A quantum algorithm for non-unitary time evolution of quantum systems

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Open quantum system evolution in the presence of an environment is crucial to understanding and improving many processes including the communication of quantum information and the transfer of energy. Quantum computing platforms have emerged as a promising route to modelling and predicting the behaviour of such systems. However, mapping inherently non-unitary dynamics into the unitary framework of gate-based quantum algorithms is a challenging task. Here, I will discuss a density matrix gate-based quantum algorithm to predict the dynamics of open quantum systems that is based on the decomposition of a non-unitary operator into Hermitian and anti-Hermitian components. I will discuss the theory behind the algorithm, its applications, and potential extensions.