, all previous approaches neglect the fact that the number of requisite bath sites in DMFT is very large and is thus unsuitable for a computation on near-term processors. This work addresses this issue by showing that noise can be used to reduce the number bath sites thanks to a more economical fitting of the DMFT hybridization function, up to a certain point. This paves the way for a solution of DMFT equations with a mixed quantum-classical algorithm.