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Algorithmically discovering high temperature superconductors with quantum computers

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Superconductors play an integral role in magnetic resonance imaging (MRI), nuclear magnetic resonance (NMR) and fusion reactors for magnetic confinement. When they were first discovered in the early 20th century, it was unclear what physics went behind making them work. Since then, we have come a long way in describing at least one class of superconductors: low temperature, Type I and Type II superconductors. The mechanism giving rise to this class of low temperature superconductors is quantum mechanical in nature. Therefore, it is conceivable that such processes can be modelled easier and with more robustness on quantum computers as opposed to classical computers. This modelling ability can then be exploited to explore a broader search space of other superconductors that may have not been discovered yet.

ReactiveQ has created a computational engineering platform that allows for multi-physics simulations to be run on classical supercomputers as well as quantum computers. In lieu of accelerating the discovery of new materials, namely superconductors, ReactiveQ looked at the viability of both near-term, Noisy Intermediate Scale Quantum (NISQ) algorithms as well as long-term Universal Gate model algorithms that could be used to automate the discovery of high temperature superconductors.

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